A Report for the Nuffield Farming Scholarships Trust

Encouraging pastoral livestock farmers to utilise their grassland better

A Trehane Trust Award
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Sara Gregson
87 High Street
Hinxton
Saffron Walden
CB10 1QY
sara@saragregson.co.uk

Dedication

This report is dedicated to the memory of Jan Crichton, the CEO of the British Grassland Society, who tragically died in 2005. Her dedication to the BGS and its cause was remarkable. I hope that she would have been as excited as I have been to receive a Nuffield Farming Scholarship on a topic so close to both our hearts.

"There is a brilliant future in UK agriculture.
***All you need is some grass and a bit of education*,"**
Michael Kyle, Nuffield Scholar 2006.

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Disclaimer
The views expressed in this report are entirely my own and do not necessarily represent the views of the Nuffield Farming Scholarships Trust, the Trehane Trust or British Seed Houses.

Danish dairy farmer Ib Andersen uses grass growth data sent to his mobile phone to help him plan his grazing for the week ahead.

Canadian researchers are finding ways to extend suckler cow grazing into the depths of winter.

A paddock that had just been vacated by cows at Lincoln University Dairy Farm. This tight grazing is the key to the system, because it ensures high quality re-growth for the cows to eat next time round.

Farmers across the world, who face much harsher working conditions than here, still make money from grass. This photo shows the devastating effect of severe drought on annual pastures in South Eastern Australia.

Acknowledgements

A Nuffield Farming Scholarship is not a solo effort – scholars draw on a wide range of people for guidance, encouragement, ideas, personal support and of course financial assistance.

I would like to thank everyone who has given me so freely of their time and/or resources, including:

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- John Stones for all his support and guidance. Also my fellow scholars from 2006 who have made the journey so much fun as well as worthwhile.
- Everyone who welcomed me to their farm, home or place of work during my travels – in particular those who so willingly gave me bed and board.
- My husband Paul who managed 'home' so brilliantly while I was away, and Emma and Edward who never questioned why their mother was travelling to far off places to look at grass.

Executive Summary

Sara Gregson was awarded a Nuffield Farming Scholarship in 2006 to find ways of encouraging mid-performing pastoral livestock farmers to utilise their grassland better. The study was sponsored by the Trehane Trust.

Over the next 18 months Ms Gregson travelled to Denmark, Canada, New Zealand and Australia to meet farmers, advisors, researchers and scientists, all of whom believe pasture holds the key to profitable and sustainable livestock farming.

More UK farmers need to grasp the opportunities good grassland management can offer their livestock operation. Farmers in other countries, who face worse problems than here, still make better use of their pasture. Many UK farmers waste half or more of the grass they grow, and are therefore not making the most of their competitive advantage.

Initiatives such as the Grazing Mentorship scheme in Canada, and the recruitment of farmers into the Paired Paddock trials programme in Australia, show that there are opportunities to engage with mid-performers to help them use their grassland more efficiently – through guided encouragement and by getting them more involved.

Ms Gregson makes several recommendations, including extolling the benefits and opportunities of efficient pasture management to farmers, creating a demand for grass-fed meat and products, setting up a mentorship programme and grazing schools, reviewing how grassland management is taught in colleges and universities, and developing a national centre for research and extension which focuses on making money from grass-based farming systems in this country.

Introduction

I am a freelance agricultural journalist and marketing communications consultant, and have worked with many companies and organisations within the industry over the past 20 years.

After graduating from Seale-Hayne College, my first job was as an ADAS livestock advisor in Berkshire. At that time the organisation was starting its commercial life and charging for its advisory services for the first time. I became involved in initiatives to market the organisation, and went on to specialise in this area.

After ADAS I worked for two of the country's leading agricultural PR and marketing companies, and for the past 11 years have run my own consultancy.

I also write articles for the livestock press and edited the British Grassland Society magazine *Grass and Forage Farmer* for nine years.

I am a member of the Chartered Institute of Marketing, Guild of Agricultural Journalists, and sit on the council of the British Grassland Society.

I have been a BGS member for 22 years and am passionate about the contribution grass plays in our lives – both as a provider of food, as a backdrop for recreation and sport and its role in maintaining life on earth.

Background to the study

Grass is the UK's national crop – covering two thirds of the agricultural land area. Its farm gate value, measured by its end products, is £6billion/year, compared to £2.4billion/ year for cereals.

Grass can offer opportunities to businesses operating at both ends of the production spectrum. Those brave enough to embrace the concept that production/ha is the key driver of a profitable livestock business, rather than production/head, can really cut production costs through efficient use of grassland.

A few of our dairy, beef and sheep farmers *are* grasping the opportunity to profit from grass, and prove that it can be done here. But these are in the minority. Realistically in the west of the country we could be growing 15 to 16t DM/ha – yet less than 10% of producers use more than 10t DM/ha - about 60% utilisation; and most farmers will be wasting a lot more. How many arable farmers would leave half their wheat crop in the field at harvest?

In a recent Grassright survey half respondents did not know how many t/ha of DM they grow. Those that gave an answer gave figures ranging from 6-18t/ha.

Grass also has a role to play at the premium end of production. Scientific research has highlighted the health-promoting properties of milk and meat produced from animals that graze. Some producers are using specific pasture types for marketing advantage, to produce meat with special local provenance and distinctive taste, for example salt marsh lamb. One Dutch dairy company is offering a premium for milk from 'outdoor' cows and sells it off the back of its 'naturalness'.

Analysis of farm accounts shows that farmers who use more home-grown forage make more money. So why are UK farmers so reluctant to grasp the opportunities this versatile crop has to offer? There is no doubt that grass has lost out in the subsidy driven era of UK farming, is not regarded as a 'sexy' crop, and has few friends in the feed and machinery supply trade.

And managing grass – a plant whose sole role in life is to send up a fibrous reproductive head and set seed, is not easy – and much harder than growing an annual arable crop.

As input costs spiral upward – in particular for feed, fertiliser and fuel, along with the extra investment needed to comply with the increasing environmental legislation, never has there been such a need to find ways to reduce 'controllable' costs. Better grassland management offers livestock farmers a chance to do this.

So let's get the cattle and sheep doing a much of the work as possible themselves – to harvest the grass and to apply their own slurry. Let's make the most of the inputs that are free – sunshine and rain.

Grass-based systems may not be appropriate for those locked irretrievably into high output production systems. But for some, better grassland utilisation could offer a real win: win route to better business performance.

Travel Plans
I set out on my journey with one key question in mind:

How can we encourage more of our dairy, beef and sheep farmers to use their grassland better in order to improve their business profitability?

In particular I wanted to hear about techniques that might stimulate our mid-performing farmers into taking those first, tentative steps towards doing things differently.

As I planned my journey I wanted to :

- Meet well respected researchers and consultants who are driving the adoption of new grassland technologies.
- Meet innovative and profitable dairy, beef and sheep producers who are utilising their pastures well, and putting its management at the heart of their business.

The countries I visited were Denmark, Canada, New Zealand and Australia.

I was lucky enough to go to the International Grassland Congress in Ireland in 2005 in my role as editor of the British Grassland Society's technology transfer magazine. This amazing event is held every four years, where more than a thousand people from developed and developing nations meet to hear about the latest grassland research and development. Every one of them has a deep interest in grass and is excited about its potential to sustain the world.

This inspiring conference was one of the main reasons for me applying for a Nuffield Scholarship, and led to my choice of countries. Many of the researchers I visited on my travels were people I had first met at the IGC.

Denmark

I was invited to Denmark by seed company DLF Trifolium in the summer of 2006, as part of a two-day press trip. The company very kindly funded an extra day at the end of the programme which allowed me to visit the Danish Agricultural Advisory National Centre.

Denmark has ideal grass growing conditions and is a leading seed producer and exporter. More than 5,000 dedicated growers produce and supply nearly half of Europe's grass seed requirements.

Like many European countries there is a strong tradition of farmer co-operation and the funding, provision and use of advisory services is a good example of this.

Danish Agricultural Advisory Service (DAAS)

Danish farmers draw heavily on advisors to gain new knowledge and for on-going advice. Most use more than one advisor. The dairy farmer I visited was working closely with three – one for crops, one for livestock and the other for business. These advisors offer more than just technical advice and will also carry out some of the administration and form-filling – freeing the farmer to farm.

Danish farm organisations started to employ their own advisors back in 1875. Now, DAAS, which is owned by the 50,000 strong national farmers' organisation Danish Agriculture, employs 3,200 professionals. Five hundred of these are based at the National Centre. This acts as a wholesaler trading in knowledge and development, which feeds into the network of 50 local centres. These function as retailers and farmer 'customers' purchase their services. So, farmers are both owners and users of the Centre.

DAAS works closely with the Danish Institute of Agricultural Science, and the Royal Veterinary and Agricultural University, as well as commercial organisations such as the slaughterhouse company Danish Crown and dairy company Arla Foods. Seventy five per cent of the National Centre's income derives from user fees; the rest from grants for research and development.

There is a short distance between science and implementation – which is good for farmers and also very motivating for the scientists. 'Seeing producers using the results of my work practically is more satisfying than just publishing a paper,' one researcher told me.

The National Centre carries out activities in six areas:

- National advisors supply advisory services to the local advisors.
- Dissemination of knowledge in a way that is useful and accessible by farmers. All the traditional methods are employed – newsletters, press articles, knowledge exchange groups, demonstration farms. This knowledge is also published on the Internet via the professional online database LandbrugsInfo.
- Development of resources such as computer programs and decision support tools.
- Trials and studies in co-operation with the research institutions. This includes a concept called Farm Test which tests new equipment and methods in practical farm situations.

- Education and in-service training of advisers, agricultural college teachers and farmers.
- Serviced activities such as livestock and milk recording.

DAAS sets itself out to be an inspiring driving force for the agricultural sector and to lead the process of turning knowledge and technology into value and business. In its Strategy for 2009 is calls itself a 'knowledge accelerator'.

The overarching philosophy is a belief that its services should:

- Be demand driven and impartial.
- Fully respect farmers ideas and articulated needs.
- Must have an economic perspective.
- Be based on the practical results of farm-based trials and tested scientific results.

Graesmatch

Graesmatch (Grass Match) is one initiative which demonstrates the close working relationship between individual farmers and their advisors. This competition was devised by the chief DAAS advisor for grasslands Karsten Neilsen, and ran for the first time in 2006.

Teams made up of a farmer and two of his advisors, one for crops and one for business, set goals for grass silage production over the growing season from May to October.

Most Danish dairy farmers aim to take four to five early cuts of high quality material from their one to two year old leys over this period. The progress of each team was tracked and the winners won a fact-finding trip to Ireland. They were judged at set points during the season, and the team in the lead were awarded a 'yellow jersey', promoting friendly rivalry. The competition was widely publicised on the Internet and via farm meetings. Other farmers took a keen interest and benefited from watching how the teams progressed.

New technology

Danish farmers appear ready and able to embrace new technology to help them improve their businesses.

I saw this when I visited dairy farmer Ib Anderson, who, like most Danish milk producers, continuously set stocks his Jersey herd. He eagerly demonstrated how he accesses grass growth data for his area sent to his mobile phone while walking his fields. This means he can more accurately plan his grazing allocation and supplementary feeding for the days ahead.

The grass growth forecast graph is drawn up by plant scientists at the Danish Institute of Agricultural Sciences, and shows growth rate to the current day, and predicts grass production for the next seven days, based on the weather forecast. It also shows growth rate relative to the previous week, and to the 'normal' growth rate expected at that time of year.

In 2006, 150 farmers were using this text messaging service and benefiting from more efficient grassland utilisation, because they could forward plan with much greater accuracy.

Danish farmers are also keen users of the Internet. Most of the knowledge gained by the National Centre is available on LandbrugsInfo – an information database that holds more than 100,000 articles and many calculation tools. Forty thousand documents are accessed by advisors and farmers every day. If farmers do not have computing skills, DAAS advisors will teach them.

Take home messages

1. **Danish livestock farmers have access to a fully integrated research and advisory resource – which is owned by them and works for them. It is innovative, forward thinking and collaborative.**

   This is in complete contrast to the fragmented situation in the UK, where there is now a vacuum between basic research and practice – previously filled by applied R&D.

   When I joined ADAS in 1985, I sat as the livestock advisor in the Berkshire Area Office in Reading with an arable colleague and a business colleague. I had access to the regional grassland and nutrition specialists and analytical labs at another site in the town. I drew on information from the network of Experimental Husbandry Farms including Bridgets and Rosemaund. There was a network and structure in place to translate and distribute grassland research to farmers in each county. Tragically this has now all been dismantled.

2. **While there is an emphasis on farmer/advisor working, Danish farmers are strongly encouraged to use new communications technology to access and input technical information that will help them to manage and improve their business. Do our farmers have the IT skills and equipment they need to keep them farming well into the 21st century?**

Canada

With almost all dairy cows confined and most of the beef finished in feedlots, the only farm animals that graze fresh grass are suckler cows and their calves, and a small national sheep flock. While there is increasing demand for sheep meat from a growing immigrant population in Ontario, the problem of predation by coyotes proves too great a challenge for many farmers.

There are a few small producers, particularly in the highly populated areas in southern Ontario, finishing cattle off grass and marketing their beef through farmers markets and specialist retailers for a premium. But in a country raised on corn-fed beef, some potential grass finishers worry that consumers may be put off by the 'different' flavour of grass-fed beef.

Conditions across Canada are extreme, with freezing temperatures and snow in winter and short, often droughty summers – too much of a challenge for perennial ryegrass. Seeded swards are diverse mixtures of hardy species like cocksfoot, timothy, fescues and brome grasses, with clovers, trefoils and alfalfa (lucerne) making up the legume element.

Managing these diverse pastures for efficient utilisation is not easy. But there are some grazing pioneers, encouraged by enthusiastic grassland advisors, and supported by some innovative extension initiatives, who are 'seeing the light'. By setting up paddock systems, and finding practical ways to overcome the problems of fencing and water supply, they are significantly increasing the output from their summer pastures. Many in the west of the country are also finding ways of extending their grazing well into the long cold winter.

Influences from across the Border

"We have built our cattle systems around our greatest weakness, and it has become the focus of the cow/calf business," Alberta Agriculture's forage and beef specialist Grant Lastwika told me.

"Step by step producers have structured their businesses more and more around stored feed, rather than around the ruminant's greatest strengths. Producers should be letting the animal do the work - converting low quality fibre roughages into high quality calves.

"They should be using sunlight and energy and natural resource management to produce high quality plant growth to sustain the system. Stored feeds should be used as a strategic tool – and not just fed in a trough in the barn because that's the way it's always been done."

Grant and his colleagues across Canada are drawing much of their enthusiasm and knowledge from the United States of America.

Allan Savoury (founder of Holistic Management), Jim Gerrish (former forage researcher who promotes Management Intensive Grazing (MIG)), Dave Pratt (runs the Ranching for Profit business school for grazers), Allan Nation (editor of *The Stockman/Grass Farmer* newspaper – 'the bible for people raising animals on pasture'), Bud Williams (runs marketing schools for beef producers) and Kit Pharo (provides animals suited to grazing

operations), were names that kept coming up in conversation. I have included their web addresses at the end of this report for those who want to find out more about each.

They all believe that the first step to a successful business is to establish clear, all encompassing goals that embrace all the desired outcomes. Every significant planning and monitoring decision is tested against these holistic goals.

Holistic Management Grazing Planning is all about getting the animals to the right place at the right time for the right reasons. It enables farmers to simultaneously:

- Maximise stocking rate/productivity.
- Improve the health of the land/environment.
- Generate a cash surplus/increase profits.
- Achieve a balanced lifestyle that leaves time to spend with the family and to pursue other interests.

It co-ordinates the three primary land management tools – rest, grazing and animals – to grow more pasture. This is done by maximising the harvest of sunlight and by meeting the grazing and pasture production challenges that occur within the grass growing season, in a planned way rather than in a knee-jerk reaction. The aim is to minimise the amount of mechanically harvested feed and maximise the amount that is grazed.

Kit Pharo urges producers not to invest in the latest gadget – rather invest in an education course that will teach them how to get the most from what they already have.

Common themes from all these grazing gurus are:

- Producers have to measure and to know their costs so they can benchmark their progress, within and between years. Allan Nation coins the term 'knowledge rich ranching'. In one of his publications he says that,
  "The cattle business is full of peril and risk for the unwary, and more ripe with perfect potential for the aware and the forward thinker. Today it is knowledge that separates the rich from the rest."
- Grazers must overcome the common mental hurdle – to think of production in terms of output/acre and not output/animal.
- The ultimate financial goal is to produce cash that can be invested in projects – usually off-farm, that generate a good rate of return on investment. Grass is the fundamental resource that when managed correctly can allow farmers to create a profit from farming activities.

This type of approach is considered fringe by many producers and making the change requires commitment and guts. But there are some brave souls who are taking the challenge and reaping the benefits.

I joined an evening farm walk organised by the Grey Wooded Forage Association in Alberta – where farmer Eldon Dicks used to open the gate to his pastures in spring and let his suckler herd roam where they pleased during the summer. After hearing about management intensive grazing he was attracted by the idea that it would give him greater control. He admitted he used to be a cow person not a grass person and he had practical concerns. How was he to hook up the movable electric fencing? Where should he put the water?

Eldon turned to Albert Kuipers who runs the Grey Wooded Forage Association for help. This local organisation has a mission to create an awareness of the potential and utilisation of forages, to act an information exchange centre, to illustrate production practices, and to seek knowledge and innovations that are environmentally and economically sustainable for the agricultural community.

It runs courses, farm tours and seminars and has six demonstration sites. It encourages continued learning with controlled grazing courses and a two day pasture school and publishes a monthly newsletter called *The Blade*.

With the group's support, Eldon took the plunge - sub-divided his fields, measured his swards so he could work out how much grass there was across the field and therefore how many cow/calf pairs it could sustain.

He has doubled the stocking rate – he now has 200 cows and calves on land that he used to run just 60. He has introduced legume species such as alfalfa into his paddocks and is achieving an even and uniform grazing height. The pasture is looking better and is more productive. The increased organic matter at the base of the swards and extra cover makes it more able to stand up to droughty summers. The 11-year old cows are 'looking and acting like seven year olds!'

Eldon admitted that he had doubted the carrying capacity of the farm, but by benchmarking since he made the change in 2002, he has proved how much he had been wasting before. "Grazing makes me think a little, rather than work a lot," he said. His daughter Ronda added that the grazing approach is a bit like using computers - you can't really understand it until you are doing it.

Research and Advice Resources
The provision of government funded research and development services for Canadian beef producers has changed dramatically over recent years. At one time farmers were very dependent on government funded extension. Now they are more independent and have learnt to be more interdependent – working with their neighbours and helping each other.

At a federal level there are just 19 Agriculture and Agri-Food Canada researchers involved in forage, and these are thinly spread across the country. They are funded to carry out research but not extension.

In Alberta there used to be 72 district advisors based at local offices across the Province. In 2002, these were cut and a toll free call centre – The Alberta Ag Info Centre was set up in Stetler. Here the emphasis is on guiding farmers to the information they need to answer their question, rather than telling them how to do it.

The premise behind this service is that 90% of the information is out there if farmers know where to look for it. The service is available to all farmers and is manned by a team of twelve advisors – with two answering calls at any one time. They deal with an average of 150 calls a day and email enquiries are growing.

Forage Beef Website
Another initiative aimed at providing relevant information which producers can easily access is the dedicated website www.foragebeef.ca, that has been funded by the

Canadian Department of Agriculture, Alberta Agriculture, the Beef Cattle Research Council, and Alberta beef producers.

This is based on the American Medical Association website in Washington DC, where doctors can locate all the relevant information on any given disease in summarised format.

Within the technical section there are three levels of information. Level 1 is straightforward information or 'knowledge nuggets' that briefly summarise the issues around each topic. At Level 2, the topic is discussed in more depth – drawing on fact sheets from across the world which are of particular relevance to forage beef production in western Canada. Level 3 is for the advisor or consultant who wants to know how the information was derived.

The Alberta Research and Extension Council of Alberta (ARECA)
ARECA is an organisation that has filled the gap for applied agricultural research on a local level since the cut backs in government funding in 2002. It is a producer driven umbrella organisation representing 15 applied research and forage organisations throughout Alberta, such as the Grey Wooded Forage Association. Members of each association pay a fee to ARECA. Additonal funding comes from the industry.

ARECA has a mandate to:

- Foster communication among it members, partners, potential partners, and its ultimate client the producer.
- Achieve sustainability for itself and its members through successful partnering.
- Effectively represent its members and the interest of producers at all levels.
- Promote applied research and extension through the co-ordination of member activities – in particular the joint application for research funds.

It is driven by a producer-run board and provides a direct link for industry and government to producers and links producers with agricultural researchers. Establishing and fostering a network of people across the industry is one of the secrets of its success.

It strives to increase efficiency, avoid duplication and capture opportunities for collaborative research and development. Each Canadian dollar invested in applied research and extension through ARECA yields an estimated Can$83 impact. Multi-pronged strategies to reduce winter feeding costs have increased profitability by Can$40 to Can$55/cow, with a total benefit to the forage beef industry of over Can$20m annually.

ARECA's director Dee Ann Bernard applies for project funding on behalf of the collective associations and is skilled in doing so. By making sure the applications demonstrate that the potential new practice will help producers achieve environmental, production and financial sustainability, she ensures a greater chance of obtaining the funds. Before ARECA, the success rate for applications for government funding by the individual groups was around 20%. It is now at 70%.

The organisation works at all levels, federal, provincial and local and has the critical mass to be listened to. Annually it sources around Can$3.5m for projects and spends

5% on administration. In 2006 it received new funding from Alberta Agriculture to hire a part-time fact sheet writer and a full-time communications specialist.

Sustainable Grazing Mentorship Programme
One of the most exciting projects that ARECA has now become involved in is the funding of grazing mentors. I feel this initiative has huge potential for introducing the 'grass farming' concept to mid-performing farmers, who are not natural information seekers and are uncomfortable with group based learning.

The idea is that farmers who would like to try controlled grazing but are nervous of doing so alone, are 'matched' to an experienced grazier who is funded to help with the initial goal setting and advise on the practical set-up. Mentors are trained to 'listen' to their clients, to 'coach' rather than 'tell', and to encourage them to 'open the minds'.

The farmer pays Can$100 to access 16 hours of the mentor's time, which consists of one day's farm visit and follow-up phone support. The mentor is paid Can$500 plus expenses through ARECA.

This scheme originated in Alberta five years ago, and in 2006 there were 15 grazing mentors. Since then, the scheme has been widened out across other Provinces.

Retired college lecturer and grazing consultant Jim Stone has been driving the mentorship scheme. "Let the innovators learn by their mistakes," he says. "Then let them tell the others how not to do it!"

More often than not the mentor becomes a valued friend and derives great personal satisfaction from seeing the client adopt change and benefit from it.

Western Forage Beef Group
The Western Forage Beef Group is the result of a joint venture between Canada Agriculture and Alberta Agriculture. It has a multi-disciplinary core of scientists and extension specialists, guided by a producer advisory committee and is based at the Lacombe Research Centre.

Its mission statement is to improve the profitability and sustainability of the forage based beef industry through the development, interpretation and transfer of knowledge and technology. It is led by charismatic and highly regarded beef researcher Duane McCartney.

After initial market research into what areas producers most needed help with, it was decided to focus on lowering winter feed costs, for the next ten years.

It investigates practical ways in which farmers can budget 90 days of grass growth more evenly over 365 days, and to reduce the costs of taking cattle through 200 plus day winters.

Much of the research is on how to extend the grazing of forage crops in winter when there is usually snow on the ground, through techniques such as banking or stockpiling forage or swath grazing.

Stockpiling is where a feed wedge of perennial pasture material is built up after a mid July hay cut. When the snow comes it bends the crop over and acts as insulator or a 'fridge' – maintaining the nutritional quality of the grass below it at a high enough level for overwintering suckler herds. The cattle access the forage by digging down through the snow behind an electric fence

Swath grazing is where a cereal such as oats or barley is overseeded into pasture in mid-May and cut in mid Sept at the soft dough stage. This is left in winrows and strip grazed behind an electric fence during the winter – sometimes through ice and deep snow. The cows break the ice with their hooves and nuzzle down through the snow to access the grain and straw.

Compared to bale grazing there is no haulage, no strings to cut, no in-field wastage and the manure is spread evenly across the paddock, which stimulates early grass growth in the spring.

These techniques, developed by the Western Forage Beef Group, can literally halve winter feeding costs. Grazing stockpiled forage can reduce costs by 53%; swath grazing by 47%. Swath grazing also cuts labour costs by 44%, and all these methods reduce muck handling and machinery costs.

The group has promoted swath grazing heavily for five years – using a wide range of communications tools. In 1996, 150 producers were swathe grazing. By 2006 this number had risen to more than 2,000.

Variety trials on 150 farms continue to investigate the yield, palatability and animal preference of different forage crops. ARECA is also currently funding 'The Year Round Grazing Project' which will examine how five producers are structuring their cattle business around grazing management systems. They are being used to showcase these new extended grazing techniques and to compare them with indoor winter feeding.

Alberta beef producer John Reid converted to a grazing based production system ten years ago. He sold his machinery, buys in hay and goes on holiday for the two weeks he used to make hay. The cattle are trained to step over the wires when they move paddocks and John carries the portable troughs on his back.

"My old business was structured around feeding for 220 days each winter," John told me. "Swathe grazing has reduced this to 100 days and my target is 60. We are getting twice as much pasture production with this system and far less waste."

Not about grass but worthy of mention…
On my travels I always pricked up my ears when people talked about communication initiatives, even if they were not directly relevant to grass farming.

In Canada there were two organisations that I believe are worthy of note.

SPARK
The Integrated Agricultural Communication Initiative at the University of Guelph in Ontario is the brain child of well known and highly respected agricultural communicator, Owen Roberts. It comprises a two level diploma course and the 'Students Promoting Awareness of Research Knowledge' initiative, known as SPARK.

Established in 1988, SPARK offers a few lucky students the chance to gain real experience in written and broadcast communications within a newsroom environment. They source, research and write news stories and feature articles on work that is going on at the University – many of them related to agriculture.

They write for industry publications, but more importantly also write for the mainstream press, educating the urban population into the latest science and technology in a way they can easily understand. As a result the public is very aware of the work going on at Guelph University – it is always in the news.

The students also prepare scripts for local radio and information breaks on Town and Country on Ontario television, and are increasingly using new communication technologies such as blogging and podcasts.

The students are 'employed' for two years and are paid the going journalism rate. They have to fit their writing around their studies. SPARK funding comes from corporate, institutional, media and government sponsors and partners.

At a time when issues such as biotechnology, food safety and nutrition are constantly hitting the news headlines – the SPARK experience is producing motivated young people who have the skills to write knowledgably and objectively about these issues. Many go on to take up jobs in agricultural communications.

SPARK has now been replicated at ten other universities across Canada based on the successful University of Guelph model.

Ontario Farm Animal Council (OFAC)
The Ontario Farm Animal Council was formed in 1988 to represent all the 35,000 livestock and poultry farmers and associated businesses. It sets out to be the responsible voice of animal agriculture, and to instil public confidence in the industry's activities by improving their understanding and perception of modern animal agriculture and food production.

Eighty per cent of the effort is spent involved in pre-active PR – for example attending shows, providing information to schools, and hosting virtual farm tours on their website, and supplying farmers with an Ag Awareness toolkit to help them disseminate good news stories about their farms to the general public.

OFAC receives two thirds of its funding from livestock farmers and one third from industry groups. The organisation regularly carries out consumer attitude research so it knows exactly what perceptions need changing most.

I came away from meeting their executive director Crystal MacKay, with two particularly impressive publications. One, a useful educational booklet called - *'The real Dirt on Farming – The people in Canadian Agriculture Answer Your Questions'* and the very stylish '*Faces of Farming'* calendar, which has the strap line – *Good Food from Good People.*

I know that LEAF and communicators like Guy Smith have generated similar projects and publications in the UK that have been very good, but OFAC, with its one sector –

industry-wide approach, presents a very polished, integrated and 'continually open' gateway between Canadian livestock farmers and consumers.

Take home messages from Canada

1. **Canadian farmers were once as reliant on local advisors as Danish farmers, but funding cutbacks have reduced the opportunities for one-on-one local advice.**

   The natural information seekers are now catered for by initiatives such as the Ag Info Telephone Centre and www.foragebeef.ca.

   But for the mid-performers it is schemes like the Sustainable Grazing Mentorship programme that will help them take the first tentative steps towards putting grass at the heart of their farming business.

2. **ARECA is doing an incredible job bringing the industry together to source funds and carry out applied research on a local level. Instead of fighting for small pieces of the funding pie, these organisations are now collaborating and successfully winning larger slices.**

   Could the British Grassland Society extend its remit to embrace some of what ARECA is doing?

   The Grey Wooded Forage Association was proactive and vibrant. How could the UK's network of 60 or so local grassland societies become more modern and dynamic in their outlook and activities? A few do carry out sponsored local trials, but if BGS acted as a central funding hub could they do more?

3. **When funds were tight – the key players within the forage beef research community in Alberta invested in independent market research to find out exactly what producers wanted them to focus their efforts on over the next ten years. They then invested time and energy developing and validating new practical techniques to address their needs.**

   It is estimated that there has been a 30% uptake of the swath grazing techniques advocated by the Western Forage Beef Group over the past five years – a classic example of investment in relevant, practical research, which has been communicated effectively, and that is really changing behaviour to the benefit of the farmer, the land and the environment.

4. **SPARK – what a fantastic way to train the agricultural communicators of the future. Unfortunately the ageing membership of the Guild of Agricultural Journalists reflects the industry. We need to encourage and train some enthusiastic bright young things to work in this industry. How can we adapt and adopt a similar programme in the UK?**

New Zealand

New Zealand's economic success has been hugely dependent on pastoral agriculture and half of all exports come from farming. Over the past 20 years the sector's productivity has grown almost twice as fast as the economy as a whole.

As a result, farmers are highly regarded and the public appreciate their contribution to Society. This is in complete contrast to the UK – where the urban population remains disconnected with the people who produce their staple foods and look after the countryside they enjoy at the weekends.

This is the land where adverts play on national radio for silage contractors and animal feed, roadside bill boards promote calf teats and herbicides, and an agricultural editor sits on the news-desk of every provincial local newspaper.

New Zealand's geographical isolation and its need to export most of its agricultural products, along with the short sharp shock of the sudden withdrawal of production subsidies in the 1980s, has forced the industry to be low cost and efficient. The national ewe flock fell from 70million to 40 million – but productivity per ewe increased from 13kg sheep meat to 24kg/year.

Innovative farmers, supported by an extensive and dynamic research and advisory service are responsible for these impressive on-going increases in productivity. (Table 1).

Table 1
Changes in on-farm productivity on dairy farms over the last decade (Caradus 2005)

Criteria	1994/95	2003/04	% change
Cows/ha	2.48	2.75	+10.9
Milk solids kg/ha	671	889	+32.4
Milk solids kg/cow	271	322	+18.8
Cows/labour unit	96	140	+45.8
Milk solids/labour unit	26,016	42,981	+65.2

New Zealand's pastoral industry involves 37,000 dairy, beef and sheep farmers supported by a service industry of 215,000 people.

In the dairy industry – 3.9million cows harvest 14million tonnes of pasture dry matter, grazing 1.4million hectares on 12,000 farms and convert it to 15million tonnes of milk. Ninety per cent of this milk is exported through Fonterra, a farmer-owned exporting company.

Pasture and forage crops, mostly non-irrigated, are grazed in situ by animals through controlled grazing management. The emphasis is very much on optimising utilisation at each grazing without penalising feed intake, pasture regrowth or cow performance.

Adjustments to stocking rate and feed budgeting techniques are used to match animal demands with the seasonal fluctuations in forage supply.

Improved permanent pastures are based mainly on perennial ryegrass and white clover. It is ironic that all New Zealand's improved pasture plants originated from overseas germplasm – much of it from Britain.

Ross White, executive secretary of the New Zealand Grassland Association gave me a copy of a fascinating DVD called *Carpets of Grass*. Black and white archive footage from the 1950s shows British-led breeding teams, sent out by grassland pioneer and founder of the British Grassland Society, Sir George Stapledon, carrying out breeding trials to find perennial ryegrass varieties most suited to New Zealand conditions.

In essence this means that New Zealand's success in low cost grass-based production is due to cutting edge ideas and technology 'exported' from the UK almost 60 years ago!

And this 'export' is carrying on today. While I was in the country, there was much excitement in the press and out in the field about the new IGER-bred high sugar variety Aberdart – with several fields clearly branded for everyone to see. The farmers were particularly interested in its nutritional benefits as well as the fact that ruminants that eat these grasses deposit less feed nitrogen in their urine – leading to less N loss to the environment.

Pasture plant breeding in New Zealand has delivered genetic gains of more than 1% per year for target traits such as forage yield and quality, and new varieties are being bred all the time to counteract current problems, such as endophyte infection, as well as improving production and environmental characteristics.

Endophyte is a naturally occurring fungus whose complete lifecycle occurs within grasses like perennial ryegrass and most New Zealand pastures are infected. These endophytes are both good and bad news. The good news is that they produce chemical compounds called alkaloids which kill some important insect pests. However, the downside is that some can depress animal performance or even induce ryegrass staggers.

New Zealand farmers apply 3million tonnes of fertiliser each year, as superphosphate and nitrogen. Fertiliser nitrogen use has increased in the past few years, but average annual use is still below 150kg/ha. Nutrient budgeting is carried out widely on farms to balance environmental issues with economic considerations. Environmental initiatives by the dairy industry such as the 'Clean Streams Accord' and protection of native grasslands show the increasing acceptance of farmers' role in looking after the countryside for the domestic population, and for the country's other major income earner, tourism.

Targets for 2015
The dairy, sheep meat and wool sectors have identified goals and targets for their industries to achieve over the next few years.

For dairy the goal is:
To increase dairy farmer profit and create wealth for the New Zealand economy, through a 50% productivity gain (4%/year) and 35% growth in milk solid production (3%/year).These goals must not compromise economic, environmental and animal welfare imperatives.

In relation to feed, the dairy industry's objective is to:

- Profitably increase the metabolisable energy utilised per hectare by 50% from grazed forage.
- Improve pasture feed quality.
- Develop and apply measurements and systems so that supplementary feed is profitably used on dairy farms.

For meat and wool the goal is:
To increase progressively farmer profit and wealth for the New Zealand economy by achieving a 35% total productivity gain (3%/year), successfully addressing industry imperatives, and ensuring that society increases its recognition of the meat and fibre sector as a driver of economic national well-being.

In relation to feed, the meat and wool industry's objective is to:

- Cost effectively and sustainably increase by 35% the metabolisable energy available from grazed pasture.
- Develop and apply measurements and systems to ensure optimal on-farm use of supplementary feed.

These are ambitious production targets and could well be achievable in practice. However at what cost to the environment? The proposed increases in pasture production could, some in the industry say, without management change cause unacceptable environmental damage. But with soaring land values, a viable return may only be possible using increasingly unsustainable and unacceptable practices.

The way out, some suggest is for the industry to move away from highly efficient commodity production, and to start adding value to what is exported in order to capture more revenue. After all, there are other countries in the world such as Chile, now with lower costs of production than New Zealand.

It is early days – but I have no doubt that the New Zealander's entrepreneurial and innovative spirit will win through, and we will soon see new added value food products make their way onto our supermarket shelves.

People power
Much of the country's success is down to the people – who are in the main energetic, optimistic and technically skilful.

The farming 'ladder' structure which allows young people to take a more personal stake in a dairy farming business, – though share-milking, and increasingly equity partnership, helps to retain highly motivated individuals and their families within the industry.

I was privileged to meet many ambitious and successful operators in the dairy, sheep and beef sectors. Like most pioneers these people were all articulate, bright and engaging and were more than happy to share their thoughts and ideas with me.

With only eight years in the industry behind them, Canterbury dairy farmers **Craig and Sue Elliot** are relative newcomers. But they have worked their way up the contract

milking/share-milking ladder and now milk over 2,000 cows in two 50% equity partnership businesses.

Craig and Helen work on the principle that making a profit allows them to borrow more from the bank and increase their asset base. Craig said they were advised at an early stage to borrow everything from the bank they could, because it was better to milk 800 cows with a 50% debt than 400 cows without debt. The bank manager is the most important person they know and in anything that they do, 'cash must fall out of the bottom.'

In 2005 they produced an economic farm surplus (profit) of $3600/ha. The farm is stocked with enough cows to harvest all the grass at the time of peak growth. Silage and concentrates are used strategically to supplement the diet in early and late season. The cows are paddock grazed and made to eat it down hard.

Overall, Craig says the recipe for running a successful business is to run quality stock and have good financial control. He and Helen work to five major principles:

- Run a tidy operation.
- Create an asset that has solid capital growth.
- Be in the top 5% for production.
- Be in the top 5% for the generation of profit.
- Have fun.

John and Cara Gregan run a 7300 sheep flock of composite ewes mated to Highlander (Romney/Texcel/Finn rams) on their South Canterbury property overlooking the Pacific Ocean.

John approaches grassland management like a dairy farmer – using paddocks to rotationally graze mobs of ewes, lambs and even ewes with lambs. All surplus ewe lambs are sold to a genetics company at weaning and all male lambs are finished. Hoggets are grazed off farm for a year and replaced on the home farm with high performance breeding ewes. His ewes are easy-care and 90% lamb within a three week period. The aim is to increase lambing percentage from 155%, increase lamb weaning weight and get 70% of lambs off farm at weaning.

John and Cara were Monitor Farmers for five years – hosting discussion group style meetings at their farm to discuss possible technical innovations and business performance.

During this time the decision to rotationally graze the ewes and lambs was monitored and recorded. During 2004, this did not result in significantly heavier weaning weights per lamb or per ewe. But the ability to increase stocking rate due to the increase in grass grown, increased lamb liveweight per hectare from 506kg to 775kg – proof once again that it is output per hectare that is important and not output per head.

The Gregan family have a strategic management plan pinned up on the farm office wall. John developed this with Cara at a two day course run by a bank – so they could write down their hopes and aspirations for the business, the family and themselves. They have a vision statement:

The Gregans will achieve financial security through growing the exisiting business so that we can seek out and take advantage of further opportunities, always remembering that the family comes first.

Under this they have plans for six elements of their life – one each for lifestyle, production, business growth, farm management, financial and staffing – each with goals that they want to achieve.

Ross and Gilly Alexander farm in the Waikato of North Island and run the ram breeding enterprise of the larger family farming business. The original objectives were to breed an animal with increased production and profitability. While these objectives have not changed there have been numerous add-ons to these ideals.

Not least is a tolerance to facial eczema (FE) – a nasty disease grazing livestock pick up from pasture which culminates in bleeding sores about the animal's face. It is prevalent in the north of North Island.

Trading as the Auckland Romney Development Group, Ross and Gilly were the first commercial ram breeders to test for the disease in 1979, and now supply FE tolerant sires to flocks in the afflicted areas. Breeding rams with resilience and resistance to worms is the next target and testing is in its sixth year.

Ross, who circumnavigated the globe nine times shearing sheep, comes from a family of innovators and forward thinkers. The focus on solving local problems, whilst retaining an eye on productivity and efficiency is now paying dividends.

AgResearch

AgResearch is New Zealand's largest Crown Research Institute, based at five sites across the country. The organisation's vision is to be the world's foremost pastoral sector R&D organisation. The Agriculture and Environment Group's objective is to ensure the on-going global competitiveness and vitality of New Zealand's pastoral industries, by providing profitable and sustainable production system and supply chain solutions, and facilitating the adoption of these.

Its position statement is 'Farming, food and health. First'. Coming from a country that does not even have a Ministry of Agriculture, this commitment to helping the future success of farmers and food producers is enviable.

I visited three of the AgResearch stations on my travels, meeting a mere handful of the many grassland scientists and researchers whose work is relevant to my topic.

I was particularly interested in social research being carried out at the Grasslands site in Palmerston North, which was investigating how farmers want to receive information from scientists.

There was a growing feeling amongst some of the researchers that the way they disseminate their findings really only caters for 10 to 20% of farmers – the ones who actively seek it, and ignores the rest. They wanted to find out how they could reach other sectors of the farming community.

AgResearch's Annette Litterland and social scientist Margaret Brown told me how they had segmented beef and sheep farmers into groups, based on whether or not they carried out formal feed budgeting – i.e. measuring swards with a platemeter on a regular basis.

The first group consisted of the top 10% farmers who did this. The second, largest group (75%) never did a formal budget but judged pasture covers by eye. This left the bottom 15% who had either tried the system of pasture management in the past but had given up, or had not tried at all.

The bottom segment is the hardest group to reach, Annette told me. "If researchers and advisors want to remain in their comfort zone they will continue to deliver their messages in a style that will only appeal, or be accessible to farmers in the top group, yet these may not be the ones that need most help, or have the most to gain."

Market research also suggested that groups prefer to learn within peer groups – and that a 'one workshop fits all' is not effective for everyone. So the researchers are running a four year programme and using the classic marketing technique of 'segmenting the target audience' into groups of like-minded, similar individuals, and tailoring advice and technical information specifically to them.

For example, 'Computer literates' are given laptops and a range of decision support tools to work with, the under 30's are taught separately and differently to the over 50's, and there are female-only workshops for groups of women who feel they can take on the pasture measuring/feed budgeting role on their property.

These women wanted to increase their knowledge so that they could be a better sounding board for their partners. Where male groups prefer to learn out in the field, the women-only groups prefer to talk indoors in a friendly and relaxed environment where they are not intimidated to ask the 'dumb' question. They like learning from other women and in general read more than men – which means they are more likely to benefit from well written handouts. The women do not want to travel far from home and joint childcare is organised for the group. The sessions run during school term time only, from 9am to 2pm. Male-only groups tend to run from 1pm to 5pm.

"If the male partner in the family business won't go to a discussion group meeting – we feel that using the 'female route' is a valid alternative way of getting new information onto the farm," said Dr Litterland.

The cost of delivering tailored information like this is more expensive because the course material, method of delivery and take-home documents will differ for each group – but because it is more relevant to the participant – uptake and adoption of new technology is more likely.

A new initiative which sets out to solve this 'cost' problem aims to combine new communications technology with the tried and tested discussion group approach. Farmers told researchers that they knew that a lot of the information they needed could be accessed on the Internet, but that they did not want to learn alone. They want/need a social element to their learning.

So a pilot study is being carried out comparing the uptake of sheep and beef farmers who are receiving feed budgeting training traditionally – in a group with a 'real' facilitator, to those who go to their local school and use interactive video conferencing facilities to receive their information.

In this way the 'group' ethos is maintained – the farmers eat and drink together and can compare their children's artwork, but there need only be one facilitator. Based at the Ministry of Education headquarters, he/she can talk, lead and interact with several groups across New Zealand simultaneously.

Rapid Pasture Meter
'If you don't measure your grass, you can't manage your grass.'

But many farmers, even in New Zealand, find walking the fields regularly with a platemeter tedious and hard to maintain consistent accuracy.

Platemeters also tend to under-estimate the amount of pasture grown and consumed – key facts farmers need to know if they are to develop reliable feed budgets and take strategic decisions about future stocking rates and supplementary feeding.

A new ATV mounted system could provide the solution. The Rapid Pasture Meter has been developed by researchers at the Centre for Precision Agriculture at Massey University, and commercialised by C-DAX into a practical on-farm measurement tool. It interfaces with software from management company Farmworks.

The device is mounted on a trailer and pulled by a quad bike at speeds up to 20km per hour. Pasture height is continuously read by optical sensors mounted in a metal 'tunnel' which is pulled through the pasture. Two hundred readings are taken every second – far more than a hand-held meter could ever capture. These measurements are converted to kg/DM/ha using a pre-selected formula.

The base model provides an instant display of pasture DM for the current paddock in which the unit is working. The top of the range model incorporates Bluetooth and GPS technology which can integrate with computer software allowing producers to map the farm to see which paddocks, or parts of paddocks are performing best/worst, to draw up feed budgets and to tap into a pasture growth predictor.

Crucially it can measure pasture mass before and after grazing, which will help farmers work out how much the stock is actually eating, and to check that they have not vacated the paddock too early, i.e. left too much uneaten pasture behind.

The Rapid Pasture Meter is robust enough to be used on moderate slopes and will eventually be able to measure other species such as wholecrop cereals and lucerne.

[See Appendix A]

At AgReseach, Annette Litterland told me that developments are under way to capture grass quality data with the scanner too, such as ME and Crude Protein, as well as details of composition, for example how much clover is present.

Annette is hopeful of high uptake of this new technology because it addresses real and practical problems that currently prevent many farmers from making full use of their pasture.

South Island Dairying Development Centre (SIDCC)
The SIDCC at Lincoln University Dairy Farm near Christchurch, is an excellent example of how industry-wide collaboration can encourage and help farmers adopt new practices.

Dairy farming in the South Island is increasing and represents more than 30% of the country's production, from 18% of the country's farms and 28% of the cows. Overall the South Island has larger farms, larger herds, higher production per cow and per hectare, and higher stocking rates.

The traditional dairying areas around the cities and large towns are experiencing significant land-use change, primarily into lifestyle blocks for 'townies' who want to live in the countryside. Many of these farmers are relocating their businesses to dairy growth areas, often converting beef and sheep farms and greatly increasing the scale of their operations. There are also a large number of large corporate farming and investment businesses.

SIDCC is a partnership between Lincoln University, Dexcel (see below), the Ravensdown fertiliser company, Crop and Food Research, the South Island Dairy Event Farmer Network and the Livestock Improvement Company.

Established in 2001, SIDCC provides a cluster of expertise, resources and services delivering innovative, practical, educational and training support for dairy farmers in South Island.

Lincoln University Dairy Farm (LUDF) is owned by the university but run by SIDCC. Its main aim is to develop and demonstrate world-best practice dairy farming systems that are robust, profitable and environmentally sustainable.

The farm team tests and develops practical applications of new technologies which help to maximise the use of pastoral production systems, while achieving a commercial return, protecting the environment, and bearing in mind the industry's 4% productivity target.

The farm is managed in a completely open and transparent way. Farmers are encouraged to join the team on their weekly pasture walk, to come to Field Days, to keep in touch via the website, where all the production and financial results are shown, warts and all.

The 180ha farm underwent a NZ$1.6million conversion to dairying in 2001. The farm is irrigated by two centre pivots and is divided into 21 paddocks. Six hundred and fifty cows graze a milking platform of 165ha and are milked through a 50 bail rotary parlour. They block calve over 12 weeks in the spring so that production can follow the grass growth curve and they winter off the milking area.

The pastures are managed in a truly intensive rotational grazing system, with a stocking rate of 4 cows/ha and 200kg/ha of nitrogen fertiliser applied. The crossbred cows are trained to grazed down tight to 1500kgDM/ha – to a bowling green smoothness, so that

light, air and water can easily reach the base of the grass and clover plants. No leaves are left to decay and the sward is thatch free. There are no obvious dung pats – the cows dung is watery and spreads widely on impact, and the cows eat evenly across the paddock. There are no visible weeds.

This focus on the post grazing residual is the key to this system of producing milk off grazed grass. By the time the cows come into this paddock again when there is between 2500 and 3,000kgDM/ha, the grass will be young, leafy and nutritious and high in energy – up to 12.5ME.

The only additional 'supplement' fed at Lincoln is around 600kg of grass silage. Around 19tDM of grass and clover is grown per hectare, with more than 16tDM eaten. Not many farmers in the UK could achieve these levels – but it shows the potential and proves that grass can be the central driver of a profitable dairy business.

The farm was budgeted to make an Economic Farm Surplus last year of $2606/ha with a return on assets of 5.9%. The rise in the milk price worldwide since I visited will have improved these figures further.

I was privileged to walk the famous Lincoln pastures and help the team make a decision about how many paddocks needed to be taken out of the rotation, as the grass was growing unusually fast in the cool summer weather.

This involved taking platemeter readings along a set path around the farm. Back in the farm office – the data we collected was entered into the computer to produce a bar chart, with the paddocks in ascending order of height and cover/quantity. Any bars peeping above the all important 'target cover line' indicate a looming surplus, any below suggest a forthcoming deficit.

The management team reckon the 20 minutes spent in the farm office after the farm walk is the most profitable part of the week, and that the weekly feed budget graph is the most powerful tool on the farm. Decisions made based on the measurements directly affect the physical and financial performance of the business over the coming weeks.

[See Appendix B]

When I walked the farm there were three paddocks well ahead of where they should be in their position in the rotation, and it was decided that they should be cut for silage immediately. Most UK farmers would regard the silage cuts as mere lawn clippings – but in this system, silage is used as a strategic tool to maintain grazing quality – not to provide a conserved forage to feed indoors in winter.

My visit to LUDF was inspiring and a definite highlight of my Nuffield travels.

Dexcel

Dexcel is a commercial trust, owned by all New Zealand dairy farmers and is responsible for leading and co-ordinating research, development and extension to help producers achieve greater productivity and profitability. The organisation was formed in 2001 and is mainly funded by Dairy Insight, which uses levy fees collected from all dairy farmers. Other income is derived from commercial and government R&D contracts.

Within its remit, Dexcel

- Undertakes a wide programme of innovative on-farm research and development ultimately focussed on improving on-farm productivity.
- Facilitates a national network of field days, seminars, conferences, specialist events and learning and knowledge sharing opportunities which aim to encourage farmers to adopt new technologies.
- Promotes farming excellence thought active involvement and judging of high profile dairy farmer and sharemilker competitions and awards.
- Encourages and supports young people in pursuing careers in dairying.
- Partners with rural professionals who in turn work with farmers to provide farm business expertise, knowledge and resources.

Current initiatives include the setting up of a range of 'prototype' farmlets that will be managed in a way to achieve targets anticipated as requirements for the dairy industry in ten years time. For example, there is a 'Super Productivity' farm and a 'Tight N' farm.

Dexcel 'Mark and Measure' seminars teach farmers how to analyse their performance, develop plans to fulfil business and personal goals, and improve their strategic thinking skills. Dexcel also manages Dairy Base a new dairy industry database and benchmarking tool, which helps farmers monitor their performance by using a set of standardised reports and Key Performance Indicators.

Dexcel also has four research farms near Hamilton and three research and demonstration farms in the regions. In 2006 it held 1723 events and had direct contact with 27,000 farmers and 1500 rural professionals.

Pasture Plus

Dexcel recently made the decision to move away from 'catch all' type meetings where a range of diverse topics is covered and a mix of operators – owners, sharemilkers, herdsmen, attend.

New specialist discussion groups are being formed, targeted to specific groups of people who are operating at a similar level, and that are more focussed on achieving measurable outcomes.

One example of this is The Pasture Plus Programme, a new, year-long training course designed for the decision makers in the business. The participants are then encouraged to train their managers who then train their staff – a concept known as cascade learning. This is successfully increasing the reach far beyond what the 27 Dexcel consulting officers could deliver individually.

The main principle of the Pasture Plus Course is to '*feed cows and graze pastures to their requirements, no more, no less.'*

Farmers attend monthly discussion meetings, fill out a paddock grazing diary and have to bring their own feed wedge graphs – drawn up by computer or by hand, for debate amongst the group.

Pasture Plus events and farm walks build on the course material. The Programme requires active participation from all those who take part, to give them the confidence to

graze down hard, knowing this will not compromise cow performance but will increase pasture quality.

Monitor Farms
Meat and Wool New Zealand is an 'industry good' organisation which is funded by producer levy to invest in R&D, trade and market development and education for beef and sheep farmers. Their role is in 'mass extension' rather than one to one consultancy – which they leave to private consultants who work for companies like Farmax.

Fourteen regional managers provide a strong leadership role in the rural sector and often run the Monitor Farm programme in their area. Launched in 1991, this is one of the world's most successful agribusiness programmes, with a return on investment estimated at 21:1.

There are 31 Monitor Farms across New Zealand and 7,700 farmers regularly attend each year. Farmers like to learn from other farmers and this principle underlies the programme, as it sets out to bring beef and sheep farmers together to talk about current issues on one farm, within a facilitated environment.

I visited four monitor farms on my travels and was impressed by the commitment and enthusiasm the Monitor Farmers and their wives had for the programme. While they benefited directly from the focus on the strengths and weaknesses of their business, the programme places a lot of emphasis on reaching out into the local community and ensuring the dissemination of ideas beyond the Monitor Farm gate. The meetings are covered extensively in the farming papers and local press.

Like all initiatives, the programme is adapting over time and going forward, the model of only focussing on one farm for three years, is changing – perhaps to having several farms in one district, specialising in different technical areas, so that group members can pick and choose the one most relevant and most useful to their business.

Farmer Initiated Technical Transfer (FITT)
This Meat and Wool New Zealand scheme provides up to $200,000 annually for small on-farm research projects. Farmers within a region are encouraged to get together and apply for funding for a project to address a local problem or opportunity. The results have to be shared with other farmers in the area, and a report publicised in the press and through farmer networks, field days and meetings. Funding can be used for sampling, testing, consultancy or expert advice. Farmers provide capital items such as land, stock and their time. Successful applications are funded for a year to a maximum of $10,000.

Waikoikoi Discussion Group in West Otago used FITT money last year to identify the causes of poor lamb growth rates following weaning on properties in their area.

Soil and herbage tests were taken on all the farms, and 100 lambs tagged and monitored while they grew. The results were benchmarked against a farmer with proven high growth rates. Monthly feed availability and palatability of the pastures being grazed were measured.

The results demonstrated, amongst other things, that pasture quality, as measured by clover content, and the age of the pasture species being offered to lambs, proved to be

key to achieving high lamb growth rates. As a result, the farmers in the group are aiming to feed lambs only young, highly digestible pasture and renew their grassland on a ten to 15 year cycle, to ensure high clover content and more palatable grass species. The results were disseminated via a report, articles in the press and features on the local radio.

Techno Grazing

Harry Weir is a farmer driven by curiosity to push the boundaries of what is achievable. He has invented the Techno-Grazing system whereby 'cheap' dairy bred bulls are stocked very tightly (7.5 animals/ha) in small 'grazing cells'. They are finished off grass from 18 months to two and a half years of age, and only ever eat grazed grass, even during the winter. This way Harry takes full advantage of the grass curve, capitalising on compensatory growth in the spring. Soil temperature and moisture content readings allow him to predict future grass growth.

The system is also organic, because he refuses to accept that organic has to be low output, and his production/ha far exceeds conventional beef systems.

His grassland utilisation is up at 90%. The bulls are moved from cell to cell every two days, and a specially adapted ATV means that the electric fences that contain the bulls can be taken down and re-erected in a matter of minutes by one man. Water is supplied via a series of tiny micro water bowls.

Harry is analytical about the problems that need solving on his farm, but uses his creative instinct to find solutions. He has a manufacturing company which sells the Techno-Grazing kit, and runs courses for other farmers who are keen to adopt his philosophy and his system.

He was interested in the fact I was looking at how to encourage mid-performers to adopt technology, as he was trying to do the same thing with his system. The early adopters had been attracted to his ideas and taken them on board. Encouraging the next set of farmers to buy-in was proving much harder.

Grazing management to this degree of utilisation is beyond most UK farmers - but like Lincoln University Dairy Farm, it shows what can be achieved off grazed grass if people are prepared to 'think outside the box', and find different ways of doing things, rather than giving in and saying 'it can't be done'.

Take home messages

1. **Grassland farming in New Zealand is not easy. Variable topography, facial eczema and endophyte are just some of the challenges. Yet farmers there have been driven by their isolation and their subsidy-free world to make the most of their natural resource. The farmers there value their grass and strive to use it still better.**

2. **The respect the general public has for farmers in New Zealand is enviable and something farmers in the UK can only dream of.**

Innovative and relevant research and development has driven the industry over the past 20 years, and will continue to play a major role as it grapples with environmental issues and searches for added value opportunities.

3. **Very high levels of grassland utilisation are possible in the right situation, with the right animals and with very careful management. The farmers I visited who practiced successful controlled grazing had the best looking pastures and were making the most money.**

4. **There are clear signs of a move away from mass extension techniques towards a more targeted approach – with greater uptake where advisors and consultants are working with groups people of similar experience and interest. Even the great Monitor Farm Programme is now taking a more 'specialist' approach, so that it can become more relevant to more people.**

Australia

I arrived in Australia in the middle of a devastating drought – the second to have struck in four years. Many farmers were only just recovering from one in 2002/2003. In the annual grassland belt of the South Eastern corner, where there should have been lush green pastures as far as the eye could see – there was just brown dust.

On one journey I had to navigate myself around the billowing smoke of a raging bush fire. A poem mounted on a wall of a petrol station praised the local farmers – describing them as 'extraordinary people, doing extraordinary things' to keep their animals alive. Managing risk and variability is an integral part of an Australian farm business.

Australia is such a vast continent that it can produce a wide variety of temperate and topical crops, 80% of which are exported. The beef industry is the biggest agricultural enterprise – exporting 60% of its products mainly to America and Japan. Lamb production has become more important within the sheep industry as the focus has moved away from wool, although it is still widely recognised for the high quality of its Merino yarn. Dairy products are Australia's fourth most valuable agricultural export.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO)
CSIRO Plant Industry is one of the world's leading research centres for plant science – and conducts basic and applied research to promote profitable and sustainable agrifood industries.

I visited researchers and scientists in Canberra to find out more about some computerised decision support tools that help beef and sheep farmers in their day to day management, and to gauge profit potential and risk within their systems. They also allow them to test new management methods before committing actual resources.

Grazfeed calculates the energy and protein requirements of sheep and cattle grazing a particular pasture. When it was initially released, it was mainly taken up by advisors. To encourage more farmers to use it, special ProGraze courses were devised and producer uptake increased significantly after this. From an initial investment of Aus$4.5million, Grazfeed has returned Aus$309 million to the industry and has over 1200 registered users.

GrassGro operates at an enterprise level and can work out the optimum stocking rate for a specific paddock, predict year-to-year variability in pasture growth based on historical weather data, examine the effects of altering factors such as calving and weaning date on the business, and suggest how many years a farmer might need to supplement his stock with purchased feed.

Tools like this can be very useful, but require a certain level of skill to operate. One producer who has found them useful is fine wool merino producer Grant Burridge. He runs 16,000 sheep on four properties at Tarcutta, about 100 miles west of Canberra.

When I arrived on his property he and his wife Annette were dashing to the yard to meet an articulated lorry full of South Australian wheat bought in to feed the sheep – as there was nothing else for them to eat. The drought which normally kicks in at the end of February had started in the middle of December.

In good years, a high dependence on pasture and very high stocking rates pays rich dividends – but costs millions of dollars in bought-in feed and lost production in the bad. In good years Grant's annual pastures can yield up to 12t DM/ha – during the 02/03 drought they barely managed 1.5t DM/ha.

Grant is a top performer and taps into the best scientific brains at places such as CSIRO. He seeks information, challenges convention and usually feels there is a more efficient way of doing things.

He uses GrassGro to work out 'what if' scenarios, for example to examine the effects of moving his shearing date from December to May in an effort to improve wool quality in his wether flock.

The program showed that shearing during May reduced returns, either by lowering stocking rates, and therefore wool production per hectare or, if sheep numbers were maintained during winter, by increasing supplement costs during the summer when grass growth was restricted. This proved that stocking rate, not time of shearing is the profit driver in fine wool production systems.

Grant was a charming and inspiring man who clearly operates at the top of his game. As such he was of the view that money spent on extension to mid-performing farmers is wasted, and that all funding should be put into scientific research that the top 25% can benefit from. This echoes Will Gemmill's Talking Point in *Farmers Weekly* last March, who feels there has been a 'dumbing down' of R&D in agriculture in the drive to push the bottom 25% up to average.

"Let the leaders do the experimental stuff and those who want, or have the ability to follow, will," Grant Burridge said. "Those who won't, cannot be pushed into changing."

Pastures from Space
The Pastures from Space program, is another CSIRO development, and provides estimates of pasture production during the growing season by means of remote sensing using satellites.

This information, which is delivered via the Internet, allows producers to make informed decisions on the amount of grass that is on offer at any one time to their livestock, across the property, allowing them to manage their feed resources more efficiently and their stocking rates more precisely.

The technology has been widely trialled in Western Australia, where pasture growth rate information is broadcast on ABC Radio and sign posted in regional areas.

Unfortunately this technology needs clear skies and would be unreliable in the UK's cloudy climate. However, new developments using radar instead of satellites may be applicable here in the future.

The Sheep's Back and The Mackinnon Project
There are initiatives across Australia which seek to help mid-performing sheep farmers grasp the opportunities of increasing their pasture utilisation.

In Perth I met up with Ed Riggall, project co-ordinator for the Sheep's Back – a new programme funded by Australia Wool Innovation that aims to deliver a 10% lift in profitability to sheep enterprises, through greater understanding of the relevant profit drivers.

This extension model has been designed by people who know sheep farming, and the information has been distilled from years of consulting and practical experience in the paddock and the office. The programme is delivered to groups of 15 wool growers and made up of nine modules, all delivered by specialist consultants.

'Unlike other sheep extension programmes, the Sheep's Back challenges and supports current notions of farming," said Ed. "And it goes much further – requiring farmers to move out of their comfort zone."

Stage one develops an 'I want', 'I can' and 'I will' attitude and garners a commitment to increasing productivity on their farm.

The second stage focuses solely on benchmarking - 'the roadmap to profit', and demonstrates how it can help farmers answer the key questions – 'Where am I now,' 'Where do I want to go?' and 'How will I get there?' Participants are then encouraged to continue benchmarking to monitor the implementation of profitable change.

Stage 3 is spread over 18 months – with the group choosing four out of ten modules which are most relevant to their situation.

"The course helps farmers capitalise on the good seasons by increasing stocking rates and, more importantly, devise a back-up plan if the season deteriorates because of drought."

The McKinnon Project is a small consultancy group based at the University of Melbourne funded partly through a trust set up to help extensive beef and sheep farmers in Victoria, to improve their productivity and profitability.

The researchers and advisors within the group work with 150 producers which between them have 1.3million sheep and 100,000 beef cows – representing 5% of the State's grazing animals. The farmers pay for the service which looks at all aspects of farm management – starting with an examination of the financial position and benchmarking it against other similar businesses. They then go on to give comprehensive advice on key areas such as time of lambing, and ways to improve pasture utilisation from the low average level of 30%, up to a more profitable 50 to 60%.

Mackinnon consultant Lisa Warn said that there were great opportunities for producers to double their utilisation of pastures, and to do so by simple means.

She told me that many farmers do not appreciate that stocking rate is the key driver to maximise production of meat and wool per ha, and are frightened to push stocking rates up because of the risk of drought.

Like Ed, she believes the answer is not to stock to the worst case scenario, but to have enough animals to optimise the amount of pasture eaten in normal years, while retaining

flexibility within the system to cope, for example by bringing stock into drought-lots, should the worst happen.

Grasslands Productivity Programme
In the 1990's, the Grassland Society of Victoria embarked on the Grasslands Productivity Programme (GPP), to help pastoral producers develop skills and confidence in managing more productive pastures on their farm.

The programme involved groups of four to six wool farmers in districts across South East Australia, with each participant establishing a paired paddock comparison on their farm – so they could measure the value of the new productive pasture technology against their existing practices.

Working on the 'seeing is believing principle', this side by side comparison allowed them to see the real benefits of carrying out different management. The fact they actually had to 'do' things as they prepared for each meeting also meant they were more involved with the whole process, and had a greater understanding of the practical application of the new technology. By seeing the improvements in a small area of the farm, gave the farmers the confidence to apply it over more acres in the future.

The new technology included applying increased rates of fertiliser to paddocks that contained productive species, increasing stocking rates, and rotationally grazing rather than set stocking.

The groups initially ran for three growing seasons under the guidance of industry-funded facilitators. By 1998 there were around 400 farmers taking part.

A large scale survey of 146 of the participants at the end of the initial programme found that they had changed the way they managed their pastures. They has increased their average whole-farm phosphate fertiliser use and stocking rates by 113% and 29% respectively. As a result almost a third of their properties were being managed as 'productive' pastures and their intention was to increase this to over half of the farm by 2000.

A later study compared the physical and financial performance of 14 of the GPP farms with 21 that did not take part in the programme. In the four years following the programme, the farms involved had significantly higher fertiliser rates, stocking rates and labour efficiencies than non GPP farms, despite these values being similar before the GPP started.

The GPP farms had also decreased their costs of production and increased their farm income by more than 50%, while the non GPP farms had increased their net farm income by less than 10% over the same period. This suggests that the introduction of productive pasture management played a key role in improving the profitability of these farms.

Researchers involved in this work estimate that there can be 70% technology adoption rates where farmers carry out the work on their own farm – and is as low as 30% where farmers just visit a farm to look and see.

Recruiting farmers

The GPP groups were established using a voluntary recruitment approach that relied on reaching potential participants by creating a general awareness through the media and word of mouth. Group formation was based on producer enquiry and interested producers were encouraged to invite fellow farmers to attend. This process was criticised for attracting only those producers who are willing to listen and trial new ideas.

As a result, producers who enrol for initiatives like the GPP, tend to be the more efficient producers anyway – the top performers and not the mid-performers that I set out to find out how to reach. Research showed that producer enrolment rates in training equate to only 10 to 15% of farmers, and are therefore unlikely to result in large-scale industry improvement.

To try and address this imbalance, researcher Jason Trompf at Latrobe University, Melbourne, developed a process known as facilitated recruitment - whereby he literally 'knocked on all the doors' of farmers within a target district and invited them all to participate in the GPP trial.

After an initial interview they were invited to attend a field day at a local GPP farmer, where they had a chance to see the paired paddock trial in action.

In one target region, 89 producers were interviewed – representing 93% of total producers. Of these, five were already participating in the GPP as volunteers. Another 30 farmers agreed to participate as a direct result of the recruitment process. The remaining 54 chose not to take part.

There were interesting differences between the three groups – i.e. the volunteers, the recruits and the non-participants.

The recruits regarded low farm productivity as a more important constraint to farm profitability than the non-participants did – and the latter were more inclined to measure livestock performance by gauging production per head than the recruits.

The volunteers had higher stocking and fertiliser rates than non-participants, and a significantly greater proportion of them measured pasture availability and weighed their livestock to measure on-going performance.

As the GPP progressed, the volunteers and recruits increased their use of fertiliser and their stocking rates. By the second year, many of the differences that existed between the recruits and the volunteers when they entered the programme had disappeared.

Interestingly the recruits gave the programme a significantly higher overall satisfaction rating than the volunteers. This was probably due to the volunteers already being attuned to the benefits of productive pasture practices, whereas the programme was a greater 'revelation' for the recruits.

The facilitated recruitment process delivered a seven-fold increase in the participation density in the GPP in the targeted districts, compared to the voluntary approach. This process therefore significantly increases the impact that a programme may have at a local, regional or industry level.

A more pro-active approach to recruitment can attract farmers who otherwise would not have joined the programme, and who potentially are capable of benefiting greatly from adopting the new technology.

This research was exactly the kind of initiative I was hoping to discover on my Nuffield travels. It is extension that is targeted at the mid-performers – those who are not natural information seekers, yet can greatly benefit from learning and understanding the principles of basing a profitable business around efficient pasture management. The challenge now is to work out how this can be applied in the UK.

Dairy Australia
In the early 1990s, Dairy Australia – which uses levy funds to encourage the adoption of new techniques on dairy farms, launched their Target 10 extension programme. The aim was to increase pasture utilisation by 10%.

There was good participation in the extension events but the results on farm were disappointing. Analysis suggested that this was because grassland management was taken in isolation and not as an integral part of the system, that the delivery of the information was too prescriptive, and that it allowed no flexibility for the tough times such as during drought.

So in 1999 a new one-year group-based course 'Feeding Pastures for Profit' was devised which took a whole systems, rather than a component approach, and which had the specific aim of building farmer confidence in their management abilities – not just of the pasture but of the business as a whole.

The results have been very positive – grassland utilisation has improved, as has profitability, and in many it has unlocked their desire to examine and question other areas of their business after the initial 'learning' year.

Eighteen courses have been run over the past eight years and are managed by a highly motivated, and engaging consultant and his team. The courses are free to farmers as they are levy payers. At the moment demand for places far exceeds those that are available.

For those who do not want to buy into a year-long commitment or who lack the basic skills needed before joining, short, two-day grassland management courses are offered, run by specialist pasture coaches.

These are a mix of people, for example some are farmers who already have good pasture management skills, some are college lecturers or dairy factory field staff. The coaches receive training – not so much on the technical side, more on how to be a good facilitator and how to engage with farmers.

This initiative, rather like the mentor programme in Canada, is producing a pool of human resource which can be used to help the mid-performers who might shy away from the structured year-long courses - to start on the 'stairway of progression'. Once they have gained some confidence in pasture management techniques they may then feel ready to join the course.

Industry Collaboration
Dr Mark Paine, principal research fellow for Innovation and Change Management at the University of Melbourne, told me that if extension programmes are to work, they must develop with time. If initiatives deliver and then stop, they will fail, as no industry is static.

Extension has to be ongoing and continuously adaptive and requires the formation of long-lasting relationships. But for this to happen, many more facilitators would be needed, because once they become involved with a group, they should ideally stick with them for many years, and would not have time to start working with new groups.

But when funding for extension activity is being reduced, how does an industry find the right balance between investing in training new facilitators to work closely with a few groups, and investing in extension techniques that which will reach many more farmers?

Dr Paine believes that future extension programmes will have to involve industry partners, such as the vet, the agronomist, the milk/meat buyer and even the nutritionist – as long as they are trained, and all buy-in to the fact that efficient utilisation of pasture is the key to a profitable business.

If farmers are to change their working practice there has to be some kind of personal interaction in the learning process, he said. And with so few consultants and facilitators on the ground, industry-wide collaborative working has to be the way forward.

Take home messages

1. **Australia is another country where growing and utilising pasture is far from easy. Yet some producers find ways of spreading the risk by stocking hard in the good years, and having the flexibility in their plans to cope with the bad years.**

2. **Stocking rate drives profit. Full Stop.**

3. **Running small scale paired paddock trials is a great way of giving farmers the confidence to adopt new technology on a larger scale on their farm.**

4. **Recruiting farmers into extension initiatives is a good way of encouraging and involving farmers who would normally join in.**

5. **Extension programmes should be systems, and not component based. Pasture management is the key to profitable livestock production, but it does not work in isolation.**

6. **Industry collaboration is required if extension initiatives are to be delivered to more mid-performing farmers.**

Conclusions

Efficient utilisation of grass is the key to running a profitable ruminant livestock business, that can generate surplus cash for on and off-farm investment in today's increasingly harsh economic environment. All the leading farmers I met on my travels were successful on the back of good pasture management.

More UK farmers need to get over the 'I can't do it here' attitude and grasp the opportunities good grassland management can offer their livestock operation.

We can grow as good grass as they do in New Zealand – but we don't value it like they do. Farming in isolation and selling at world market prices has really encouraged full use of their national crop.

Conditions here may be wet in winter, but at least we do not face -20˚ winters and metres of snow cover, unpredictable and severe droughts, or pastoral diseases such as ryegrass endophyte or facial eczema. Farmers who face worse problems than we do, still make better use of their pasture. We are not making the most of our competitive advantage.

Tony Evans of Andersons says "The greatest barrier to greater grassland use is a lack of knowledge and confidence to rely more heavily on it."

Information on grassland management is available through the MDC Grass+ programme, through the EBLEX Sheep and Beef Better Returns Programmes and through the British Grassland Society, and the companies that supply the UK grassland industry – but may only be accessed or acted upon by the natural information seekers.

Some say that adoption of new techniques will only succeed with fertile, open minds and that even a looming financial crisis is often not enough to stimulate change. But this is very limiting. While I am sure there are those who will never use their grass well, I am sure there are many who could, but just don't realise it yet. They need 'recruiting' in.

I believe that initiatives such as the Grazing Mentor scheme in Canada, and the Paired Paddock trials in Australia, show that there are opportunities to engage with mid-performers to help them use their grassland more efficiently – through guided encouragement and by getting them more involved.

As the Chinese proverb says:

'Tell me and I'll forget
Show me and I'll remember
Involve me and I'll understand'

First we need to inform and excite farmers about the potential benefits of better grassland management, and then help them to overcome the natural resistance there is in us all to do things differently.

I accept that not everyone will be able to adopt a full blown, rotational paddock grazing system – but many could rethink their reseeding policy or grassland herbicide strategy –

both of which could improve the contribution of the grass crop to their business. There are step changes that people can, and should be encouraged to take.

“You don’t drown by falling in the water,” says a notice on the wall of the Dexcel office in Lincoln, New Zealand, “You drown by staying there.”

I hope that through my Nuffield travels and this report I can help more UK dairy, beef and sheep producers to make their way out of the water.

Recommendations

Marketing Communications (Promotional activity)

- Raise the profile of grass as the UK’s most important crop. Extol the benefits and opportunities of efficient pasture farming to livestock farmers.

- Create a demand by promoting our fantastic, natural, home-produced ‘grass-fed’ products to:
  a) The food supply chain – processors, retailers and the catering trade.
  b) Consumers.

- Commission market research to find out exactly what the barriers are to adopting a grass-based approach on UK farms – is it lack of knowledge or confidence?

Research

- Find easier ways to encourage farmers to measure, monitor and understand grass growth – so this becomes less of a barrier to adoption. Would ATV mounted measuring systems work here?

- Develop a national centre for research and extension on grassland management which focuses on making money from grass-based systems. Collaborate with as many-like-minded organisations as possible. Could such an initiative attract funding through the LINK programme?

Education

- Review how grassland management is taught in agricultural colleges and universities – is it up to date, relevant and inspiring? Does the course content recognise the full potential of grass as the key component of a profitable business or teach it as a single module in isolation?

- Investigate the possibilities of running grazing schools/short courses tailored to specific geographic areas/livestock sectors/groups of people e.g. advisors or consultants, bank managers, as well as farmers.

Communication for Rural Innovation (Extension).

- Set up an interactive grassland management centre as a web or blog site which can pull together ideas, advice and comment from across the world and throughout the UK. Could BGS develop this as part of its website?

- Actively recruit farmers who are not natural information seekers, but who could really benefit from better grassland management. Use marketing techniques to 'segment' them into appropriate learning groups. Offer them tailored advice packages and encourage on-farm paired paddock type demonstrations.

- Find and fund more grassland 'gurus' and facilitators. The Pasture to Profit Programme in the UK has been very successful using seconded consultants. But where are our home-grown experts, where will they come from in the future and how can we utilise the concept of cascade learning and collaborative industry-wide training?

- Set up a mentorship programme – whereby successful grassland farmers are trained to coach those that are less experienced and do not feel comfortable with group-based learning.

- Look at extending the Monitor Farm Programme, which has been successfully launched in Scotland and Wales for sheep and beef farmers, across the UK.

Funding
At a time when budgets for government funded grassland research have been slashed and diverted into environmental rather than production areas, finding the money to fund the implementation of any of these recommendations will be challenging.

Collaboration with organisations such as BGS, IGER, the new levy-funded sector companies, QMS, HCC, MLC, RABDF, agricultural colleges and universities, farm business consultants, meat processors and milk buyers, vets and the supply trade – notably the seed, herbicide and fertiliser companies, will be essential if progress is to be made.

Grazing ruminants and the environment

Since I was awarded my Nuffield Scholarship, grazing ruminants have had some bad press in terms of their front and back-end emissions. The idea that sheep and cattle should spend more time out in the UK's fields goes against current government thinking. Full page articles in the mainstream press that suggest cows are more polluting than Land Rovers, do not help.

This topic would warrant a Nuffield study in its own right – but I felt it important not to ignore completely an area which could have a significant impact on my study findings and recommendations. Research is underway across the world to tackle this issue.

In New Zealand, the Pastoral Greenhouse Gas Research Consortium (PGgRc) was launched in 2002 and will be investing NZ$5m each year for the next five years on research to find mitigation solutions for methane and nitrous oxide, the two main greenhouse gases produced by grazing animals. There are already encouraging

developments in these areas. Once again New Zealand is turning a problem into an opportunity – as it encourages businesses to develop innovative products and procedures that can help farmers overcome these problems.

One example of this is ECO-N. Developed by Lincoln University this product, which is marketed by fertiliser co-operative Ravensdown, reduces nitrate leaching and nitrous oxide emissions from urine spots – the main source of nitrate leaching from New Zealand's pastoral agriculture.

ECO-N also increases pasture production by retaining nitrogen from the cow urine in the soils in a form that is available to the grass plant. It is said that ECO-N reduces nitrate leaching by 60%, reduces nitrous oxide emissions by up to 80% and increases pasture production by drip feeding additional nitrogen to the plants during the winter and early spring. It offers farmers the chance to reduce their nitrogen fertiliser rates to maintain production levels, or increase total pasture production by maintaining current nitrogen inputs.

[See Appendix C]

There is also promising work being carried out in the UK. IGER has developed high sugar grasses which give rumen micro-organisms greater energy to process more of the protein in the grass into milk or meat so less N is lost out of the back end. New government funded research is setting out to discover whether feeding high sugar grasses can also cut methane emissions.

Canada too has a Greenhouse Gas Mitigation Programme, the result of Agriculture and Agri-Food Canada's commitment to addressing these issues. The CAN$21 million programme is administered by four groups which are working towards common goals, including identifying best management practices to reduce greenhouse gas emissions, raising awareness of these, and encouraging producers to adopt them.

In America, Allan Savoury questions the assertions that ruminants are the 'bad boys' and suggests that we need more, not less, grazing animals to overcome the problem.

He says that the research data villifying cattle has been obtained from mainstream, industrial feedlot operations, and that reports blaming cattle for climate change have distracted the debate from some of the genuine contributors of global warming, as well as the crucial role grazing cattle can play in solving the problem.

He goes on to say that Management Intensive Grazing sets up a chain of events that heals the land, increases organic matter in the soil and increases the grasses ability to act as a carbon dioxide sink, thereby reducing the amount of the undesirable gases in the atmosphere.

Personal Post Script

My Nuffield Farming Scholarship has given me a fantastic opportunity to travel the world to see the pastoral livestock industries of several different countries.

I feel that I have achieved the aims I drew up at the start of my study, and have come back with a range of ideas and information that could be of real use to farmers, advisors and researchers here.

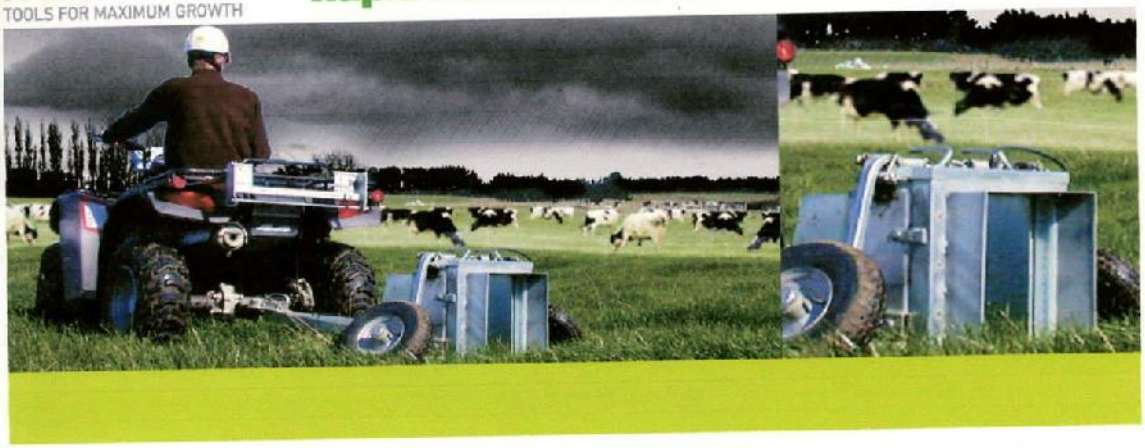
The study has given me the taste for independent travel and the urge to carry on my research – to go to countries I feel I missed out on, but could learn much from, for example North America and countries in South America. I shall be attending The International Grassland Congress in China in June 2008.

Grass is so important – as a provider of food, as a backdrop for sport and recreation and for maintaining life on earth. It encompasses a fascinating and incredible range of plants, and deserves much greater recognition within farming and the wider world. If nothing else, I intend to use my Nuffield experience as a platform from which I can use my skills and enthusiasm to raise its profile over the coming years.

APPENDIX A – Rapid Pasture Meter

FARMWORKS
TOOLS FOR MAXIMUM GROWTH

Rapid Pasture Meter



THE NEW PASTURE METER REPRESENTS A REVOLUTIONARY ADVANCEMENT IN THE RAPID MEASUREMENT OF PASTURE DRY MATTER. THE TECHNOLOGY UTILISES OPTICAL SENSORS THAT ARE INSTALLED IN A SKID TYPE TRAILER. THE OPTICAL BEAMS CONTINUALLY MEASURE PASTURE HEIGHT AS THE TRAILER IS TOWED BEHIND A FARM VEHICLE. A MOUNTED DISPLAY UNIT CONVERTS THE HEIGHT MEASUREMENT TO KgDM/Ha USING A PRE-SELECTED FORMULA.

- The Rising Plate Meter has traditionally been the mainstay of the dairy farmers pasture measurement kit, however the increase in both farm size and herd size has made plating onerous which has tended to compromise technique and eventually accuracy as speed is increased.

- The Pasture Meter unit is mounted on a trailer and pulled behind an ATV. Speeds of up to 20km per hour are acceptable with 200 readings per second being taken.

This provides a significant improvement on the traditional plate meter and probe devices.

KgDM/Ha readings are recorded on a display mounted onto the ATV placed in front of the driver.

- Pasture height is read by sensors mounted into a metal "tunnel" which is pulled through the pasture.

The base model will provide an instant display of pasture DM for the current paddock in which the unit is operating while the top of the range model will incorporate Bluetooth™ and GPS technology and integrate with FARMWORKS P-Plus PDA and desktop software. The software encompasses mapping, feed budgeting and a pasture growth predictor.

APPENDIX B – Lincoln University Dairy Farm – Farm Walk Notes

Lincoln University Dairy Farm - Farm Walk notes

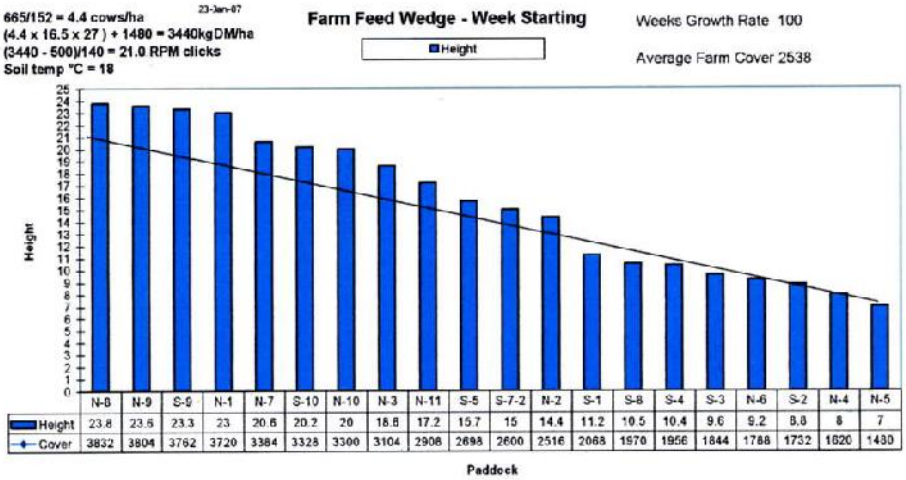
Tuesday 23rd January 2007

Critical issues for the short term

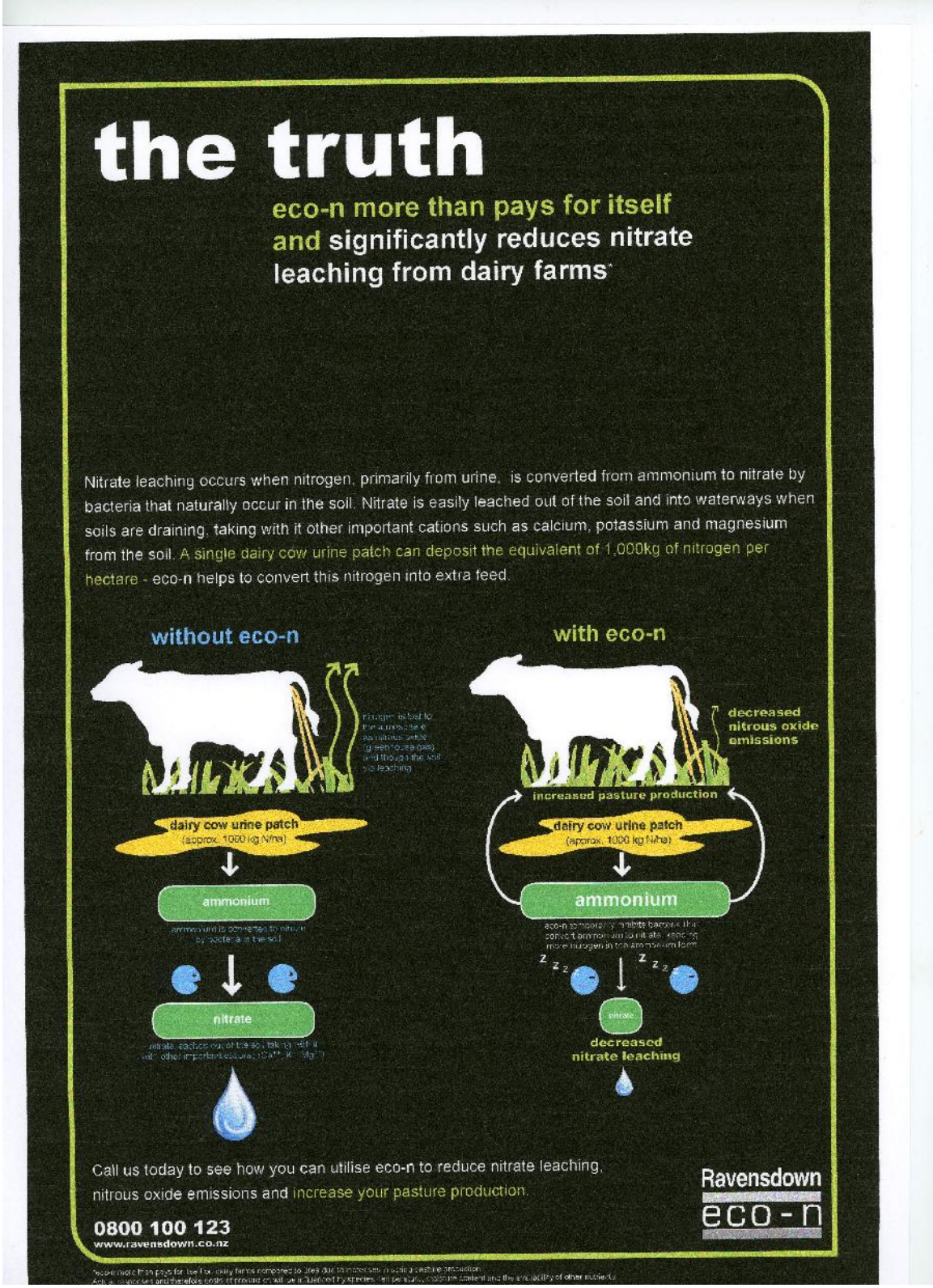
1. Closely monitor pasture growth over the next three to four days, and if current growth continues we will need to take out more paddocks for silage.
2. Maintain round length at 27 days and offer cows 16.5 kg top quality pasture diet.
3. Cultivate and re-grass S6.
4. Monitor pests in recently under sown Tabu (Paddock S4).

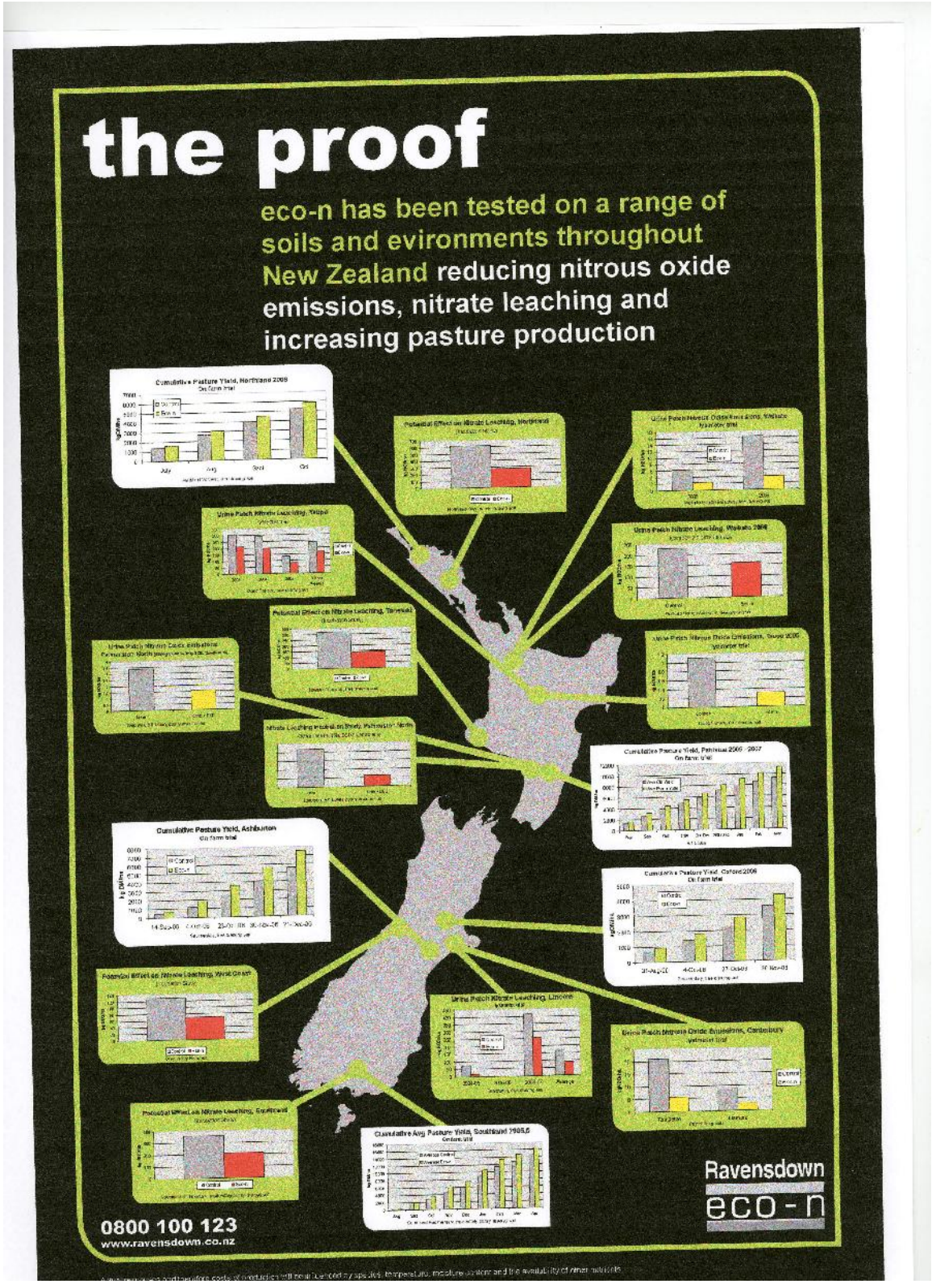
Summary of Key Factors affecting Grazing Management & Animal Performance

5. SOIL TEMPS have remained around 18° C.
6. Visually there appears to be more clover on this week's farm walk than we have seen all season.
7. PASTURE GROWTH over the last week has averaged 100 kg DM/ha (last week105).
8. AVERAGE PASTURE COVER has risen by 84 kgs DM/ha to 2538 kgs DM/ha. Area was allocated for a 27 day rotation this week (5.7ha/per day), however with one paddock (7ha) removed for silage, this reduced grazing interval down to 22.5 days.
9. Dry matter is 5% lower than normal for this time of the year; typically January dry matter has measured approximately 18 to 19%, currently 13.1%! This could be restricting intake and therefore affecting milk production. Fibre levels are at an ideal level at 40% and are not impacting on animal health or performance. Cows are still grazing comfortably to 7 clicks on the RPM.
10. MILK PRODUCTION has dropped 9% in the past week from 1.64kgs MS/cow/day to 1.5kgs MS/cow/day and 6.53 kgs MS/ha. Production to date is now 1% down on last season. We expect a lift in production again as dry matter levels improve and pre-grazing levels reduce, because pasture quality is still high at 11.9ME.
11. The PASTURE FEED WEDGE is showing that we have several paddocks of grass longer than that required to maintain a 27 day rotation, and with most paddocks above the target line we have identified two more paddocks as surplus, N-8 and N-9 will be taken for silage as soon as possible.



APPENDIX C – ECO-N




the proof
eco-n has been tested on a range of soils and evironments throughout New Zealand reducing nitrous oxide emissions, nitrate leaching and increasing pasture production
Cumulative Pasture Yield, Northland 2009
Cumulative Pasture Yield, Ashburton
Cumulative Avg. Pasture Yield, Southland 1985-8
Urine Patch Nitrate Leaching, Lincoln
Urine Patch Nitrous Oxide Emissions, Canterbury
Cumulative Pasture Yield, Oxford 2006
Cumulative Pasture Yield, Feilding 2006 - 2007
0800 100 123
www.ravensdown.co.nz
Ravensdown
eco-n

Further Reading

Communication for Rural Innovation – Rethinking Agricultural Extension.
By Cees Leeuwis.
Published by Blackwell Publishing. ISBN 0-05249-X

Crossing the Chasm – Marketing and Selling Technology Products to Mainstream Customers.
By Geoffrey A Moore.
Published by Capstone. ISBN 13:978-1-84112-063-8

Feel the Fear and Do It Anyway.
By Susan Jeffers.
Published by Arrow.

Management Intensive Grazing – The Grassroots of Grass Farming.
By Jim Gerrish.
Published by Green Park Press. ISBN 0-9721597-0-3

Proceedings of the New Zealand Grassland Association. Volume 68. 2006.
Published by the New Zealand Grassland Association. ISSN 0369-3902

Screw it, let's do it.
By Richard Branson.
Published by Virgin Books. ISBN 0-75351099 5

Utilisation of grazed grass in temperate animal systems.
Edited by J.J. Murphy.
Published by Wageningen Academic Publishers. ISBN 9076998760

XX International Grassland Congress: Offered papers.
Edited by F.P. O'Mara.
Published by Wageningen Academic Publishers. ISBN 9076998817

Useful web addresses

Denmark
www.agrsci.org
www.landscentret.org.dk

Canada
www.agr.gc.ca
www.cattle.ca
www.ontarioagrcentre.ca
www.areca.ab.ca
www.foragebeef.ca
www.agric.gov.ab.ca
www.reducedtillage.ca
www.ofac.org
www.uoguelph.ca/research/communications/spark
www.adfarmonline.com
www.soilcc.ca **(Canadian Green House Mitigation Program)**

USA
www.eatwild.com
www.ranchmanagement.com
www.holisticmanagement.org
www.lowcostcowcalf.com
www.pharocattle.com
www.stockmanship.com

New Zealand
www.agresearch.co.nz
www.dexcel.co.nz
www.dairyinsight.co.nz
www.side.org.nz
www.siddc.org.nz
www.farmworkspfs.co.nz
www.meatnz.co.nz
www.farmax.co.nz
www.kiwitech.co.nz **(Techno Systems)**
www.Ravensdown.co.uk **(ECO-N)**
www.pggrc.co.nz

Australia
www.csiro.au
www.dairyaustralia.com.au
www.mackinnonproject.com.au
www.wool.com.au **(The Sheep's Back)**