

‘Ideas For When It Rains’ BCG Study Tour New Zealand 2005

SUMMARY	2
An idea/concept that you may apply to your own farm.	2
An idea/concept we could apply to BCG.	2
Jim McCartney	3
Foundation for Arable Research (FAR)	4
FAR Main Research Site	6
Simon Osbourne	6
FAR Insect Pest R&D	8
Eric Watson	8
Craig McKenzie	9
John Wright	11
Crop and Food Research	12
Dairy Research Farm	12
Lincoln University Environmental Research	13
Wrightsons Seeds	13
Crop and Food Research	14
South Island Dairying Development Centre (SIDDIC)	16
Quotable quotes	17
Improvements or changes for the next trip	17

These comments have been compiled from notes taken during the BCG Study Tour to New Zealand in February 2005. The aim of the tour was:

- Development of professional networks
- Exposure to new ideas, innovations and approaches
- Identify opportunities for future collaboration and research
- Get to know people personally and enhance networks in the industry
- Collect ideas on future actions and directions the BCG and WFS may take
- Opportunity to showcase some of the research highlights of BCG-WFS work;

It is hoped that through exposure to grains and agricultural research being carried out in neighbouring countries to Australia, collaborative research ideas and initiatives may be developed.

SUMMARY

An idea /concept that you may apply to your own farm.

- Look at types of crops and markets
- Improve relationships with marketing agents/groups particularly when crop planning to gain edge on market requirements
- Take home the enthusiasm
- Use the networks created to improve my on farm management
- Look at radish, white clover and ryegrass seed production
- Keep my farm yard tidy
- Reassess the role of livestock
- Trial some of the "gardaprim".
- Continue with canopy management.
- Remain open-minded, never say no, and to keep looking.
- Try not to be distracted
- Look at direct relationships with breeding company
- Move to Frances South Australia
- Learn from one another in the group and take home ideas/info
- Get a better handle on water use
- Be involved in trial work and keep up interest
- Recognise our advantage of cheaper production costs
- Reminded us that crops can grow

An idea/concept we could apply to BCG.

- Bulletins published and sent to members strategically through the year like FAR.
- Trial some of New Zealand varieties (wheat in October).
- Continue soil health studies when looking at production increases and trials
- Increase soil health
- Put varieties under disease pressure and analyse how they go
- More research into climate modelling
- Continue to look at diversified crops
- What drives maximum yield trial
- See what potential yields are achievable when water isn't a limiting factor.
- Use an artificial environment to see what we can learn from it (rain + sunlight)
- Investigate organic carbon and circulate the true facts and what is best as there is a bit of misinformation out there
- See if there is any correlation between soil water and frost.
- Organise more tours such as this one and maybe have people pay to go on them – possible money maker?
- Have a trial that measures everything – Min vs no till, yield, disease, run off (like the dairy site), etc. Similar to the systems site but in more depth.
- Do a frost project as there is a lot of issues that need some answers (eg. soluble carbohydrates)
- Maybe get their lab to find a fungus to deal with our summer weeds such as heliotrope
- More research on canopy management
- Water - Look at ways to ensure maximum water use efficiency, soil health, other interactions, polymers, etc
- Improve the self guided tour books
- Consider the end products in more depth – GMO issues, people's eating habits, develop good relationships with production industries.
- Have a look at the fat lamb production

- Sponsorship – lifestyle companies
- Do a whole farm trial – conducting management strategies for whole farm
- Target bequests for funding
- Work directly with seed company to breed south mallee wheat
- Look at practicality of diversifying crop/vegetable/pulse rotation. Eg. Growing hemp, contracts, are contracts easier to get in Australia?

Jim McCartney

Tai Tapu Farm

- 28 inch rainfall (14 inch Min and 37 inch max)
- 580 acres – 400 acres is cropped and the rest is livestock
- irrigation from wells that vary from 24 to 44 metres deep
- Happy to harvest at 16% moisture and dry down to 14%. All his silos have drying drawers
- The rotation is variable and includes white clover, ryegrass, garden peas and wheat
- Strong market for white clover but the wet sept means that it won't harvest that well
- Most contracts are area based but the remainder is tonnage based.
- No rain from nov to mid Jan and lived of irrigation
- Owns 1000 breeding ewes and aims for 150% lambing rate. Sells half of them
- Livestock makes cropping pretty successful as double cropping most of your land however they do have some downsides
- Aims to make \$1000/acre
- Has tinkered with vegies crop but hasn't been very successful
- Cultivates and burns stubble.
- Rust hasn't been a big issue for awhile due to new varieties and fungicide program
- Uses Amistar and Opus in two hits but could probably get away with one
- Applied 200kg/N and 200 kg of superphosphate. However there was 190kg/N residue
- Uses a split application of nitrogen as only wishes to be putting out 100kg/N and rest depends upon the season.
- Previous crop was ryegrass, peas and now wheat and should yield 9t/ha
- He aims for 80 to 100 plants/m² and 500 heads/m²
- the wheat is about \$300 delivered with 12% protein
- Most of the grain is stored so can sell at an opportune time
- South island still imports wheat, as it is cheaper to get from Australia.
- Soil pH is 6 and he applies lime at 1t/ha
- It costs \$500 to put a well down, \$5000 for the license, and pumps 30litres/sec
- He crops the same amount of land every year. The remaining 180 acres is uncroppable
- He thinks that irrigation is the biggest pain in the arse (labour eg. 2hrs both in the morning and at night)
- He believes the biggest constraint is the markets.
- His pea crop will go 2t/ha and is under contract for \$600/tonne. They have a good return
- They had to spray for aphids
- White clover is \$5.50 a kilo and is under contract for 900kg/ha.
- As December was quite cold, then white clover won't yield as well
- Applies MCPA to stop it growing, which is then direct headed or mowed.

- If put reglone on it then it can become quite expensive
- White clover is most profitable crop. Can do a second year of it and maybe a third year as well but would regret it, as would have major weed issues.
- Spend \$200-250/ha on chemicals and he uses a lot of dims + fops as has a good rotation

Foundation for Arable Research (FAR)

Nick Pyke – CEO

- Average yields and tonnage for new Zealand
 - Wheat 7.8t/ha and 500 000 tonnes/year
 - Barley 7.0t/ha and 480 000 tonnes/year
 - Maize 10.8 t/ha and 150 000 tonnes/year
 - Pulses 2.5 t/ha and 120 000 tonnes/year
 - Herbage seed 20 000 tonnes/year
- Soils are recent alluvial that has been washed down from the mountain
- Huge variation in rainfall from year to year – ranges from 400mm to 750 mm
- Usually apply 4 to 5 applications of 40 to 50 mm of water (irrigation)
- FAR was established in 1995 and operates under commodity levies Act and they are in their 3 ref. – Farmers take a vote every 6 years to see if they still exist and they receive \$2 million from the government.
- They have a levy on combinable crops (0.8%)
- Its principally an applied research and extension organisation
- It was established because in the early 1990's the government looked at starting up a science and extension research organisation and if industries weren't going to do applied research and development then funding would be cut.
- They are responsible to New Zealand arable farmers
- They have 9 staff members that cover all of New Zealand.
- They have a member base of 2700 farmers and it's a bit of an issue getting around
- There are very few consultants in New Zealand. Farmers rely on chemical resellers, seed companies and even fertiliser companies for advice.
- Farmers are going through a cycle from 1992 where advice was free and presently not a lot of willingness to pay for advice.
- FAR works with a range of consultants but not as sponsors.
- FAR receives \$2 million in levies and \$800 000 to \$900 000 in grants from the government and \$700 000 leveraged.
- They are farmer controlled and accountable with a regional/national focus
- Independent and cost effective
- User targeted and timely
- Industry interaction
- Direct leverage 35% of total \$ invested
- Activities – research information collection, education, extension and advocacy.
- Research strategies – production efficiency, sustainable systems, meeting customer needs, and new products and services.
- Extension is critical
 - 20% of investment
 - information sent in the mail is still found to be most effective
 - 650 of 2700 have e-mail (phone lines are crap)
 - FAR conferences and field days (1 big conference/year focused on one crop type eg. wheat and 30 to 35 field days).
 - Workshops and discussion groups

- E-mail (crop action)
- Training courses
- Their site has a 3 year lease and is open to farmers at anytime with guide books available
- **Their interaction with Australia**
 - Disease management in cereals
 - Canopy management in cereals
 - Slugs IPM
 - Soil borne disease prediction
 - Wheat model
 - Extension (GRDC adviser updates/workshops/training courses.)
- **FAR funding needs**
 - Government investment
 - Reliance on commodity products
 - Innovativeness and capability
 - Options for new technology unique to New Zealand
 - Capitalising on previous farmer investments
 - Capitalise on new Zealand competitive ability
- **Future investments**
 - Innovative foods eg. snack foods and dietary needs
 - Smart seeds – eg. novel endophyte grasses
 - Plant extracts eg. high value oils
 - Smart farming – eg. integrated within farm electronics delivering cost savings
 - Novel pest management eg. decrease bird management costs and damages, IPM
- Birds are NZ number one pest. The real issue is the public's response to control measures.
- They use a number of products that aren't registered for use on birds but they get a permit to do so
- Sparrows and finches are the worst.
- 20% of research investment goes into hard core science
- 10% into running the place
- 20% into extension
- Other potential areas of investment
 - Water resources, water needs, water management
 - Rate and fate of nitrogen in crops and environments
 - Grain legume feed quality and production
 - Low residue production systems – end users
 - Pollination of arable crops
- Burning is overshadowed by other environmental concerns such as water and Nitrogen
- Already considering how to make a better management tool for removal of stubble for when constraints do come in
- Thinks organic carbon levels are between 3 to 5% so not such an issue
- Dairy farming is relatively new as they are starting to move down here as the land in the north is a lot dearer – the water rules will be changing as they use too much
- Spray topping – residues on grain is an issue

- They have determined that there is no benefit from putting fertiliser on peas but fertiliser companies have argued against that, so its hard to get the message across.

FAR Main Research Site

Anton Nicholls – Extension Agronomist

- Has 3 field days a year (250 people plus)
- Open gate policy with a site handbook with trial descriptions
- 10 and a half ha site with a 3 year lease
- silty loam 0-30cm and then clay loam from 30-60cm
- weedy site
- Anton manages the site and most of the work is contracted out
- 1 demo site with no reps – not enough information
- main trial is dry land vs irrigation (linear) – irrigation receives an extra 140mm than dry-land
- uses annual ryegrass to soak up any differences between irrigated and dry land
- last year dry land wheat yielded 4t/ha and irrigated wheat yielded 8t/ha but there was a dry finish
- Incorporates silage cuts in the trial
- grows buckwheat, barley, lentils and chickpeas
- no economical aspect involved in comparing irrigated vs dry land
- applying Amistar Xtra to soil to treat take all – foliar spray before incorporation
- 3 new milling wheats with sprouting resistance

Simon Osbourne

No-Till farmer

- 4th generation farmer
- 35ft above sea level
- artesian water – couldn't live without
- GSR is from sept to early Jan
- Previously a cattle farm, highest OM 15%, currently the farm is 7-8% OM
- Naturally acidic to neutral soil (5-7), he applies lime > 6.
- He believes the most important nutrient/mineral is carbon. Carbon stores water and takes a long time to build up and is very easy to lose
- Stopped growing peas – header and machinery doing too much damage to soil
 - When soil is moist – machinery gets bogged and create furrows.
 - Seed peas better condition, no such a problem
- Won't put any heavy machinery on farm when wet
- Doesn't use controlled traffic
- Stubble management – chopped
 - Aims for 0.5 to 1% screenings
 - Screenings absorb water – heap of green feed in header trail.
- No known resistance. High OM, higher absorption of chemical – higher residual effect
- Very few 'No-Till' farmers around his area.

Crop Component

Fertilisers – 1500kg fertiliser (Cropmaster 15:10:10:8), keep linseed going

- Linseed – spring coming from grass – N low
- Milling wheat – 400kg coming into spring – then 100 to 150kg Urea at GS39

- 1tonne/ha lime on wheat stubble

Chemical

- 3kg Roundup Dry + 10g Ally (Escort)
- going on wheat – 3kg R/up dry, grass or broadleaf 0.5kg/ha Bladex
- disease – 440ml/ha Folicur
- Paul Barclay: Finds Bladex applied to light sandy soils to be all right on pulses but bad on crop!
 - Possible leaching.

Water Resources

- Three aquifers in soil
 - 1st aquifer – water reserve – polluted with Fe and chemicals
 - 2nd and 3rd – beautiful
 - dairy farmers – big water issue – no conservation of water
 - aquifers on verge of being over utilised

Limiting factors

- Weather (not rainfall) at the right time – contrary to Jim MacCartneys (marketing)

Bio-Till Seeder

- 11ft wide
- Accordia drill system
- weight in bar itself, not points
- no fertiliser with drill, spreads fertiliser on top
- like to keep base nutrients up
- to drill 12inch rows – take off back two cultivars, wider row spaces for crops such as radish
- Low maintenance – no in paddock changes
- Original points – no real damage to points
- Easy to get parts
- 240 ha cropped, Warterton shallow clay loam, family farm since 1864, no-till since 1976, conservation agriculture since 1994
- Conservation agriculture is where there is no mechanical soil disturbance with permanent soil cover (with residue or cover crops), appropriate crop rotation
- Strong belief in family farming philosophy
- 4th generation (1989): started in survival mode, recession in 1980's, and long-term view to develop conservation agriculture and machinery. Re-establish native tree planting's, starting to see long-term benefits of conservation agriculture, focus on reducing energy and capital inputs. Learning and developing integrated weed, pests, and disease management systems.
- Problems with system include weed control cycles, cold wet soil in the spring, water resources, and low inflation, high dollar, interest rates, and capital value of land relative to returns

Soil - Carbon

- Basic and most important non-mineral component
- Takes a long time to accumulate, short time to break down
- Basic food source for soil bacteria
- Dictates soil properties – soil strength to resist erosion, trafficking, leaching, CEC, chemical sorption and water holding capacity
- Soil biodiversity – bacterial, fungal, fauna,

Soil – carbon storage

- Soils will sequest carbon
- Maximum levels are soil type dependent
- Time from cultivation to maximum storage is around 30-50 years

- Agriculture's contribution to carbon released into atmosphere due to human activity is 20-25%.
- During 19 days after ploughing, C loss as CO₂ accounted for 134% of C in previous wheat residue
- We have huge C storage potential in our arable soils

Crop rotations

- Physical – level of residue, crop type (ie. rooting depth, ability of crop to push through residue, predators, disease cycles, hard seed, cost of pest, weed and disease control)
- Decay cycles eg. white straw (high C:low N) to legume (high N:low C)
- Role of burning in less desirable rotations
- Mineral value of straw
- Carbon value of straw – valuable soil mineral resource - 1cm of mulch reduces surface evapotranspiration by 90%

Pest management

- Bio-diverse shelter belts, gorse fences, protecting habitat for over-wintering of insects will have a significant impact on aphid, springtail and slug populations
- Avoid use of Ops
- Strategic, targeted chemical control

Monitoring is most important tool

FAR Insect Pest R&D

Gill Carr – Project Officer

IPM – aphids – slugs

- Avoid putting chemical on aphids which cause death of naturally occurring slug predators
- Study showed – earwigs increased with chemical control for slugs

SLUGS – peaks coming up to spring and autumn – use label rates (worth money)

- Grey slugs can lay up to 2000 eggs
- Bare-earth sprays will knock everything out
- Dry season in Australia, good period for control
- NZ – no good break for control – ISSUE!

EARWIGS – no label control

- Peter Taylor: Lorsban – oil – put on cracked wheat EDTA baits working well, used in Australia – not available in NZ.

Eric Watson

- 490 Ha that is mostly arable and 30 ha not irrigated
- grows 1/3 wheat, 1/3 ryegrass/fescue, 1/3 break crops (peas, spinach, linseed, radish)
- In some of the break crops its hard to control weeds
- The high quality milling wheat isn't looking good this year
- 600mm rainfall
- a dry year is better as can control water supply through irrigation
- Fescue is good crop as has multiple uses – get seed, silage, and graze
- Pulled out of growing onions as too risky
- He has 3 wells and has to pay for electricity and a license fee but not the amount
- Crops require sunshine hours
- Had bad stripe and leaf rust and a bit of septoria
- Doesn't use jockey

- Has later applications of N (GS32). Can shift it back to GS39 but if delay to long with wheat on wheat can be disastrous
- Canopy management has improved yields by 1 to 2t/ha along with soil testing during growing season
- Weather is the biggest constraint, as you can't control it. Modern management techniques can help
- Marketing is another constraint – options of which crop to grow on what land and management
- No succession planning
- Have grazed lambs occasionally but not a stock person. Requires fencing and a lot more work
- Meat companies bring cull cows for about 6 weeks and they feed them silage, etc.
- Wheat at about 17% moisture can dry in about 36 hours in drying shed. Cost about \$18-19 tonne
- Its very good at drying small seeds
- Does contract drying
- Cost \$250000 to build a drying shed but he turn-over \$100 000 with it last year
- variable costs on chicory are higher than wheat

Ryegrass

- Cut at about 40-45% moisture
- 220kg/N plus 3 fungicides and a growth regulator
- should yield slightly more than 1800 kg
- \$1.90 /tonne contracted

Pak choy

- Had primrose issues – (bad for header)
- It's a speciality seed that will go back to Asia
- Hopefully yield about 400 kg and sells for \$8 to \$9/kg
- Had 100 kg/N

Advanced Tall Fescue

- Ranges in yield from 300 to 1100 kg
- Already harvested it and it will now be irrigated for silage
- 300 kg/N applied

Crop sequence trial on Eric's farm

- Autumn sown wheat
- 10 years ago, used to sow in winter
- wants to determine how one crop affects the next
- 5 different break crops eg. grass, linseed, brassica, peas, barley
- run this piece of land for 3 years and look at the effect of the following wheat crops
- look at break crops and see how it affects first wheat than 2nd wheat crop
- can see where they had spring barley as crop is noticeably shorter and noticeable take-all
- 2 contractors employed to do the soil analysis and tiller counts, etc.
- herbicide application is biggest problem due to spray drift
- nitrogen is biggest constraint due to having to ensure spreader doesn't spread into wrong area as otherwise 3 years down the drain
- water constraints due to irrigating so yield might be a bit below

Craig McKenzie

- 900 mm rainfall but can still be very dry though

- Handling sheep became an issue and so got rid of breeding stock and went into trading lambs. Then brought shares in irrigation scheme and got rid of all sheep
- 1/3 in wheat, 1/3 in ryegrass and 1/3 in the rest
- 14.7t/ha is their best crop
- They budget on 8t/ha but should go 10t/ha. It's a combination of milling and feed wheats
- marketing is really hard – trying to decide what milling wheat to grow when milling companies wont make up their minds about premiums, etc
- ryegrass PTY LTD is grown under contract
- Carrots are also grown under contract under a tier contract so you get top price (eg. \$30) for the first amount (eg. 200 kg) and then price decreases for next 200kg to \$17. Onions and radish same
- Has grown hemp for 4 years
- Peas and white clover grown under contract
- Farmers are a lot tougher, sharper and hungrier since 1986 and 1987 since they lost their subsidies and a lot of farmers had to sell up as they went broke. Banks screwed over a lot of farms
- Yields have increased because of varieties and new technologies have helped along with information from England. Understanding canopy and nitrogen management has also played a big part
- Wheat calculator still only a management tool.
- A lot want irrigation but can't get it, not as many in this area
- \$3000/ha for irrigation shares – limited to 2 shares per Ha
- \$113000 to put pivot up
- Entitled to 24 L/sec and can pump as often as you like. Restrictions will come in soon
- \$8500/acre for dry land but a lot of variation around.
- Irrigated intensively to keep out second growth and to maximise yields (due to 3 dry wk's).
- Major limitations is still seasons
- Cultivation methods – doesn't stick to any particular system otherwise get caught out with weeds or conditions
- Carrots \$2000 to \$3000/ha to grow them and are contracted out. Limited by the varieties and requires a 2 km isolation barrier. However they are also the most profitable
- \$692/ha is estimated costs for wheat. Receives \$250 for feed wheat and \$320 for milling wheat if quality right. Not less than 10.5% protein
- penalised \$18 per 1%
- July or oct/nov best time for holidays
- 1800 lambs and 100 2/3 year old cattle. Makes \$50 profit in those lambs and only here for 5 to 6 months.
- Use growth regulators to keep ryegrass on its feet and can also be frost affected.
- Nick Pykes trial
 - Grass weeds an issue in cereals
 - Autumn wheats so less time to get rid of weeds between one crop and the next
 - Minimum cultivation and sown one month later resulted in less grass weeds as by delaying sowing allowed spraying and cultivation
 - Soft brome harder to manage than sterile
 - There was a high number of ryegrass plants in no-till system
 - As they have animals in the system, there is a lower risk to herbicide resistance but the risk is being under rated in New Zealand and farmers are

putting their head in the sand. Chemicals don't even have group names on containers.

- Glean being used 2 out of 5 years so next 15 years should be interesting
- Newer varieties are prone to lodging and it comes back to sowing date and rate
- Aims for 400 to 600 ears/m²
- Grew triticale because safer from take all

Hemp

- No one allowed at all in the field due to license and customs
- Used in salad oils and has lots of other uses
- Will yield about 800kg and pays \$3.50/kg
- Sowed in October and harvested at end of Feb so is usually 120 day crop
- Has a huge taproot and so don't have to water
- The new baler didn't arrive so had to burn stubble and it burns red hot

Carrots

- Male and female hybrids. Males can be trimmed so flowering at same time for pollination
- Pollination is extremely important and requires hot sunny weather
- Requires 6 bees/ha
- Also requires 2km isolation barrier to prevent cross-pollination
- Poppies isn't an option as market is too tight

Onions

- Seed – bulb – seed production
- Bulbs grown elsewhere and transplanted here
- Potato planter puts them down and then go along and place upright by hand
- Hand harvested – snap of flower on top, put them in barrels and then dry
- \$1500 to \$1700 to pick 1.7ha of onions
- potential yield of 500 kg/ha at \$30/kg
- Costs \$4000 to grow so just under \$10000/ha profit
- Limitations is labour for harvest and weather (hail and downy mildew).

John Wright

Feed mill and seed processing

- Industry is heading towards central cleaning
- Cleans his own seed and just started outside work
- 8 staff on operation side and 2 on arable side
- Join with a group from North Island
- Fell through because they lacked marketing skills
- Now, does his own marketing
- Output is 900t/year
- Machinery comes from the states (USA)

Pellet production

- They can make what ever nutrition mix you require
- Have difficulties getting pellets high in fibre to form nice pellets
- All computer operated – type in the mix you require, fill the bins with the right product and hey presto!
- Pellets are formed by a drum which has holes or pellet shape depressions which when the product spins the pellet mix is forced to the outside of drum filling those holes – compacting the pellets then dropping out to produce the pellets

- Typical cow pellet will contain wheat, barley, linseed, peas and molasses plus watties waste products such as dehydrated beans and carrots

Frozen Peas

- Break crop
- Main market – Heinz beans and watties
- 25ha sown to it
- 4th year
- have to get contract to grow and contractors come harvest
- sowing time usually push late due to contractors
 - sowing date 1st week November and harvest end of first week in February (4 month crop)
 - atrazine (2L) required for weed control – applied just after sowing
- environmental pressure from atrazine usage and movement into waterways
 - atrazine found in waterways from use on maize crop
- contractors can often arrive too late to harvest them
- if peas are left too late it will become too dry for winter feed
 - 65% return on initial return and get to keep dry peas
 - store and clean in feed mill
- Frost not a problem

Crop and Food Research

Bill Griffin

- Government owned Independent Company with its own board of directors.
- Had a revenue of \$36 million in 2003
- 58% of income is from government funded research programs
- 370 staff based at 8 locations and 2 in Australia
- Capabilities + partnerships = results
- HRZ wheats
 - Developing milling quality wheats for high rainfall areas
 - Longer season varieties
 - Higher disease pressure and prevalence of additional diseases
 - Pre-harvest sprouting conditions in some areas
 - Yields are even more spectacular this year (about 8 to 9 t/ha previously)
 - Quality is looking good also. Maintaining Australian hard
- Future
 - Large number of lines entering multi-site trials in coming seasons
 - Focus on HRZ as main commercial breeding target at crop + foods
 - Spin off germplasm with added value traits for New Zealand industry
 - By 2009 looking at having 200 000 tonnes in production

Dairy Research Farm

Peter Gaul – Farm Manager

- Linear irrigation
- Lucky to have such good ground for research
- Pastures are made up of 50% Ryegrass: 50% clover
- Main issue: getting cows back into paddock after 21 days
 - Supplement left over pasture
- Water (irrigation) rate = 6mm/day
 - Irrigation consultant use to get correct water rate
 - Aquaflex – cable in ground, connected to a computer measures moisture

- Will irrigate during day (evaporation?) – depends on droplet size
- Will measure effluent and/or water contamination
- Water flow (natural) from one side to the other
 - Measure the effect the farming operation has on water quality
 - Aims to improve water resource
- Olsen P used to be 10 to 15.
- OM 5-6%
- When the farm was bought – trees had been removed. Cows need some kind of shelter
- Available DM not including stock damage. 15-20% stock damage
- cows eat all day, sleep 8hrs
 - 8 to 10hrs sleep – ruminating 24hrs
 - \$500/cow/yr cost
 - Owner looking at \$300 to 400/day net profit per cow

Lincoln University Environmental Research

Keith Cameron - Researcher

- Environmental Issue – more regulations here than in Australia
 - Aims to decrease environmental impact and improve productivity
- Lysimeters use to measure water coming in to the farm and off the farm to measure the effect
 - Installed in 2001
 - They can be grazed, urinated and irrigated upon without damage
- University – got to have various soil types on site to study farming systems
 - Shallow sandy soils, sandy soils, clay (heavy) soils
- Drainage pipes installed to measure effluent on different soils
- Effluent measurements too early to have conclusive evidence
 - No effluent found – maybe a time issue
 - Transfer time 2-3yrs
 - Shallow sandy soils – later
 - Deeper sandy soils – earlier
 - Collect urine > pour on ground > measure leaching
- Drain pipes – 5 metres wide, collects 100sq metres
 - Gauge = 0.2mm accuracy – tips when gets to 2L
 - Counter records how many tips
 - Water is automatically sampled

Nitrification inhibitor "Eco-N"

- Maintains N in soil by activating or converting N to NH_4^+
- Kept N in soil by organic matter + clay because of it's slightly positive charge
- Sprayed in Autumn and Spring to avoid (reduce) nitrate leaching in winter

Wrightsons Seeds

Warrick Green - CEO

- Originally set up around arable farming but its broader now and includes being a plant breeder of forage grass for global markets
- One base here and 2 in Australia
- 25 permanent and 30 casuals all with tertiary qualifications
- privately funded - wrightsons
- Leading forage grass breeders but also do turf grass, forage brassicas and peas. Don't do any cereal breeding here but in Australia we do

- annual budget – non-biotech is around \$4 to \$5 million
- have an interest in forage biotechnology and also in livestock
- they breed for agronomic traits but also in terms of animal performance and productivity
- they do all the quality control, stock seed control and multiplications
- they are involved in introducing winter grain wheat into high rainfall areas
- initiated a breeding program for screening for stripe rust
- Deal directly with the maltster.
- Do a lot of contract work (breeding programs and seed quality control) where they do the selections
- 70% of their work is private and 30% collaborative with AgResearch, Crop and Food and FAR
- 50% is spent on pastoral sector – forage grass breeding and evaluation
- 20 to 25% is spent on arable crops, peas and cereals
- 25% is spent on quality control and maintenance, etc
- stripe rust is a bigger issue than stem rust
- multigene resistance in New Zealand
- white clover seed production is big here
- 10000 tonnes of PTY LTD seeds but New Zealand always has a shortfall

Nick Brooks - Research Manager

Ryegrass

- Two plots of each variety next to each other, with and without modus (a plant regulator)
- Modus makes the stem stronger and has a 30% increase in plant production
- Sown 10 kg/ha of ryegrass seed and grazed through winter
- 50 units of Nitrogen applied when soil temp was 6 degrees. Another 50 units of nitrogen at stem extension.
- Modus timing is critical and is usually when first ears are emerging. Only 1 fungicide application
- Harvested when moisture was at 45% and yielded 3.2 t/ha with modus. Plots without modus yielded only half that
- Modus can work a little bit in cereals but at very low rates. There is no significant response in cereals but maybe could be used to combat lodging in cereals. In ryegrass it thickens and shortens the stem, has better pollination, more spikelets, shortens the ear and can stand up a lot longer.

Cereals

- Screens and evaluates material from overseas so actually breed here
- When there is a new variety, it is grown in a single plot and then replicated They have thousands of plots so in first year don't look at yield just consider agronomic traits
- After quality is analysed in the 2nd/3rd year in replicates, then consider yield
- Grown over a number of sites to see performance in various climates
- Do quality testing themselves but very expensive so they are selective about which ones get tested
- They have been getting 10 t/ha for milling quality wheat, which is unusual but not unusual for feed wheats. They receive \$240 for feed wheats compared to \$300 for milling so starting to stress a few people.

Crop and Food Research

Trish Fraser - Soil Scientist

- Her main aim is to look at soil organic matter and define it
- Combination of autumn and spring tillage treatments incorporating:
 - Conventional tillage: mouldboard plough (20cm) plus maxi-till, grub, harrow and roll x 2
 - Minimum tillage: maxi-till (grub, harrow and roll) x 2
 - No tillage
- Move away from intensive tillage
- Zero till tends to have a lower yield but it isn't significant. It also takes 2 weeks longer to mature which has to be a result of moisture as nothing else is limiting.

	Barley 2000/2001	Wheat 2001/2002	Peas 2002/2003	Barley 2003/2004	Peas 2004/2005
Conventional	10.8	7.9	5.2		
Minimum	10.2	8	5.9		
No-tillage	10.5	7.5	5.3		

- Not a big problem with rabbits but birds and slugs are bad. The grass in the laneways could be an issue
- The soil OM is the main focus but at the same time they are gathering information about yield and diseases.
- Also measuring soil structure and water storage, soil chemical fertility, earthworms and slugs, in addition to crop establishment and performance
- All straw residues returned to each plot, brassica cover crops and pasture plots grazed by sheep

Derek Wilson

- There has been irrigation trials since early 1970's
 - Have been experimenting with putting stresses (water) on trials to get an idea of how a crop can handle stress. Gain a greater knowledge of their responses
 - Water shelter responses to rain sensors – the shed will move and cover the crops from rain, making it possible to manipulate the amount of water the crop receives. A half an hour after a rainfall event, the shed will return to its resting spot.
 - Cost \$250000 and weighs 14 to 15 tonnes, covers 200 metres and the shed is 75 metres long
 - Experimenting with peas, sweet corn, and white clover
- The important key aims to quantify is:
- Water use
Growth rate to mm – WUE
- Yield loss depending on amount of stress applied (severity)
 - Disease isn't a problem as irrigation is flood or drip – no moisture on the leaf
 - Sandy mixture of soil so no waterlogging
 - Can only cultivate in one direction
 - Rooting depths
 - Wheat 1.5m
 - Maize 1.5 m
 - Peas 1.0 m
 - Even with no irrigation, the wheat still yielded 3.5 tonnes and the peas 3 tonnes
 - When irrigating the aim is to get the best overall economic return per mm of irrigation through optimum allocation of water across a range of crops

Key rules and principles for irrigating crops for maximum profit

- Match good irrigation management with good management of other inputs. Eg. ideal irrigation must be combined with good fertiliser management and disease & weed control

- Start irrigating early
- Irrigate when the soil moisture deficit (SMD) reaches the 'refill point'.
- The 'refill point' differs among crops and soils. It is larger for crops with deeper root systems and for soils with heavier textures
- Small frequent irrigations are better than large infrequent ones
- Yield losses occur whenever the refill point is exceeded – arable crops lose from 1 to 3 % of yield for each 10mm of SMD over the refill point
- Give priority for irrigation to the best crops
- Don't stop irrigating too early. Consider these facts
 - The length of grain fill is usually about 40 days
 - At an average ET of 5mm/day, crops need about 200mm of water
 - Yield is reduced by about 1 t/ha for every 4 or 5 days that grain growth is shortened by water deficit. Also, quality is reduced due to smaller grain size and increased screenings
- WUE wheat is 25-35kg/ha/mm
- Best combination for growing is cool but sunny over a long period
- Sunlight is an issue – NZ potential not achieved as they get enough water but not enough sun
- Cultivators with longer growing season – want flowering in December, growing in Jan and Feb

South Island Dairying Development Centre (SIDDIC)

- 180 ha Lincoln university farm underwent a \$1.6 million conversion to dairying in mid 2001.
- The farm is irrigated by 2 centre pivot irrigators and divided into 21 paddocks.
- 650 cows and a milked through a 50 bail rotary dairy
- changes in concentration and movement of nutrients are being measured in free-draining and slow-draining soils
- they are aiming to protect the environment by developing farm management strategies that will minimise the leaching of nutrients into aquifers and waterways
- Changes in nitrogen, phosphorous, and microbial content of the unconfined aquifer are being monitored through a series of wells to a depth of 15m.
- issues that SIDDIC are focussing on are:
 - the efficient use of irrigation and fertilisers
 - sustainable, profitable farming
 - best practice management systems
 - environmental protection
 - forage production, storage and utilisation
 - milk production and quality
 - increasing on-farm product value
 - meeting the industry's productivity targets
 - attracting top people to the dairy industry
 - skills training for dairy farm workers

Quotable quotes

Bomber: "I'm on drugs, I need another shot of distillate!!!"

Kate: " Just a quick hour at the pub" (2am which turned into 5:30am)

Stuart W: "You haven't had much experience then have you!" to Kate

Bomber: "Geez! Friendly neighbours you've got."

Bomber: "Forty points is the difference between a cocky and a swaggie."

Joan: "If I was twenty years younger."

Bomber: "Wear the fox hat."

Oxy/Pete T: "The phone must be on vibrate."

Rodney: "Is that water or the sky below us?"

Rodney: "I've just wet myself."

Kate: "I'll just duck in here and get something to eat" and comes out with a 6 pack of beer.

Improvements or changes for the next trip

- All must be home no later than midnight
- Two free afternoon sessions instead of a full day
- Mix around the motel accommodation and billets
- The mix of farms and research was good
- Good idea to go to a farm first
- Have a list of trip participants and their mobile phone numbers
- List of accommodation details including name, address, and phone number of motel/billets.
- Key contact and phone numbers of principle host or organisation for each participant
- Visit something non-agricultural
- Meet before the trip or e-mail people to help them with ideas or concepts on what the trip is about
- Book accommodation earlier and closer to town
- Have a bit more night/dinner social activities planned eg. ten pin bowling/movies/theatre etc
- Start to plan next trip now....