32nd Annual FLRC Workshop

Nutrient Loss Mitigations for Compliance in Agriculture

12th, 13th and 14th February 2019

Agricultural and Horticultural Sciences Lecture Block
Manawatu Campus, Massey University, Palmerston North, NZ

The following organisations have given financial support to this event:

AGMARDT, Ballance Agri-Nutrients, DairyNZ,
Waikato Regional Council, AgResearch,
Analytical Research Laboratories, Ravensdown,
Horizons Regional Council, Hill Laboratories, NIWA,
Nutrient Management Adviser Certification Programme,
Foundation for Arable Research
and Eurofins NZ Laboratory Services.

We are grateful for this support that allows for presentations by invited speakers, involvement of students from several universities and enables registration costs to be kept to a minimum.
Provisional Programme

Tuesday 12th February

0915-1000  Registration and Morning Tea

1000–1010  WELCOME
           Professor Chris Anderson
           Acting Director, Fertilizer & Lime Research Centre, Massey University

Session 1 : International Frontiers

1010-1035  Jenny Deakin  Invited Speaker
           Environmental Protection Agency, Ireland
           THE KEY WATER QUALITY ISSUES IN IRELAND AND THE IRISH EPAS RIVER BASIN MANAGEMENT PLAN

1035-1100  Katie Flahive  Invited Speaker
           U.S. Environmental Protection Agency, Washington D.C.
           NUTRIENTS AND WATER IN THE UNITED STATES: OPPORTUNITIES AND CHALLENGES TO ADVANCE WATER QUALITY

1100-1115  Flemming Gertz  Invited Speaker
           SEGES, Denmark
           ENGAGING FARMERS IN ENVIRONMENTAL MANAGEMENT IN DENMARK

1115-1130  Peter Thorburn et al
           CSIRO, Brisbane, Australia
           “DIGITAL AGRICULTURE” HELPING FARMERS REDUCE IMPACTS OF CROPPING ON THE GREAT BARRIER REEF

1130-1145  Alessandro Aduso
           Ministry for Primary Industries, Wellington
           LEAP – A GLOBAL TOOL TO SUPPORT NEW ZEALAND SUSTAINABILITY

1145-1200  Discussion

1200-1300  Lunch
# Session 2: Environmental Challenges for Agriculture

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<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tr>
<td>1300-1320</td>
<td>Lee Matheson, Invited Speaker</td>
<td>WHAT ENVIRONMENT MANAGEMENT CHALLENGES ARE FACING NORTH ISLAND PASTORAL FARMERS</td>
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<tr>
<td>1320-1340</td>
<td>Andy Macfarlane, Invited Speaker</td>
<td>WHAT ENVIRONMENT MANAGEMENT CHALLENGES ARE FACING SOUTH ISLAND FARMERS</td>
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<td>1340-1400</td>
<td>Dan Bloomer, Invited Speaker</td>
<td>WHAT ENVIRONMENT MANAGEMENT CHALLENGES ARE FACING INTENSIVE VEGETABLE PRODUCTION</td>
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<td>1400-1420</td>
<td>Rich McDowell, Invited Speaker</td>
<td>CURRENT AND FUTURE CHALLENGES IN LAND AND WATER SCIENCE</td>
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<tr>
<td>1420-1435</td>
<td>Discussion</td>
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<td>1435-1445</td>
<td>Poster Papers</td>
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**Joel Gibbs**  
*Ministry for Primary Industries, Wellington*  
**INSIGHTS AND ANALYSIS FROM THE 2017 AGRICULTURAL PRODUCTION CENSUS**

**Hendrik Venter**  
*Ravensdown, Napier*  
**WHOLE FARM SOIL TESTING: SOIL FERTILITY TRENDS OVER TIME**

**Miles Grafton, T Kaul, A S Palmer and P A Bishop**  
*School of Agriculture & Environment, Massey University*  
**USING PROXIMAL HYPERSPECTRAL SENSING TO MEASURE SOIL OLSEN P AND pH**

**Jonas Rolighed**  
*Aarhus University, Denmark*  
**A SIMPLE LANGMUIR-BASED MODEL TO PREDICT PHOSPHORUS LEACHING FROM THE SOIL MATRIX**
Ian Ferguson  
Viable Agriculture Ltd, Ashburton

THE EMPLOYMENT OF IN-SITU MEASUREMENT OF SOIL MOISTURE AND NUTRIENTS AT DEPTH UNDER CONSECUTIVE CROPS OF WINTER GREEN FEED IN A TYPICAL DAIRY SUPPORT OPERATION ON LISMORE SOIL

1445-1515  Afternoon Tea

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**Session 3 : Regional Policy Initiatives**

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1515-1530  Iain Maxwell  
*Hawkes Bay Regional Council, Napier*  
UPDATE ON POLICY ROLLOUT IN THE HAWKES BAY REGION

1530-1545  Leo Fietje  
*Environment Canterbury, Christchurch*  
UPDATE ON POLICY ROLLOUT IN THE CANTERBURY REGION

1545-1600  Kate Proctor  
*Horizons Regional Council, Palmerston North*  
ONE PLAN – INTERIM FIXES AND LONG TERM SOLUTIONS

1600-1615  Mark Gasquoine  
*Waikato Regional Council, Hamilton*  
UPDATE ON POLICY ROLLOUT IN THE WAIKATO/WAIAPA RIVER CATCHMENT

1615-1630  Graham Sevicke-Jones  
*Environment Southland, Invercargill*  
UPDATE ON POLICY ROLLOUT IN THE SOUTHLAND REGION

1630-1700  Panel Discussion – including commentary by farmers

1700  Day One concludes
Wednesday 13th February

Session 4 : Reducing Agricultural Emissions

0840-0850  Joel Gibbs  
*Ministry for Primary Industries, Wellington*
FERTILISER EMISSIONS IN THE GHG INVENTORY

0850-0900  Jacqueline Rowarth, M Manning et al  
*Agri-Environment Analyst, Tirau*
NITROGEN AND CARBON INTERACTIONS

0900-0910  Donna Giltrap, M Kirschbaum, J Laubach and J Hunt  
*Manaaki Whenua – Landcare Research, Palmerston North*
MODELLING THE IMPACTS OF IRRIGATION ON CARBON BALANCES IN A GRAZED DAIRY PASTURE

0910-0920  Roberto Calvelo Pereira  
*School of Agriculture & Environment, Massey University*
FULL INVERSION TILLAGE PASTURE RENEWAL OFFERS GREENHOUSE GAS MITIGATION OPTIONS: THE MANAWATU EXPERIENCE

0920-0930  Sam McNally  
*Plant & Food Research, Christchurch*
FULL INVERSION TILLAGE PASTURE RENEWAL OFFERS GREENHOUSE GAS MITIGATION OPTIONS: THE CANTERBURY EXPERIENCE

0930-0945  Discussion

0945-1000  Poster Papers

Ranvir Singh, N Jha, M Gonzalez and A McMillan  
*Fertilizer & Lime Research Centre, Massey University*
MEASURING DENITRIFICATION IN SHALLOW GROUNDWATER

Kamal Prasad Adhikari  
*School of Agriculture and Environment, Massey University*
EFFECTIVENESS AND LONGEVITY OF THE UREASE INHIBITORS 2NPT AND nBTPT IN REDUCING NH₃ EMISSIONS FROM CATTLE URINE APPLIED TO PASTURE SOILS

Selva Selvarajah  
*Enviroknowledge, Dunedin*
THE CHEMISTRY OF AMMONIA LOSS FROM UREA IN SOIL TO BETTER INTERPRET AND STREAMLINE AMMONIA VOLATILISATION RESEARCH – A CRITICAL REVIEW
Session 5: Reducing Nutrient Loss to Water

1030-1040 Jamie Thompson
Ravensdown, Christchurch
CLEARTECH – A TECHNOLOGY SET TO CHANGE EFFLUENT MANAGEMENT

1040-1050 Brian Ellwood
Lowe Environmental Impact, Christchurch
INTEGRATING BIOSOLIDS AND WASTEWATER AS A SOIL AMENDMENT INTO NUTRIENT BUDGETS AND THE ASSOCIATED ENVIRONMENTAL MANAGEMENT CONSIDERATIONS

1050-1100 Rachel Durie, K Woodford and G Trafford
Lincoln University, Canterbury
NUTRIENT LOSSES WITHIN FARMING SYSTEMS THAT INCORPORATE A COMPOSTING BARN: THE CURRENT STATE OF KNOWLEDGE

1100-1110 Jacqueline Rowarth, M Manning, A Roberts et al
Agri-Environment Analyst, Tirau
RIGHT P FERTILISER, RIGHT PLACE, RIGHT TIME
1110-1120  Ian Williams, R Densley and P Beukes  
*Genetic Technologies, Hamilton*  
DEDICATED CROPPING BLOCKS WITHIN DAIRY FARMS: USING KNOWN MITIGATION STRATEGIES AT A FARM SYSTEMS LEVEL

1120-1130  Peter Carey, B Malcolm and S Maley  
*Lincoln Agritech, Christchurch*  
CATCH CROPS TO MITIGATE N LOSS AFTER WINTER FORAGE GRAZING: FROM PLOT TO Paddock

1130-1140  Pip McVeagh, D Bloomer and G O’Brien  
*LandWISE, Hastings*  
OPPORTUNITIES TO REMOVE NITRATES FROM DRAINAGE WATER UNDER INTENSIVE VEGETABLE PRODUCTION

1140-1150  Mark White  
*National Winner of the BFEA, Bay of Plenty*  
GROWING KIWIFRUIT WITH AN ENVIRONMENTAL FOCUS

1150-1205  Discussion

1205-1230  Poster Papers

**Nicole Wheadon**  
*Ravensdown, Christchurch*  
EFFLUENT NUTRIENT MANAGEMENT - USING CLEARTECH TO REDUCE MODELLED NUTRIENT LOSSES AND ENVIRONMENTAL RISK

**Anne-Maree Jolly**  
*WSP Opus, Palmerston North*  
BORIS AND HIS FOUR FRIENDS ADVENTURE TO PINEDALE: MEASURING NUTRIENT LOSSES FROM DAIRY FACTORY WASTEWATER APPLICATION AT LAND

**Vicki Burggraaf**  
*AgResearch, Hamilton*  
MEETING NITROGEN DISCHARGE ALLOWANCES ON A ROTORUA DAIRY FARM VIA FEEDING AND MANAGEMENT STRATEGIES

**Hannah Stalker**  
*DairyNZ, Otago*  
HOW FARM ENVIRONMENT PLANS CAN INCREASE GOOD MANAGEMENT PRACTICE IN OTAGO

**Gere Geretharan**  
*School of Agriculture & Environment, Massey University*  
CONSEQUENCES OF FLUORINE (F) ACCUMULATION IN ALLOPHANIC SOIL
Nilusha Ubeynarayana  
*School of Agriculture & Environment, Massey University*  
**INFLUENCE OF SOIL Cd LEVELS ON ROOT EXUDATE SECRETION IN CHICORY AND PLANTAIN**

Abhiram Gunaratnam  
*School of Agriculture & Environment, Massey University*  
**ASSESSMENT OF NITROGEN FERTILISERS UNDER CONTROLLED ENVIRONMENT – A LYSIMETER DESIGN**

Jim Risk and A Dawson  
*Ballance Agri-Nutrients, Tauranga*  
**COMPARING FINE PARTICLE AND GRANULAR NITROGEN RESPONSE ON SOUTHLAND PASTURES**

Aimee Dawson, P Turner and D Gorrie  
*Ballance Agri-Nutrients, Tauranga*  
**THE EFFECT OF CONTROLLED RELEASE NITROGEN FERTILISER ON PASTURE PRODUCTION ON TWO DAIRY FARMS IN WHATAROA, SOUTH WESTLAND**

Lamis Javid  
*University of Auckland*  
**ROLE OF BIOREMEDIATION IN NUTRIENT REMOVAL FROM RUNOFFS FOR LIGHT-WEIGHT MEDIA**

Kien Tat Wai  
*University of Auckland*  
**ROLE OF PHYTOREMEDIATION IN NUTRIENT REMOVAL FROM RUNOFFS FOR LIGHT-WEIGHT MEDIA**

Dilieka Weerakoon  
*University of Auckland*  
**INORGANIC NITROGEN CONTAMINANT REMOVAL FROM AGRICULTURAL RUNOFFS BY BIOMASS DERIVED ADSORBENT**

Jesus A Jimenez-Torres, C W N Anderson and P Jeyakumar  
*School of Agriculture & Environment, Massey University.*  
**THE EFFECT OF PHOSPHORUS IN GLYPHOSATE ADSORPTION-DESORPTION IN NEW ZEALAND SOILS**

1230-1330  **Lunch**
Session 6: Managing Critical Pathways

1330-1340 Ranvir Singh, A Rivas, S Collins, P McGowan and D Horne
Fertilizer & Lime Research Centre, Massey University
SPATIAL AND TEMPORAL VARIABILITY OF SHALLOW GROUNDWATER CHEMISTRY AND REDOX CONDITIONS IN THE TARARUA AND LOWER RANGITIKEI CATCHMENTS

1340-1350 Rebecca Eivers
Streamlined Environmental, Hamilton
CONSTRUCTED TREATMENT WETLAND DESIGN CONSIDERATIONS TO MITIGATE DIFFUSE POLLUTION FROM INTENSIVE AGRICULTURAL CATCHMENTS

1350-1400 John-Paul Praat, J Sukias, A Wright-Stow, A Bichan and A Perrie
Groundtruth Ltd, Te Awamutu
CHANGES IN WATER QUALITY THROUGH A CONSTRUCTED WETLAND ON A WAIRARAPA DAIRY FARM – MITIGATION IN ACTION

1400-1410 Brandon Goeller
NIWA, Hamilton
SEEING THE STREAM THROUGH THE BMP: LINKING THE IMPACTS OF EDGE-OF-FIELD NUTRIENT MITIGATION TO WATERWAY HEALTH

1410-1420 Aldrin Rivas, G Barkle, B Moorhead, J Clague and R Stenger
Lincoln AgriTech, Hamilton
NITRATE REMOVAL EFFICIENCY AND SIDE EFFECTS OF A WOODCHIP BIOREACTOR FOR THE TREATMENT OF AGRICULTURAL DRAINAGE

1420-1430 Neale Hudson, E Baddock, L McKergow, S Heubeck, C Tanner, J Scandrett, D Burger and A Wright-Stow
NIWA, Hamilton
EFFICACY OF A NITRATE-N WOODCHIP FILTER: TWO YEARS OF FIELD TRIALS

1430-1440 Brian Levine
School of Agriculture & Environment, Massey University
QUANTIFYING THE ABILITY OF DETAINMENT BUNDS TO ATTENUATE NUTRIENTS AND SEDIMENTS IN SURFACE RUNOFF IN THE LAKE ROTORUA CATCHMENT

1440-1455 Discussion
1455-1515  Poster Papers

Roland Stenger and A Rivas
Lincoln AgriTech, Hamilton
CRITICAL PATHWAYS: UNRAVELLING SUB-CATCHMENT SCALE NITROGEN DELIVERY TO WATERWAYS

Grace Chibuike and L Burkitt
School of Agriculture & Environment, Massey University
THE NITRATE ATTENUATION CAPACITY OF HILL COUNTRY SEEPAKE WETLANDS AS Influenced BY THE CONCENTRATION AND CHEMISTRY OF DISSOLVED ORGANIC CARBON

John-Paul Praat, A Wright-Stow, L Brown and L Burkitt
Groundtruth Ltd, Te Awamutu
EFFECT OF RANK GRASS BUFFER WIDTHS FOR REDUCING CONTAMINANTS FROM DAIRY-FARM LANEWAYS

Mette Vodder Carstensen
Aarhus University, Denmark
INTEGRATED BUFFER ZONES FOR DIFFUSIVE NUTRIENT REMOVAL: A DANISH CASE STUDY

Dave Horne and R Singh
Fertilizer & Lime Research Centre, Massey University
INNOVATIVE DRAINAGE MANAGEMENT TECHNOLOGIES

Sian Cass and H Lowe
Lowe Environmental Impact, Palmerston North
NUTRIENT MANAGEMENT STRATEGIES – HOW CAN YOU GET BEST BANG FOR YOUR BUCKS

Ewen Rodway
Environment Southland, Invercargill
PHYSIOGRAPHIC OF SOUTHLAND: USING SCIENCE IN POLICY TO EFFECT POSITIVE CHANGE

Phil McKenzie
Change for Good Consulting, Wellington
SUSTAINING POSITIVE PRACTICE CHANGE

Mike Beare
Plant & Food Research, Christchurch
NO-TILL ESTABLISHMENT OF FODDER BEET AND KALE TO REDUCE SOIL COMPACTION AND THE RISK OF N LOSSES FROM WINTER GRAZING

1515-1545  Afternoon Tea
Session 7 : Developments with Overseer

1545-1700 - At the request of Overseer Ltd.

Facilitator:  Dr Caroline Read  
OVERSEER Ltd, Wellington

Overseer Limited was established in 2016 to create a sustainable future for the now nationally significant nutrient budgeting tool OVERSEER. Following the successful session looking at functionality for the Science version of Overseer at the FLRC workshop in 2018, Overseer Ltd will facilitate a similar interactive afternoon session to cover the following topics:

1. Update on OverseerFM since release in June 18 and the release of the new Science product
2. Update on science modelling work underway and how to get involved
3. Presentation of the Overseer Development Roadmap

The session will progress with a rapid-fire highlight of the software updates over the past 8 months – specifically the inclusion of the GHG emissions reporting, trend analysis visualization and work on the scenario tool. Overseer Ltd will showcase the OverseerScience MVP (the research version workshoped last year) and how to get access to this service.

This will be followed by an update on the science modelling work that is currently underway, including the new approach being used to provide transparency and enable inclusive development. This will cover a range of pieces of work in various stages of development including:

1. Urease inhibitors
2. ME requirements modelling updates
3. Plantain and findings coming from the FRNL programme

The final part of the session will engage with participants on our current Development Roadmap, setting out our priority focus areas over three business horizons – core, emerging and next generation.

1700-1800  Poster Papers on Display  
Informal Drinks in the Ag Hort Lecture Block

1815-  Workshop Dinner at Wharerata
**Thursday 14th February**

**Session 8 : Challenges for Irrigated Agriculture**

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<tr>
<td>0845-0905</td>
<td>Andrew Curtis Invited Speaker</td>
<td><em>Irrigation NZ, Canterbury</em></td>
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<tr>
<td>0905-0915</td>
<td>John J Drewry, A K Manderson and C B Hedley</td>
<td><em>Manaaki Whenua – Landcare Research, Palmerston North</em></td>
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<tr>
<td>0915-0925</td>
<td>John Bright</td>
<td><em>Aqualinc Research Ltd, Hamilton</em></td>
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<td>0925-0935</td>
<td>M S Srinivasan, C Muller, T Carey-Smith, P Blackett, T White, L Chan, M Kinsman, S Fitzherbert, S Beechener and G Elley</td>
<td><em>NIWA, Christchurch</em></td>
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<td>0935-0945</td>
<td>Jim Hargreaves</td>
<td><em>WaterForce, Napier</em></td>
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**Discussion**

**0945-1000**

**1000-1030** | Morning Tea |
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<tr>
<td>1030-1040</td>
<td>Nathan Odgers, L Lilburne, S Vickers, J Guo and A Manderson</td>
<td>Manaaki Whenua – Landcare Research, Christchurch</td>
<td>METHODS FOR UPSCALING AND DOWNSCALING S-MAP INFORMATION: PROVISION OF SPATIAL SOIL INFORMATION IN VARIOUS FORMATS AND SCALES</td>
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<td>1040-1050</td>
<td>Donna Giltrap</td>
<td>Manaaki Whenua – Landcare Research, Palmerston North</td>
<td>MEASURING AND MODELLING THE 3D DISTRIBUTION OF A URINE PATCH ON A GRAZED PASTURE</td>
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<td>1050-1100</td>
<td>Ben Jolly</td>
<td>Manaaki Whenua – Landcare Research, Palmerston North</td>
<td>TECHNOLOGIES FOR MAPPING COW URINE PATCHES: A COMPARISON OF THERMAL IMAGERY, DRONE IMAGERY, AND SOIL CONDUCTIVITY WITH SPIKEY R</td>
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<td>1100-1110</td>
<td>John Paterson, T Stephens, S Bermeo, B Levine and T Nolan</td>
<td>Phosphorus Mitigation Project, Rotorua</td>
<td>THE RISING POTENTIAL FOR LIDAR ENABLED MICRO MANAGEMENT OF STORM WATER RUNOFF AT FARM SCALE TO IMPROVE MACRO MANAGEMENT / WHOLE CATCHMENT OUTCOMES FOR BOTH WATER QUALITY AND FLOOD DAMAGE ISSUES</td>
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<td>1110-1120</td>
<td>Neale Hudson, E Baddock, L McKergow, J Sukias, S Heubeck, V Montemezzan and G Olsen</td>
<td>NIWA Hamilton</td>
<td>APPLICATIONS OF CONTINUOUS NITRATE-N ANALYSERS IN NEW ZEALAND FOR IMPROVED NUTRIENT MANAGEMENT</td>
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<td>1120-1130</td>
<td>Linh Hoang</td>
<td>NIWA, Hamilton</td>
<td>ESTIMATING NUTRIENT LOSS FROM A DAIRY FARMING CATCHMENT USING THE SOIL AND WATER ASSESSMENT TOOL</td>
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<td>1130-1140</td>
<td>John-Paul Praat, P Handford and N Edgar</td>
<td>Groundtruth Ltd, Te Awamutu</td>
<td>SMARTFARMS ENVIRONMENTAL MONITORING SYSTEM</td>
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<td>1140-1200</td>
<td>Discussion</td>
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<td>1200-1300</td>
<td>Lunch</td>
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<tr>
<td>1300-1310</td>
<td>Alec Mackay et al</td>
<td>AgResearch, Palmerston North</td>
<td>WHOLE FARM PLANNING TO DELIVER INTEGRATED SOLUTIONS</td>
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<tr>
<td>1310-1320</td>
<td>Richard Parkes and A Bradley</td>
<td>Beef + Lamb New Zealand, Masterton</td>
<td>PROCESS NOT PRESCRIPTION CATERING TO THE HETEROGENEITY OF THE NEW ZEALAND FARMING LANDSCAPE</td>
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<td>1320-1330</td>
<td>Terry Parminter, S Ridsdale, S Bryant and P Hedley</td>
<td>KapAg Ltd, Paraparaumu</td>
<td>THE POSSIBLE IMPACT OF A PROPOSED NITROGEN CAP ON MILK PRODUCTION AND FINANCIAL VIABILITY OF DAIRY FARMS IN THE UPPER MANAWATU RIVER CATCHMENT OF THE TARARUA DISTRICT</td>
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<td>1330-1340</td>
<td>Simon Redmond</td>
<td>Consultant, Palmerston North</td>
<td>HELPING FARMS COMPLY WITH ENVIRONMENTAL REGULATIONS. TWO CASE STUDIES IN THE MANAWATU</td>
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<td>1340-1350</td>
<td>Simon Park, H Creagh and C Sutton</td>
<td>Landconnect Ltd, Tauranga</td>
<td>TARAWERA FARM ENVIRONMENTAL PLANS – FARMERS BUILDING ON THE PAST, PREPARING FOR THE FUTURE</td>
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<td>1350-1400</td>
<td>Mike Freeman</td>
<td>Landpro, Cromwell</td>
<td>HOW TO FIX THE BROKEN LINKS IN THE CHAIN BETWEEN NUTRIENT DRIVEN WATER QUALITY ISSUES AND LAND MANAGEMENT CONTROLS</td>
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<td>1400-1410</td>
<td>Phil Journeaux</td>
<td>AgFirst, Hamilton</td>
<td>ISSUES WITH NATURAL CAPITAL ALLOCATION OF NUTRIENTS</td>
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<td>1410-1420</td>
<td>Gavin Marshall</td>
<td>Fonterra Cooperative Group, Auckland</td>
<td>DEVELOPMENT OF A NITROGEN RISK SCORECARD</td>
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<td>1420-1430</td>
<td>Lania Holt, A Renwick and P Johnstone</td>
<td>Scion, Rotorua</td>
<td>THE CASE FOR A NOVEL AGROFORESTRY SYSTEM AND CROSS-SECTOR COLLABORATION</td>
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1430-1445  Discussion
1445-1500  Closing Remarks
1500   Afternoon Tea and depart