Contents

Introduction ......................................................................................................................... 2
Aims............................................................................................................................................. 2
Objectives ............................................................................................................................... 2
Enrolment .............................................................................................................................. 3
Projects ................................................................................................................................. 4
Introduction
Possible projects available to Honours candidates are set out in this booklet.

The supervising staff member’s name is specified. You are encouraged to discuss the specific projects with these people. Students with their own possible projects or students who find none of the listed ones attract them are invited to discuss possibilities with the staff member whose interests are most closely aligned to their own (see the Faculty website – http://www.lincoln.ac.nz/Lincoln-Home/About-Lincoln/Faculties-and-Divisions/Faculty-of-Agriculture-and-Life-Sciences/ (under Related Links)

Many elective subjects are taught by the staff within the Faculty. There is a wide range of opportunities for combining these subjects and those from other Faculties, into a suitable course of study. There are also opportunities for the development of special topic subjects for Honours candidates.

Aims
Dissertations are aimed towards individual research and study. Such an approach provides for student initiative in developing a research idea through the initial proposal, review of literature, design of experiments, conduct of experiments, analysis of results and their discussion. This will provide an assessment of the student’s ability to conduct independent research and communicate results to other students and staff.

Objectives
At the completion of a dissertation a student should be able to:

- break down a problem into key questions.
- develop those questions into a research proposal.
- read and critically assess literature on the chosen research topic.
- write a research proposal.
- plan and conduct appropriate research work.
- analyse results according to accepted statistical procedures.
- write up the results in a form that encompasses the above and discusses the significance of the results compared with other studies.
- communicate progress and results through written and verbal methods.
Dissertations are assessed by the supervisor and an independent examiner, who is normally an academic staff member of Lincoln University.

These are the projects received to date. Please consult the Faculty website for others that may have been added subsequently.


Enrolment
Please refer to the university website
http://www.lincoln.ac.nz/Study/Qualifications/?QualGroup=honours

Application checklist:
- You need English as a first language or provide documentation of your English Language proficiency
- Birth certificate or passport, certified copies only
- Academic transcripts, official copies or certified copies of all tertiary education qualifications either completed or partially completed
- The name of the area you're applying for honours in (e.g. Ecology) and a statement of research interest

To apply online go to: https://mylinc.nz

Special note: If after Bachelor degree study you receive a letter of invitation from Lincoln University to study Honours, you are still required to complete an application form prior to registration.
### List of Projects

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Title</th>
<th>Supervisor and email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A comparison of root development and composition in ryegrass, clover and fodder beet treated with conventional fertiliser approaches and fishery by-product hydrolysate</td>
<td>Dr Jim Gibbs&lt;br&gt;&lt;a href=&quot;Jim.Gibbs@lincoln.ac.nz&quot;&gt;<a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>2</td>
<td>Acoustic monitoring of Great Spotted Kiwi</td>
<td>Dr Laura Molles&lt;br&gt;&lt;a href=&quot;Laura.Molles@lincoln.ac.nz&quot;&gt;<a href="mailto:Laura.Molles@lincoln.ac.nz">Laura.Molles@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>3</td>
<td>Awheto: ecology and spatial distribution</td>
<td>Dr Seona Casonato&lt;br&gt;&lt;a href=&quot;Seona.Casonato@lincoln.ac.nz&quot;&gt;<a href="mailto:Seona.Casonato@lincoln.ac.nz">Seona.Casonato@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>4</td>
<td>Building the ideal organic amendment for reducing the plant uptake of a commonly found toxic trace element</td>
<td>Dr Niklas Lehto&lt;br&gt;&lt;a href=&quot;Niklas.Lehto@lincoln.ac.nz&quot;&gt;<a href="mailto:Niklas.Lehto@lincoln.ac.nz">Niklas.Lehto@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>5</td>
<td>Compositional changes in fodder beet across the growing season</td>
<td>Dr Jim Gibbs&lt;br&gt;&lt;a href=&quot;Jim.Gibbs@lincoln.ac.nz&quot;&gt;<a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>6</td>
<td>Dairy replacement rearing – integrated heifer management system using fodder beet</td>
<td>Dr Jim Gibbs&lt;br&gt;&lt;a href=&quot;Jim.Gibbs@lincoln.ac.nz&quot;&gt;<a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>7</td>
<td>Developing a soil test to measure bioavailable phosphorus and cadmium simultaneously</td>
<td>Dr Niklas Lehto&lt;br&gt;&lt;a href=&quot;Niklas.Lehto@lincoln.ac.nz&quot;&gt;<a href="mailto:Niklas.Lehto@lincoln.ac.nz">Niklas.Lehto@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>8</td>
<td>Dry rot of forage brassicas</td>
<td>Dr Eirian Jones&lt;br&gt;&lt;a href=&quot;Eirian.Jones@lincoln.ac.nz&quot;&gt;<a href="mailto:Eirian.Jones@lincoln.ac.nz">Eirian.Jones@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>9</td>
<td>Duration controlled grazing for dairy cows on winter forage crops</td>
<td>Prof Grant Edwards&lt;br&gt;&lt;a href=&quot;Grant.Edwards@lincoln.ac.nz&quot;&gt;<a href="mailto:Grant.Edwards@lincoln.ac.nz">Grant.Edwards@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>10</td>
<td>Ecology and behaviour of Banks Peninsula Tui</td>
<td>Dr Laura Molles&lt;br&gt;&lt;a href=&quot;Laura.Molles@lincoln.ac.nz&quot;&gt;<a href="mailto:Laura.Molles@lincoln.ac.nz">Laura.Molles@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>11</td>
<td>Effects of plantain on kidney function in sheep</td>
<td>Assoc Prof Graham Barrell&lt;br&gt;&lt;a href=&quot;Graham.Barrell@lincoln.ac.nz&quot;&gt;<a href="mailto:Graham.Barrell@lincoln.ac.nz">Graham.Barrell@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>12</td>
<td>Entomophagy: Insects as food for people – the New Zealand context</td>
<td>Dr Rob Cruickshank&lt;br&gt;&lt;a href=&quot;Robert.Cruickshank@lincoln.ac.nz&quot;&gt;<a href="mailto:Robert.Cruickshank@lincoln.ac.nz">Robert.Cruickshank@lincoln.ac.nz</a>&lt;/a&gt;</td>
</tr>
<tr>
<td>No.</td>
<td>Project Title</td>
<td>Supervisor and email</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>13.</td>
<td>Flammability of New Zealand plants</td>
<td>Dr Tim Curran</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Tim.Curran@lincoln.ac.nz">Tim.Curran@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>14.</td>
<td>Fodder beet finishing systems – is grazing time associated with liveweight gain performance?</td>
<td>Dr Jim Gibbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>15.</td>
<td>Fodder beet intakes for beef cattle – do palatability differences between commercial cultivars influence daily intake and utilisation?</td>
<td>Dr Jim Gibbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>16.</td>
<td>Improving the characterization of allophane and aluminium toxicity in New Zealand soils through Vis-NIR (visible near infrared reflectance) spectroscopy</td>
<td>Dr Henry Chau</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Henry.Chau@lincoln.ac.nz">Henry.Chau@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>17.</td>
<td>In-situ detection of genetic chimeras in grapevine</td>
<td>Dr Chris Winefield</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Chris.Winefield@lincoln.ac.nz">Chris.Winefield@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>18.</td>
<td>Interactions between the genes responsible for two different forms of Batten disease in sheep</td>
<td>Prof David Palmer</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:David.Palmer@lincoln.ac.nz">David.Palmer@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>19.</td>
<td>Methane emissions of cows grazing pasture</td>
<td>Prof Grant Edwards</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Grant.Edwards@lincoln.ac.nz">Grant.Edwards@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>20.</td>
<td>Milk yield and urination behaviour of dairy cows grazing simple and diverse pastures</td>
<td>Dr Racheal Bryant</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Racheal.Bryant@lincoln.ac.nz">Racheal.Bryant@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>21.</td>
<td>Nitrogen fixation and nitrate assimilation in a native plant</td>
<td>Assoc Prof Jim Morton</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:James.Morton@lincoln.ac.nz">James.Morton@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>22.</td>
<td>Novel legumes for acid soils</td>
<td>Dr Jim Moir</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Jim.Moir@lincoln.ac.nz">Jim.Moir@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>23.</td>
<td>Novel methods of parasite control</td>
<td>Dr Andrew Greer</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Andrew.Greer@lincoln.ac.nz">Andrew.Greer@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>24.</td>
<td>Phosphate solubilising bacteria as tools for sustainable agriculture</td>
<td>Assoc Prof Hayley Ridgway</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Hayley.Ridgway@lincoln.ac.nz">Hayley.Ridgway@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>25.</td>
<td>Reference model for body condition scoring</td>
<td>Dr Andrew Greer</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:Andrew.Greer@lincoln.ac.nz">Andrew.Greer@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>No.</td>
<td>Project Title</td>
<td>Supervisor and email</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>26</td>
<td>Remote sensing technology for grazing behaviour</td>
<td>Dr Andrew Greer <a href="mailto:Andrew.Greer@lincoln.ac.nz">Andrew.Greer@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>27</td>
<td>RFID-based monitoring of feed intake</td>
<td>Dr Andrew Greer <a href="mailto:Andrew.Greer@lincoln.ac.nz">Andrew.Greer@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>28</td>
<td>Rumen epithelial changes in cattle fed pasture or fodder beet</td>
<td>Dr Jim Gibbs <a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>29</td>
<td>Rumen pH control in cattle fed ad libitum fodder beet</td>
<td>Dr Jim Gibbs <a href="mailto:Jim.Gibbs@lincoln.ac.nz">Jim.Gibbs@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>30</td>
<td>Souvenirs or heirlooms? Is the New Zealand biota Gondwanan, Zealandian or Australian</td>
<td>Assoc Prof Adrian Paterson <a href="mailto:Adrian.Paterson@lincoln.ac.nz">Adrian.Paterson@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>31</td>
<td>The development of GPS monitoring of sheep in a maze and computational methods to collect and codify the data</td>
<td>Prof David Palmer <a href="mailto:David.Palmer@lincoln.ac.nz">David.Palmer@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>32</td>
<td>The effect on red meat quality of novel processing technology</td>
<td>Assoc Prof Jim Morton <a href="mailto:James.Morton@lincoln.ac.nz">James.Morton@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>33</td>
<td>The mechanism of ovine heritable cataract</td>
<td>Assoc Prof Jim Morton <a href="mailto:James.Morton@lincoln.ac.nz">James.Morton@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>34</td>
<td>Using heart rate monitors to measure the effect of winter feeding strategies on heat production dairy cows</td>
<td>Dr Racheal Bryant <a href="mailto:Racheal.Bryant@lincoln.ac.nz">Racheal.Bryant@lincoln.ac.nz</a></td>
</tr>
<tr>
<td>35</td>
<td>Weed control in annual clovers</td>
<td>Dr Farhad.Dastgheib <a href="mailto:Farhad.Dastgheib@lincoln.ac.nz">Farhad.Dastgheib@lincoln.ac.nz</a></td>
</tr>
</tbody>
</table>
Details of each project available are as follows:

1. **A comparison of root development and composition in ryegrass, clover and fodder beet treated with conventional fertiliser approaches and fishery by-product hydrolysate**

   Root development is influenced by many factors, including nutrient and water supply, soil environment, and a range of exogenous bio-active compounds. In various catchments across NZ, regulatory control of fertiliser input to pasture and cropping has limited farmer choice of nutrient supply, and in other circumstances tightly defined marketing approaches post farm gate for end products have dictated alternative farming practices. In such scenarios, one increasingly common alternative to nutrient supply via traditional fertilisers has been the use of fish products. These are generally accepted to be comparatively low in N, P and K, but in some manufacturing methods, potentially higher in trace elements and in a range of bio-active compounds that may exert an effect on root development. This project will examine the effect of various rates of fish hydrolysate application on root development of ryegrass, white clover and fodder beet, and soil microbial community, in comparison with conventional fertiliser approaches. This project may be supported by a student stipend for the successful candidate.

   **Supervisors: Dr Jim Gibbs & Associate Professor Mitchell Andrews**

   **Email: Jim.Gibbs@lincoln.ac.nz**

2. **Acoustic monitoring of Great Spotted Kiwi**

   This project will involve the analysis of acoustic monitoring data for great spotted kiwi in the Hawdon and Nina Valleys. Eight kiwi were translocated from the Hawdon to the Nina in 2015, and we have an ongoing automated acoustic recording program running in both locations. A large collection of recordings is already available for analysis. Potential topics include: detection, cataloguing and measurement of calls; determining the most effective spacing and placement of automated recorders; documenting time-of-night and seasonal changes in calls; and investigating changes in call rates pre- and post-translocation in both populations. All topics will require the student to undertake self-directed study to become proficient in the use of sound analysis software. This project will be almost entirely computer-based, so can be done alongside coursework, but there are ample opportunities to participate in field work as well. This is a collaborative project with the
Department of Conservation, the Nina Valley Restoration Group, and a current PhD student.

**Supervisor: Dr Laura Molles**
*Email: Laura.Molles@lincoln.ac.nz*

3. **Awheto: ecology and spatial distribution**

Awheto are culturally significant in New Zealand where they were traditionally used for making an ink used in tattooing (ta moko) and as a medicine. This unique organism is produced when a fungus, *Ophiocordyceps robertsii*, invades the body of a ghost moth (*Dumbeltonius* and *Aoraea* spp). This honours project aims to locate a site(s) in the South Island to observe the awheto in its native environment. Information will be obtained to investigate the spatial distribution, emergence, development, and vegetation association of the awheto within the site. The data will be compiled and compared to existing data from a North Island site. Laboratory culturing of the fungus and insect rearing will also be used to determine the infection process. This project will be undertaken as a collaboration between Lincoln University and Plant and Food Research.

**Supervisors: Dr Seona Casonato & Dr Hannah Buckley. Co-supervisor: Dr Garry Hill**
*Email: Seona.Casonato@lincoln.ac.nz*

4. **Building the ideal organic amendment for reducing the plant uptake of a commonly found toxic trace element**

The New Zealand economy relies heavily on the primary production sector and the use of phosphate fertilisers. Cadmium (Cd) is a toxic trace element that occurs naturally in the phosphate rock used to produce these fertilisers. Continued application of the fertilizer has resulted in an accumulation of Cd in NZ soils and there is increasing evidence to suggest that it is being taken up from the soils by plants and entering the population’s food supply. Occasional non-compliances with Cd food standards has already been noted in NZ for wheat and potatoes and for animal kidneys (saleable offal products). If this continues unmanaged, there may be an emerging public health risk and the possibility for serious damage to the reputation of NZ agriculture and her economy.

Recent work by Drs Robinson and Lehto at Lincoln University’s Soils Department has identified that certain types of organic soil amendments can reduce the amount of Cd taken up by plants, while providing growth benefits
to the plants. However, some amendments appear to perform this function better than others. The exact characteristics of an organic soil amendment that are important for preventing plant Cd uptake remain unknown. This project will involve carrying out analyses to characterise different organic amendments with a view to identifying (1) the key characteristics of the amendments responsible for reducing plant Cd uptake (2) the longevity of this effect under varied environmental and agricultural conditions and (3) the additional benefits provided by these organic amendments. This important and timely project will involve a combination of laboratory- and fieldwork and is best suited to an ambitious student, who wishes to develop insight into elemental cycling in soils and skills in the laboratory and critical data analysis.  

**Supervisors: Dr Niklas Lehto & Dr Brett Robinson**  
**Email:** [Niklas.Lehto@lincoln.ac.nz](mailto:Niklas.Lehto@lincoln.ac.nz)

5. **Compositional changes in fodder beet across the growing season**  
Fodder beet (*Beta vulgaris*) is a high quality ruminant feed that is currently grazed from January to December in NZ. There are significant changes in the leaf: bulb content in this period, due to both growth and senescence, which also affect the protein and mineral supply of the plant to stock. These differences are also cultivar specific, and are influenced by water and fertiliser supply, and crop yield. These differences may affect animal performance, either by altering intakes or altering rumen degradability. This project will use a wide range of cultivars from three regions of NZ sampled across the growing season to establish the changes in plant composition during this time, and to calculate what change in nutrient supply to ruminants these differences would represent.  

**Supervisor: Dr Jim Gibbs**  
**Email:** [Jim.Gibbs@lincoln.ac.nz](mailto:Jim.Gibbs@lincoln.ac.nz)

6. **Dairy replacement rearing – integrated heifer management system using fodder beet**  
Replacement heifers are a pivotal tool for improving productivity and maintaining profitability in any dairy system. The key performance indicators that have emerged from decades of research into optimal heifer rearing have been clustered around achieving breed specific target liveweights at first mating and then calving, and the lifetime productivity benefits of doing so are well documented and widely accepted in the industry. Despite this, the research to date in NZ has demonstrated that the majority of farms do not
achieve target weights with their heifers, and seasonal nutrition deficit is the primary failure. A system of integrated fodder beet (Beta vulgaris) and pasture grazing has been developed over the past five years. The system requires less land due to very high annual stocking rates (>10/ha), significantly reduces feed costs as fodder beet is the least expensive grazing crop available to farmers for extended use, and mitigates parasite issues in young stock by reducing larval intake. Recent downwards movement of the dairy payout has accelerated the trend to rear heifers on the dairy platform, which has increased the uptake of the integrated heifer management system across NZ. This project will use the data obtained from a number of key best-practice farms across NZ to establish the cost: benefit to whole farm profitability of this system, in comparison with both traditional contract rearing, and the use of alternative feed sources on platform.

**Supervisor: Dr Jim Gibbs**

**Email:** Jim.Gibbs@lincoln.ac.nz

7. Developing a soil test to measure bioavailable phosphorus and cadmium simultaneously

The New Zealand economy relies heavily on the primary production sector and the use of phosphate (P) fertilisers. Cadmium (Cd) is a toxic trace element that occurs naturally in the phosphate rock used to produce these fertilisers. Continued application of the fertilizer has resulted in an accumulation of Cd in NZ soils and there is increasing evidence to suggest that it is being taken up from the soils by plants and entering the population’s food supply. In recognition of this risk, the tiered fertilizer management strategy (TFMS) has been proposed. The TFMS would restricted farmers to the amount of P fertilizer they can apply when a certain threshold soil Cd concentration is reached to reduce the accumulation of the toxic metal. An accurate measure of the bioavailabilities of P and Cd is critical in this context. Inaccurate measure of the two elements’ bioavailability can result in added costs to the farmer or loss of earnings due to reduced productivity.

Normally the measurement of P and Cd bioavailability in soils involves two separate analyses and often these measures fail to provide an accurate representation of actual plant bioavailability, resulting in added costs from the tests and conservative fertilizer application. The diffusive gradients in thin-films (DGT) technique has been shown to represent well the bioavailability of P and Cd (and several other trace elements) to a range of different plants species, in a variety of soils. A recent development to this highly versatile
technique has enabled the simultaneous measurement of P and Cd bioavailability in soils. No other single measurement technique can do this and there is now vast potential for this to be developed to a highly valuable soil analysis tool for future farmers.

In this project, the student will develop expertise in soil analysis using DGT and other commonly used methods for determining plant available nutrient and, through carefully designed plant growth trials, establish the potential of the new DGT probe to act as a tool to be used in the TFMS. In addition, they will gain skills in computer modelling of nutrient supply in soils and insight into the factors governing the plant bioavailability of the two elements.

**Supervisors: Dr Niklas Lehto & Dr Brett Robinson**
**Email:** Niklas.Lehto@lincoln.ac.nz

8. **Dry rot of forage brassicas**
Dry rot of brassicas is an important disease of forage brassicas in New Zealand reducing crop yield and quality. Recent research in the group had identified the disease is caused by the pathogens *Leptosphaeria maculans* and *L. biglobosa*. However, information regarding the disease cycle and control strategies is limited. Some of the aspects that could be studied include investigating the disease cycle, structure of the New Zealand pathogen population, control strategies including fungicides and susceptibility of different cultivars.

**Supervisor: Dr Eirian Jones**
**Email:** Eirian.Jones@lincoln.ac.nz

9. **Duration controlled grazing for dairy cows on winter forage crops**
Grazing winter forage crops for part of day before returning to a standoff pad is a potential strategy to reduce the impacts of dairy cows on the environment. However, more information is needed on how reduced grazing time may affect performance of animals and behavioural interactions. This study will consider the effect of duration controlled grazing for different time periods on foraging behaviour, feed intake and performance of dairy cows that are grazing forage crops of fodder beet and kale during winter.

**Supervisor: Professor Grant Edwards**
**Email:** Grant.Edwards@lincoln.ac.nz
10. Ecology and behaviour of Banks Peninsula Tui
In 2009 and 2010, 72 tui were translocated from Maud Island in the Marlborough Sounds to Hinewai Reserve on Banks Peninsula. Sightings of released birds and their offspring are regularly reported from all over the Peninsula, particularly in the Akaroa area where many birds frequent sugar-water feeders. There are several options for projects focused on this population, including:
• Estimation of survival rates, age structure and population size based on re-sighting data
• Exploring the relationship between bellbirds and tui (distribution, abundance, interactions)
• Vocal diversity and temporal change in song patterns
• Social behaviour and feeder use
Some topics will require independent field work; this will generally consist of day trips to Banks Peninsula and the extent of field work required will depend on the topic. Undertaking a project with a field component requires good people skills, as the reintroduction and monitoring projects have strong community involvement and the birds are often found on private property. Some projects will also require the student to become proficient in specialised analysis techniques, such as use of MARK, GIS and/or sound analysis software.
Supervisor: Dr Laura Molles
Email: Laura.Molles@lincoln.ac.nz

11. Effects of plantain on kidney function in sheep
Recently, New Zealand pastures have been diversified by the addition of various herb species such as plantain and chicory. This due to perceived benefits of more diversified pastures. Plantain has been added due to its high palatability and mineral content. However, due to other compounds found within plantain, there may be effects that have not been researched. One such effect is the claim that plantain acts as a diuretic. There is very little information about how plantain acts as a diuretic or how much of an effect it has on the animal. However, a diuretic may have implications for reducing the impact of stock urine on the environment. If it is shown to have an effect, a cultivar of plantain may be developed to increase urine output and thus reduce the concentration of urine nitrogen in sheep and cows. This may help to prevent leaching of nitrate into ground water. The proposed studies will be conducted in association with PGG Wrightson Seeds.
Supervisor: Associate Professor Graham Barrell
Email: Graham.Barrell@lincoln.ac.nz
12. **Entomophagy: Insects as food for people – the New Zealand context**

Insects have been a common feature of the human diet in many countries and cultures around the world since the evolution of the human species. However, in more recent history, insect-eating has become rare, even reviled, in most developed countries. As pointed out recently by the Food and Agriculture Organisation of the United Nations, this is a shame because insects provide an easy local supply of animal protein that is arguably much more environmentally sustainable than other forms of agriculture. Over the past few years, interest in this topic has been increasing around the developed world. New Zealand is an interesting case with cultural use of insects as food by Māori, and the popularity of “wild foods” festivals, contrasting with the perception more usual in developed countries that eating insects is revolting or disgusting in some way (despite the fact that most New Zealanders are happy to eat shrimps, prawns, crabs, lobsters, crayfish, etc., which are phylogenetically similar to insects). We are looking for an honours student who is interested in exploring this topic. Your research project might include assessing the nutritional qualities of a range of New Zealand insects, piloting methods for mass rearing of particular insect species, developing methods for processing insects into food products that are acceptable to consumers, or investigating the attitudes of New Zealanders to the concept of insects as food. This will be a highly interdisciplinary project involving a mix of entomology, agriculture, food science, social science, and commerce, and would particularly suit a student interested in combining some or all of these different disciplines in creative ways to address the global challenge of feeding a growing population in a healthy and environmentally sustainable way.

*Supervisors: Dr Rob Cruickshank & Professor Charles Brennan*

*Email: Robert.Cruickshank@lincoln.ac.nz*

13. **Flammability of New Zealand plants**

Fire is one of the most pervasive and important disturbances worldwide. While less widespread and generally infrequent in New Zealand forest ecosystems, fires do occur, and are predicted to become more extensive and frequent due to global climate change.

To understand the ecological effects of fire it is important to determine the flammability of plant species; that is, their capacity to burn. Most studies of flammability have been conducted on small plant fragments in the laboratory limiting their relevance in determining the flammability of whole shoots. However, the recent development of a low-cost device for measuring shoot
flammability in the field will allow for more consistent, widespread and rapid collection of such data.

There are two projects associated with this research: 1) Quantifying flammability and serotiny in lodgepole pine to test current theories of the role of fire in plant evolution; and 2) Traits associated with flammability in NZ plants.

1) Evolution of flammability and serotiny in lodgepole pine

Very recent research in other parts of the world has shown that fire has been a selective force on plants for over 120 million years. It has been suggested that some species in fire-prone environments have evolved to be more flammable, as this causes damage or mortality to neighboring plants and opens up space for seedlings of the flammable species. However, it is yet to be confirmed that flammability traits are heritable. Another important fire-adaptive trait is serotiny, the storage of seed in the canopy until release after a fire. Serotiny has been shown to be correlated with flammability in Banksia and Pinus, but these studies have not quantified either trait. This project will quantify both flammability and serotiny in lodgepole pine (Pinus contorta) to test these current ideas on plant evolution. It will involve field work to collect samples and laboratory work to burn Pinus shoots and measure genetic variation in Pinus populations that have been planted or have naturalized around NZ.

2) Traits associated with flammability

Despite the fact that fire risk is expected to increase in NZ with global climate change there have been few attempts to quantify the flammability of NZ plant species. There have been some attempts to rank the flammability of New Zealand trees and shrubs based on questionnaire surveys of fire managers, but these results have yet to be confirmed by rigorous scientific testing. The first stage of this project will be to measure flammability on a range of NZ plants. This information will be of great utility to NZ fire management agencies.

While it is important to measure the flammability of as many species as possible to determine how vegetation may be affected by global climate change, it is unlikely that this is feasible in the short term to allow parameterization in dynamic global vegetation models. Consequently, alternative approaches are needed, such as determining which easily measured plant functional traits are correlated to flammability and using these ‘easy’ traits to model vegetation change. The second stage of this project will be to determine which morphological, physical and chemical traits of species are correlated with flammability. This project will involve extensive...
field work to collect samples, followed by laboratory work to measure flammability (by burning shoots) and other plant traits. There is also scope within this project to calibrate the device for measuring shoot flammability with assessments of the flammability of larger plant parts, including tree branches or whole shrubs. Such experiments would be conducted in collaboration with the Fire Engineering Department at the University of Canterbury. 
*(In collaboration with Dr Adrian Paterson)*

**Supervisor: Dr Tim Curran**

**Email:** Timothy.Curran@lincoln.ac.nz

14. **Fodder beet finishing systems – is grazing time associated with liveweight gain performance?**

Fodder beet (*Beta vulgaris*) has been developed as a beef finishing tool here in NZ in the past five years. Profitability from the system has been observed to be high in experienced operators, but is critically dependant on achieving and maintaining high intakes of beet across the finishing period. Reduced access to the crop due to limited grazing time has been associated with reduced liveweight gains. Recent grazing behaviour assessments have also demonstrated strong differences between individual cattle in time spent eating, and other research has demonstrated liveweight gain differences of greater than 100% over periods of 100 days within a single co-grazing mob. It is not established at present if grazing time is associated with liveweight gains in *ad libitum* fodder beet systems where access is unrestricted, or if bite rate and bite size differ between animals of different liveweight gain performance. This project will use grazing behaviour assessments in combination with digital recordings of mouth movements to assess differences in these behaviours between high and low liveweight gain animal groups.

**Supervisor: Dr Jim Gibbs**

**Email:** Jim.Gibbs@lincoln.ac.nz

15. **Fodder beet intakes for beef cattle – do palatability differences between commercial cultivars influence daily intake and utilisation?**

Fodder beet (*Beta vulgaris*) has been developed as a beef finishing tool here in NZ in the past five years. Profitability from the system has been observed to be high in experienced operators, but is critically dependant on achieving and maintaining high intakes of beet across the finishing period. Fodder beet cultivars have been demonstrated to differ in dry matter content, depth of the
bulb into the soil, and the proportion of leaf and bulb in the plant. There are also measurable differences in plant composition, in both macro and micro concentration compounds. There is growing evidence that suggests there are both preference and daily intake differences between cultivars with young (<2 years) cattle, and these differences may explain the observed differences in both daily intake and utilisation, and therefore performance. This project will measure preference, daily intake, rate of intake and utilisation across commercially available cultivars grazed by finishing beef cattle to assess if there are differences, and to determine if any plant characteristic is associated with these.

**Supervisor: Dr Jim Gibbs**

**Email:** Jim.Gibbs@lincoln.ac.nz

16. Improving the characterization of allophane and aluminium toxicity in New Zealand soils through Vis-NIR (visible near infrared reflectance) spectroscopy

Allophane is an important component of productive New Zealand soils and amounts up to 60% in some Andisols and Spodosols soils. Their presence in these soils largely accounts for the low bulk density, well developed structure, variable charge and high anion adsorption capacity. When managed correctly, these groups of soils are one of the most productive in New Zealand. In addition, aluminium toxicity is often associated with acidic grassland soils in New Zealand. Without suitable characterization and management, plant growth is severely hindered in these soils. The objective of this study is to obtain Vis-NIR (visible near infrared reflectance) spectra for allophane and aluminium on New Zealand soils using the Vis-NIR spectroscopy method. Specifically, the effects of the spectral data pre-treatment method and number of latent variables on allophane and aluminium prediction will be determined. In addition, the capability of Vis-NIR spectroscopy to capture allophane and aluminium variability will be evaluated. For this purpose, a number of soil samples collected around New Zealand will be scanned by the Vis-NIR spectroscopy. The potential of Vis-NIR spectroscopy in predicting allophane will be verified in the field. The obtained results will be applicable for improved management of aluminium toxicity and mapping of our highly productive allophanic soils.

**Supervisors: Dr Henry Chau, Dr Jim Moir & Associate Prof Peter Almond**

**Email:** Henry.Chau@lincoln.ac.nz
17. **In-situ detection of genetic chimeras in grapevine**

Grapevine bud-sports are a common occurrence in vineyards. The random appearance of such mutations has formed the sole basis for genetic diversification in wine-grapes over the last 200-300 years and represents the single most important source of genetic diversity in commercially grown *Vitis vinifera*. Our current research programme has shown that mature grapevines are in actuality a collection of highly similar but genetically distinct genomes. Bud sports are often the result of a reassignment of these genomes within the apical meristematic tissues of grape, exposing hidden phenotypes. The locations and extent of these chimaeras within various grape tissues is currently unclear. Our work has focused on the drivers of the mutations that drive the differentiation of these chimeric sectors, in particular the activity of transposable elements (TEs), which have been shown to be active in grape. Working with a recently identified red berried bud-sport of Sauvignon blanc this project will focus on identification of mosaics of cells that are genetically distinct from one another using a combination of PCR, qPCR, and in-situ-PCR combined with in-situ hybridisation to identify both individual cells that contain unique genetics and those cell that potentially show elevated levels of TE activity.

*Supervisor: Dr Chris Winefield*

*Email: Chris.Winefield@lincoln.ac.nz*

18. **Interactions between the genes responsible for two different forms of Batten disease in sheep**

Batten disease is a collective term for group of fatal inherited diseases of children, arising from mutations in different genes that result in blindness, neurodegeneration and brain atrophy leading to premature death. There have been suggestions of cross-regulation of genes for different forms for Batten disease but substantial evidence is scant. At Lincoln we have two flocks of sheep with different forms of Batten disease arising from mutations in different genes but that have very similar disease progressions, perhaps indicating close or interacting molecular pathways. This project will involve a quantitative PCR comparison of the expression of mRNA for the products of these genes from different tissues and at different stages of disease development to determine the extent of this at the mRNA level.

*Supervisors: Professor David Palmer & Dr Nadia Mitchell*

*Email: David.Palmer@lincoln.ac.nz*
19. **Methane emissions of cows grazing pasture**

The objective of this study is to measure methane emissions from dairy cows grazing different forages and forage supplements. This will be achieved using GreenFeed technology. This is a non-invasive system that requires cows to eat feed pellets dispensed in the GreenFeed units, and whilst eating, the concentration of methane in their respired breath and eructations (burps) is determined. The information will be used to describe system level effects of changing feeding systems on methane emissions.

*Supervisor: Professor Grant Edwards*

*Email: Grant.Edwards@lincoln.ac.nz*

---

20. **Milk yield and urination behaviour of dairy cows grazing simple and diverse pastures**

Nitrate leaching from urine patches is key driver in whole farm N loss and yet there is very little information on the volume and frequency of urination behaviour of grazing dairy cows. Strategies to reduce concentration of N in the urine have shown that pastures containing chicory and plantain appear to achieve this outcome but information on volume of urine is required to complete the picture. Moreover, these forages need to be able to support similar milk yield as traditional pasture types. This project will utilise urine harnesses attached to dairy cows grazing mixed pasture types in autumn to capture data on urination behaviour and milk production. Measurements on animal grazing behaviour, pasture utilisation and nutrient intake will also be included to help understand whether there are relationships between feeding, diet composition and timing and concentration of N in urination and defecation events.

*Supervisor: Dr Racheal Bryant*

*Email: Racheal.Bryant@lincoln.ac.nz*

---

21. **Nitrogen fixation and nitrate assimilation in a native plant**

The pathways of nitrogen fixation, nitrate and ammonium assimilation are well understood in a limited number of crop and test plant species. However there is evidence that other plants react to changes in soil nitrogen in different ways. This project will characterize the response of a New Zealand native plant, Coriaria arborea, to changes in the form and amount of available nitrogen. It has been suggested that this plant is an “obligate” nitrogen fixer in a symbiotic association with actinorhiza. The focus will be on the extent of nitrogen fixation with different different forms and concentrations of soil
nitrogen in pot trials. There will also be a study of changes in the activity of nitrate reductase and glutamine synthetase in different tissues.

**Supervisors: Associate Prof Jim Morton & Associate Prof Mitchell Andrews**
**Email:** James.Morton@lincoln.ac.nz

22. **Novel legumes for acid soils**

The productivity of South Island high country is typified by a short, often soil moisture limited growing season, and acid soils (pH < 5.5). Traditionally, white clover has been sown as the key pasture legume, but fails to persist. The use of alternative pasture species, such as deep rooting Lucerne, has been suggested to improve dryland pasture production. However, lucerne is known to be intolerant of acid soil conditions, and related aluminium (Al) toxicity issues. Nutrient (especially P) and trace element availability is also strongly influenced by soil pH. To offset increased soil acidity, lime must be applied, and where this cannot be done, soils may be too acidic for legumes and productivity declines sharply. Often the cost of lime is uneconomic in extensive high country, and the response to liming unknown. Although the relative Al tolerance of some forage legumes has been examined, information on many legumes is at best, vague. This study will examine a selection of novel pasture legume species grown in acidic / high aluminium soil conditions at Lincoln University. Soils will be adjusted to reflect a range of soil pH conditions and the establishment and growth rate will be used to determine the relative performance of the focus legumes.

**Supervisor: Dr Jim Moir (In conjunction with Professor Derrick Moot)**
**Email:** Jim.Moir@lincoln.ac.nz

23. **Novel methods of parasite control**

Gastro-intestinal parasites cause a major constraint to animal production systems. Management of this disease has typically relied on targeting the population within the host animal with the use of anthelmintic compounds. However, alternative approaches for parasite control to compliment anthelmintic use are still required, including targeting the free-living stage of the parasite life cycle. Recently we have observed beneficial effects of the use of acid fertilisers to reduce parasite larval development. This project will continue to explore these effects with the aim of identifying the key active components in vitro and development of field-based methods to reduce parasite contamination.

**Supervisor: Dr Andy Greer**
**Email:** Andrew.Greer@lincoln.ac.nz
24. **Phosphate solubilising bacteria as tools for sustainable agriculture**

Phosphorus is the second most limiting nutrient for plant growth. For New Zealand pastures delivery of phosphate is normally via application of readily soluble superphosphate, however, the majority (70-95%) of applied fertiliser P is rapidly converted to plant unavailable forms by physicochemical reactions in soil. Thus, many soils contain high levels of phosphorus but it is “locked up” in forms unavailable to the plant. Continued reliance on P fertilisers is both inefficient and unsustainable. Many soil bacteria that form close associations with plant roots can produce extracellular enzymes and organic acids that solubilise mineral phosphate. Better utilisation of processes and functions carried out by soil micro-organisms, could improve phosphorus delivery to pasture without increasing fertiliser application. This honours project explores the ability of soil bacteria to solubilise mineral P and increase the growth of clover.

*Supervisor: Associate Professor Hayley Ridgway*

*Email: Hayley.Ridgway@lincoln.ac.nz*

25. **Reference model for body condition scoring**

The aim of this project is to provide anatomically accurate models of the lumbar region of sheep to develop and evaluate its suitability as a training tool. Using a combination of 3D printing, production of silicon skin and muscle layers this project will develop life-like models of the lumbar region for varying body condition scores. Once developed, the use of the reference model as a training tool for body condition scoring in sheep will be evaluated.

*Supervisor: Dr Andy Greer*

*Email: Andrew.Greer@lincoln.ac.nz*

26. **Remote sensing technology for grazing behaviour**

Recent technological advances have led to the development of ear-tag sensors that can detect grazing behaviour, rumination time and activity of cattle. In addition to aiding fertility management of flocks and herds, this technology has the potential to assist with collection of data for farm management decisions regarding allocation and intake as well as identification of ill-thrift. However, to date the use of these tags has only been validated in cattle, whereas they have potential uses for other species of livestock as well. The aim of this project is to validate the ability of remote-sensing tags to accurately detect the grazing behaviour of cattle and other species including sheep and
deer and assess whether sub-clinical ill thrift symptoms could be detected.

Supervisors: Dr Andy Greer & Dr Racheal Bryant
Email: Andrew.Greer@lincoln.ac.nz

27. RFID-based monitoring of feed intake
Supplementation of sheep with nuts is increasing in popularity as sheep systems become more intensive. However, while mob mean nut consumption can easily be calculated, there are few measures of the individual variation of nut consumption. Radio-frequency identification (RFID) tags enable individual animal information to be collected effortlessly when combined with an appropriately placed reader and may be able to be utilised to determine the nut consumption on an individual animal basis. This project will involve a combination of controlled pen-studies where the time spent consuming the nut will be related to nut consumption leading to field-based studies where the reader is used in combination with nut feeders.

Supervisor: Dr Andy Greer
Email: Andrew.Greer@lincoln.ac.nz

28. Rumen epithelial changes in cattle fed pasture or fodder beet
The rumen epithelium is a major site of energy, nitrogen and mineral transfer in ruminants, and the cell depth and characteristics alter with changes in feed. These differences are associated with animal performance, intake and health. Traditional understanding of the drivers for rumen epithelial shifts has focussed on the concentration and type of rumen acids present, but more recent research has demonstrated that systemic physiological drivers beyond the epithelium also influence epithelial function and structure, particularly rumen nitrogen content. In NZ, numerous forages are used for livestock, and one rapidly growing application is the use of grazed fodder beet (Beta vulgaris). The energy supply to ruminants of quality pastures and fodder beet in NZ can be similar, but the associated nitrogen intakes are typically widely divergent. This project will use rumen papillae microscopy to compare epithelial structure in groups of cattle fed pasture and then fodder beet, and compare observed changes with previous documented changes in cattle fed pasture then cereal grains. This information will be matched with rumen function changes of these cattle between diets.

Supervisor: Dr Jim Gibbs
Email: Jim.Gibbs@lincoln.ac.nz
29. **Rumen pH control in cattle fed ad libitum fodder beet**

Fodder beet is a high metabolisable energy feed that has ample carbohydrate of a rapid fermentable profile. Similar feeds have been suspected or demonstrated to produce a comparatively low rumen pH as a result of acid production from fermenting carbohydrates. Current systems of grazing fodder beet use unrestricted intakes after a transition period, and a large body of specific rumen assessment research has demonstrated that the rumen pH of cattle fed in this manner is unusually high, given the energy intake, and it is higher than that of cattle fed less fodder beet in restricted amounts. Recent research has also demonstrated that the rumen nitrogen content influences acid removal, and that fodder beet fed cattle have an atypical rumen nitrogen profile. It is possible that *ad libitum* fodder beet intakes are based on a grazing pattern that regulates both energy and protein supply to the rumen, and at present this mechanism is poorly understood. This project will use rumen assessments of cattle grazing with restricted and unrestricted fodder beet intakes to establish the effect of grazing behaviour on rumen pH and nitrogen content.

*Supervisor: Dr Jim Gibbs*

*Email: Jim.Gibbs@lincoln.ac.nz*

---

30. **Souvenirs or heirlooms? Is the New Zealand biota Gondwanan, Zealandian or Australian?**

There has been a great deal of debate about the origin of the New Zealand biota. Great emphasis has been placed on the Gondwanan break-up and the Zealandia and Gondwanaland origin of New Zealand species. Such an origin would suggest lineages had been isolated for tens of millions of years in New Zealand. The late-Oligocene drowning (around 23 million years ago) removed most of the New Zealand land area as well as many New Zealand lineages. This event suggests that post-drowning dispersal from Australia may explain the presence of modern New Zealand lineages. Over the last decade at least 100 studies have been published that provide data on biological diversity. This project would gather together information from these studies in order to understand the impact of our Gondwanan and dispersal history. Meta-analyses of data from these studies will be allow us to better understand the factors that drive the biogeographical history of the New Zealand biota.

*Supervisor: Associate Professor Adrian Paterson*

*Email: Adrian.Paterson@lincoln.ac.nz*
31. **The development of GPS monitoring of sheep in a maze and computational methods to collect and codify the data**

This project is to collect and analyse data from sheep negotiating a maze using GPS type monitoring. The maze has been developed to test cognition, sight and spatial awareness in sheep and how these parameters alter with the neurological changes associated with ovine Batten disease over time. The maze is simple, consisting of a series of gates and blind alleys. The sheep have to individually find a group of cohorts at the end of the maze, with their traverse times and any pauses or errors recorded. Currently their progress is monitored by video, then each animal has to be scored in real time. Over the summer we wish to replace that with a computerised GPS tracking system and develop computational methods to collect and codify the data. The honours project will be to finish that set up and collect and analyse data from control, affected and gene therapy treated sheep over time as the disease progresses.

**Supervisors: Prof David Palmer, Prof Don Kulasiri & Dr Nadia Mitchell**

**Email:** [David.Palmer@lincoln.ac.nz](mailto:David.Palmer@lincoln.ac.nz)

32. **The effect on red meat quality of novel processing technology**

Tenderness is one of the most important eating qualities of red meat and a major determinant of price. There has been a continual interest in using new technologies to improve the tenderness of low value cuts of meat. Some of these techniques operate by mechanically breaking up the structure of the meat and other by enhancing the natural tenderizing effect of the endogenous proteolytic enzymes. These two approaches can lead to different effects on the meat quality including texture, colour and stability.

This project will explore the effect of novel technology on the enzymes involved in meat quality particularly the calpains and the key enzymes in glycolysis. This will involve a variety of protein techniques including zymography and Western blotting and possibly mass spectrometry or electron microscopy. There will also be a meat quality component which will include tenderness and colour determination and may lead to sensory analysis.

**Supervisors: Associate Professor Jim Morton & Dr Hannah Lee**

**Email:** [James.Morton@lincoln.ac.nz](mailto:James.Morton@lincoln.ac.nz)

33. **The mechanism of ovine heritable cataract**

Lincoln University has a flock of sheep with an autosomal dominant gene for cataract. This provides a convenient large animal model for understanding lens structure and testing possible therapies for cataract. Genetic mapping has
localised the mutation causing the disease to a small region on chromosome 6. There are only a few genes in this region. The project will use a mixture of molecular biology and biochemistry to test the possible candidate proteins and attempt to determine the mechanism leading to this inherited cataract.

**Supervisor: Associate Professor Jim Morton**
**Email:** James.Morton@lincoln.ac.nz

34. **Using heart rate monitors to measure the effect of winter feeding strategies on heat production dairy cows**

Digested nutrients consumed and absorbed by animals are used for maintenance and other physiological parameters such as growth and pregnancy. However, in any of these metabolic processes energy is lost as heat. Heart rate is an indirect measure of heat production and as such could potentially be used to assess the conversion efficiency of a diet. For example feeding cows during winter may result in low feed conversion efficiency as more energy is expended maintaining body temperature in cold conditions. In this study heart rate will be used to compare heat production of pregnant, non-lactating dairy cows on similar diets but using different energy allocations.

**Supervisor Dr Racheal Bryant**
**Email:** Racheal.Bryant@lincoln.ac.nz

35. **Weed control in annual clovers**

Annual clovers such as subterranean, Persian and Balansa are suited to regions with dry summers such as the east coast. They are usually sown in autumn to provide early spring growth which is very useful for filling feed shortage at that time. They can also be grown as seed crops with reasonable profit to the farmers. These species are seriously affected by weed competition during early stages of their growth and as such successful growing of them depends on weed management. While there are a number of registered herbicides for more common pasture legumes, there is uncertainty about chemical control options in these crops. The project aims to provide the information which can then be used for weed control recommendations. The project will use cultural and chemical control methods in field experiments and will evaluate selected herbicides for their effectivity and selectivity in the above crops. The project is building on two years of field trials and will have relevance to current pastoral practices. The student working on this project will also have opportunity in developing skills in weed identification.

**Supervisor: Dr. Farhad Dastgheib**
**Email:** Farhad.Dastgheib@lincoln.ac.nz