



**GROWING
NZ**

**INNOVATION
CHALLENGE**

teaching
resource

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INTRODUCTION

This programme is for year 9-11 students with an interest in technology, science or business.

The challenge uses a team project approach and can be delivered through an inter-school challenge day or a classroom project.

INTER-SCHOOL CHALLENGE DAY (IN SELECTED REGIONS)

This day presents teams with an industry challenge. It requires students to use investigative research and practical knowledge of science, technology and business to design and prototype a solution to the challenge. Students interview and collect feedback from industry representatives. Each day has \$250 worth of prizes up for grabs.

Communication

Inquiry

Teamwork

Presentation

Feedback



CLASSROOM PROJECT

This teacher led classroom project mirrors the facilitated inter-school challenge and can be delivered through five classroom lessons.

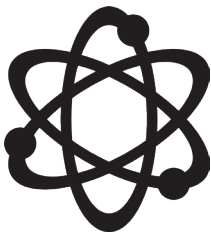
The resource consists of a project guide and student guidebook. Teachers facilitate the project and adapt it for their students.

Students can complete their research online or teachers may wish to incorporate field visits or arrange for industry representatives from their region to come into class.

CURRICULUM LINKS

The GrowingNZ Innovation Challenge is a practical cross curricular programme which has strong links to Level 4 and 5 of the science, technology, social sciences and English learning areas in the NZ curriculum.

As a general guide, teachers may find the following specific links within each of the learning areas:



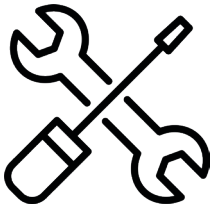
SCIENCE

Nature of Science

- Participating and communicating
- Investigating science

Physical World

- Physical inquiry and physics concepts



TECHNOLOGY

Technological Practice

- Planning for practice
- Brief development
- Outcome development and evaluation

Technological Knowledge

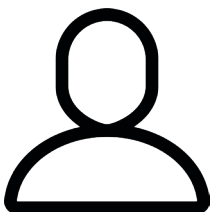
- Technological modelling - prototyping refinement
- Technological products



SOCIAL SCIENCES

Exploration and innovation

Responding to community challenges



ENGLISH

Speaking, writing, presenting

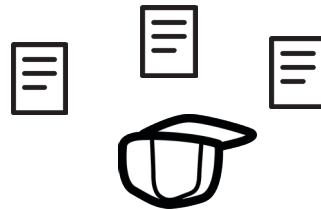


PROJECT JOURNEY

Divide into teams of four



Draw challenge from hat



Research



Choose two enablers

AI ✓ **GPS** ✓ **L** **VR**

Build prototype/s



Brainstorm ideas



Presentation



Enter and win



PROJECT OUTLINE

LESSON 1: DISCOVER YOUR CHALLENGE

In this lesson students draw a challenge from a hat and begin to research it in depth. Their goal is to develop an understanding of the issues and the effect these have on the user and the industry. Students should also look into what existing methods are used and analyse the benefits and limitations of these.

LESSON 2: CHOOSE YOUR ENABLERS

In this lesson students will review a selection of new and existing technologies or sciences which could provide an opportunity to help the people and the industry. They will use team brainstorming to develop a potential solution which incorporates these 'enablers'.

LESSON 3: PROTOTYPE

In this lesson, students will use basic materials or drawings to build a rough prototype of their solution. The prototype does not need to be a 'working prototype' but rather is designed to show the form and function of their concept. Students will document their thinking which underpins their ideas and articulate the 'value' their solution will provide for the end user and the industry.

LESSON 4: IT'S SHOWTIME

In this lesson, students will present their prototype to observers or guests. This could be in a group presentation (pitch style) or in a more casual 'science fair display' style. Guests from the community or industry could be invited in to also share in the work they have been doing and provide feedback, but this is optional.

LESSON 5: ENTER AND WIN

In this lesson, students will prepare and submit a competition entry into the National Competition. All entries must be in digital format and could be in any of the following formats:

- Slide show
- Explainer video (less than 2 minutes)
- Infographic style poster.



LESSON 1

Curriculum Links

SCI: Participating and contributing

TEC: Characteristics of technology

PURPOSE

By the end of this lesson students will:

- Know what the GrowingNZ Innovation Challenge and competition is
- Be assigned a specific challenge to work on
- Develop an understanding of the issues and the effect on the user and industry
- Know and analyse what existing methods are used.

WHAT YOU WILL NEED

- Printed and cut copies of the Challenge Cards - enough for 1 per group (some student teams may have the same challenge).
- Printed copies of each of the Challenge Detail sheets (enough to match the number of cards).

ACTIVITY

- Arrange groups into teams of four and ask each team to assign a team captain.
- Cut and place the appropriate number of challenge cards into a hat (allocate at least 1 card per team). Teams send their captains to pull a random challenge out of the hat and take it back to their team. You may wish to allow teams to return their challenge and choose another (avoid doing this more than once).
- Provide each team with a copy of the Challenge Detail sheet that matches their Challenge Card.
- Ask teams to use BYOD, computers or the library to find out as much as they can about the challenge. In particular, focus their attention on how an individual might be experiencing this challenge and what they are currently using to 'cope' with the situation.
- Ask students to list/document their findings:
 - Who experiences the challenge the most (crop farmers, dairy farmers etc.)?
 - What appears to be particularly painful, annoying, time-consuming for the user?

LESSON 2

Curriculum Links

SCI: Physical world, using physics
Participating and contributing
Investigating science

TEC: Planning for practice

EN: Ideas

PURPOSE

By the end of this lesson students will:

- Review a range of enablers*, two of which they will incorporate into their 'big idea'
- Participate in team brainstorming to develop their idea
- Refine their design based on their understanding of customer needs.

WHAT YOU WILL NEED

- Access to computers for further research into the enablers (optional).
- Brainstorming skill-building sheet (p. 25 Student Guidebook).
- Brainstorming materials (post-it notes, whiteboard and markers, flip charts etc.).

ACTIVITY

- Ask students to review their findings from the last activity.
- In the Student Guidebook, there are 18 enablers*. Initial information can be found in the related Challenge Detail sheets. Ask students to review these sheets and choose two enablers which they will incorporate into their 'big idea'.
- Student teams should have a good understanding of each of the enablers'* potential and limitations. If not, encourage them to undertake further research.
- Using creative brainstorming and the tips outlined in the student guidebook, student teams will develop a 'big idea' to solve the challenge. Their idea should be informed by the findings from lesson 1 and incorporate their enablers*.
- Ask students to visualise their idea by sketching out several versions of their concept on paper.

*Enablers are specific technologies or sciences which can 'enable' users to approach problems in new ways.

LESSON 3

Curriculum Links

SCI: Physical world, using physics

TEC: Technological modelling

Brief development

Outcome development

PURPOSE

By the end of this lesson students will:

- Design a rough prototype/s of their concept from basic everyday materials
- Write a statement which clearly describes the value their 'big idea' provides
- Develop and rehearse a short presentation (if time allows).

WHAT YOU WILL NEED

- Prototyping skill-building sheet (p. 27 Student Guidebook).
- A range of basic materials for prototyping (paper, cardboard, craft knife, sellotape, scissors, string, glue, coloured pens, pipe cleaners etc.).
- Creating and Describing Value skill-building sheet (p. 26 Student Guidebook).
- Presentation Tips skill-building sheet (p. 28 Student Guidebook).

ACTIVITY

- Set up a table in the room with basic craft resources for students to use for building a rough prototype.
- Using the Prototyping skill-building sheet as a guide, discuss the difference between rough prototyping vs working prototyping.
- Encourage multiple versions of their 'big idea'. To build energy, try giving teams a deadline in which to submit their prototype and offer a small incentive for the most creative and resourceful team.
- Teams should complete a statement that articulates the value their 'big idea' provides. Students can use the Creating and Describing Value skill-building sheet in their student guidebook. (Note: you may need to explain the concept of value in more depth. It's good for students to focus on the value they give rather than the product they make.)
- Ask students to use the Presentation skill-building sheet to help plan a 5 minute presentation explaining their challenge, their 'big idea' and the value they will create.

LESSON 4

Curriculum Links

TEC: Brief development

Outcome development

EN: Speaking, presenting, ideas

PURPOSE

By the end of this lesson students will:

- Present their 'big idea' to a guest audience
- Answer questions and collect feedback.

WHAT YOU WILL NEED

- Space to present from i.e. wall space or display boards.
- A guest audience (external guests or from within the school).
- Presentation Tips skill-building sheet (p. 28 Student Guidebook).

ACTIVITY

- Consider leading a quick conversation with the class on what makes a presentation worth watching. There is a Presentation Tips skill-building sheet in their guidebook.
- Using desks, wall space or display boards, set up areas where teams can display their 'big idea'. You can run this session like a science fair, where guests browse and 'chat' to the teams. Or pitch style where teams can formally pitch/present their idea from their display area.
- Allow time for students to set up their display areas and refine their 5 minute presentation.
- You may consider briefing guests on their role. This could include giving them the big picture of the project, asking them to 'rate' or 'score' the students' presentation or simply providing positive useful feedback to help students further refine their idea.
- If you are using 'pitch style' presentations, a good rule of thumb is to allocate 5 minutes for presenting, and 2-3 minutes for questions. You will need to keep a good watch on the clock and enforce the times allocated.
- Encourage students to record/document the feedback they receive.



LESSON 5

Curriculum Links

TEC: Brief development
Outcome development
Characteristics of technology
EN: Presenting

PURPOSE

By the end of this lesson students will:

- Plan and create a digital presentation of their 'big idea'
- Submit their entry into the national competition.

WHAT YOU WILL NEED

- Access to the internet and a minimum of one computer per team.
 - Competition entry information (p. 29 Student Guidebook, p. 35 Teaching Resource).
-

ACTIVITY

- Students work in teams to develop a digital competition entry.
- Suggested web based tools for making an entry can be found in the competition entry information in the student guidebook.
- Entries can ONLY be submitted once into the competition and must be in one of the following formats:
 - Infographic poster
 - Explainer video
 - HTML slide show (uploaded to web).
- Entries are reviewed at the end of each term and winners receive \$250 worth of cash prizes.
- For more detailed information on entries, please review the competition entry information in the Teaching Resource or Student Guidebook.

CHALLENGE CARDS



MAINTAINING WATER SUPPLY

Water is transported around dairy farms through pipes. The water flow can be disrupted if there is a leak in a pipe, a pump breaks down or a valve in a trough gets broken.

Your challenge is to create a new way for farmers to quickly identify that there is a problem and locate where it is.

MEASURING PASTURE

Livestock farmers use grass and clover as a main source of feed. They want to understand the rate of growth and the quality of the grass being grown.

Your challenge is to come up with a means of providing ongoing, realtime information about pasture growth and quality.

PROTECTION FROM PESTS

A biosecurity disaster, such as an invasion of a dangerous plant or animal pest, would have a large impact on production and NZ's ability to market our goods overseas.

Your challenge is to create a way to improve New Zealand's biosecurity and protect the country from harmful invasions of plant and animal pests.

NB: You may wish to narrow this challenge down to a specific pest. Perhaps one which affects your local region.

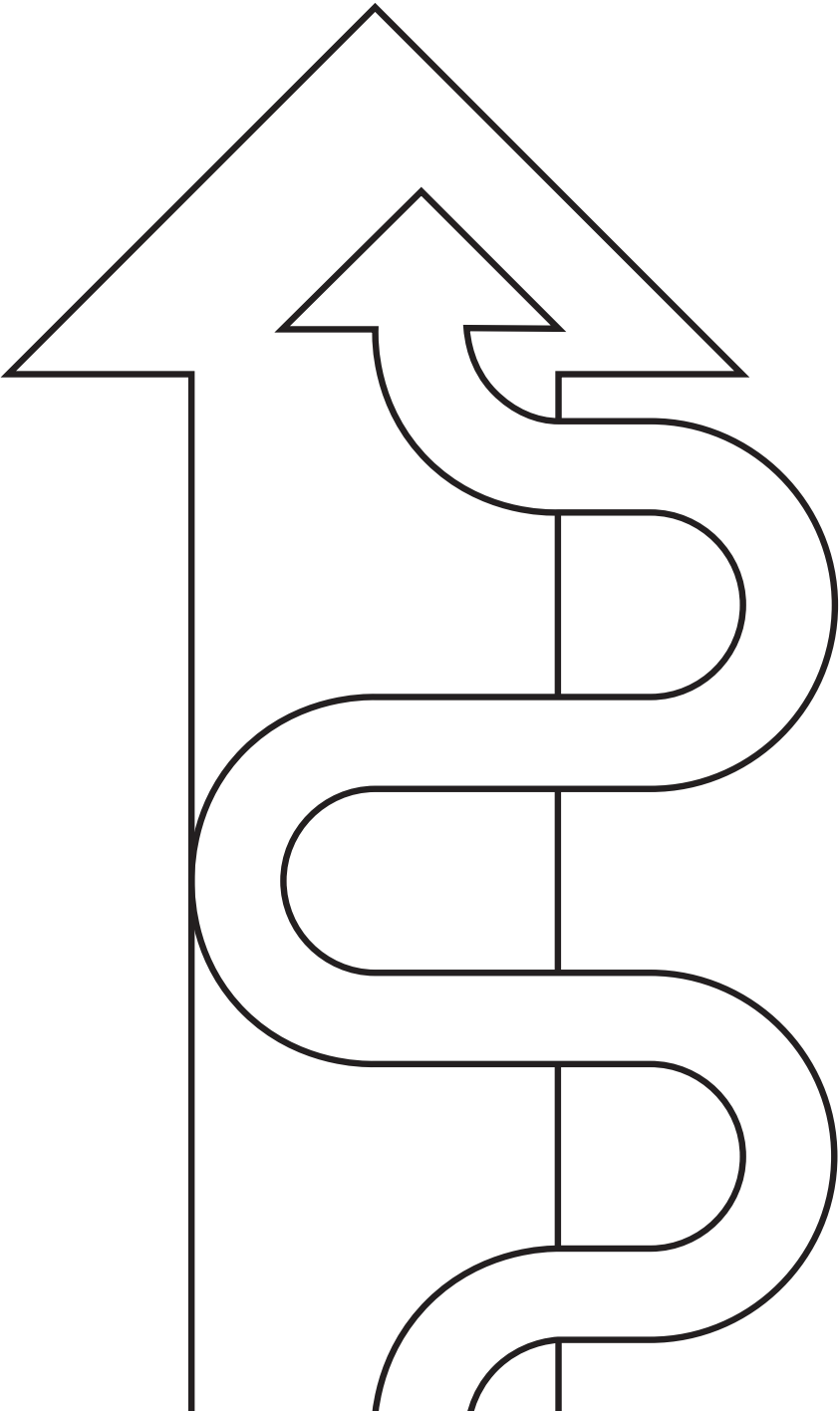
NOVEL PRODUCT FROM A NEW CROP

Faba beans (also known as broad or fava beans) are a high protein crop which can be grown with good success in New Zealand. As a raw product faba beans are not particularly appealing.

Your challenge is to develop a new way to sell this product to the world. Your use of technologies or sciences could be at any stage such as in growing, processing or packaging this crop.

You will need to print out enough copies of the challenge card sheets to ensure there are enough for 1 card per team. We recommend you use a fun random selection process such as a race and draw from a bowl/ hat.





CHALLENGE CARDS



KEEPING COWS COOL

Dairy cows feel hot much sooner than we do, because digesting grass and making milk creates a lot of heat. When it's above 23 °C and 80% humidity, they can't lose that heat fast enough so they start to eat less and make less milk to stay a bit cooler. With so many cows and so few trees, it is tricky for farmers to keep all their cows cool enough so that feed intake and milk production aren't reduced.

Your challenge is to find a way to keep cows cool in hot weather conditions.

ON-FARM BIOSECURITY

Disease or pest infection can be disastrous for a farm and catastrophic for the industry. Biosecurity is the precautions that farmers and growers need to take to reduce the chance of a new animal disease, plant pest or insect pest arriving on their property.

Your challenge is to design and develop a farm biosecurity defence system to protect a farm from either animal diseases, plant pests or insect pests.

IRRIGATION EFFICIENCY

Irrigation is used to assist the growth of crops, usually at times when there is insufficient rainfall to optimise production. Poor water application caused by worn/wrong/damaged equipment, and poor position of the irrigators on the land can result in some areas being overwatered, and some being underwatered.

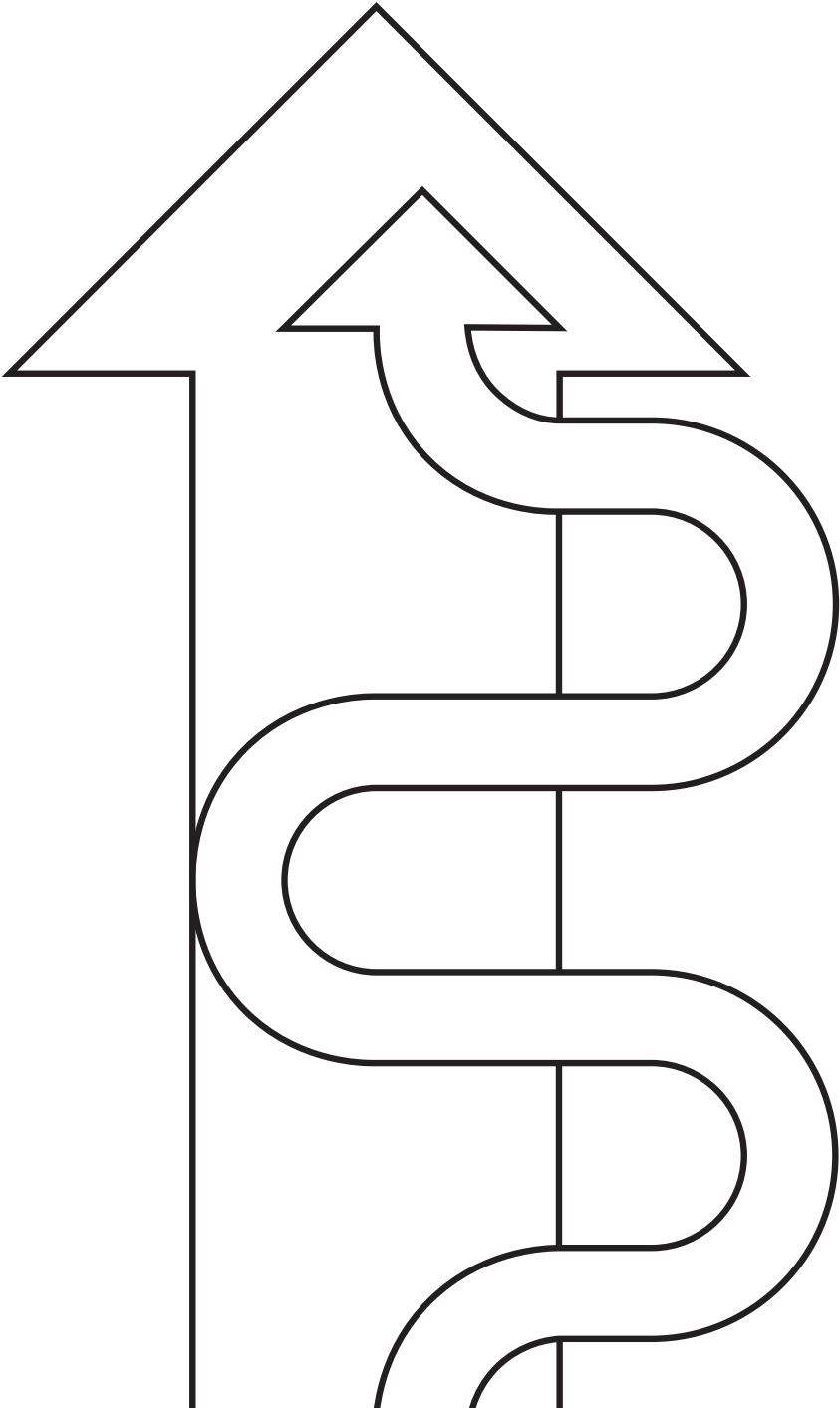
Your challenge is to come up with a solution to make irrigation more efficient, to reduce water wastage and improve productivity.

FORESTRY TRACEABILITY

Forestry is the third largest export earner for NZ, contributing over \$5 billion to the New Zealand economy each year. Export earnings are expected to grow to over \$6 billion by 2020. Traceability of timber products is especially important with the increasing rate of globalisation & prevention of illegal logging worldwide.

Your challenge is to develop a traceability system for tracking timber product from an overseas market back to the forest where it was grown.





CHALLENGE CARDS



PASTURE DAMAGE

When the ground is wet, cattle can damage the pasture in areas of high use around feed troughs, gateways, tracks etc. This is known as 'pasture pugging'. Damaged pasture then becomes unproductive.

Your challenge is to come up with a solution to identify areas of land susceptible to pugging, and a solution to limit the likelihood of damage to the pasture.

SILAGE LEACHING

Silage provides a source of feed for animals during winter months.

Liquid (known as leachate), drains from the silage. It is very acidic and contains high levels of nutrients, and as a result is extremely toxic to waterways.

Preparing and storing silage well is the best way to minimise leachate.

Your challenge is to come up with a solution to detect and prevent silage leaching before it becomes a problem.

CREATING VALUE FROM AN EXISTING PRODUCT

Crossbred wool makes up 90% of NZ's wool production. It is generally used for making carpets and some clothing. The market price for crossbred wool is currently very low, making it difficult for farmers and the wool processing industry to make any money.

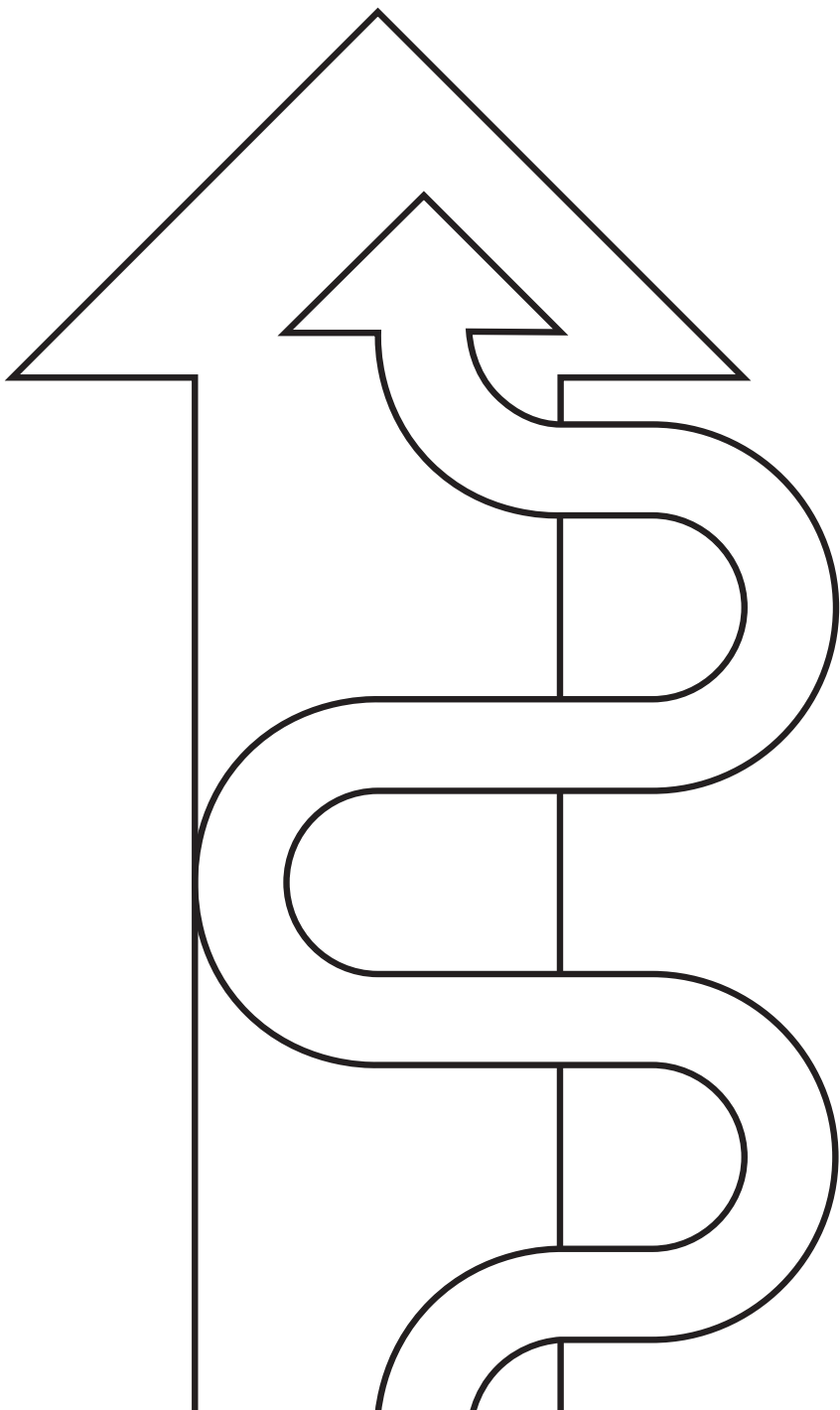
Your challenge is to come up with an innovative product that uses the properties of crossbred wool and uses enabling technologies in producing, marketing or distributing the product. Describe the market for the product (who would buy and use it).

OPTIMAL WEEDKILLER

If not controlled, weeds grow freely causing weed infestations in cropped fields or pasture paddocks. Weeds can also harbour pests and be a fire risk. The optimal application of weedkiller has a significant impact on productivity.

Your challenge is to come up with a solution to apply the right type of weedkiller at the right time, and to map the efficiency of the application.





CHALLENGE CARDS



WATER SCARCITY

Droughts are becoming more frequent and severe, with significant economic impact and risk to food production/crop production/animal and human wellbeing.

Your challenge is to come up with a way for water to be stored/preserved/recycled for use in times of severe drought.

CAREERS AND CAPABILITY

The diverse range of career opportunities in the primary sectors provide variety, challenge, financial rewards, and opportunities to grow and make your mark. Yet these sectors struggle to attract enough young people to meet the capability requirements to ensure these sectors important to New Zealand remain sustainable, progressive, and productive.

Your challenge is to develop a solution for what the primary sector needs to do to attract more youth to the agri-science and business industries.

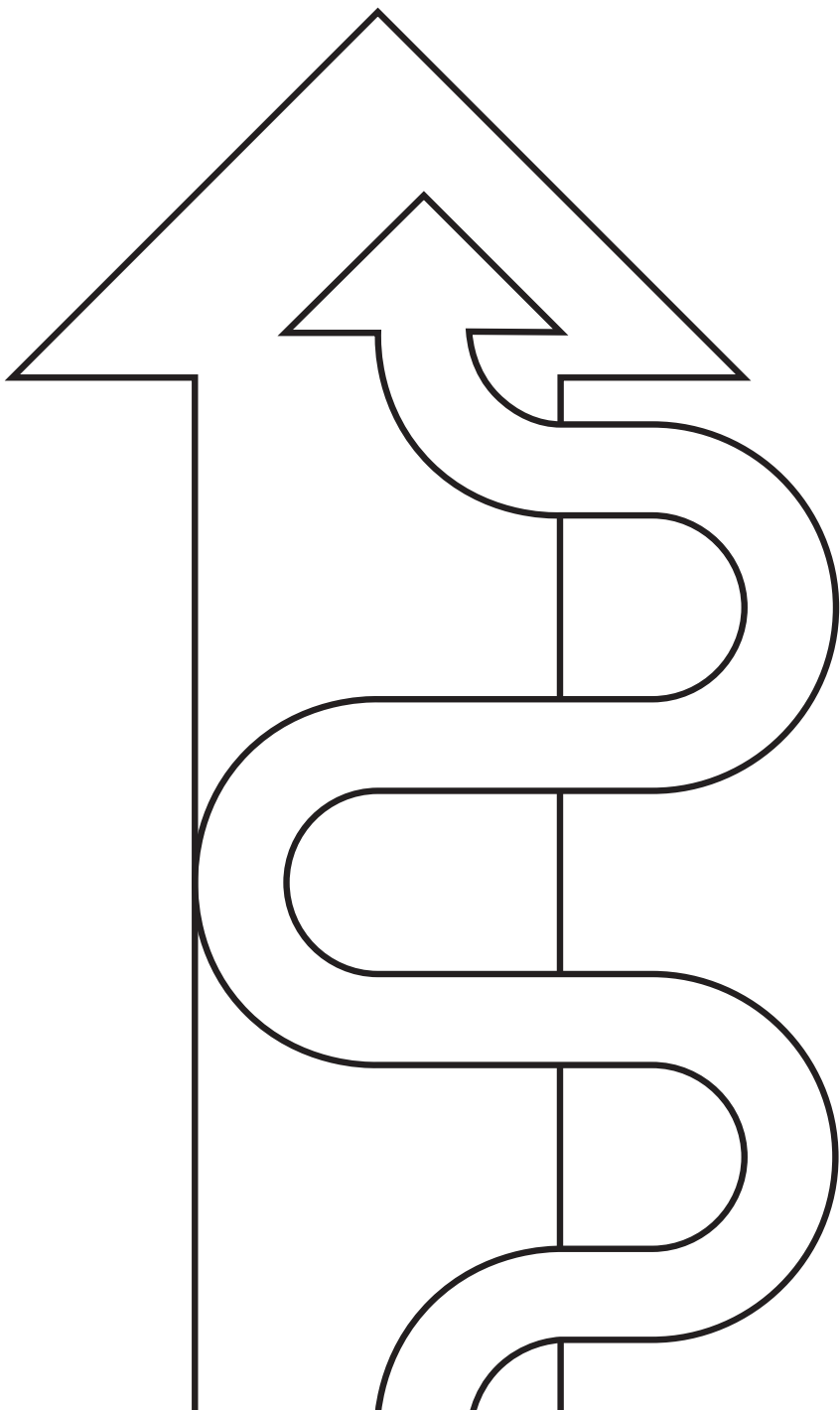
ANIMAL CONDITION

Just like people, sheep and cattle can grow 'old' at different rates.

A 3 year old sheep can be in a poorer physical condition than a sheep twice it's age. An animal in poor condition will produce less offspring and be more susceptible to health risks than an animal in good condition. Currently farmers will score/rate an animal based on its body condition and this is done manually by sight and feel of each animal.

Your challenge is to develop a faster, more accurate method for farmers to measure and record an animals' body conditioning score (BCS).





MAINTAINING WATER SUPPLY

Water is transported around dairy farms through pipes, generally made of alkathene.

Dairy cows need to drink about 100 litres of water a day during the milking season, so a flow of water needs to be maintained to the water trough in each paddock.

The water flow can be disrupted if there is a leak in a pipe, a pump breaks down or a valve in a trough gets broken.

"Your challenge is to create a new way for farmers to quickly identify that there is a problem and locate where it is."

USEFUL RESEARCH LINKS

Hack Your Own Sensor

<https://www.youtube.com/watch?v=wXdzyjNHsLQ>

Listening for Water

<https://www.youtube.com/watch?v=7MWkHp8Oon4>

Measuring Flow and Pressure

<https://www.youtube.com/watch?v=LFHA47T1jpE>



MEASURING PASTURE

New Zealand livestock farmers use grass and clover pastures as a main source of feed.

Monitoring pasture growth is key to their management, as it enables them to plan ahead. They aim to ensure they don't run out of feed and also to avoid letting grass grow long and stalky, which is lower quality.

They want to understand the rate of growth and also the quality of the grass being grown. They not only use this information for feed budgeting but also to understand how their individual paddocks are performing and what they might need—e.g. nutrients.

Currently they can monitor pasture by walking around assessing it by eye or using a platemeter. If they want to get an accurate assessment of quantity or quality, they have to take a herbage sample and get a lab test done.



"Your challenge is to come up with a means of providing ongoing, real-time information about pasture growth and quality."

USEFUL RESEARCH LINKS

Regular Pasture Measurements

https://www.youtube.com/watch?v=BqbTOn0_8ul

Rising Plate Meter

<https://www.youtube.com/watch?v=9zp8PRConnM>

Stick Measure

<https://www.youtube.com/watch?v=j5q4S3CFGck>

PROTECTION FROM PESTS

New Zealand relies heavily on the primary sectors and a biosecurity disaster, such as an invasion of a dangerous plant or animal pest, would have a large impact on production and our ability to market our goods overseas.

"Your challenge is to create a way to improve New Zealand's biosecurity and protect the country from harmful invasions of plant and animal pests."

USEFUL RESEARCH LINKS

Ministry for Primary Industries

<https://www.mpi.govt.nz/protection-and-response/finding-and-reporting-pests-and-diseases/keeping-watch/>

Declaration Process

<https://www.youtube.com/watch?v=yIXS81xpz2g>

Detector Dogs

<https://www.youtube.com/watch?v=vkKo6vnCHVg>



NOVEL PRODUCT FROM A NEW CROP

Finding new markets by experimenting with new crops or creating new products from existing crops can add significant value to NZ exports.

Due to advancements in both technology and science new methods of growing, processing and transporting food products are creating opportunities for new products to be created.

Faba beans (also known as broad or fava beans) are a high protein crop which can be grown with good success in New Zealand. As a raw product faba beans are not particularly appealing.

"Your challenge is to develop a new way to sell this product to the world. Your use of technologies or sciences could be at any stage such as in growing, processing or packaging this crop."

(You should describe the technology used, what the product is, what the expected market will be and why it will appeal to this market).

USEFUL RESEARCH LINKS

What did Fonterra do with the hard bits they removed from regular butter to make it semi-soft? They made a special fractured butter that is perfect for pastry!

<https://www.anchorfoodprofessionals.com/my/en/products/butter/lamination-butter/butter-sheets.html>

When honey producers found the rich dark characteristics of manuka honey were preferred over clover honey, they were able significantly increase the exported value of New Zealand honey.

In addition, due to it's antibacterial properties new products are being used in the medical profession.

https://en.wikipedia.org/wiki/Mānuka_honey

KEEPING COWS COOL

Dairy cows feel hot much sooner than we do, because digesting grass and making milk creates a lot of heat. When it's above 23 °C and 80% humidity, they can't lose that heat fast enough so they start to eat less and make less milk to stay a bit cooler.

"Your challenge is to find a way to keep cows cool in hot weather conditions."

If it gets even hotter or more humid, they can suffer from heat stress, which is when they start panting and drooling.

With so many cows and so few trees, it is tricky for farmers to keep all their cows cool enough so that feed intake and milk production aren't reduced.

Cows need at least 5 m² of shade each – if there is less than that, dominant cows push the submissive cows out. So, for a 250 cow herd to have enough shade each, every paddock would need 1250 m² of shade, that's at least 20-30 mature trees in a paddock!

USEFUL RESEARCH LINKS

Managing Heat Stress in Cows

<https://www.dairynz.co.nz/animal/cow-health/heat-stress/>

(There's a temperature humidity index calculator on this page, which is interesting to play with.)

<https://www.farmingmagazine.com/dairy/heat-stress-dairy-cows/>

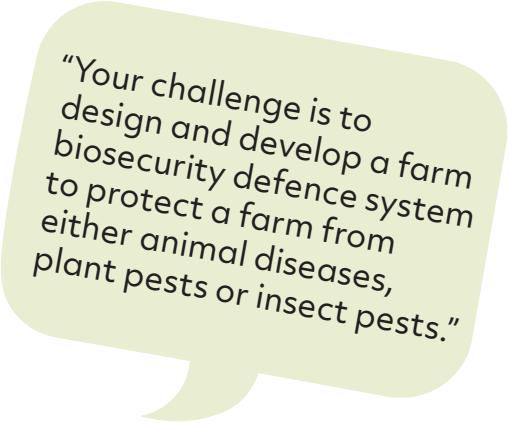
Helping Cows to Stay Cool

<https://www.youtube.com/watch?v=TBlFemqXfZc>



ON-FARM BIOSECURITY

Disease or pest infection can be disastrous for a farm, and if it spreads between farms or orchards, catastrophic for the industry. Biosecurity is the precautions that farmers and growers need to take to reduce the chance of a new animal disease, plant pest or insect pest arriving on their property.



"Your challenge is to design and develop a farm biosecurity defence system to protect a farm from either animal diseases, plant pests or insect pests."

USEFUL RESEARCH LINKS

Mycoplasma Bovis in Cattle

<https://www.mpi.govt.nz/protection-and-response/responding/alerts/mycoplasma-bovis/>

Myrtle Rust

<https://www.youtube.com/watch?v=tobB302ha68> <http://www.mpi.govt.nz/protection-and-response/responding/alerts/myrtle-rust/>

PSA Virus on Kiwifruit

<https://www.youtube.com/watch?v=vA-ctl2qVZI>

IRRIGATION EFFICIENCY

Irrigation is the artificial application of water to the land or soil to assist in the growing of crops and is usually used at times when there is insufficient rainfall to optimise the growing and production.

Water is moved through pipes, canals, sprinklers and other man-made means. Poor water application caused by worn/wrong/damaged equipment, and poor position of the irrigators on the land can result in some areas being overwatered, and some being underwatered.

"Your challenge is to come up with a solution to make irrigation more efficient, to reduce water wastage and improve productivity."

USEFUL RESEARCH LINKS

What is Irrigation

<https://www.youtube.com/watch?v=amrCMakolKA>

About Irrigation

<https://www.dairynz.co.nz/environment/water-use/irrigation/>

Irrigation NZ

<http://irrigationnz.co.nz/knowledge-resources/>



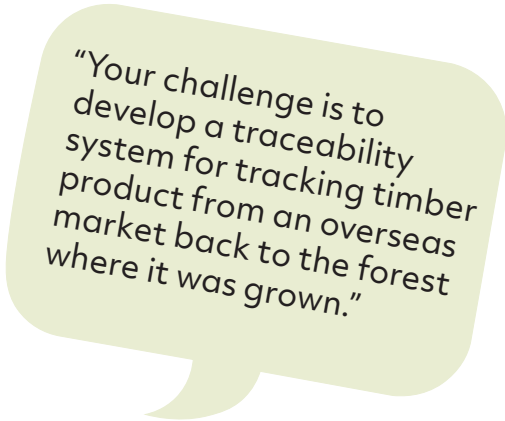
FORESTRY TRACEABILITY

Forestry is the third largest export earner for NZ, contributing over \$5 billion to the New Zealand economy each year. The export earnings are expected to grow to over \$6 billion by 2020.

Traceability of timber products is especially important with the increasing rate of globalisation and prevention of illegal logging worldwide.

Customers want to know which clean green forest their product came from.

Traceability is the ability to trace the history, application or location of the wood, or the processing of it, by means of recorded identifications. This involves identification of the product and recording of data from the forest where it was grown, through processing and distribution to the customer (the supply chain).



"Your challenge is to develop a traceability system for tracking timber product from an overseas market back to the forest where it was grown."

USEFUL RESEARCH LINKS

Management of Traceability

<http://www.fao.org/3/a-i6134e.pdf>

Standard for Traceability of Wood Products

<https://www.standards.govt.nz/touchstone/environment/2014/sep/new-standard-for-the-traceability-of-wood-products/>

About Supply Chain Management

<https://www.youtube.com/watch?v=M1QBxVjZAw>

PASTURE DAMAGE

When the ground is wet, cattle can damage the pasture in areas of high use around feed troughs, gateways, tracks etc. This is known as 'pasture pugging'. Damaged pasture then becomes unproductive.

"Your challenge is to come up with a solution to identify areas of land susceptible to pugging, and a solution to limit the likelihood of damage to the pasture."

USEFUL RESEARCH LINKS

Managing Pugging Damage

<https://www.dairynz.co.nz/feed/pasture-management/managing-pugging-damage/>

Why Pugging is Bad News

<http://thisnzlife.co.nz/headline/>

Farmers Talk About Pasture Pugging

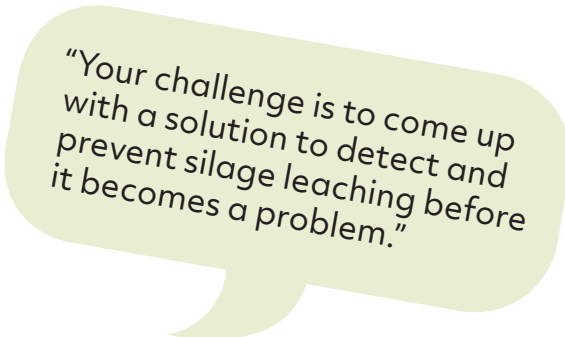
<https://www.youtube.com/watch?v=FC5PcLJAmko>



SILAGE LEACHING

Silage is 'pickled grass', and is a way of storing grass for longer periods of time than if it were left in the open air, therefore providing a source of feed for animals during winter months.

Liquid (known as leachate), drains from the silage. It is very acidic and contains high levels of nutrients, and as a result is extremely toxic to waterways. Preparing and storing silage well is the best way to minimise leachate.



"Your challenge is to come up with a solution to detect and prevent silage leaching before it becomes a problem."

USEFUL RESEARCH LINKS

About Grass Silage

<https://www.dairynz.co.nz/feed/supplements/grass-silage/>

Silage Leachate Pollution

<http://leachate.info/leachate-pollution/silage-leachate-pollution.html>

Silage Stack and Bales

<https://www.boprc.govt.nz/media/29038/FarmDairy-090526-Factsheet05.pdf>

CREATING VALUE FROM AN EXISTING PRODUCT

Crossbred wool makes up 90% of NZ's wool production. It is generally used for making carpets and some clothing. The other 10% is merino wool, which is much finer and softer, and is used mainly for clothing.

The market price for crossbred wool is currently very low, making it difficult for farmers and the wool processing industry to make any money.

"Your challenge is to come up with an innovative product that uses the properties of crossbred wool and uses enabling technologies in producing, marketing or distributing the product. Describe the market for the product (who would buy and use it)."

USEFUL RESEARCH LINKS

Industry Issue

http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11976852

Properties of Wool


<http://nzwool.co.nz/about-wool/>

<http://nzwool.co.nz/resources>



OPTIMAL WEEDKILLER

If not controlled, weeds grow freely causing weed infestations in cropped fields or pasture paddocks. Weeds can also harbour pests and be a fire risk. The optimal application of weedkiller has a significant impact on productivity.



"Your challenge is to come up with a solution to apply the right type of weedkiller at the right time, and to map the efficiency of the application."

USEFUL RESEARCH LINKS

Weed Management

[https://www.far.org.nz/assets/files/uploads/FAR_Focus_11 - weeds in maize.pdf](https://www.far.org.nz/assets/files/uploads/FAR_Focus_11_-_weeds_in_maize.pdf)

Robotics for Weed Control

https://www.youtube.com/watch?v=n_KM5tPtz-U

Drones for Weed Control

<https://www.youtube.com/watch?v=6PDpYoBYxHg>

WATER SCARCITY

Droughts are becoming more frequent and severe, with significant economic impact and risk to food production/crop production/animal and human wellbeing.

"Your challenge is to come up with a way for water to be stored/preserved/recycled for use in times of severe drought."

USEFUL RESEARCH LINKS

NZ Drought Index

<https://www.youtube.com/watch?v=k1hMGz5QxnQ>

Vertical Farming

https://www.youtube.com/watch?v=-_tvJtUHnmU

Drought & Agriculture

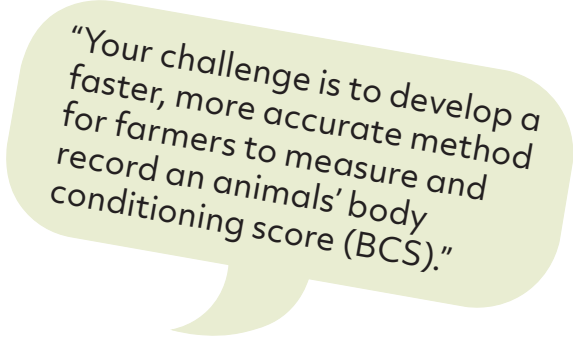
<https://www.youtube.com/watch?v=J5WMyD9-CHs>



ANIMAL CONDITION

Just like people, sheep and cattle can grow 'old' at different rates. A 3 year old sheep can be in a poorer physical condition than a sheep twice its age. An animal in poor condition will produce less offspring and be more susceptible to health risks than an animal in good condition. This will have an impact on the productivity of the farm. Because of this, farmers cannot rely on age alone to determine the overall health of their animals.

Currently farmers will score/rate an animal based on its body condition and this is done manually by sight and feel of each animal.



"Your challenge is to develop a faster, more accurate method for farmers to measure and record an animals' body conditioning score (BCS)."

USEFUL RESEARCH LINKS

Body Condition Scoring Sheep

<https://beeflambnz.com/knowledge-hub/module/body-condition-scoring-sheep>

<https://www.youtube.com/watch?v=YB0PZDeZhq8>

Body Condition Scoring Cows

<https://www.youtube.com/watch?v=KfIFYr1UPls>

CAREERS AND CAPABILITY

The diverse range of career opportunities in the primary sectors provide variety, challenge, financial rewards, and opportunities to grow and make your mark. Yet these sectors struggle to attract enough young people to meet the capability requirements to ensure these sectors important to New Zealand remain sustainable, progressive, and productive.

"Your challenge is to develop a solution for what the primary sector needs to do to attract more youth to the agri-science and business industries."

USEFUL RESEARCH LINKS

Dairy Careers

<https://www.dairynz.co.nz/people/dairy-careers/>

CareersNZ

<https://www.careers.govt.nz/jobs-database/primary-industries/>

Just The Job

<http://www.justthejob.co.nz/individual-career-videos/primary-industries-/>



THE COMPETITION

Student entries must be digital and submitted via a hyperlink.

Entries must be in one of these formats:

Infographic Poster

- piktochart.com
- canva.com

Explainer Video

- moovly.com
- biteable.com

HTML Slide Show

- emaze.com
- Google Slides: google.com/slides/about (turn sharing on)

Students need to submit their single entry via this link.

[HTTPS://WWW.SURVEYMONKEY.COM/R/GROWINGNZ_ENTRY](https://www.surveymonkey.com/r/growingnz_entry)

Representatives from GrowingNZ will judge entries based on:

- Demonstrated understanding of the challenge itself (quality of research undertaken)
- Application of 'enablers' incorporated into your 'big idea'
- Quality of your explanation on how you have created value.

Teachers will be notified by email if one or more of their student teams are selected as a prize winner.



DEADLINE DATES

Winners will be selected each term from the entries received during the term.

Submit your entry by 4pm on these dates:

- 6th July
- 28th September
- 3rd December

HELPING YOU GROW NEW ZEALAND'S NEXT GENERATION OF TALENT

Designing a biosecurity defence system to protect a farm from diseases and pests. Keeping cows cool in hot weather conditions. Developing a traceability system to track timber products from an overseas market back to the forest where it was grown. Those are just a few of the challenges you might have had a taste of when participating in GrowingNZ's Innovation Challenge.

For New Zealand's innovative primary sectors to keep leading the world, we need a lot of different people with a lot of different talents - students who love programming robots, working with animals or protecting our environment... We also need students who are naturals when it comes to speaking multiple languages or managing complex businesses.

Robotics engineers, geneticists, farm managers...we need your help to get 50,000 more people who enjoy a challenge excited about joining our sector by 2025.

It doesn't matter if a student has grown up in a city or the country, or where they see themselves spending time in the future. Stepping out their back door to work on a farm, flying around the world to different countries or being an entrepreneur in an inner-city office...it's up to them.



FIND OUT MORE

GrowingNZ and our members offer an extensive range of activities, events and resources to help you and the next generation of talent learn about the many exciting education, training and career opportunities available in our primary sectors:

- **Enjoy a Teacher's Day Out**

Making the journey from farm to plate, a wide range of primary sector careers are show-cased at these popular professional development days for teachers. Held around New Zealand with a focus on science, technology and business, they are a fantastic opportunity for you to take a closer look at how various careers relate to your teaching in the classroom.

- **Be inspired at teacher conferences**

At selected teacher conferences we bring young professionals working in our primary sectors to talk about their roles and share their career paths. Their stories are engaging and inspiring, and often have unexpected twists.

- **Make the most of our curriculum resources**

Our members have developed a variety of high-interest teaching and learning resources for primary and secondary students aligned to the New Zealand Curriculum. These enable students to explore and make connections between their learnings and in the context of New Zealand's primary sectors.

- **Share our database of scholarships**

While the first year of study could be 'fees-free' for students, we have hunted and gathered \$3million worth of scholarships which cover other costs too. Some scholarships pay for books and accommodation and fees after the first year. Others include mentoring and work experience. There are also scholarships for apprenticeships and cadetships.

www.growingnz.org.nz/scholarships

GrowingNZ (the Primary Industry Capability Alliance) is an industry, education and government alliance providing information, activities and resources to support career opportunities in New Zealand's innovative primary sectors.

GROWINGNZ.ORG.NZ



NOTES

**THE GROWINGNZ INNOVATION
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