# Investigate a technological innovation in New Zealand primary production scheme – Level 3

**Duration:** 5-6 weeks

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| **Essence statement:** | Using new technological knowledge and skills to be able to make informed decisions that enhance and sustain primary production for future generations. |
| **Big Picture:** | New Zealand is a country whose wealth depends on primary production and associated agribusinesses. To ensure a sustainable future, agribusinesses need to keep up with technological developments.  The following are important ideas within the Big Picture:   * Apply technological knowledge and concepts to agribusiness. * Using knowledge and skills to understand future alternative management practices in agribusinesses. * Understand why adopting new technology is important to the future of agribusinesses. * Apply industry knowledge to meet producer needs, resolve their issues and develop new technologies. |
| **Key Concepts:** | Changing values, drones, economy, electronic navigation, energy, environment, environmental impacts, future focus, gadgets, GIS, GPS, human impacts, innovation, land management, land use, laser, location based information, management, managing resources, maps, monitoring change, people and the environment, resource use, social and environmental impacts, sustainability, technological change, technological innovation, technology, topographical maps. |
| **New Zealand Curriculum Links.**  **Education for Sustainability Level 8:** | |
| * **Knowledge and Understanding:** | * Evaluate social, economic, and technological measures that could be taken to sustain natural resources and improve biodiversity now and for the future. * Analyse the impact of strategies and initiatives for a sustainable future. |
| * **Attitudes and Values:** | Analyse the values and behaviours that will contribute to a sustainable future. |
| * **Actions** | Analyse actions necessary for sustainability and plan, implement, and critically evaluate personal action for a sustainable future. |
| **Geography Level 8:** | |
|  | * Understand how interacting processes shape natural and cultural environments, occur at different rates and on different scales, and create spatial variations. * Understand how people’s diverse values and perceptions influence the environmental, social, and economic decisions and responses that they make. |
| **Technology Level 8:** | |
| * **Nature of Technology:** | * Understand the implications of technology as intervention by design and how interventions have consequences, known and unknown, intended and unintended. * Understand how technological outcomes can be interpreted and justified as fit for purpose in their historical, cultural, social and geographical locations. |
| **Agricultural and Horticultural Science Level 8:** | |
| * **Contextual Strand: Sustainability** | **Learning Objective 3:** Critically examine the impact of primary production management and processes on the environmental sustainability of primary production. |
| * **Contextual Strand: Profitability** | **Learning Objective 4:** Critically examine the impact of a range of specific factors on the profitability of primary production in New Zealand. |
| **E-Learning and pedagogy.** | * Assist the making of connections by enabling students to enter and explore new learning environments, overcoming barriers of distance and time. * Facilitate shared learning by enabling students to join or create communities of learners that extend well beyond the classroom. * Enhance opportunities to learn by offering students virtual experiences and tools that save them time, allowing them to take their learning further |
| **Principles:** | **Treaty of Waitangi:** Have an understanding the Maori perspective on land use and sustainability.  **Coherence:** Creating links between knowledge and skills gained within the science and technology communities and the agribusiness industry.  **Future Focus:** Sustainability and conservation management decisions that allow producers to enhance and sustain primary production for future generations.  **Cultural diversity:** Students examine a variety of worldviews in considering sustainability issues. |
| **Values:** | **Innovation, inquiry and curiosity,** by thinking critically, creatively and reflectively.  **Ecological sustainability,** which includes care for the environment.  **Community and participation** for the common good. |
| **Key Competencies:** | **Thinking:** Make sense of information, develop understanding, make decisions, and reflect on learning.  **Using language, symbols, and text:** Interpreting and making meaning of a variety of language and symbols.  **Managing self**: Provide students with chances to engage with the material and create their own interpretation of the content.  **Relating to others:** Connect students with a range of expert opinions.  **Participating and contributing:** Enable students to transfer new learning into the context of their own communities where they are encouraged to take action. |

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| **Depth of coverage.** | **Specific Learning Outcomes.**  **Students understand:** | **Learning Activities.** | **Resources.** |
| **What’s The Big Picture?**   * The role of technology to develop new ideas and techniques, carry out production. * Why is technology important in agriculture e.g., solve problems, sustainable practices? * Understand why adopting new technology is important to the future of agribusinesses. | * What is technology? | Possible brainstorming ideas may include.   * Why is new technology important to agribusinesses? * What is the role of technology in the future of agribusinesses? | * Poster paper. * Pens. |
| **Field of technology and its importance.**   * Food production is the field of technology. * Priorities for development are; sustainability, profit, human desire and/or need, attitudes to existing technologies. * Why is technology important in agriculture e.g., solve problems, sustainable practices, profit, and economics? * How does it affect us? | * Why we use technology in agribusiness. | * Why is technology important in agribusiness? * How does it affect us? * Why do we use technological innovations in agribusiness? |  |
| **Technological innovations.**   * Explain what is a technological innovation? * Why are they relevant? * Why get innovative? * What are the drivers of technological innovation? * Where does it begin? – explore the creation of the development of new technologies. * A new innovation should solve a problem. * Innovative refers to originality, invention, commercialisation, or improvement. * Innovation from a problem – production needed solutions * How were we driven to this point? * Provide examples of technological agri-innovation products. E.g. drones, hi-tech devices / apps and software. | * What are technological innovations? * Why are technological innovations important? * The drivers of technology. * Where it all begins. * Why study innovation? * Why should the innovation solve a problem? | * Go over the understanding of what is a technological innovation product. * Brainstorm types of technological innovation products. * Discuss applications of technological innovation in New Zealand. * Discuss how technologies can be used across industries (war shed to dairy shed/ battle to beef)? * Discuss innovations from an unrelated source (as above). |  |
| **Technological advances in the primary sector.**   * Introduction to a range of historical and contemporary technology advances, including Maori tools and use of cultivation technology. * The history of technological innovation in New Zealand. * How did we get where we are now? * What are the scientific and technological advances that are integrated in farm management systems? | * The history of technological innovation in New Zealand. * Maori tools and use of cultivation technology. | * Compare and contrast traditional and new management practices associated technology. |  |
| **Consequences of a technological development**  Technological developments can have multiple consequences, both intended and unintended, known and unknown. Technological development can impact on:   * The ‘made’ world, for example, the link between consumer preferences and technological innovation has resulted in rapid product development and an increase in the infrastructure required to support new developments. * the natural world, for example, extending the potential market for new technologies has increased consumer uptake but has also impacted on product lifespan, creating life-cycle issues. * The social world, for example, playing electronic games can have negative social and physical consequences. | * The consequences of a technological development. | * Brainstorm the possible consequences of a technological development in an agribusiness. |  |
| **Responsibilities of technologists**  Responsibilities can be both individual and collective, and they arise within the broader environment where technologists work, for example, social, physical, cultural, political, economic, and spiritual environments.  Technologists have a responsibility to address factors such as:   * The protection of life and the safeguarding of people, for example, the physical and emotional safety of users of the technology. * Societal and community wellbeing, for example, potential wider societal consequences of using drones. * Sustainable management and care of the environment, for example, the effective use of resources. | * The responsibilities of technologists. |  | * Why Have a Code of Ethics?’ – EthicsWeb: <http://www.ethicsweb.ca/codes/coe2.htm> * ‘Creating a Code of Ethics for Your Organization’ – EthicsWeb: <http://www.ethicsweb.ca/codes/> * An example of a Code of Ethics – IPENZ: <http://www.ipenz.org.nz/ipenz/who_we_are/ethics_inc.cfm> |
| **What it means to be human**  Initial broad discussions on what it means to be human, including concepts such as:   * human needs and wants, for example, issues relating to protection, creation, affection, leisure * human characteristics, for example, flexibility of movement, adaptability to different environments, natural evolution in body characteristics * human intellect and will, for example, the capacity to make decisions and the importance of personal choice * natural variation, for example, body shape and size, motor skills, dexterity. |  |  | * ‘Fundamental human needs’ entry – Wikipedia: <http://en.wikipedia.org/wiki/Fundamental_human_needs> * Smithsonian National Museum of Natural History: <http://humanorigins.si.edu/human-characteristics> * Softpedia: <http://news.softpedia.com/news/Redefining-What-It-Means-to-Be-Human-175477.shtml> |
| **Examples:**   1. **Robotics.**  * The role of robotics in the primary sector. * The technological advances that are integrated within management systems. * Understand a hi-tech robotics future in land and water production. | * The role of robotics in the primary sector. * The technological advances that are integrated within management systems. * Understand a hi-tech robotics future in land and water production. | * Outline what is the technology and what is its application. * How do you use the technology? * Explain its effect on production. * Discuss the social, economic, environmental implications of its use on production. * View <https://www.ruraldelivery.net.nz/stories/Weal-s-Robotic-Milking-System> * <https://www.ruraldelivery.net.nz/stories/Tree-Swinging-Robot> | * <http://biotechlearn.org.nz/focus_stories/robotic_milking> * <http://www.dairynz.co.nz/milking/robotic-milking/> * <http://biotechlearn.org.nz/focus_stories/robotic_milking/training_cows_to_milk_themselves> * Video on Lely Astronaut – Waikato Farm 2014 (on shared area). |
| 1. **Precision agriculture**  * What is precision agriculture? * The role of ICT in precision agriculture. * Technological advances are integrated within ICT based farm management systems. * Understand a hi-tech ICT future in land and water production. | * What is precision agriculture? * The role of ICT in precision agriculture. * The technological advances that are integrated within ICT based farm management systems. * Understand a hi-tech ICT future in land and water production. | * Outline what is the technology and what is its application. * How do you use the technology? * Explain its effect on production. * Discuss the social, economic, environmental implications of its use on production. * View <https://www.ruraldelivery.net.nz/stories/Supreme-Environment-Award-Winners-2013-2017-04-02-23-32-46Z> | * <http://www.agrioptics.co.nz/> * <http://www.agrioptics.co.nz/precision-moving-from-cropping/> * <http://www.agrioptics.co.nz/portfolio/em-survey/> |
| 1. **Hi-tech devices / apps and software**  * Investigate what hi-tech devices / apps and software are available in agribusiness. | * What hi-tech devices / apps and software are available in agribusiness? * The role of these devices and apps in agribusiness. | * Outline what is the technology and what is its application. * How do you use the technology? * Explain its effect on production. * Discuss the social, economic, environmental implications of its use on production. | * <http://www.agrioptics.co.nz/portfolio/trimble-mobile-services/> * <http://www.agrioptics.co.nz/portfolio/em-survey/> * <http://www.agrioptics.co.nz/portfolio/pa-softwar/> |
| **Investigation on Drones.**   * Investigate what drones are available in agribusiness. |  | * Outline what is the technology and what is its application. * How do you use the technology? * Explain its effect on production. * Discuss the social, economic, environmental implications of its use on production. * View <https://www.ruraldelivery.net.nz/stories/Aeronavics> * View https://www.ruraldelivery.net.nz/stories/Drones-for-Farm-Tasks-2017-03-29-23-50-07Z | * <http://www.learnz.org.nz/highcountry152> * http://activities.learnz.org.nz/hc152/07-drones/quiz.html * <http://technology.tki.org.nz/Technology-in-the-news/Drone-searches-for-missing-plane> * <http://technology.tki.org.nz/Technology-in-the-news/Using-drones-to-thwart-elephant-poachers> * <http://technology.tki.org.nz/Technology-in-the-news/Christchurch-firefighters-test-new-drones> * <http://technology.tki.org.nz/Technology-in-the-news/Drones-help-aid-relief-in-Nepal> * <http://technology.tki.org.nz/Technology-in-the-news/The-swarming-drones-that-can-float-on-water> * <http://technology.tki.org.nz/Technology-in-the-news/Farmers-Flying-Drones-May-Soon-Be-Given-Clearance> * <http://www.stuff.co.nz/stuff-nation/12295504/New-drone-rules-criminalise-our-kids> |
| **Assessment**   * Technology AS91615 * Students will be assessed on the depth and comprehensiveness of their understanding of the consequences, responsibilities, and challenges involved in the development of drones. | * How to apply technological knowledge and concepts to agribusiness. * How to use knowledge and skills to understand future alternative management practices in agribusinesses. * Why is new technology important to agribusinesses? * What is the role of technology in the future of agribusinesses? | * Go over AS91615 L3 Technology student task. | * AS91615 * AS91615 L3 Technology student task * Assessment exemplars (for teacher only) |
| **Possible Assessment:** | * AS91615 Technology 3.8 Demonstrate understanding of consequences, responsibilities, and challenges involved in technology (4 credits) | | |