Agriculture in the SACE

Build real-world food and fibre applications into SACE Stage One and Two Science subjects and Activating Identities and Futures (AIF).

GENERAL RESEARCH TASKS

Topic ideas:

- How useful are GM crops in solving global food security issues?
- To what extent is fruit fly eradication in SA possible?
- What is the future of farm machinery in Australia?
- What is the most important influence on consumers when buying meat?
- How important will organic systems be in the future of farming?
- How effectively can conservation and production coexist on Australian farms?
- What are the pathways into farm ownership for first generation farmers in Australia?
- Is the Murray Darling Basin Plan delivering for SA farmers?
- How important is the search for a different name for plant-based milk alternatives?
- When is meat not meat?
- Plant-based proteins versus animal proteins
- In what ways are kangaroos the answer to environmentally sustainable meat production?
- How can AI improve animal welfare on Australian farms?
- What can regenerative agriculture learn from First Nations farmers in Australia?
- How will drones improve sustainability for Australian farmers?
- How does consumer perception influence wine production in the Clare Valley?
- What is the impact of the Nuffield Scholarship program on Australian farming?
- In what ways can social media influence Australian farmers?
- How does consumer perception of free-range chicken or pig farms compare to the reality?
- What is the relationship between farm safety and farm productivity?
- To what extent are women changing agriculture in Australia?
- Does agriculture's workforce reflect the diversity of Australia's population?
- Carbon farming – carbon neutral or net zero?
- Is frost the greatest threat to Australian cropping?
- How can agrotourism benefit farm sustainability?
- Is wool the ultimate sustainable fibre?
- Will solving food waste solve food security?
- How will entrepreneurs impact the future of food production?
- Gluten – friend or foe?
- Can carbon credit schemes improve farm sustainability?

ACTIVATING IDENTITIES AND FUTURES

Learning goals:

- To shear sheep effectively
- To use yield maps to plan a cropping program
- How to use NDVI images to improve crop yields
- Modify sheep yards to improve flow and use natural sheep behaviour more effectively
- How can drones help manage water points on a pastoral lease
- Prune vines to reduce disease risk
- Create and use a map of frost zones for a property growing lentils
- Plan a feed ration and budget for cattle in a feedlot
- Plan a marketing campaign for a value-added product from a farm
- Create an effective worker safety policy for a family farm
- How to reduce fire risk for Australian farms
- Build agribusiness skills needed for a dairy
- Create a solar powered feed system for a chicken caravan
- Understand how biosecurity impacts an oyster lease
- Create a pollination plan for an almond orchard
- Produce, package and sell extra virgin olive oil
- How to propagate native tree seedlings for revegetation
- Create a bush tucker product
- Evaluate the best livestock program for an unarable block of land
- Understand how carbon farming could benefit a family farm
- Train and prepare a steer for the Led Steers Competition at the Adelaide Show
- How artificial intelligence could progress a poultry business
- What impact the introduction of genetically modified crop varieties has had in SA
- How can Australian farmers support farmers in developing nations to be more sustainable
- How to build a maternity ring for sows
- What new products can second grade apples be used for
- Are farmers with disability being supported in Australia

BIOLOGY

Science as a Human Endeavour ideas:

- Probiotics in agriculture
- Alternatives to bees as pollinators
- Norman Borlaug – the father of the "Green Revolution"
- Gene editing in plant breeding
- Genomic testing in dairy herds
- Genetically modified crops and food security
- Biotechnology in Agriculture
- Pest eradication – eg feral pigs on Kangaroo Island
- Ecovineyards
- Biosecurity
- Food waste
- Antibiotics in ag
- Managing chemical resistance (herbicides, insecticides, fungicides)
- Biological control in ag
- Vaccinations to reduce methane in ruminants
- Using feed supplements like asparagopsis to reduce methane

Design & deconstruction prac ideas:

- Photosynthesis in crops
- The farm as an ecosystem
- Respiration and photosynthesis rates and influences
- Fermentation in sourdough starter
- Weed responses to herbicides (homeostasis)
- Ruminants and methane
- Crop canopy as an exchange surface
- Soil microbiome
- Regenerative farming as an ecosystem
- Moisture stress in crops
- Shelf life of food

CHEMISTRY

Science as a Human Endeavour ideas:

- What is the glyphosate debate about?
- Sensory scientists and winemaking
- AI in winemaking
- Smart fertilisers
- Managing farm waterways
- Sustainable food packaging
- Protein – sources and options
- Biofuels
- Methane
- Ethylene in ag
- Cold plasma tech and food safety

Design & deconstruction prac ideas:

- Bee by-products
- Soil chemistry
- Nutrient cycling in cropping
- Salinity and farming
- Fertilisers
- Trace elements
- Wine chemistry
- On farm corrosion

PHYSICS

Science as a Human Endeavour ideas:

- Satellites and agriculture
- Robotics transforming agriculture
- Yield mapping
- Variable rate technology
- Normalised Difference Vegetation Index (NDVI) imaging in farming
- Using data in agriculture
- Solenoids and irrigation
- Connectivity driving progress in ag
- Advancing farm machinery through AI and innovation
- Autonomous machinery in horticulture
- Electric vehicles in ag
- Weed recognition technology
- Detecting fruit ripeness
- Soil moisture monitoring
- Spectroscopy in ag for plant and soil health
- Projectile motion for pest management
- Solar applications in ag (photoelectric effect) – large scale eg power generation and small scale eg cattle smart ear tags or virtual fencing collars

Design & deconstruction prac ideas:

- Sensors in ag
- Springs in ag
- Electroconductivity applications in agtech
- Under pressure – spray technology
- Circuits in ag eg electric fences, irrigation systems, connecting IT within spray units

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Resources:

- ★ Agrifutures AgriFutures Australia | Our vision is to grow the long-term prosperity of Australian rural industries. (Knowledge Hub is particularly useful)
- ★ Agrifutures growAG Tech Explained Tech Explained - growAG
- ★ South Australian Department for Primary Industries and Regions Department of Primary Industries and Regions, South Australia
- ★ The Stock Journal (subscription required for online access to all content or buy hard copies) Agricultural & rural farm news | Stock Journal | SA
- ★ Ag Institute's Student Compendium (contacts and connections in agriculture) South Australia Student Compendium
- ★ ABC Landline Landline - ABC News or Landline : ABC iview
- ★ Landscape Boards SA Home | Landscape Boards SA
- ★ Primary Industries Education Foundation *Primezone* – a one stop shop for food and fibre education resources Primezone | Australian Agriculture Food Fibre Lesson Plans
- ★ Industry Research and Development Corporations:
  - Grains Research and Development Corporation GRDC Home - GRDC
  - Meat and Livestock Australia Research & Development | Meat & Livestock Australia
  - Dairy Australia Australian Dairy | Products, recipes, nutrition, sustainability and more - Dairy Australia
  - Fisheries RDC Fisheries Research and Development Corporation | FRDC
  - Australian Pork Home | Australian Pork
  - Wine Australia Wine Australia | Wine Australia
  - Cotton RDC Home | CRDC
  - Australian Eggs Resources for Australian Egg Farmers: Standards, Training & More
  - Australian Wool Innovation Australian Wool Innovation
  - Forest and Wood Products Forest & Wood Products Australia (FWPA)
  - Horticulture Innovation Hort Innovation | Home
  - Australian Livestock Export LiveCorp - The service provider and research body for the Australian livestock export industry.
  - Sugar Research Australia Home - Sugar Research Australia
  - Australian Meat Processors Australian Meat Processor Corporation - Supporting the red meat processing industry throughout Australia
  - End Food Waste End Food Waste Australia - Food Waste Action » End Food Waste Australia