Australian Curriculum: Science – *Food for our Future: Science Feeding the World*

SCIENCE AS A HUMAN ENDEAVOUR

Year	Nature and Development of Science	Use and Influence of Science
R	**ACSHE013:** Science involves exploring and observing the world using the senses Observe sunflower seeds germinating in a glass jar or saucer. Explore how earthworms aerate and mix soil.	
1	**ACSHE021:** Science involves asking questions about, and describing changes in, objects and events Sugar Detectives What happens when wheat seeds germinate?	**ACSHE022:** People use science in their daily lives, including when caring for their environment and living things Sugar Detectives Caring for growing cress and mustard as micro herbs.
2	**ACSHE034:** Science involves asking questions about, and describing changes in, objects and events What happens when milk is left out of the fridge?	**ACSHE035:** People use science in their daily lives, including when caring for their environment and living things Caring for yourself: eating healthy foods.
3	**ACSHE050:** Science involves making predictions and describing patterns and relationships How much salt needs to be dissolved in water to make fresh eggs float?	**ACSHE051:** Science knowledge helps people to understand the effect of their actions Why is it important to eat fruit and vegetables?
4	**ACSHE061:** Science involves making predictions and describing patterns and relationships Which chocolate melts first, white, brown or dark?	**ACSHE062:** Science knowledge helps people to understand the effect of their actions Develop a healthy food pyramid for your family.
5	**ACSHE081:** Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena What conditions will grow the most mould on bread? **ACSHE082:** Important contributions to the advancement of science have been made by people from a range of cultures Find out about the Rotary Food Plant Solutions (www.learngrow.org)	**ACSHE083:** Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives What are the advantages and disadvantages of self-driving tractors? **ACSHE217:** Scientific knowledge is used to inform personal and community decisions What are the best conditions to improve growth of local food crops?
6	**ACSHE098:** Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena Which developed the greatest amount of mould, uncooked or cooked food? What are the best storage conditions to prevent potatoes sprouting? **ACSHE099:** Important contributions to the advancement of science have been made by people from a range of cultures Research the 'Green Revolution (1940-1960)' and the countries involved.	**ACSHE100:** Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives How does a robot milk cows? What are the advantages and disadvantages of a robotic dairy? (www.scenicrim4realmilk.com.au) **ACSHE220:** Scientific knowledge is used to inform personal and community decisions Find out about your local 'farmers market'. Talk to the stall-holders about how they use science to produce their food.
7	**ACSHE119:** Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world What are the important aspects for the success of sustainable food production in your area? **ACSHE223:** Science knowledge can develop through collaboration and connecting ideas across the disciplines of science Describe some of the international collaborations established by the UWA Institute of Agriculture (www.ioa.uwa.edu.au)	**ACSHE120:** Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations Describe ways in which agricultural food crop pests are controlled in Australia. **ACSHE121:** Science understandings influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management Research the different scientific controls used to control rabbits in Australia. **ACSHE224:** People use understanding and skills from across the disciplines of science in their occupations Which branches of science work together to develop a sustainable management of water use in farms?
8	**ACSHE134:** Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world How does biodiversity improve sustainability of food production in different countries? **ACSHE226:** Science knowledge can develop through collaboration and connecting ideas across the disciplines of science Investigating meat tenderness.	**ACSHE135:** Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations Using Polyacrylamide for water retention in soils. **ACSHE136:** Science understandings influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management Describe how technologies have been applied to modern farming techniques to improve yields and sustainability. **ACSHE227:** People use understanding and skills from across the disciplines of science in their occupations
9	**ACSHE157:** Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community Fungal control in wheat crops by testing different treatments. **ACSHE158:** Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries Developing lactose free milk. Adapting agricultural practices/crops to climate changes eg Cotton.	**ACSHE160:** People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions Determine the role of enzymes in food science. **ACSHE161:** Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities Effect of soil pH and salinity on agricultural ecosystems. **ACSHE228:** The values and needs of contemporary society can influence the focus of scientific research Fish stocking to help recovery of populations at risk.
10	**ACSHE191:** Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community Stud beef cattle parentage testing by DNA marker technology. DNA computer modelling for determining bacterial spoilage of meat. **ACSHE192:** Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries Weed control and herbicide resistance.	**ACSHE194:** People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions Determine the role of enzymes in food science. **ACSHE195:** Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities Soil pH and salinity on agricultural ecosystems. **ACSHE230:** The values and needs of contemporary society can influence the focus of scientific research Researching lipids found in different seeds to increase consumer health. Developing different cereals to produce gluten free bread.

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SCIENCE UNDERSTANDING

Sub-strand	Biological Sciences			Chemical Sciences		Earth and Space Sciences		Physical Sciences	
Key Concept	Structure and function	Diversity and evolution	Interdependence	Properties and structure	Interaction and change	Systems in space	Changes to the Earth	Transformation & conservation of energy	Forces and motion
YEAR F			**ACSSU002:** Living things have basic needs, including food and water Needs of young lambs: milk from their mother ewe Needs of wheat seedlings: water and food (fertliser).	**ACSSU003:** Objects are made of materials that have observable properties What's in your lunch box? Taste and describe different flavoured milks Taste and describe the differences between apples, oranges and bananas.			**ACSSU004:** Daily and seasonal changes in our environment, including the weather, affect everyday life What time of the year are food crops grown in your area?		**ACSSU005:** The way objects move depends on a variety of factors, including their size and shape Movement of seeds by wind (dandelion) and falling (wattle) is determined by size and shape.
1	**ACSSU017:** Living things have a variety of external features Describe the identifying features of cattle, ducks, dogs, sunflowers and apple trees.		**ACSSU211:** Living things live in different places where their needs are met Needs of young calves: protection by their mothers and farmers Needs of strawberry plants: farmers provide water, shelter and fertilizer Needs of bees: apiarists provide shelter and sugar solution during winter.		**ACSSU018:** Everyday materials can be physically changed in a variety of ways Describe the differences between bread and toast as well as fresh and cooked apples.		**ACSSU019:** Observable changes occur in the sky and landscape Talk about the different farms in your local area Measure the rainfall in your area and mark the rainy days on a calendar.	**ACSSU020:** Light and sound are produced by a range of sources and can be sensed Identify the sounds of cows and calves, sheep and lambs as well as hens and chickens Grow wheat seeds in the dark and in the light.	
2	**ACSSU030:** Living things grow, change and have offspring similar to themselves Describe the physical development of lambs and calves into mature adults Describe the physical development of broad bean seedlings into mature plants.				**ACSSU031:** Different materials can be combined, including by mixing, for a particular purpose Make a salad dressing (a mixture?) of (balsamic) vinegar and olive oil.		**ACSSU032:** Earth's resources, including water, are used in a variety of ways Healthy soil, healthy living. How is water used to grow food in your area?		**ACSSU033:** A push or a pull affects how an object moves or changes shape Need a different push to move toy tractors up and down a slope, and on the level.
3		**ACSSU044:** Living things can be grouped on the basis of observable features and can be distinguished from non-living things List the living and non-living things on a local farm. How many food crops are grown in your area and your State? How many of them do you eat? How many different types of meats are sold in your supermarket?			**ACSSU046:** A change of state between solid and liquid can be caused by adding or removing heat Which chocolate melts fastest: white, brown or dark? What temperatures do different ice-creams and fruit gelatos melt?	**ACSSU048:** Earth's rotation on its axis causes regular changes, including night and day Show the importance of sunlight in the growth of a local food crop.		**ACSSU049:** Heat can be produced in many ways and can move from one object to another Measure the different temperatures of white sand, brown and black soils. How does soil temperature effect the germination of grass, wheat and sweetcorn.	
4	**ACSSU072:** Living things have life cycles Lifecycle of a chicken. Visit a young animal pavilion in your agricultural show.		**ACSSU073:** Living things, including plants and animals, depend on each other and the environment to survive List all the living things that make up a local farm (from a worm to a farmer), and show their interconnections.	**ACSSU074:** Natural and processed materials have a range of physical properties; These properties can influence their use Air-dry some local fruits and compare the characteristics between the fresh and dried fruit.			**ACSSU075:** Earth's surface changes over time as a result of natural processes and human activity Collect different soil types and ask a farmer which is best for which crop.		**ACSSU076:** Forces can be exerted by one object on another through direct contact or from a distance Use a piece of tyre to compare and contrast the friction on concrete, gravel and wet soil.
5	**ACSSU043:** Living things have structural features and adaptations that help them to survive in their environment How does the soil type and climate effect what type of farming is carried out in your area and a different			**ACSSU077:** Solids, liquids and gases have different observable properties and behave in different ways Gases are used in food production in agriculture to increase crop yields (CO_2 in drip irrigation,		**ACSSU078:** The Earth is part of a system of planets orbiting around a star (the sun) Describe how the sun is the essential ingredient to grow food crops and animals.		**ACSSU080:** Light from a source forms shadows and can be absorbed, reflected and refracted Germinate and grow wheat seeds under different coloured lights. What colour of light is	

	State?			greenhouse enrichment). Gases are used in food preservation in agriculture to destroy pests (CO_2 in grain silos) and preserve fruit (CO_2 to reduce the percentage of ethylene). Describe examples of gaseous, liquid and solid fertilizer used to increase food crop yield.				reflected from cereal leaves?	
6			**ACSSU094:** The growth and survival of living things are affected by the physical conditions of their environment Investigate the effect of saline soils, different fertilizers and drainage on the yield of food crops.		**ACSSU095:** Changes to materials can be reversible, such as melting, freezing, evaporating; or irreversible, such as burning and rusting How is dairy effluent treated to make it safe to irrigate pastures?		**ACSSU096:** Sudden geological changes or extreme weather conditions can affect Earth's surface How are famers "drought proofing" their farms?	**ACSSU097:** Electrical circuits provide a means of transferring and transforming electricity Report on ways in which scientists use electrical circuits to measure salt and pH in soil on a farm? **ACSSU219:** Energy from a variety of sources can be used to generate electricity What ways can electricity be generated on the farm?	
7		**ACSSU111:** There are differences within and between groups of organisms; classification helps organise this diversity Different cattle breeds respond to different conditions.	**ACSSU112:** Interactions between organisms can be described in terms of food chains and food webs; human activity can affect these interactions Sustainable fishing and maintaining the oceanic food web.		**ACSSU113:** Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques Making butter.	**ACSSU115:** Predictable phenomena on Earth, including seasons and eclipses, are caused by the relative positions of the sun, Earth and the moon Plan a seasonal sowing guide for a garden.	**ACSSU116:** Some of Earth's resources are renewable, but others are non-renewable Soils are non-renewable, what strategies do farmers use to minimise soil loss? **ACSSU222:** Water is an important resource that cycles through the environment How does the farmer conserve water for his crops and animals?		**ACSSU117:** Change to an object's motion is caused by unbalanced forces acting on the object What are the major reasons why quad bikes have fatal accidents? **ACSSU118:** Earth's gravity pulls objects towards the centre of the Earth Describe the difficulties in growing food crops in zero gravity. What would be the solutions?
8	**ACSSU149:** Cells are the basic units of living things and have specialised structures and functions Plant cells producing antioxidants (fruits). **ACSSU150:** Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce Effective germination for food crops. Photosynthesis: N for leaf growth, P for roots and fruit, K for flowers			**ACSSU151:** The properties of the different states of matter can be explained in terms of the motion and arrangement of particles Osmosis, diffusion, molecular motion and fresh cherries. **ACSSU152:** Differences between elements, compounds and mixtures can be described at a particle level Aquatic air, measuring dissolved oxygen. Agricultural chemicals: Interactive Molecular Visualiser	**ACSSU225:** Chemical change involves substances reacting to form new substances Using Polyacrylamide for water retention in soils. Fermentation & brewing. Nitrogen cycle, fertilisers and food production.		**ACSSU153:** Sedimentary, igneous and metamorphic rocks contain minerals and are formed by processes that occur within Earth over a variety of timescales Use of limestone and dolomite to condition cropping soils.	**ACSSU155:** Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems Farm wind turbines.	
9	**ACSSU175:** Multi-cellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment Development of drought resistant crops. Photosynthesis and light intensity. Adapting agricultural practices/crops to climate changes eg cotton.		**ACSSU176:** Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems Growing food on the Space Station. Farming ecosystem. Building soil carbon. Effect of soil pH and salinity on agricultural ecosystems.	**ACSSU177:** All matter is made of atoms which are composed of protons, neutrons and electrons; natural radioactivity arises from the decay of nuclei in atoms Molecular structure of essential oils Insecticides in Cotton Agricultural chemicals: Interactive Molecular	**ACSSU178:** Chemical reactions involve rearranging atoms to form new substances; during a chemical reaction mass is not created or destroyed Cheese making. Effect of enzyme lactase on lactose concentration in milk. Determine the role of enzymes in food science.		**ACSSU180:** The theory of plate tectonics explains global patterns of geological activity and continental movement Different rock formation processes generate different landforms, that produce different soil types, that determine the local agriculture.	**ACSSU182:** Energy transfer through different mediums can be explained using wave and particle models Growing food on the Space Station. Optimising energy in a glasshouse system.	

	Induction of spawning of oysters.		Biodiversity and sustainable food production.	Visualiser. Introduction of organic chemistry.	**ACSSU179:** Chemical reactions, including combustion and the reactions of acids, are important in both non-living and living systems and involve energy transfer Soil pH and its effect on nutrient availability. Acid soils and effect on food production. Fruit storage: Effect of ethylene. Production of malt.				
10		**ACSSU184:** The transmission of heritable characteristics from one generation to the next involves DNA and genes Plant breeding v's GMOs. Researching lipids found in different seeds to increase consumer health. Weed control and herbicide resistance. Extraction and analysis of beef DNA. BT Cotton Identifying foreign fish in our market place. **ACSSU185:** The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence The evolution of wheat Simulation of population genetics and natural selection in an aquatic ecosystem.		**ACSSU186:** The atomic structure and properties of elements are used to organise them in the Periodic Table Trace elements required for effective growth of different crops. SO2 in the wine industry; equilibrium.	**ACSSU187:** Different types of chemical reactions are used to produce a range of products and can occur at different rates Wine production. Alcohol production. Wine faults. Fungal control in wheat crops by testing different treatments. Determination of ascorbic acid in fruit and vegetables. Food crops or biodiesel.	**ACSSU188:** The universe contains features including galaxies, stars and solar systems and the Big Bang theory can be used to explain the origin the universe Sustainable agriculture in a space colony.	**ACSSU189:** Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere Water cycle and crops. Carbon footprint of the dairy industry.	**ACSSU190:** Energy conservation in a system can be explained by describing energy transfers and transformations Satellite imagery to determine crop health.	**ACSSU1229:** The motion of objects can be described and predicted using the laws of physics Tractor stability on different surfaces, towing different implements.
The following web sites have been drawn on for examples: www.australiancurriculum.edu.au , www.scienceweb.asta.edu.au , www.csiro.au/en/Portals/Education/Programs/Do-it-yourself-science.aspx									