Acknowledgements

Founder of From Paddock to Plate, Louise FitzRoy, has produced this national educational resource to be incorporated into the curriculum programs of schools across Australia.

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Year level: 9  
Curriculum focus

This unit highlights several case studies in which food waste plays a prominent role in the activities and operations of schools and organisations showcased in our virtual excursion. Teachers and students will be inspired to turn food waste into compost within the school grounds and create worm farms to encourage prolific vegetable gardens. Students will explore how to grow food in even the most confined city spaces and learn to appreciate the time and effort it takes to produce food to reduce food wastage. The teaching materials provide students with an understanding of where food waste goes after it’s thrown in the bin and how damaging it can be to the environment. The video also profiles different initiatives to recycle food waste and associated packaging, and turn it into useful products to create a sustainable future and assist Australian farmers to feed their animals in times of flood or drought.

In this unit students will:

• see how schools are utilising food waste to grow more food;
• learn how to grow large amounts of food in small spaces;
• discover inventions to turn food waste into useful products that will benefit others;
• visualise what happens to food waste after it is thrown in the bin;
• develop their own initiatives to grow a sustainable future.

Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), downloaded from the Australian Curriculum website in January 2017.

Sample of topics covered for discussion and further consideration

- Food security
- Sustainability
- Biodiversity
- Environment
- Waste management
- Water security
- Drought & natural disasters
- Traceability
- Nutrition
- Food waste & recycling
- Innovation & design
- Technology
- Food miles
- Ethics
- Animal welfare
- Animal health
- Soil & pasture management
- Community
- Pests & diseases
- Economics
Strand: Geographical Knowledge and Understanding: Unit 1: Biomes and food security

PAGE 9 & 10 | ACHGK060
The distribution and characteristics of biomes as regions with distinctive climates, soils, vegetation and productivity

PAGE 13 | ACHGK061 (Cross-curriculum priorities: Sustainability)
The human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations

PAGE 20 | ACHGK062 (Cross-curriculum priorities: Sustainability)
The environmental, economic and technological factors that influence crop yields in Australia and across the world

PAGE 23 | ACHGK063 (Cross-curriculum priorities: Sustainability)
The challenges to food production, including land and water degradation, shortage of fresh water, competing land uses, and climate change, for Australia and other areas of the world

PAGE 23 | ACHGK064 (Cross-curriculum priorities: Sustainability)
The capacity of the world’s environments to sustainably feed the projected future population to achieve food security for Australia and the world

Strand: Geographical Knowledge and Understanding: Unit 2: Geographies of interconnections

PAGE 30 | ACHGK065
The perceptions people have of place, and how this influences their connections to different places

PAGE 30 | ACHGK066
The way transportation and information and communication technologies are used to connect people to services, information and people in other places

PAGE 30 | ACHGK067
The ways that places and people are interconnected with other places through trade in goods and services, at all scales
The effects of the production and consumption of goods on places and environments throughout the world and including a country from North-East Asia

The effects of people’s travel, recreational, cultural or leisure choices on places, and the implications for the future of these places

Strand: Geographical Inquiry and Skills: Observing, questioning and planning

Develop geographically significant questions and plan an inquiry that identifies and applies appropriate geographical methodologies and concepts

Strand: Geographical Inquiry and Skills: Collecting, recording, evaluating and representing

Collect, select, record and organise relevant geographical data and information, using ethical protocols, from a range of appropriate primary and secondary sources

Evaluate sources for their reliability, bias and usefulness, and represent multi-variable data in a range of appropriate forms, for example, scatter plots, tables, field sketches and annotated diagrams, with and without the use of digital and spatial technologies

Represent spatial distribution of geographical phenomena by constructing special purpose maps that conform to cartographic conventions, using spatial technologies as appropriate

Strand: Geographical Inquiry and Skills: Interpreting, analysing and concluding

Evaluate multi-variable data and other geographical information using qualitative and quantitative methods, and digital and spatial technologies as appropriate, to make generalisations and inferences, propose explanations for patterns, trends, relationships and anomalies, and predict outcomes
Apply geographical concepts to synthesise information from various sources and draw conclusions based on the analysis of data and information, taking into account alternative points of view.

**Strand:** Geographical Inquiry and Skills: Communicating

Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate.

**Strand:** Geographical Inquiry and Skills: Reflecting and responding

Reflect on and evaluate the findings of the inquiry to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations; and explain the predicted outcomes and consequences of their proposal.

*Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), downloaded from the Australian Curriculum website in January 2017.*
Fun fast facts about food waste

- Australians discard up to 20% of the food they purchase
- This equates to 1 out of every 5 bags of groceries they buy
- Up to 40% of the average household garbage bin is food
- For the average Australian household $1,036 of food is thrown away each year

- This money could be spent on:
  - Enough food to feed the average household for over a month
  - Paying off six months of your electricity bill

- Aussies throw out $8 billion of edible food every year
- Australia wastes 4 million tonnes of food each year
- This equates to 523kg per household, which is the same weight as just over 5 average size fridges!

- Out of the $8 billion what do we waste every year?
  - $2.67 billion of fresh food = 33%
  - $2.18 billion of leftovers = 27%
  - $1.17 billion of packaged and long-life products = 15%
  - $727 million of drinks = 9%
  - $727 million of frozen food = 9%
  - $566 million of takeaways = 7%

- Why is it wasted?
  - We cook too much food
  - Food is mistakenly thrown out before the use-by/best before date
  - We forget about leftovers in the fridge/freezer
  - We don’t know how to use leftovers
  - We buy too much because we don’t stick to a shopping list
  - We often shop when we’re hungry so we buy more food than we need
  - We don’t check the cupboard or fridge before going shopping
  - We are not planning our meals and menus as much as we could
  - Buying takeaways at the last minute instead of cooking the food we have in/family members changing plans
• Who are the biggest wasters of food?
  o Young consumers (18-24)
  o Households with incomes of more than $100,000 per year
  o Families with children

• When food rots in landfill, it gives off a greenhouse gas called Methane that is 25 times more potent than the carbon pollution that comes out of your car exhaust.
• When you throw out food, you also waste the water, fuel and resources it took to get the food from the paddock to your plate.
• An estimated 20-40% of fruit and vegetables are rejected even before they reach the shops mostly because they do not match consumers' and supermarkets' high cosmetic standards.
• If you add up the foods Australia wastes each year, it's enough to fill 450,000 garbage trucks. Placed end to end, the convoy would bridge the gap between Australia and New Zealand just over three times.

FoodWise, January 2017

Do Australians actually waste $8 billion worth of edible food each year?

Useful words and phrases

Sustainability
Recycle
Landfill
Greenhouse gas emissions
Methane
Carbon pollution
Compost
Worm farm
Food scraps
Cosmetic standards
Vertical foodwall
Urban sky farm
Fuel consumption
Self-sufficient
Carbon neutral coffee
Food bank
Food security
Freegan
Locavore
Food supply chain
Consumer
Edible
LET’S GET STARTED

Firstly, please read the FP2P Welcome Guide on the FP2P website - www.frompaddocktoplate.com.au/school-programs/

It is important to understand the level of knowledge your students have of food waste in Australia and around the world. This will determine the structure of your delivery for this unit.

➢ ASK the students to describe and list what they know about food waste.
➢ DISCUSS the useful words and phrases.
➢ BRAINSTORM and gather ideas and information from the class and use this as a platform to begin this unit.

It is now a great time to watch the From Paddock to Plate ‘Food Waste’ virtual excursion.

Ask the students to do the follow-on activities below in succession or as standalone lessons.

ACHGK060
Environment

TALK with students to find out what they know about biomes.

IDENTIFY and DESCRIBE the world’s biomes.

Teacher resources:
 o www.blueplanetbiomes.org/world_biomes.htm
 o www.worldbiomes.com/biomes_aquatic.htm
 o www.worldbiomes.com/biomes_desert.htm
 o www.worldbiomes.com/biomes_forest.htm
 o www.worldbiomes.com/biomes_grassland.htm
 o www.worldbiomes.com/biomes_tundra.htm
IDENTIFY and DESCRIBE the major biomes of Australia.

INVESTIGATE the biomes that would be most suitable for growing food.

EXAMINE the influence of climate, soil type and rainfall. DISCOVER where these biomes are located, what animal and plants live in them and the type of climate. CONSIDER what foods could be grown in these biomes.

Text references:

• ‘Most of Australia's land, about two-thirds, is given over to farming production. About 90 per cent of farmland is for grazing on native pastures, occurring mostly in the arid and semi-arid zones. Cattle and sheep grazing is known as pastoralism and has a long history associated with rural and outback Australia, connecting most Australians. The opportunity to open up vast native grass resources as grasslands and establish native pasture for livestock grazing was due to the fire-stick farming carried out by Aboriginal people over thousands of years. Later, Aboriginal people became the backbone of the pastoral industry. Grazing continues as the highest value sector in farm production. In 2012, the highest value of production, in order, was cattle, wheat, dairy, vegetables, fruit and nuts, before lamb meat and wool. At the same time, most of Australia's agricultural businesses are involved in a ‘two-legged’ economy – combining wheat and sheep. Cropping is across a wide variety of grains and other crops. In 2012, smaller agricultural practices, such as fruit and nut trees, grape growing, sugar cane, and other crop businesses represented about half the number of the total grain, beef, cattle and sheep businesses. New companies are developing niche industries in organic farming and native bush foods.’ – Australian Government

• ‘The warm temperate zone includes inland Queensland, New South Wales tablelands, the coastal region south of Sydney and north to Coffs Harbour. In Western Australia it is approximately the coastline south of Exmouth to Geraldton and inland to Meekatharra. Characteristics include cool winters with light frost, usually non-existent on the coast. The ocean moderates temperature allowing coastal zones in warm temperate zones to grow a range of plants.”
including subtropical ones. The rainfall is reliable year round; average annual lowest temperature 5°C. Warm summer, average January maximum less than 30°C. Temperate zones experience the distinct four seasons. Where frost does occur it is both a limitation and a blessing as it can have a significant effect of reducing pest numbers of fruit fly etc. Frost is also said to sweeten certain vegetables such as parsnips and cabbage. A true winter induces dormancy of plants including herbs such as comfrey and the plants seem to do better for the rest of the year. A winter chill factor allows for successful growing of fruit trees that require this.’ – Green Harvest

• ‘While soil types vary widely across Australia, there are three main types – clay, sand and loam. Clays, particularly when they are wet can become quite sticky, and while some are at risk of holding too much water when it is available and are easily compacted. When they dry out they can form a surface crust that is almost impenetrable to water. Sandy soils on the other hand tend to lose or leach water and nutrients very easily. Loamy soil that is crumbly and looks good enough to eat is the best type of soil. It has a good balance of sand, clay and organic matter as well as a combination of small and large particles that enables good root development and the circulation of air, water and nutrients. The magic ingredient in any good soil is organic matter.’ – Gardening Australia

• ‘Wheat is the most abundant crop, occupying 22% of the total cultivated area in the world. The most intensive wheat cultivation occurs in the temperate latitudes of both hemispheres. Wheat is most prevalent in the Great Plains of the United States, the Canadian Prairie Provinces, the Indus and the upper Ganges Valleys, along the Kazakhstan and Russian border, and in southern Australia. Wheat is also found throughout Europe, in southern South America, in parts of eastern Africa, and in eastern China.’ – Geographic distribution of major crops across the world by Billie Leff, Navin Ramankutty & Jonathan A. Foley, Global Biogeochemical Cycles Volume 18, Issue 1 March 2004

Teacher resources:
- www.abc.net.au/gardening/stories/s1235759.htm

DEFINE food security. What does food security mean to you? REMEMBER that food security involves more than just the production of sufficient quantities of food.

UNDERSTAND the threats to food production around the world and how they are being addressed.
For example:

- Pests and diseases
- Land degradation
- Urban encroachment
- Land availability
- Water
- Weeds
- Chemical and fertiliser use
- Drought
- Natural disasters
- Pollution
- Climate change and variability
- Erosion of agricultural biodiversity
- Population growth and demographic changes
- Food prices
- Farm profitability
- Insecurity of imports
- Lack of infrastructure
- International trade
- Intellectual property rights
- Food waste
- Decline in funding for agricultural research and development
- Politics and conflict
- Food safety

DETERMINE primary actions that you believe are required to secure the food supply?

For example:

- ‘Educate governments, policy makers and the general public on the issue of food security and the potential consequences of inaction.’ – *Food security issues for the Australian Horticulture Industry*, a report prepared by Growcom for Horticulture Australia Limited (HAL), March 2011
- ‘Establish a higher profile for horticulture with Government at all levels.’ – *Food security issues for the Australian Horticulture Industry*, a report prepared by Growcom for Horticulture Australia Limited (HAL), March 2011
- ‘Increase research into sustainability and climate change adaption across the horticulture supply chain’ – *Food security issues for the Australian Horticulture Industry*, a report prepared by Growcom for Horticulture Australia Limited (HAL), March 2011
- ‘Establish an Australian Food Security Agency.’ – *Food security issues for the Australian Horticulture Industry*, a report prepared by Growcom for Horticulture Australia Limited (HAL), March 2011
- ‘Incentives from government and private sector to encourage uptake of formal qualifications in agriculture.’ – *Food security issues for the*
WALK around your school and locate the most suitable place to set up a produce garden. EXPLAIN why you have chosen this location.

ACHGK061
Sustainability | Water management | Environment | Energy | Greenhouse gas emissions | Climate change | Biodiversity | Recycling | Soil health | Fuel consumption | Food miles

BRAINSTORM and ANALYSE the agriculture industry’s possible environmental effects on biomes in Australia.

DISCUSS what the industry is doing to minimise the impact of production.

For example:
• Vegetation clearing
• Chemical and fertiliser use
• Land degradation
• Water use

Text reference:
• ‘Two broad types of environmental problems are linked to Australia’s fruit and vegetable production practices: (1) pollution and contamination of soil, water, air and food resulting from the use of farm chemicals; and (2) degradation of natural resources, especially the deterioration in the available quantity and quality of soil and water. More recently, fruit and vegetable producers have been indirectly associated with disturbance and reduction of biotopes and wildlife habitats (e.g. on the Great Barrier Reef) and with reduction in wildlife species and loss of biological and genetic diversity of plants and animals.’ – *Environmental Policy and Australia’s Horticulture Sector* by Randy Stringer, Centre for International Economics and School of Economics, University of Adelaide, March 1998

Teacher resource:
“Fresh produce in a typical Australian food basket may travel a combined 21,000km – or more than half way around the earth - from its origins to our plate. We could save all that fuel by growing food locally and turning our cities into catchments and food bowls.” (7:16 – 7:33)

RESEARCH & DEVELOPMENT
Minimising the environmental impacts of grain cropping at a paddock to neighbourhood catchment scale

- ‘This project has examined the environmental impacts of dryland cropping from a paddock to neighbourhood catchment scale. At the paddock scale, total runoff and soil erosion were highest under down slope farming, but under large rainfall events, the down slope treatment was able to reduce rill development, thereby reducing soil erosion. Regardless of traffic direction, zero tillage has kept erosion rates low. Data from the down slope triple bay have highlighted the increased erosion due to higher sediment concentration, supporting the need for contour banks to continue to be installed at the current standard spacing. Catchment results have shown that catchment condition (ground cover) is an important driver in sediment loads delivered to streams, and cover levels across the entire catchment need to be maintained above 30%. Water quality results at both scales have shown that the total P concentrations in runoff water are strongly correlated to sediment concentration, and total N concentrations at the catchment scale appear to be dominated by discharge and sediment concentration (unlike the paddock scale which is dominated by application). Pesticides (atrazine) are regularly detected at high concentrations post-application. Better management practices therefore need to be implemented to reduce the off-farm impacts of applied nutrients and pesticides, particularly N and atrazine. Due to drought conditions and lack of cropping opportunities, there has been very little change in farm management practices during the term of this project. Despite these conditions, the project team surveyed (by telephone) 99 grain growers across the southern portion of the Central Highlands (33% of all dryland grain growers in the Central Highlands) to record current levels of adoption of management practices (tillage, CTF, contour banks, fertility management, riparian fencing, etc.). These results showed that 75% of properties had installed contour banks, 33% of growers had adopted zero tillage with a further 50% undertaking reduced tillage. CTF, a relatively new technology, was adopted by 36% of growers. These results show good levels of in-paddock adoption, but even practices beyond the paddock (e.g. riparian fencing) that reduce sediment loads to streams have been adopted by 15% of grain growers.’ – Grains Research & Development Corporation
NEWS ARTICLE

- ‘Coastal agricultural industries are meeting their responsibility to farm in a way that protects the Great Barrier Reef. That was the message from the farming winners of this year’s Federal Government Reef Program Awards, announced on Tuesday night, at Reef Range and Red Dust, on Queensland’s Sunshine Coast. There is no denying that agriculture has a significant and detrimental impact on the health of the Great Barrier Reef, and is a big concern for governments, landcare groups, farmers, and the public alike. Many Queensland farmers are trying to change that, and it is those at the forefront of that push that have been recognised in the 2015 Reef Programme Awards. Brian and Mark Pressler from Hill End Farms in Bundaberg, won the award in the sugarcane category, for their use of tractor GPS navigation to reduce the amount of driving they do in their fields, to limit runoff. They are also installing improved irrigation systems and variable rate technology on fertiliser bins. Mark Pressler said the social responsibility to farm sustainably has never been higher, and the cane industry is working to meet that obligation. "We are not environmental vandals and we try as much as we can to minimise our impact on the reef," he said. "We all want to be here for the long term so sustainability is the key, and sustainability is out biggest driver." - Queensland farmers proving agriculture and the Great Barrier Reef can co-exist by Marty McCarthy, ABC Rural, 3 September 2015

Teacher resource:
- www.abc.net.au/news/2015-09-02/reef-program-awards/6743482

Food origin | Nutrition | Health | Traceability | Food miles | Storage | Retail | Technology | Recycling | Food waste

PLAN, REHEARSE and DELIVER a presentation on the ‘from paddock to plate’ journey of food, from farm and tracing back to point of sale in the supermarket.

CONSIDER the route that food may take from the source, through production to manufacturing and then onto retail. THINK about what happens to this food when it is thrown away?
“Aussies throw out over eight billion dollars of edible food every year. That’s over $1000 on average by every household. But what people think is waste, perhaps isn’t actually waste.” (9:15 – 9:29)

“So here on our premises, trucks come in and they’ve got huge bins of packaged food on, up to 10 tonnes in a bin. That gets tipped out on the floor. We then use a frontend loader with a big bucket to pick up half a tonne at a time. We put that straight into, what I call, our “don’t want, do want” machine. We turn things that people don’t want, into things that people do want. And of everything that comes into this store, 99 per cent of what comes in gets turned into something that’s useful again. So the frontend loader picks up what is packaged bread here, pours it into the feeder at the start of the process which then metres the product out. You can’t have a big lump of food going in, just like you can’t fill your mouth with 50 grapes. The individual loaves then get fed into a large mill, which we’ve built, and this is quite a unique mill. Not only can it cope with the packaged food, but other things in it. Because we get all sorts of things in the bin. We get pot plants, we get filing cabinets, we get old computers because we try and make it very easy for the waste producers.” (9:30 – 10:47)

“So we put the single bin down, they throw what is 90 per cent food in there with other things. And we also try not to handle it by hand too much. That’s not sustainable. You’ve got to do it with machines. We’ve designed this process to be mechanical and also to process at a very high rate. We process this stuff at up to 20 tonnes per hour. What that means is that it has a low cost of production. That’s really important, because at the end of the day the product needs to be affordable. If you’re doing an individual piece of bread every time, the process that is built around that principle, the cost of the product at the end is too high and won’t sell. If it doesn’t sell, there is no point recycling. So we’re getting these products in, thousands of tonnes every year, and we’re processing it with mechanical means at a high rate to create a low cost product which is cattle feed that turns into milk and meat on dairy and beef farms.” (11:19 – 12:32)

“The mill breaks open the packaging that then goes into a sequence of screens. It’s very much like gold panning. Gold is heavy. It sinks to the bottom of a process, the lighter things go to the top. Here, the lighter things
are plastic and paper. The heavier things are bread. So if you throw that in the air, the bread will fall down first, while the lighter things will fall down second. We use that simple principle to separate the two. The plastic and the paper get vacuumed off using a big vacuum cleaner, the bread goes into a further process. We do have one person on our machine who controls the starting and the stopping of the machine. That person is the “king” or the “queen” of the machine. They are also taking the strange things out like for example, fabric gloves, bits of machinery, bits of copper cable that came with it. There’s not a lot of that. For every day we’re processing hundreds of tonnes, we probably end up with 20 kilos but those 20 kilos are what forces the material to go to landfill unless we do what we do.” (12:48 – 14:02)

Text references:
• “There once was a time when peaches were peaches. Pietro Porcu remembers this time. In Sardinia, where he was born, a man with a microphone and a ute would sell peaches you could sniff from 100 metres. "You would handle them very carefully," says the Melbourne restaurateur. "If you touched them they bruised. They would ripen on the tree." Now, says the man who owns South Yarra’s Da Noi, peaches are hard and picked too early. "As soon as there is a little bit of colour they take them off the tree. They put them in dark rooms. They ripen slowly there and when you get them to the table it’s ‘oh yeah’. This peach almost forgot that it’s been a peach." There has long been a sense fruit and vegetables no longer taste as they once did. It’s a view held not only by gourmets such as Porcu. Australians, it seems, are not completely convinced by supermarket fresh food. Farmers’ markets are thriving and one in four Coles and Woolworths customers walk out of the store and into a greengrocer for at least some of their fruit and vegetables. Despite multimillion-dollar investments in the fresh supply chain, Coles and Woolworths get 60¢ of every dollar spent on fruit and vegetables, compared with almost 80¢ of every grocery dollar. Earlier this year, Coles ignited the so-called "fresh wars" with carrot-snapping celebrity chef Curtis Stone declaring, "We never freeze and we never thaw our fresh Aussie fruit and vegies". But can supermarket fruit and vegetables be truly fresh in modern supply chains? Is it possible for a peach to really taste like a peach? Finding the answers is a bit like discovering a magician’s secrets. Behind the facade of the supermarket fresh food section are many tricks of the trade, and even some optical illusions: tomatoes that appear ripe, but aren’t, 11-month-old apples, bananas that are gassed with a hormone and warmed yellow. The methods possibly do compromise taste and nutrition, but the supermarkets say they are done in the consumer’s name. If food does not taste like it used to, perhaps it’s because we’ve demanded it that way.’ — What they do to food by Melissa Fyfe and Royce Miller, The Age, 9 June 2012
• ‘A vegetable grower is excited about the prospect of his product going from the ground to the dinner plates of Hong Kong within 24 hours. Geoffrey Story is among many from Toowoomba and the region who are preparing to tap into the lucrative Asian market. As the first international freight flight out of Wellcamp airport prepares for lift-off on Monday, companies say it will be a game-changer. In a trial run for freight transport out of the region, a Cathay Pacific Airways Boeing 747-800F will fly to Hong Kong packed full of Darling Downs produce.’ – Hong Kong flight takes food from paddock to plate in a day by Andrew Backhouse, The Chronicle, 21 November 2015

• ‘Vegetables that did not make the supermarket grade have been sent to feed drought-stricken cattle in south-west Queensland. Bundaberg’s Barbera Farms donated a 22-tonne truckload of zucchinis and tomatoes to graziers near Charleville. Drought charity organisation Aussie Helpers has been coordinating the delivery of the vegetables, and co-founder Brian Egan said the gesture was welcomed, since the drought was such an ongoing concern.’ – The vegetables supermarkets reject feed drought-stricken cattle by Airlie Felton-Taylor, ABC Rural, 20 October 2015

Teacher resources:

WATCH this short movie called ‘A little local knowledge’ presented by nutritionist Arabella Forge - www.localharvest.org.au/a-little-local-knowledge/

• ‘Look at the tomato sitting on the shelf there. It looks fresh and healthy. But truth be told, that is one tired, worn-out little tomato. Because the system that rushes to get this guy to the shelf is, well, complicated. The great journey begins a long way away – before the tomato is even grown. Barrels and barrels of oil come from all over the world to help produce this tomato. The oil is needed for packing and shipping. And it’s also used to fertilise the soil. The tomato is then subjected to regular fungicide sprays while it grows. Then when it’s still green and crunchy, it’s picked from the plant, to prolong its life on the shelf. Later it will be sprayed with ethylene to make sure it goes red. The farmer knows this is not ideal, but he has no choice – he has a contract with the supermarket, and that puts him in a big rush. It’s not a great contract either. When that tomato is sold, the
farmer will get as little as 14 cents to the dollar. The middlemen will get the rest. The tomato then gets thrown into a truck to travel vast distances. It then sits in cold storage, where it gradually loses some of its nutritional value. Finally, weeks after it has been picked, the tomato is put on display. Shiny, red … lifeless.’ – Local Harvest

DID YOU KNOW?

- ‘The industrialisation of our food supply means that our current production is extremely oil intensive. It has been calculated that, on average, it takes ten calories of fossil fuels to produce one calorie of food in our current setup. Some food has an even more ridiculous ratio – like corn-fed feedlot beef which consumes about 55 fossil fuel calories to one calorie of meat. We are effectively eating oil.’ – 2010 Food Crisis for Dummies

- ‘Conventional food and farming today rely on the use of nitrogen fertiliser. Today, one third of the energy consumed in agriculture goes for nitrogen fertilizer. The manufacture of one tonne of fertiliser produces seven tonnes of nitrous oxide, a greenhouse gas with a global warming potential 296 times greater than carbon dioxide.’ – Organic Agriculture Centre of Canada (OACC)

- ‘….tomatoes are often picked green to make them easier to transport. Then, before sale, they’re placed in ripening rooms where they are exposed to ethylene gas. This imitates some of the changes that occur during ripening but, because the sugars and flavour compounds that make tomatoes taste good come only from the vine, they don’t develop their full flavour’. – CHOICE

- ‘(The NSW Farmers Association) research revealed that farmers were being paid about 40¢ a kilogram for grey pumpkins, which were then being sold on supermarket shelves for as much as $2.78 a kilogram. It was a similar story for tomatoes and carrots.’ – Growers underpaid for produce, say farmer by Alexandra Smith, The Sydney Morning Herald, 28 September 2011

- ‘At the supplier end of the grocery cycle, the National Farmers’ Federation estimates that Australian farmers get as little as five percent of the retail price of fruit and vegetables. Meanwhile Australia’s grocery prices have risen over 40 percent in a decade – well above the OECD average for developed nations.’ – FairChoice

- ‘About 75% of Australian tomatoes are produced in Queensland, where they grow year round. In summer they’re also produced in NSW and Victoria. Western Australia is self-sufficient, relying on winter tomatoes from Geraldton and Carnarvon and summer ones from the Perth area. So, depending on where you live, tomatoes can be well-travelled by the time you eat them.’ – CHOICE

- ‘The CERES report on food miles in Australia estimates that the average distance travelled for a tomato = 1,618.37km. This estimate assumes that Melbourne’s tomato sources vary seasonally. During
summer most tomatoes come from within Victoria, but during winter as far as Queensland or WA, or we import hydroponically grown tomatoes from New Zealand. (To ensure a conservative figure, the estimate disregarded the tomatoes imported from New Zealand.’ – Food Miles in Australia

CREATE a visual presentation of this process.

EVALUATE the best ‘from paddock to plate’ method for everyone concerned (farmer, grower, manufacturer, retailer and consumer).

*Use the From Paddock to Plate app to locate farmers in your area. The app will show you the distance the growers are to your school and map the route to get to their farms. The websites and contact details of these farmers are also on the app to assist with your research task.*

ACHGK062
Geographic diversity | Sustainability | Land management | Environment | Water management | Weed and pest management | Climate change | Drought | Innovation

DESCRIBE how environmental factors, for example, climate, soil, landform and water, can support higher crop yields and investigating the environmental constraints on agricultural production in Australia, for example, soil moisture, water resources and soils.

DISCUSS, in groups, provide reasons to JUSTIFY the location of specific farms in Australia considering seasonality, vegetation availability, temperature and pests and diseases.

Text references:
- ‘The birth of farming, as we know it today, started from very humble beginnings. Three months after the arrival of the ‘first fleet’ in January 1788, the livestock in the colony consisted of seven horses, seven cattle, 29 sheep, 74 pigs, five rabbits, 18 turkeys, 29 geese, 35 ducks and 209 fowls. Australia is a land of climatic extremes that have brought numerous challenges to farming. These have led to inventions and methods of production that have often put Australia at the forefront of world agricultural development. The invention of the combine header harvester and stump-jump plough, and improved strains of drought and disease-resistant wheat, are just several inventions or adaptations that show the ingenuity of Australian agriculture. Australian farmers have also been quick to
adopt large scale mechanisation, irrigation practices and grain handling and storage systems in order to remain price-competitive.’

– Australian Bureau of Statistics

• ‘For the first farmers, the challenges were all about adapting to Australian conditions. This emphasis remains today, with droughts, floods, storms and bushfires often affecting agricultural production. With farmers using over half of Australia’s landmass, managing land and water-based natural resources is critically important, both environmentally and economically. In 2006–07, more than 94% of agricultural businesses reported undertaking activities, costing almost $3 billion, to prevent or manage weeds, pests, and land and soil problems.’ – Natural Resource Management on Australian Farms, 2006–07

• ‘Successful production of organic vegetables can be very dependent on site selection. Apart from all the obvious reasons for choosing a site – suitable soils and climate, a plentiful supply of good-quality water, access to labour, transport and markets, and so on – the site should be relatively free of the pests and diseases of the crops the producer hopes to grow. For example, there may be greater risks associated with growing organic vegetables in an area where large monocultures of similar crops are grown or in higher rainfall areas, where pests and disease may be more prevalent. If processing is an option, then access to a certified processor would be a consideration.’

– NSW Department of Primary Industries

• ‘From tasteless carrots to sunburned apples, a new report by two University of Melbourne researchers paints a challenging picture for Australia’s agricultural sector and the impacts of climate change in the decades to come. Through the examination of 55 food commodities and a breakdown of the ways each of the country’s multiple climate regions will be affected by climate change, the study concludes the quality of beef, chicken and even kangaroo will suffer. The biggest challenge to come from climate change is a hotter, drier country. And how Australia responds might present a road map for agriculture elsewhere as the Earth’s climate warms. Australia has already seen its average temperatures increase more than 1.5 degrees Fahrenheit over that of the last century, according to data from CSIRO, Australia’s national scientific agency, and the Bureau of Meteorology. If global emissions continue at the current trajectory, Australia is expected to warm more than 9 F by 2090. Wheat farmers, for example, will endure. Wheat will still grow even if the rainfall season is shortened, but a warmer climate will severely harm crops such as chickpeas, walnuts and peaches in their ability to produce yields. In the northern, tropical parts of the country, the researchers found little evidence rainfall will disappear. Instead, climate models project more intense rains and tropical cyclones, although cyclones are expected to happen less frequently. Those more extreme weather
events are expected to jeopardize crops like bananas and sugar cane. In the southern parts of the country, decreasing rainfall and more heat waves and droughts are already affecting farmers. Warmer nights affect pasture and crop growth; plants can’t recover when temperatures don’t fall. This could have profound effects for the output of dairy cows. In extreme heat wave conditions, the authors projected milk yields to decrease up to 40 percent. Poor pastures mean lower-quality diets, which lead to changes in milk protein content. Cheese production will also suffer, the report found. In the parts of the country with a Mediterranean climate—the southwest of Western Australia, southern South Australia and western Victoria—the cool, wet winters and hot, dry summers are expected to heat up and dry out. Already, the authors found, areas in the southwest have warmed up faster than anywhere else in the country, and rainfall has dropped off since the 1960s. The number of days above 95°F is expected to increase 20 percent in the next 15 years and double by 2070. That means about 70 percent of the country’s wine-growing region is expected to be unsuitable by 2050. Climate change isn't a food security issue for the country, Eckard said, despite the fact that 93 percent of all food Australians consume are being produced in the country. With an increase in farming adaptation technologies, Eckard said he’s confident the country will even go as far as to increase the amount of food it exports in the future. However, he expects some of the crops to shift to those that are more drought- and heat-resilient. For example, sweet potatoes could be a staple of the future. Unlike corn or wheat, where drought or a heat wave can wipe out an entire planting, even in bad seasons sweet potatoes will still pull through. They might be smaller, he added, but farmers won’t lose their entire crop.’ - *Australia’s Farmers Challenged by Climate Change* by Brittany Patterson, Scientific American, 19 March 2015

**Teacher resources:**

- [www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Farming%20in%20Australia~207](http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Farming%20in%20Australia~207)

‘Sweet potatoes could be a staple of the future.’

DISPLAY the geographical concepts (location, place, distribution, spatial interaction, spatial change, movement and regions) in the classroom so that students can refer to these terms during the unit.
TALK with the class about geographer’s use of geographical concepts and terminology. Geographers often organise information using concepts such as:

- **Location** using coordinates of latitude and longitude or grid references. For example, Stony Creek VIC (where Peter Hanrahan’s dairy farm is located) latitude 38.6051° south, longitude 146.0884° east; 160 kilometres southeast of Melbourne and 600 kilometres southwest of Canberra.

- **Places** describing physical (environmental) or human (cultural) characteristics. For example: The town has an Australian Rules football team, the Stony Creek Football Netball Club, nicknamed "The Lions", competing in the Alberton Football League. The club colours are maroon and white. The club’s last premiership came in 2009 when Stony Creek defeated Wonthaggi Power in the seniors.

ASK students to PRESENT their response, supported by visual aids including maps, to communicate a reasoned argument about the importance of geographical locations in sustaining food production.

*Use the Paddock to Plate app as a useful tool to find where commercial farms and fresh produce businesses are located throughout Australia.*

ACHGK063 • ACHGK064 • ACHGS067 • ACHGS068, ACHGS071

Environment | Food waste | Sustainability | Water security | Global growth | Food security | Genetics | Recycling | Jobs | Employment | Traceability | Pest management | Global warming | Climate | Skills | Population | Technology | Careers

EXPLORE the effects of anticipated future population growth on global food production and security, and its implications for agriculture and agricultural innovation.

- PRESENT and discuss the impact of Mat marketing Little Veggie Patch Co online (website and social media) to national and international customers and why you believe this is important.

  - www.facebook.com/littleveggiepatchco
  - https://twitter.com/littlevegpatch
  - www.instagram.com/littleveggiepatchco/
“So this was once an unused car park and we were quite surprised when we found out that for eight years, since Fed Square got built, it was empty. We then got permission to put in 140 veggie patches with the idea to rent out gardens to inner city dwellers. Also to restaurants and businesses. What we find, people within the local community just on the other side of the railway track, will come down here daily, at night time if they’re nocturnal gardeners. We also have a lot of restaurants that send their junior chefs down. The idea is to get them out of a pretty stressful environment, the kitchen, getting them to learn about growing food and picking food and that then translates into the story that they put into their restaurant. We also have businesses that crate share. It’s a good way to escape the office, get some grit under your nails and really connect with the food that you are growing.” (5:53 – 6:43)

- DISCUSS the various impacts of global warming on the food industry when considering the implications of a growing population on global food production.

“My biggest competitor is landfill. It’s a very efficient competitor. It puts a single bin at your feet and you don’t have to think. You can just throw everything in there and that’s why landfill takes millions of tonnes of waste every year. Until we make it as easy as landfill, that problem will remain until you are very old. We need to change it. It’s not sustainable to put food in landfill.” (10:48 – 11:18)

- CONSIDER how becoming self-sufficient will assist global food production for a growing population.

“Fresh produce in a typical Australian food basket may travel a combined 21,000km – or more than half way around the earth - from its origins to our plate. We could save all that fuel by growing food locally and turning our cities into catchments and food bowls.” (7:16 – 7:33)

“This café isn’t a typical café that sends its waste to landfill. It’s changed its attitude towards sustainability, by composting on site and taking its little tiny roof area and collecting that water to grow food. How good’s that?” (8:47 – 9:03)
With a growing population comes a greater demand for jobs. 
CONSIDER the jobs and skills involved in being a farmer. Would you like to work alongside Peter on the dairy farm?

“As custodians of the land, we always have to manage our land. And so being environmentally friendly is not just good for the total environment, it’s good for our business environment, which is so important to us. And we must have a sustainable existence. My wife Catherine and I have four sons who are all interested in agriculture and they love to look after the land, so whether it’s recycling products that we bring in or recycling our dairy effluent which goes back as fertiliser for our maize crop and then it all goes around in a cycle.” (16:54 – 17:16)

DETERMINE how genetically modified food crops will or will not assist with demands placed on global food production.

Text references:

• ‘Plant genetic engineering methods were developed over 30 years ago, and since then, genetically modified (GM) crops have become commercially available and widely adopted. In 2009, GM crops were being grown on 10 percent of the Earth’s arable land. In these plants, one or more genes coding for desirable traits have been inserted. The genes may come from the same or another plant species, or from totally unrelated organisms. The traits targeted through genetic engineering are often the same as those pursued by conventional breeding. However, because genetic engineering allows for direct gene transfer across species boundaries, some traits that were previously difficult or impossible to breed can now be developed with relative ease. So-called first-generation GM crops have improved traits. Herbicide-resistant soybeans and corn (maize), for example, can be “weeded” with herbicides that are more effective, less toxic, and cheaper than the alternatives. Cotton and corn have been modified to incorporate Bacillus thuringiensis (Bt) genes, producing proteins that are toxic only to larval pests. Crops can also be modified to ward off plant viruses or fungi. Even though the seed is more expensive, these GM crops lower the costs of production by reducing inputs of machinery are needed to harvest the significantly higher yields. One study in India suggests that Bt cotton produces 82 percent higher incomes for small-farm households compared with conventional cotton—a remarkable gain in overall economic welfare. Second-generation GM crops involve enhanced quality traits, such as higher nutrient content. “Golden Rice,” one of the very first GM crops, is biofortified to address vitamin A deficiency, a common condition in developing countries that leads to blindness and entails...
higher rates of child mortality and infectious diseases. Other biofortification projects include corn, sorghum, cassava, and banana plants, with enhanced minerals and vitamins. Widespread production and consumption of biofortified staple crops could improve health outcomes and provide economic benefits in a very cost-effective way, especially in rural areas of developing countries. A recent simulation shows that Golden Rice could reduce health problems associated with vitamin A deficiency by up to 60 percent in rice-eating populations. Despite all those real and potential advantages, GM crops have aroused significant opposition, particularly in Europe. The major concerns relate to potential environmental and health risks, such as allergenicity of transgenes or loss of biodiversity. But there are also fears about adverse social implications—for instance, that GM technology could undermine traditional knowledge systems in developing countries—and the monopolization of seed markets and exploitation of small farmers. Unexpected risks have not materialized so far, and those risks that do exist seem to be manageable. There is even evidence that GM technology can contribute to the preservation of agrobiodiversity, because the new traits can be inserted into local heirloom varieties. Nevertheless, concerns have led to complex and costly biosafety, food safety, and labeling regulations. Governments have responsibility for ensuring that foods are safe for consumption and that new agricultural inputs do not damage the environment or harm agricultural production.

‘Currently, the only genetically modified food crops produced in Australia are canola and cotton, but a variety of other GM foods can be imported and used as an ingredient in packaged foods. Foods where GM ingredients are highly refined do not need to be labelled as containing GM products. Field trials of pineapple, papayas, wheat, barley and sugarcane are underway in Australia. These products have been modified for insect resistance, herbicide tolerance, color, oil production, sugar composition, flowering and fruit development. Gene technology research is also underway in Australia on bananas, rice and corn.’ - Find out which genetically modified foods are available in Australia and which GM crops can be grown here by Chiara Pazzano, SBS, 15 November 2012

Teacher resources:
FIND OUT what GM foods are approved for sale in Australia and New Zealand, including potatoes! -

**FOOD FOR THOUGHT**
UNDERSTAND how gene technology works and give some examples of its current application in food production.

DEVELOP an awareness and understanding of the positive and negative impact of genetically modified foods.

ASK critical questions about the interests served by those promoting GM food products and/or food production practices.

DEBATE the importance of labelling GM foods.

APPRECIATE the historical and social impact of food technology.

RECOGNISE the impact food decisions have in the domestic, community, commercial, industrial and global settings.

EVALUATE the impact of food technology on people and the environment.

➢ EXPLORE the ongoing problem of food wastage and how this is hindering food security efforts.

“The students and teachers at Monbulk Primary School didn’t like the fact that the food scraps were just going into our bins and then into the big skip to fill up landfill. It was so wasteful when we could be using it to put in our compost for the gardens or giving it to the chickens and the worm farm.”
(1:08 – 1:20)

“At ZEA Hungry Goods we believe that in order to transform our society, we must first restore the composition of our soils. That’s why we created a high quality apparel brand that transforms 10 kilos of food waste into fertile soil with every item that we sell. We do that by funding composting systems like worm farms or tumblers or fermentation systems in urban agriculture projects around the world like here in Melbourne.”
(4:47 – 5:14)
“We have 1.3 billion tonnes of food waste going to landfill every year. That’s enough food to feed half of the world’s population. However, all of that food waste is going to landfill today. If we use that food waste to instead transform the fertility of the soil and grow more food, then we wouldn’t have hunger in this world. We wouldn’t be having these big issues like climate change that is heavily impacted by food waste. So food waste is possibly one of those actions that we take every day. Every time we sit down and we enjoy our food, in the preparation of that food and at the end of that meal, we have a great opportunity to contribute to all of these causes in a much more positive way.” (5:15 – 5:51)

“My biggest competitor is landfill. It’s a very efficient competitor. It puts a single bin at your feet and you don’t have to think. You can just throw everything in there and that’s why landfill takes millions of tonnes of waste every year. Until we make it as easy as landfill, that problem will remain until you are very old. We need to change it. It’s not sustainable to put food in landfill.” (10:48 – 11:18)

Text references:
- ‘From an ethical standpoint, it’s pretty simple. When you consider that 15 per cent of U.S. homes are food insecure, throwing away food is morally callous. And no, the food you leave on your plate isn’t going to feed anyone (here or in a developing nation). But that doesn’t mean you couldn’t donate excess food instead of preparing too much. Or buy less food—to reduce the amount you’ll discard—and pass the savings along to your local food bank.’ – Wasted Food, 29 March 2011
- ‘Eliminating the millions of tonnes of food thrown away annually in the US and UK could lift more than a billion people out of hunger worldwide, experts claim. Government officials, food experts and representatives of the retail trade brought together by the Food Ethics Council argue that excessive consumption of food in rich countries inflates food prices in the developing world. Buying food, which is then often wasted, reduces overall supply and pushes up the price of food, making grain less affordable for poor and undernourished people in other parts of the world. Food waste also costs UK consumers £10.2bn a year and when production, transportation and storage are factored in, it is responsible for 5% of the UK’s greenhouse gas emissions.’ - Elimination of food waste could lift 1bn out of hunger, say campaigners by Adam Vaughan, The Guardian, 9 September 2009
- ‘No More Forgotten Veggies in the Fridge: When you can just head to the garden to grab your veggies you’ll likely have far less food
waste from limp forgotten veggies in your fridge crisper. Let’s face it, most of us buy a lot of produce intending to eat it all before it goes bad but sometimes things come up and you forget about them. Growing your own food means full access to the freshest vegetables and fruits at all times!’ – Isis Lorran, food blogger and author, Little Mountain Haven

• ‘Every year Australians waste about $10 billion worth of food. It starts on the farm, where fruit and vegetables are rejected for cosmetic reasons, and continues right through to the household, where leftover or unwanted food is thrown out. In France, supermarket giant Intermarche has introduced a successful campaign called Inglorious Fruits and Vegetables. The supermarket purchased produce usually discarded for purely cosmetic reasons and displayed it in special aisles, sold them at a 30 per cent discount. When it was launched, the program was an immediate success; within a month, it reached over 13 million people and stirred a national conversation about food waste and just what makes a piece of fruit, or a vegetable acceptable to the consumer. The campaign only faced one problem: the produce quickly sold out. Now the ugly fruit and vegetables are available in soup and fruit juice form. Intermarche calls it ‘a glorious fight against food waste’. In Australia, between 20 and 40 per cent of fruit and vegetables grown are rejected before they reach the shops because they don’t meet supermarkets’ high cosmetic standards and specifications.’ – Campaign for ugly fruits aims to end food waste, Bush Telegraph, Radio National, 14 July 2014

Teacher resources:
- www.littlemountainhaven.com/reasons-to-grow-your-own-food/
- www.abc.net.au/radionational/programs/bushtelegraph/irregular-food/5595302

REFER to the reference made above about fruit and vegetables being ‘…discarded for purely cosmetic reasons…’ and DEBATE whether you are in support of this statement or not. Would you buy a vegetable if you thought it looked “unusual” and “ugly”? Even though you know that its appearance won’t have affected its flavour. DISCUSS with ethical reasoning.

- CONSIDER the benefits and disadvantages of knowing where the food you eat comes from. Why is this important when it comes to food security? What pressures will an increasing world population have on food security?
SOURCE and ANALYSE news articles and DEVELOP your own argument using basic language structures that suggest conclusions or conditionals. PRESENT the argument to the class as an individual or in groups.

ACHGK065 • ACHGK066 • ACHGK067 • ACHGS063
Technology | Innovation | Profitability | Finance | Design |
Productivity | Genetics | Weather | Pests and diseases | Food waste |
| Recycling

EXPLORE the latest technologies and structures being developed in the agriculture industry.

Text references:
• ‘Australia could see fully automated vegetable farms by 2025, according to top robotics researchers, with the ability to automate the entire production process for some crop commodities emerging through targeted research and development in the industry.’ – AUSVEG
• ‘In a shed near Toowoomba, researchers at the University of Southern Queensland are developing the tools and techniques they think will dominate farming practice by 2025.
  ➢ Mechatronic engineer Dr Cheryl McCarthy is researching the use of drones to automatically detect hot spots in crops, and will soon be one of the few people in Australia licensed to operate unmanned aerial vehicles commercially.
  ➢ Agricultural engineer and biosecurity expert Paul Kamel traps moths in a device that allows him to photograph them under a microscope and upload the image, to help spot incursions early.
  ➢ Crown rot is a disease caused by fungus, which survives in the stubble of its host plant, limits water movement from the soil and causes browning of the stem. It can be a major headache for the grains industry, causing significant yield losses, particularly in wheat crops. Plant pathologist Dr Cassy Percy is investigating better ways of using phenotyping to learn more about resistance to the disease.
  ➢ Food expert Lindsay Brown has been investigating the potential of recycling food waste. He has begun clinical trials to look at how the waste products of foods such as wine can be utilised, and made into functional foods which could improve health. "For example, when we make red wine most of the stuff gets thrown out [and] gets used as compost," Mr Brown said.
Precision agriculture expert Troy Jensen has been developing technology which can measure and quantify the spatial capacity of farms in terms of things like fertiliser use. However, to do so requires advanced technology such as auto-steer tractors, which Mr Jensen said already existed. But farm equipment could be even more advanced in the future. "The idea behind fully autonomous, driverless tractors is a possibility," Mr Jensen said. – *Drones as common as tractors? Farm technology in 2025* by Robin McConchie, Craig Zonca and Arlie Felton-Taylor, ABC Rural, 27 October 2015

Teacher resources:

EXPLORE the differences and/or similarities of food production overseas compared to Australia.

TALK about how they all use resources from and within biomes and about how their different systems and approaches to production might impact on the physical conditions of the land and water environments within biomes.

INVESTIGATE some of the products and/or services that businesses in your town, city or rural region sell to other places.

ACHGK068
Food security | Sustainability | Waste management | Climate | Seasonality | Environment | Economics | Nutrition

REFER back to page 11 and DISCUSS the meaning of food security.

BRAINSTORM words and phrases to gauge students’ understanding.

TALK about World Food Day and RESEARCH as a class how to achieve the goal of feeding an expected global population of 9.6 billion people by 2050.

THINK about the capacity of the world’s environments to sustainably feed this projected future population.

PLAN an inquiry into what systems dairy farmer, Peter Hanrahan, has put in place and can put in place, to meet both local and regional demands as well as national and international demands.
“Everything helps and there are always different opportunities at different times and it’s often when cows are short of their natural feed, which is grass, so that can be when it’s extremely wet or when it’s extremely dry. At the moment we’re wetter than average, but six months ago we were far drier than average. So by having the constant supply of bread from the city, it enables us to have a consistent diet for our cows right throughout the year.” (16:06 – 16:30)

“As custodians of the land, we always have to manage our land. And so being environmentally friendly is not just good for the total environment, it’s good for our business environment, which is so important to us. And we must have a sustainable existence. My wife Catherine and I have four sons who are all interested in agriculture and they love to look after the land, so whether it’s recycling products that we bring in or recycling our dairy effluent which goes back as fertiliser for our maize crop and then it all goes around in a cycle.” (16:54 – 17:16)

Use the Paddock to Plate app to speak to farmers both locally and nationally to find out the importance of food security to them and how they think we might achieve the goal of feeding so many people worldwide.

Teacher resources:


ACHGS064 • ACHGS065

Excursion | Environment | Sustainability | Jobs | Skills | Economics | Water security | Food safety | Profitability | Biosecurity | Waste management | Food origin

USE the Paddock to Plate app to FIND and VISIT a local farmer’s property to GATHER relevant data from a range of primary sources, for example, from observation and annotated field sketches, conducting surveys and interviews and experiments, or taking photographs, about challenges to food production.
If this is not possible, make observations from the From Paddock to Plate virtual excursions.

ACHGK069
Food Security | Reflect | Tourism

IN SUMMARY, develop a table to show the types of challenges to food production in Australia compared to other areas of the world.

CONSTRUCT a graph to show the relationship between growth in world population and world food production.

INVESTIGATE the global growth of tourism and its likely effects on the future of places including employment.

REFLECT on all the information and knowledge gathered in the above tasks.

ACHGS070
Food origin | Nutrition | Health | Traceability | Food miles |
Global warming | Climate change | Environment | Biodiversity |
Geographic location | Food security

DISCUSS the relevance of food’s nutritional content in relation to sustainably feeding the projected future population to achieve food security for Australia and the world.

Text reference:
• ‘Jodie Goldsworthy is the director of Beechworth Honey in NSW and says there are research papers which suggest pollination can increase crop yield by 25 per cent. That, if you think about it, is an astonishing figure.’ – BlueNotes, 11 December 2015

PLAN, REHEARSE and DELIVER a presentation that expresses views and values other than students’ own about why certain foods are nutritionally better for you than others.

TOUCH, SMELL and TASTE a selection of foods and DISCUSS characteristics that identify their nutritional value.
‘There’s more to eating the rainbow than unicorns and, um, rainbows. Sure, a plate full of colour looks pretty – and in our opinion, wildly appetising – but ensuring your plate is covered in a wide variety of coloured vegetables is also a top way to guarantee you’re consuming as many different vitamins, minerals, antioxidants and disease-fighting phytochemicals as possible. Fruit and vegetables fall into five different colour categories. Each category delivers its own set of unique health properties.

- **Green**: Kale, spinach broccoli, herbs, lettuce, beans, zucchini, asparagus.
  Perhaps our favourite colour of the veggie bunch. We try and include greens in every meal (including breakfast). Green vegetables contain lutein; an antioxidant that reinforces improved vision. They also contain potassium, vitamin C, vitamin K and folic acid as well the phytochemicals carotenoids, indoles and saponins, all of which have cancer-fighting properties.

- **Red**: Tomato, capsicum, radish, rhubarb.
  Red fruits and vegetables contain several beneficial antioxidants, such as lycopene and anthocyanins. These compounds help promote the health of your heart, eyes and immune system, as well as help prevent cancer.

- **Orange**: Carrots, sweet potato, pumpkin.
  There’s truth to what your mother said: Carrots really do help you see in the dark. Due to their high levels of beta-carotene, which the body converts into vitamin A, these vegetables are an essential vitamin for healthy vision.

- **Purple**: Eggplant, blueberries, blackberries, red cabbage, purple onions.
  The darker the vegetable, the higher the antioxidant level. The plant pigment that gives these fruits and veggies their purple hue is called anthocyanin. It has antioxidant properties that protect cells from damage and can help reduce the risk of cancer, stroke and heart disease.

- **White**: Onions, garlic, potatoes, mushrooms, cauliflower, parsnips, turnips.
  Although many would argue that white is not technically a colour, white vegetables still come with their own list of health benefits. Many contain a range of health-promoting phytochemicals such as allicin (found in garlic), which is known for its antiviral and antibacterial properties. These vegetables are also high in potassium, magnesium, vitamin C, fibre and folate, and have anti-cancer properties as well as reducing the risk of heart disease.’ - *Why you should eat the vegetable rainbow* by Jordanna Levin, I Quit Sugar with Sarah Wilson, 28 February 2014
Teacher resource:
- https://iquitsugar.com/eat-the-vegetable-rainbow/

DETERMINE and APPLY criteria for evaluating the credibility of the websites where information is sourced.

Use the Paddock to Plate app to locate farmers to source produce for this unit of work. Also use the app and From Paddock to Plate book to see how farmers express their viewpoints on the nutritional content of the food that they produce.

DID YOU KNOW?
1. ‘Around 80% of the world’s production is consumed by the wealthiest 20%.’ - Shah, A, 2008, ‘Global Food Crisis 2008’ Global Issues, viewed 9 November 2010
3. ‘We grow 50% more grain than we need to feed the entire population but much of this is fed to livestock.’ - Vegetarian Network Victoria, 2010, Eating up the World: the Environmental Consequences of Human Food Choices, 3rd Reprint September 2010

Excursion | Food miles

VISIT your local supermarket to DISCUSS food waste practices on site and initiatives to reduce food packaging.

REFLECT on the fact that some foods don’t have a long shelf life and consumers’ and supermarkets’ have high cosmetic standards.

Text reference:
- ‘Every year Australians waste about $10 billion worth of food. It starts on the farm, where fruit and vegetables are rejected for cosmetic reasons, and continues right through to the household, where leftover or unwanted food is thrown out. In France, supermarket giant Intermarche has introduced a successful campaign called Inglorious Fruits and Vegetables. The supermarket purchased produce usually discarded for purely cosmetic reasons and displayed it in special aisles, sold them at a 30 per cent discount. When it was launched, the program was an immediate success; within a month, it reached over 13 million people and stirred a national conversation about food waste and just what makes a piece...’
of fruit, or a vegetable acceptable to the consumer. The campaign only faced one problem: the produce quickly sold out. Now the ugly fruit and vegetables are available in soup and fruit juice form. Intermarche calls it 'a glorious fight against food waste'. In Australia, between 20 and 40 per cent of fruit and vegetables grown are rejected before they reach the shops because they don’t meet supermarkets’ high cosmetic standards and specifications.’ – Campaign for ugly fruits aims to end food waste, Bush Telegraph, Radio National, 14 July 2014

Teacher resource: www.abc.net.au/radionational/programs/bushtelegraph/irregular-food/5595302

Local community

PRESENT an argument about how farming and agriculture is represented and portrayed in society through the media, by your friends, your parents and other role models. You must PRESENT a point of view and justify your position in order to persuade other about this issue. Include texts that integrate visual, print and audio features.

CONSIDER all attitudes, opinions, values and beliefs.

What conclusion can you draw?

DID YOU KNOW?
‘By buying locally grown food you’ll be strengthening your community by investing your food dollar close to home. Only 18 cents of every dollar, when buying at a large supermarket, go to the grower. 82 cents go to various unnecessary middlemen. Cut them out of the picture and buy your food directly from your local farmer.’ – Local Harvest, www.localharvest.org.au/why-is-local-important/

Reflect

What have the students learnt from this unit?

• What is something new that you have learnt about reducing food waste in Australia?
• Describe what you know about sustainable farming practices.
• How might you help others know more about how Australian farmers grow food?
What have you learnt about food security and food packaging?
What questions do you have about growing food, utilising food waste and reducing rubbish at your school?
What piece of work are you most satisfied with?

Websites (viewed January 2017) - As content of the websites suggested for research purposes in this unit is updated or moved, hyperlinks may not always function.