

PRIMED

Student worksheet

Year

7

Technologies



Department of **Primary Industries and Regional Development**
Department of **Training and Workforce Development**
Department of **Education**

Student worksheet 1.1

KWHL chart

A KWHL chart is used to assess what you know about a topic before, during and after you have engaged with it.

Topic: Food and fibre production in Western Australia

What do I <u>K</u> now?	What do I <u>W</u> ant to know?	<u>H</u> ow do I find out?	What have I <u>L</u> earnt?

Student worksheet 1.2

Primary industries in Western Australia

Primary industries in Western Australia produce many of the food and fibre products we use daily.

1. Define the following terms and provide an example for each.

Primary industry:

Raw commodity:

Value-added product:

2. Using some of the product images you have cut out, paste a product example into each of the boxes to show which Western Australian primary industry produces it.

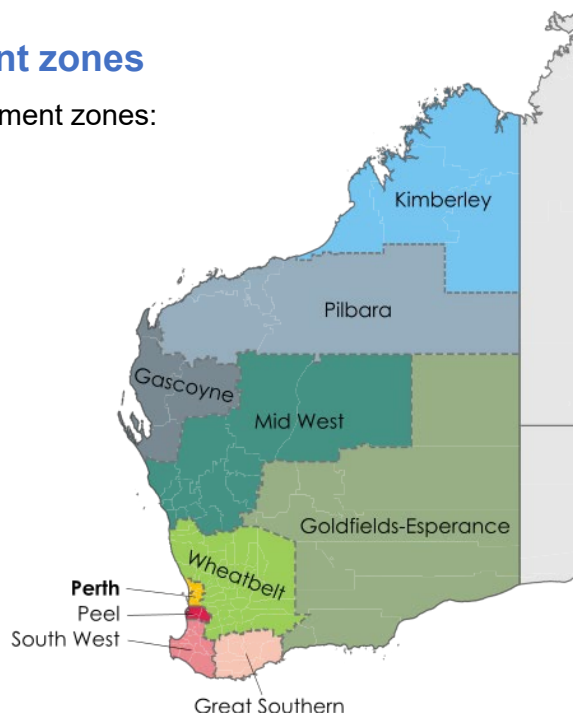
Grain	Horticulture	Aquaculture and seafood
–Meat and livestock	Dairy	Fibre
Forestry/Timber	Eggs and poultry	Grapes and wine

Student worksheet 2.1

Western Australian regional development zones

Western Australia is divided into nine regional development zones:

Kimberly
Pilbara
Gascoyne
Mid West
Wheatbelt
Goldfields–Esperance
Perth
Peel
South West
Great Southern



Author – Philtro. Creative Commons, 4.0 International, 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license available at https://commons.wikimedia.org/wiki/File:Regions_of_Western_Australia.svg

In your small group, research one region of Western Australia and provide a summary of the following information:

1. Location of the region
2. Region population and major cities/towns
3. Region ports/airports and other major transport features
4. Description of the region's landscape
5. Overview of the region's rainfall and climate
6. Description of the soil types in the region
7. Summary of the region's agricultural practices, including the types of food and fibre produced there

Useful resources include:

WA Open for Business website

<http://www.waopenforbusiness.wa.gov.au/Why-Western-Australia/Discover-Western-Australia>

Buy West Eat Best website

<https://www.buywesteatbest.org.au/>

Buy West Eat Best – Western Australian Food Map

Department of Primary Industries and Regional Development Website

<http://www.drd.wa.gov.au/regions/Pages/default.aspx>

Regional Climate Zones Map

<http://www.bom.gov.au/climate/climate-guides/>

When you have gathered your information, you are going to report your findings to the rest of your class by providing a summary of your research on the page attached.

Western Australian zone: _____

Location:

Population:

Transport:

Soils:

Climate and rainfall:

Landscape:

Agricultural practices:

Student worksheet 3.1

Understand the production process

To help understand what happens when different products are grown/produced, we can organise production into:

- **Input:** what's going into the process – everything that's needed to produce the item
- **Process:** all the activities that happen – the steps taken to make a product
- **Output:** what's coming out – everything resulting from the production process

For example:

Honey production

Input	<ul style="list-style-type: none"> • Equipment: hive, smoker, protective clothing, extractor, strainer, glass jars, packaging, advertising materials • Materials: bee colony, flowering plants • People: beekeeper, business manager, workers involved in production and marketing • Knowledge and skills: knowledge of the process and the needs of bees; skills to work with bees; scientific knowledge of bee health, predators and pest control; and knowledge of customers and marketing • Facilities: suitable land to situate hives on and carry out processing • Energy: electricity
Process	<ol style="list-style-type: none"> 1. Prepare the hives and bee colony. 2. Check, maintain and protect the hives (throughout the process). 3. (The bees) collect nectar, make the honey with it and then store the honey. 4. Harvest the honey (by removing the frames from the hives). 5. Extract the honey (by separating it from the beeswax and filtering it). 6. Bottle and package the honey. 7. Promote the product.
Output	<ul style="list-style-type: none"> • Extracted pure honey in packaged form ready for consumption. • By-products – beeswax (can be sold to commercial manufacturers, to be used for example in furniture polish and candles. Pollen (can be used as a dietary supplement). Royal jelly used to feed the queen bee (can be used as a skin product). Propolis used by bees to maintain the hive (can be used as a disinfectant and for medical purposes). • Pollinated plants. • Waste – obsolete production equipment, used jars and packaging, possibly pollution from electricity generation.



Image: by Pexels, available at <https://pixabay.com/photos/apiary-bee-beehive-beekeeping-1867537/>

1. Match the following aspects of production to identify input, process or output.

Input	The final result of production.
	The steps to implement technology to create the product.
	The impact of the production process – for example, on the environment.
Process	The series of operations to produce the product.
	Finished products, by-products and waste.
	The knowledge and skills needed to apply technology.
Output	Materials – the ingredients that are changed during the process into the final product.
	The actual making of the product.
	The energy, such as sunlight, electricity and fuel, to power all the stages of production.

2. Watch the PowerPoint presentation *How to Grow a pair of jeans* on the Cotton Australia website <cottonaustralia.com.au/grow-a-pair-of-jeans>.
3. Use the question prompts to explain the production process used to 'grow' a pair of jeans.

Input	What materials are needed?	
	What equipment is needed?	
	What prior knowledge is required?	
	What energy is required?	
Process	What are the steps used to grow the cotton?	
	What technology is used?	
Output	What is the finished product?	
	Are there any by-products?	
	Is there any waste?	
	Is there any impact on the environment?	

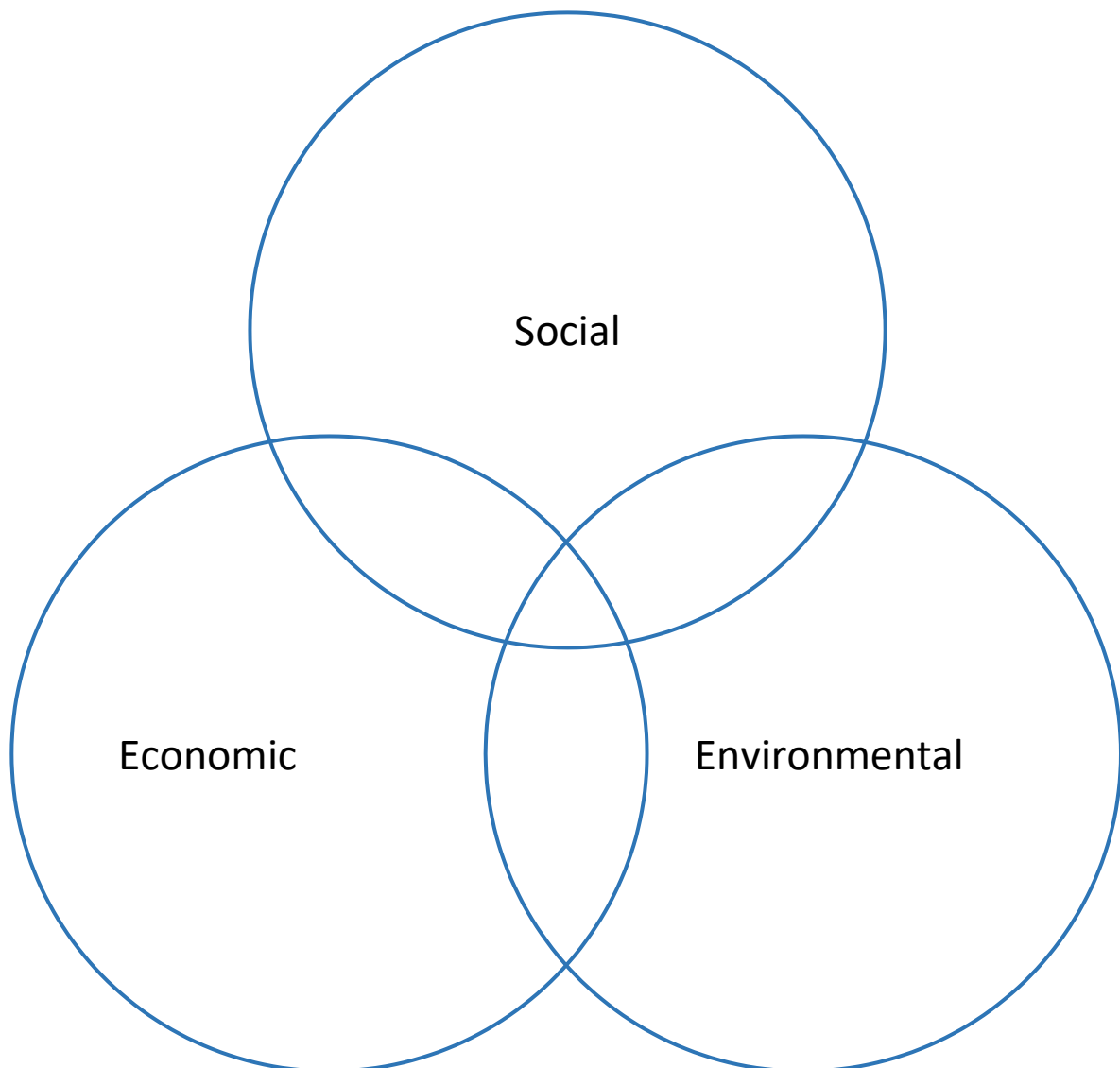
Student worksheet 4.1

The triple bottom line

1. Define 'sustainability' in your own words:

2. Explain the triple bottom line:

3. For a primary industry to be sustainable it must consider economic, environmental and social factors. Watch the PowerPoint presentation and add notes below explaining the three elements of the triple bottom line.



Case study

Read the passage below and use three different colour highlighters to identify which factors in the case study the fit under economic, environmental and social.

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Eagle Vale Olives reach for the sky

SMALL LANDHOLDER SERIES
NW 36 2011

Awarded Australia's best green table olives, Western Australian family-owned and operated Eagle Vale Olives is a niche farming success story. Operated collaboratively by Gerard and Leanne Bunter and Eric and Jill Dixon, Leanne recently shared the tale of Eagle Vale Olives with Noteworthy's Caroline Fowler.

"Gerard and I originally owned a freight business in Geraldton but our interests were more in farming and living on the land. An illness in our family prompted us to research what crops we could grow that had health benefits and we discovered olives," Leanne said.

"During 1995 Gerard and I, along with my parents and our business partners Eric and Jill Dixon, eschewed the advice that olives would not grow in such extreme climates and planted 3000 trees in the Chapman Valley which is 470 kilometres north of Perth.

We live in a Mediterranean climate to which the trees are adapted and we saw people growing them in their backyard in Geraldton so we thought, why not? Underground water in the Chapman Valley is plentiful — we sunk a bore and also built a 3785 cubic metre catchment dam.

Our first harvest was during 1997 and we started with the production of extra virgin olive oil (EVOO). The quality surpassed our expectations. The warmer climate tends to produce mild oil and this gives us the flexibility to infuse it with different flavours.

Confidence in what we had achieved to that point, drove our decision to diversify and introduce both green and black pickled table olives into the product mix. This was an important decision as the price of olive oil alone was not sustainable as a wage for four people.



Our survival has depended on diversification and delivering what the customers want.

The 3000 trees is not enough for our production requirements so we purchase olives from two other producers — one with 7000 trees and another with 3500.

Harvest and production

Harvest is during February and March and we employ up to 30 staff — mostly local — to hand pick the fruit. The process is labour intensive as every olive is hand graded for size and quality before they are put into tanks for treatment. Between harvests we employ part-time staff to make the marinades and prepare the olives for pre-booked orders.

Once the hand picking is complete we start harvesting the olives for the production of EVOO. This is not as labour intensive as we use a machine but the fruit must be crushed within 24 hours of harvest. Therefore the timing of delivery to the Gingin crushing plant is critical. We backload one tonne cubes of oil to the farm where the oil is transferred into refrigerated air-tight vats to be filtered. The final filtered product is stored in a container which varies in size depending on the customer purchase order.

Quality the key

The whole process of harvest, storage and transport is critical in the production of both table olives and oil. Storage in cool temperatures with no exposure to the air is vital.

Olive oil, like fruit juice, goes rancid very quickly if not kept in pristine condition. Part of our job is to educate the consumer of correct food storage practices so that quality can be maintained. Filtered olive oil will keep well for up to two years if stored in the correct conditions.

Marketing a full time job

When we are not harvesting, the marketing and development of our products is a full-time job. We employ a full-time staff member who markets our products to restaurant chefs, delis and gourmet grocery stores. The fact that we are a local,

Farm information

Farmers: Gerard and Leanne Bunter partnering in business with Eric and Jill Dixon

Location: Chapman Valley, WA

Property size: 121ha with 3000 olive trees grown on 8ha. Olives are also purchased from other local farmers who grow 10,500 trees combined.

Products: Extra Virgin Olive Oil, marinated olives, pitted olives, dukkah, tapenade, skin care products.

Annual rainfall: 450mm. The 3000 trees are irrigated with 12.5 megalitres per year.



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Eagle Vale Olives reach for the sky

family-owned business gives us a lot of traction amongst these food outlets. Taste-testing at various supermarkets also gets our brand out there and we run these in Perth and in the larger centres of northern WA.

The website has been instrumental in marketing and sales of Eagle Vale Olives products, especially since people have become more comfortable with online shopping. The list of outlet stores to which we supply can be viewed on the website as well as our long list of national awards (46 in total) since 2002.

The drive to diversify

Our survival has depended on diversification. People are always asking what new products we have available and it's grasping these opportunities and finding out what people want which has helped the business to expand and meet market demand.

The business went from only producing olives for oil to marinating the olives and including tapenade and dukkah into the product mix. Today the business has a whole range of natural EVOO skin care products and gift hampers.

WA's first pitting and slicing machine

Our latest venture has been the commissioning of WA's first pitting and slicing machine. Previously, pitted olives were only available in WA as an imported product from Spain and Italy. The machine, which was purchased from Seville, Spain, will allow us to sell local pitted olives to gourmet stores and supermarkets across WA. Our customers were continuously asking after fresh local pitted olives which drove our decision to invest in the hi-tech machine.

Grazing the grove

Sheep are an integral part of our olive operation. We run 200-300 Merinos, sometimes buying in fat lambs during winter to sell into the spring market. The sheep graze the grass between the rows of olive trees, reducing the fire risk and controlling the weeds. When the pasture becomes too short the sheep begin to eat the bark and the olives on the trees – surprisingly they don't mind the bitterness! At this point the sheep are removed from the grove; some will be sold while others are relocated to new pasture. The feed situation determines what number we carry from year to year and we grow some oaten hay used for supplementary feeding during Autumn."

Contact: Eagle Vale Olives

T: 9920 5285 **W:** www.eaglevaleolives.com.au

FOR MORE INFORMATION

The Small Landholder Information Service and Kondinin Group have developed a series of *Noteworthy* factsheets.

For copies or more information go to www.agric.wa.gov.au/small_landholder or contact the Small Landholder Information Service on 9733 7777.

Kondinin Group www.farmingahead.com.au

HEALTHY FACTS ABOUT OLIVE OIL

The health benefits of extra virgin olive oil have long been researched and include:

- Rich source of monounsaturated fats, which may reduce risks of heart and cardiovascular disease.
 - Beneficial for the stomach, pancreas and intestines.
 - It may help lower bad cholesterol as it contains a wide variety of valuable antioxidants and it could also have a lowering effect on blood pressure.
 - Contains a protective element which may lower the risk of several types of cancer including breast, colon, lung, ovarian and skin cancers.
 - Helps with anti-ageing, osteoporosis and skin damage.
 - Helps to prevent or delay the onset of diabetes.
 - May help support the immune system.
- Believe it or not but deep frying with olive oil can be healthy. Renowned nutritionist Rosemary Stanton along with food scientists have deemed the oil safe for deep frying when compared with other undesirable fats.

This is because olive oil is rich in monounsaturated fats also comprising anti-oxidants and these substances can increase protection against cancer and heart disease.

When food is deep fried in olive oil at the right temperature (180 degrees Celsius), the oil forms an outer crust, preventing further penetration of the oil into the food and stopping the vitamins from escaping.

Because less oil can penetrate, foods properly fried in olive oil have fewer kilojoules and a lower fat level than foods that are shallow fried.



Jose Gomez Luna (left) from Seville in Spain and Eric Dixon experiment with WA's first pitting and slicing machine. Customers were craving local fresh pitted olives and the Bunters and Dixons took the opportunity to do the market research, purchase the technology, and deliver.

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Student worksheet 5.1

Design challenge: Futureproof food and fibre production

Agricultural practices have come a long way over the years, with changes in farm machinery, livestock handling, farm facilities, feeding capabilities, crop science, breeding programs, processing techniques, waste management, water efficiencies and more. Many farms are now using artificial intelligence and robotics to produce food and fibre commodities.

Looking towards the future, we need to be making continual improvements in our food and fibre production systems to ensure they are sustainable. This means ensuring, we can produce enough affordable food and fibre commodities for our growing population that doesn't have a detrimental impact on our environment.

In this task you will:

1. Reflect on what you already know about food and fibre production in Western Australia.
2. Select one food or fibre commodity grown in Western Australia and:
 - investigate where and how it is grown/produced
 - analyse the on-farm production system of this commodity and complete a review of the inputs, processes and outputs of its production
3. Apply this knowledge to design a diorama (3D miniature model – like a mini museum display) or digital model of a futureproof production system for a Western Australian food or fibre commodity, which meets the criteria of a sustainable enterprise.

Sample diorama

This diorama represents a cooling tower construction.



Image: 'Cooling tower construction diorama' by [Birhanb](#). Licensed [CC BY-SA 3.0](#). Available at https://commons.wikimedia.org/wiki/File:Cooling_tower_construction_diorama.jpg

Task summary

You can do steps 2, 3 and 4 as part of a small group. But you must complete steps 1 and 5 (the defining and evaluating parts) on your own.

Step 1	Define What are the requirements of this task? Explain the purpose.	Complete this step individually. In your own words, define the requirements of this task.
Step 2	Investigate Consider components/resources to develop solutions and identify constraints.	Complete this step as a member of a small group of students. In detail, investigate a food or fibre production process that occurs in WA. Find out the inputs, processes and outputs needed to make this production process sustainable. Consider environmental, economic and social factors.
Step 3	Design Design, develop, review and communicate design ideas, plans and processes within a given context, using a range of techniques, appropriate technical terms and technology	Complete this step as a member of a small group of students. Prepare a plan to produce a diorama or digital model of a sustainable food or fibre production process.
Step 4	Produce Safely make solutions using a range of components, equipment and techniques.	Complete this step as a member of a small group of students. Follow your plan and create a diorama or digital model representing a sustainable food or fibre production process
Step 5	Evaluate Apply given contextual criteria to evaluate design processes and solutions.	Complete this step individually. Use the evaluation criteria you create in Step 1 to reflect on your design.



Before you start

Select a way to organise your research – for example, writing your research notes in a workbook or portfolio, or typing them into a digital document.

Step 1: Define

- Review the design challenge set for you.
- In your own words write down a list of criteria that explains what you need to do to complete the challenge.

Step 2: Investigate

- Research the types of farming that take place in Western Australia and provide some examples of different types of farms.
- Select a food or fibre commodity grown in Western Australia to research.
- Research **where** this commodity is produced and why it is produced in that region. Consider climate conditions, soil types and other facilities in the area.
- Research **when** this commodity is produced. What processes take place throughout the year to produce this commodity?
- Research **how** this commodity is produced. Consider the steps taken in the production process on the farm, including:
 - technology used
 - people involved / job roles required
 - environmental considerations
- Complete a summary of the input-process-output (IPO) model specifically for this commodity.

Step 3: Design

- Use the information you have gathered of the production of your commodity to design a futureproof food or fibre production model which represents a farm / production process of your commodity.
- Brainstorm your ideas first. Consider **how**:
 - to produce enough of this commodity for the future population
 - the production process won't damage the environment
 - the production process will be profitable
 - technology can be used to improve production
 - people will be involved in the process.
- Draw your design ideas using labels to describe your plans.
- Select your chosen design and write the steps you will take to produce your model (a production plan), remember to plan this as a group and allocate tasks to each person).
- Prepare a list of all the materials/resources you will need to complete your model

Step 4: Produce

- Implement your design and produce your model:



Remember

You can produce either:

- a diorama (3D miniature model) – for example, using a shoebox model to represent your production system
- or**
- a digital model using a digital application.

The important thing is to be able to demonstrate, through your model:

- your understanding of the production process
- how you have designed your future farm / production process to be sustainable.

You must include labels or an index explaining how the parts of your farm/process are sustainable.

Step 5: Evaluate

- Independently reflect on your design process and complete an evaluation using the following criteria.
 1. Review the criteria you prepared in step 1. How does your design meet the criteria you listed?
 2. How does your model represent a sustainable production system?
 3. Are you happy with the final product of your model? Why/why not?
 4. How could you improve your model if you were to produce it again?
 5. Did you and your partner work well to produce your model?
- Finally, review your KWLH chart (Student worksheet 1.1) from the first lesson and complete the 'What have I Learnt?' column.

Input-process-output model

Inputs	What materials are needed?	
	What equipment is needed?	
	What prior knowledge is required?	
	What energy is required?	
Processes	What are the steps used to grow the commodity?	
	What technology is used?	
Outputs	What is the finished product?	
	Are there any by-products?	
	Is there any waste?	
	Is there any impact on the environment?	