

Diversity on a Plate

Curriculum connections

Use of this learning and teaching activity may contribute to achievement of the Standards. Indications of relevant Domains and Levels in the *Victorian Essential Learning Standards* are provided to assist teachers to make decisions about the appropriateness of the activity for their students.

Refer to introductory notes for VELS curriculum connections which define the relevant standards in greater detail.

Victorian Essential Learning Standards Domains and (Levels):

The Humanities (4,5,6)
Science (4,5,6)

Duration: 30 - 60 minutes

Setting: The classroom

Summary

In this activity students learn about the diversity of plant and animal species involved in global food production and the importance of having genetic diversity within a species.

Student outcomes

This activity will enable students to:

- Discover the relatively small number of plant and animal species that provide food for humans across the world
- Discuss the importance of genetic diversity within a species in adapting to changing climatic conditions and consumer demands on food production
- Understand the implications of low genetic and species diversity for food production.

Background notes for teachers

Did you know that only twelve plant species and six animal species provide more than 70% of all human food? Or that just four plant species (potatoes, rice, maize/corn and wheat) and three animal species (cattle, pigs and chickens) provide more than half of all human food? When teaching and learning about biodiversity (variety of living organisms) we often think about native plants and animals, however we often don't consider the diversity of the food that we eat.

Agricultural biodiversity provides us with food, clothes and medicines and is essential for sustainable agriculture and food security. In spite of its vital importance for human survival, agricultural biodiversity is being lost at an increasing rate. It is estimated that some ten thousand species have been used for human food and agriculture over time. Currently no more than 120 cultivated species provide 90% of human food supplied by plants. In addition, loss of genetic diversity has occurred for different types of plant and animal species. Hundreds of thousands of varieties that were cultivated in the past have been replaced by a small number of modern and highly uniform commercial varieties. The risk this poses is the loss of agricultural biological diversity that may reduce the capability of present and future generations to face unpredictable environmental changes and human needs (Food and Agriculture Organization of the United Nations).

There is positive news however, as stores of different varieties of seed are maintained around the world, conserving genetic variety and enabling scientists to use these genetic 'pools' to trial development of new varieties of crops that are resistant to drought, temperature variation, reduced water availability, salt, disease or other factors impacting on agricultural production.

This activity introduces students to the top twelve agricultural crops and six livestock species produced across the world (measured in million metric tons), and encourages students to investigate and consider the importance of diversity in the food that is available for them to eat.

Materials

Student Worksheet A or Student Worksheet B (see below) - these worksheets should be printed out on A3 paper, cards cut out and laminated.

The activity

Create a set of cards from the student worksheet, enlarging if possible for use with the class.

Introduce this activity by discussing with students that twelve plant species and six animal species alone provide more than 70% of all human food.

1. In small groups, or as a class, ask students to brainstorm which plant and animal species may be included in this list of 18 species (Clue: all species are land based ie. not fish).

Level 5 & 6

2. Once students have developed a list, hand out Student Worksheet A. Determine how many of the species they brainstormed were correct. Discuss the differences and reasons for them.
3. Ask students to cut out and arrange the cards in order from the 1st – 12th top agricultural crop species, and 1st – 6th top livestock species produced across the world (measured in million metric tons). ** Students may use the *Food and Agriculture Organization of the United Nations* website (<http://faostat.fao.org>) to find out the answers.

Level 4

2. Once students have developed a list, hand out the cut out cards on the Student Worksheet B to some of the students. Determine how many of the species they brainstormed were correct. Discuss the differences and reasons for them.
3. Ask these students to hold up these cards and line up at the front of the room in order from the 1st – 12th top agricultural crop species, and 1st – 6th top livestock species produced across the world (measured in million metric tons).





4. Discuss as a class where these plants and animals are grown in the world. Which of these do they eat regularly?
5. It is most likely that Europe's entire potato crop in the 1800s originated from only two plants brought back to Europe by the Spaniards. This lack of genetic diversity is almost certainly one of the causes of the devastating potato blight of the early 19th century.

As a class discuss why biological (and genetic) diversity is important in the plants and animals we rely on for food.


Answer: It increases the capability of plants and animals to adapt and prosper in localized conditions. It also allows present and future generations to survive unpredictable environmental changes such as climate change or disease, and continue meet human needs.


















Extension activity – Humanities Geography


Investigate where in the world each of these crop or livestock species is produced using the *Food and Agriculture Organization of the United Nations* website (<http://faostat.fao.org> > production).

-  Identify the largest producers (eg. the top four) and map the results on a world map.
-  Using an appropriate symbol, depict on the map which country is the highest producer of each food species.
-  List the top crops produced in Australia (in quantity and value).
-  Investigate the factors influencing why certain types of crops are grown in some countries. Draw up a table to summarise the findings.

Name: _____

 **Student Worksheet A: Plants and animals that provide 70% of all human food (cut out cards on the dotted lines)**

	Cassava		Goat Meat and Milk		Cattle Meat and Milk
	Sweet potato		Tomato		Chicken Eggs and Meat
	Sugar cane		Buffalo Meat and Milk		Pig Meat
	Wheat		Sugar beet		Potato
	Rice		Maize (corn)		Palm oil fruit
	Soybean		Barley		Sheep Meat and Milk

 **Student Worksheet B: Plants and animals that provide 70% of all human food - answers (cut out cards on the dotted lines)**

	<p>7 - Cassava</p> <p>224 million metric tons</p>		<p>5 - Goat Meat and Milk</p> <p>20 million metric tons</p>		<p>1 - Cattle Meat and Milk</p> <p>640 million metric tons</p>
	<p>12 - Sweet potato</p> <p>99 million metric tons</p>		<p>10 - Tomato</p> <p>133.2 million metric tons</p>		<p>2 - Chicken Eggs and Meat</p> <p>140 million metric tons</p>
	<p>1 - Sugar cane</p> <p>1627 million metric tons</p>		<p>4 - Buffalo Meat and Milk</p> <p>92 million metric tons</p>		<p>3 - Pig Meat</p> <p>103 million metric tons</p>
	<p>4 - Wheat</p> <p>611 million metric tons</p>		<p>6 - Sugar beet</p> <p>246 million metric tons</p>		<p>5 - Potato</p> <p>323 million metric tons</p>
	<p>3 - Rice</p> <p>657 million metric tons</p>		<p>2 - Maize (corn)</p> <p>788 million metric tons</p>		<p>9 - Palm oil fruit</p> <p>162 million metric tons</p>
	<p>8 - Soybean</p> <p>219 million metric tons</p>		<p>11 - Barley</p> <p>133.0 million metric tons</p>		<p>6 - Sheep Meat and Milk</p> <p>17 million metric tons</p>

Extension activity results tables

Top twelve agricultural crops produced in the world, by quantity (million metric tons) 2007 data			Top country producing each product
1	Sugar cane	1627	Brazil (549 million metric tons)
2	Maize	788	USA (331 million metric tons)
3	Rice	657	China (187 million metric tons)
4	Wheat	611	China (109 million metric tons)
5	Potatoes	323	China (64 million metric tons)
6	Sugar beet	246	France (33 million metric tons)
7	Cassava	224	Nigeria (43 million metric tons)
8	Soybeans	219	USA (72 million metric tons)
9	Palm oil fruit	162	Indonesia (16 million metric tons)
10	Tomatoes	133.2	China (33 million metric tons)
11	Barley	133.0	Russia (15 million metric tons)
12	Sweet potatoes	99	China (75 million metric tons)

Top five livestock products produced in the world, by quantity (million metric tons) 2008 data			Top country producing each product
1	Cattle (Meat)	62	USA (12 million metric tons)
	Cattle (Milk)	578	USA (86 million metric tons)
	Cattle (Meat + Milk)	640	
2	Chickens (Eggs)	60	China (22 million metric tons)
	Chickens (Meat)	80	USA (16 million metric tons)
	Chickens (Eggs + Meat)	140	
3	Pig	103	China (47 million metric tons)
4	Buffalo (Meat)	3	India (1 million metric tons)
	Buffalo (Milk)	89	India (60 million metric tons)
	Buffalo (Meat + Milk)	92	
5	Goat (Meat)	5	China (1 million metric tons)
	Goat (Milk)	15	India (4 million metric tons)
	Goat (Meat + Milk)	20	
6	Sheep (Meat)	8	China (2 million metric tons)
	Sheep (Milk)	9	China (1 million metric tons)
	Sheep (Meat + Milk)	17	

Source: Food and Agriculture Organization of the United Nations
(<http://faostat.fao.org> > Production)

Extension activity results tables

Top ten agricultural products produced in Australia, by quantity (million metric tons) 2007 data			World Ranking (by quantity) 2007 data
1	Sugar cane	36	8th largest producer
2	Wheat	13	15th largest producer
3	Cow milk	9	18th largest producer
4	Barley	5	8th largest producer
5	Grapes	1	12 th largest producer
6	Sorghum	1	11 th largest producer
7	Potatoes	1	> 25th largest producer
8	Rapeseed	1	8 th largest producer
9	Oats	0.8	8 th largest producer
10	Oranges	0.4	21 st largest producer

Top ten agricultural products produced in Australia (by value) 2007 data			World Ranking (by value) 2007 data
1	Cow milk	\$2436 million	18th largest producer
2	Wheat	\$1382 million	12th largest producer
3	Wool	\$782 million	Largest producer in the world
4	Sugar cane	\$755 million	7th largest producer
5	Grapes	\$709 million	12 th largest producer
6	Cotton	\$406 million	11 th largest producer
7	Barley	\$353 million	3rd largest producer
8	Rapeseed	\$301 million	8 th largest producer
9	Potatoes	\$154 million	> 25th largest producer
10	Chickpeas	\$124 million	4 th largest producer

Source: Food and Agriculture Organization of the United Nations
(<http://faostat.fao.org> > Production)

Extension activity results tables

Australian agricultural products in the top ten world ranking for production by quantity, 2007 data	
1 st	Lupins & Wool
4 th	Chick peas
5 th	Canary seed & Triticale (hybrid of wheat and rye)
7 th	Broad beans & Lentils
8 th	Rapeseed & Sugar cane & Barley & Oats & Peas

Australian agricultural products in the top ten world ranking for production by value, 2007 data	
1 st	Wool
2 nd	Sheep meat
3 rd	Barley & Lupins
4 th	Chick peas
6 th	Broad beans & Lentils & Oats
7 th	Sugar cane
8 th	Rapeseed & Peas
9 th	Horse meat
10 th	Cottonseed

Source: Food and Agriculture Organization of the United Nations
(<http://faostat.fao.org> > Production)