Unit 1.1.3

Early Development of Agricultural Food Systems

Key Knowledge and Key Skills

Key Knowledge 1.1.3

The factors that facilitated the early development of agricultural food systems, including those that enabled the cultivation of wild plants and the domestication of animals for farming.

Key Skills 1.1.3

Examine attributes and challenges of hunter-gatherer and agricultural food systems.

Key Terms and Definitions

Agriculture is the art and science of growing plant crops and raising animals for food, other human needs, or economic gain.

Annual plants sprout from seeds or bulbs, mature, and produce new seeds (offspring) in one year or a growing season.

Broadcasting is the term used to describe the process of scattering seeds or fertiliser evenly over soil.

A **crop** is a harvested plant that can be used for food, textiles and paper, decoration, and fuel, and to feed livestock.

Cross-breeding involves the mating or reproducing of two different species, breeds, or varieties of plants and animals.

Cultivation occurs when soil is improved to grow healthy plants and crops. Cultivation involves loosening and breaking up (tilling) soil, removing weeds, and adding water and air to the soil to prepare it for planting seeds.

Domestication occurs when humans select specific wild plants and animals and rear them for food, labour, textiles (clothing), and medicine.

In agriculture, the term **fertile** refers to the soil or land containing enough nutrients that plants and crops require to grow well.

Fallow is the term used to describe farming land that has been ploughed and harrowed but left for a period in order to restore its fertility.

Fertilising soil involves adding material like manure to the ground to improve the nutritional quality of the soil or crops and plants growing in the soil.

Harvesting refers to the gathering of a crop.

Irrigation refers to supplying soil and plants with a constant source of water.

Terrain is the word used to describe an area of land and the natural features that exist within it. For example, some areas have mountainous terrain, while others are flat and arid.

The **Fertile Crescent** is an area in the Middle East where it is believed agriculture first commenced. This region includes parts of modern-day Iraq, Syria, Lebanon, Israel, and Jordan.

Legume is the term used to describe the fruits or seeds of some plants. Legumes can be grouped into three categories: beans, lentils, and peas.

Mesoamerica is an area of land that Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala, Brazil, and central to southern Mexico all occupy.

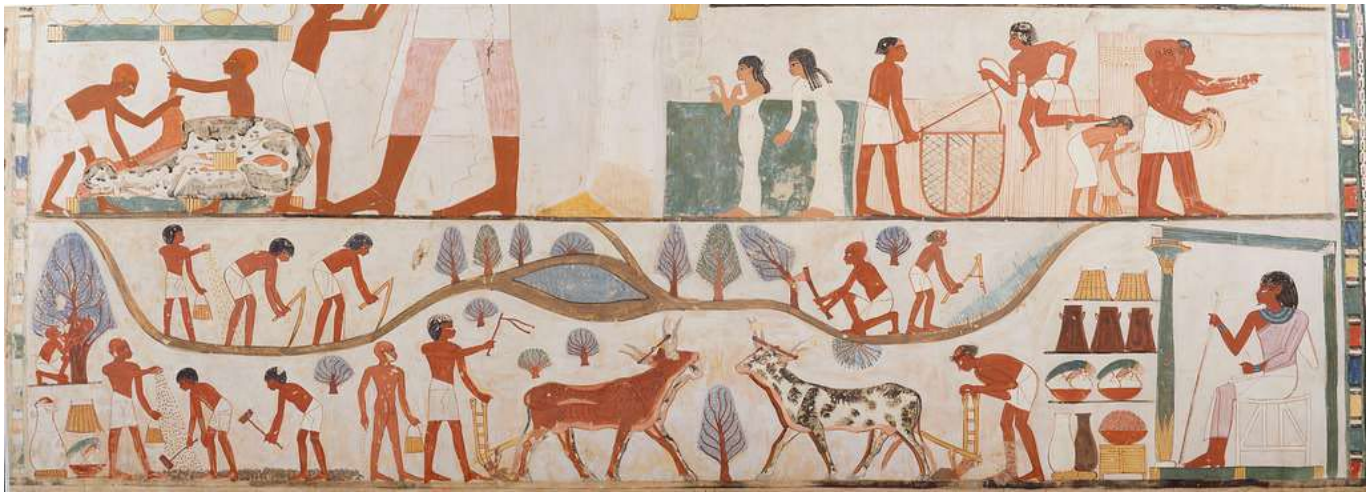
Perennial plants keep growing every season; the top part of the plant usually dies at the end of a growing season, leaving the root system intact for the remainder of the year.

Selective or plant breeding involves the selection of specific plants with specific desirable characteristics and using the seeds from these plants to produce more plants with the same traits. This process can also be applied to animals.

Early Agricultural Food Systems

Around 12,000 years ago, people began to form settlements. During this time, people started the process of planting or raising wild plants and animals for food, clothing, medicine, and many other purposes. This process is referred to as domestication. The origins of agriculture became dependent on the domestication of plants and animals. Domestication of plants and animals involves selective breeding; selective breeding occurs when people breed plants and animals with desirable characteristics. Domesticated plants and animals were grown and cared for by humans.

Watch this video that provides a detailed account of how farming began: https://youtu.be/bhzQFIZuNFY



East Wall, *South Side of Nakht's Offering Chapel* is a painting by Norman de Garis Davies

Cultivation of Crops

Cultivation refers to improving the soil to grow healthy crops. Examples of cultivation include loosening and breaking up (tilling) soil, removing weeds, and adding water and air to the soil to prepare it for planting seeds.

Early farmers did not use any elaborate farming tools when cultivating the soil. They cultivated it by hand or with primitive tools. Initially, farmers used a technique known as broadcasting, where seeds were scattered onto the soil by hand. Eventually, farmers developed a system where seeds were dropped down a tube and covered with soil. Weeds may have been removed with their hands. Sharp stones and bones may have been used to break up the earth, sticks used to make holes in the soil to plant seeds or seedlings, and crops harvested by hand.

Domestication: Highland Cow and Planting seeds.

Cultivating the soil.

Domestication of Crops

Early farmers collected and planted the seeds of wild plants. Possibly, people discovered that wild plants grew from seeds when some seeds fell on the ground, and soon afterwards, they noticed seedlings starting to grow. Or, maybe they saw seedlings sprout from discarded food. Regardless of how they discovered that plants grew from seeds, people soon realised they could cultivate plants. They began clearing land to plant crops for food, textiles and paper, decoration, and fuel, and to feed livestock. They protected the crops from wild animals by building physical barriers like fences.

Through trial and error, the farmers gradually figured out how much water and sunlight plants needed to grow and the type of soil they preferred. They also realised that some plants from the same species were likely to grow more quickly than others, were more resistant to diseases, and produced more offspring. As a result, they began to select plants with the most desirable characteristics. They then used the seeds from these plants to produce more plants with the same traits. This process is called selective or plant breeding. A plant becomes domesticated when farmers use selective breeding to select plants with desirable characteristics and use their seeds to produce more successful varieties of plants.

Watch this video to see how some plants have changed due to selective breeding: https://youtu.be/NdYcgJ-XKT8

Watch this video to find out how humans have domesticated plants and animals: https://youtu.be/rboewQNMpdU

Types of Crops Cultivated

The type of crops people cultivated depended on the geography and climate of a particular region. The terrain, climate, soil properties, and water availability largely influenced the crops that could be grown. Some of the earliest crops were barley, corn, dates, grapes, legumes, melons, millet, nuts, oats, rice, rye, sorghum, and wheat.

Barley

Barley is one of the world's oldest crops. It was domesticated when farming began around 10,000 years ago. It was well-suited to the climate of the Fertile Crescent as it tolerated cold conditions and high altitudes.

Corn (Maize)

Corn, also known as maize, was first domesticated in the Mesoamerica region in southern Mexico around 10,000 years ago. Early farmers may have begun selectively breeding corn when they realised that some plants were taller than others or some corn kernels may have been tastier or easier to grind. Nowadays, maize crops are very different from what they looked like many years ago. They are larger, have more rows of kernels, and tend to be sweeter.

Legumes

Legume is the term used to describe the fruits or seeds of some plants. Legumes can be grouped into three categories: beans, lentils, and peas.

Wild peas are thought to be one of the first cultivated crops in the Fertile Crescent around 11,000 BCE. Lentils have been gathered and eaten since around 60,000 BCE; evidence of the first cultivation of lentils occurred in West Africa about 10,000 BCE. From there, they spread to Egypt, Greece, and Central Asia. Chickpeas originated in West Asia and were first purposely cultivated around 10,000 BCE.

Millet

Millet is a wild grain that requires little watering and grows well in dry and cold climates. Early farmers cultivated three types of millet:

- broomyard millet in China;
- pearl millet in Africa; and
- panic millet in Europe.

Sorghum is a grain that is similar to millet. Sorghum was produced in China and Africa by 8000 BCE.

Oats

Oats require the same conditions to grow as wheat and barley. Evidence suggests that oats became widely cultivated in Europe by around 2000 BCE. Oats became a popular crop to grow in Europe because they could survive Europe's cold and wet winters.

Rice

Some scientists believe rice was first domesticated in East Asia (China) and later in (South Asia) India. It is thought that Chinese rice farmers migrating to Southeast Asia brought rice with them. Others believe it originated in the Ganges River valley, which borders Nepal, Bangladesh, and an independent region of China called Tibet. Recent studies indicate cross-breeding and selective breeding of rice plants have been occurring for 15,000 years. During

this time, the length of the stems on plants became shorter, resulting in a more robust plant that produced more grains. Nowadays, there are over 40,000 types of rice worldwide.

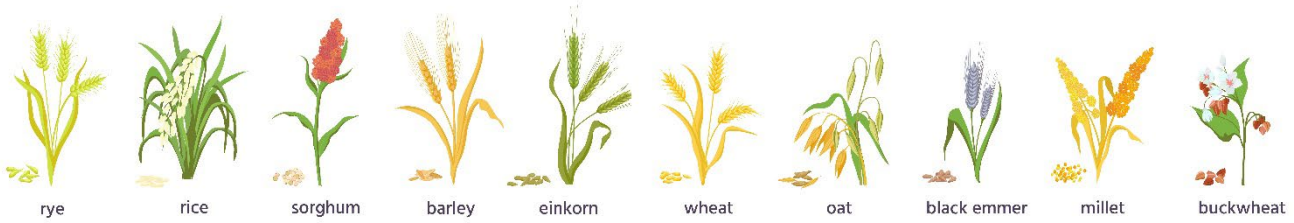
Rye

Rye is another type of grass plant that grows better in colder and wetter climates and therefore was grown in West Asia and Europe around 7000 BCE.

Wheat

It is believed that the first wheat grain crops were emmer and einkorn. Early farmers were likely to have selected the heads of wheat with the largest grains, making it easier for them to separate the grain from the plant and replant the seeds. Wheat grows best in a damp, warm climate with low humidity.

The image below shows a sketch of a vareity of cereal crops.



Domestication of Animals

The domestication of animals contributed to the overall success of agriculture. Early farmers quickly realised that domesticated animals could provide meat, milk, fertiliser, and clothing. The type of animals domesticated by people depended on where they settled down and the type of animals living in the area.

The first animals domesticated were:

- sheep, goats, and pigs in Southwest Asia;
- chickens and camels in Central Asia;
- water buffalo, pigs, and dogs in China;
- donkeys in Egypt; and
- llamas and alpacas in South America.

Domesticating animals would have initially been a time-consuming and challenging process. Early farmers needed to ensure they had enough food to feed their families and the animals. Many also had to build shelters and fences to protect the animals from predators and prevent them from wandering away.

Early farmers selected animals that:

- mated and bred well in captivity;
- matured quickly;
- remained calm and exhibited predictable patterns of behaviour; and
- were accustomed to a social hierarchy that enabled humans to become their group leader.

Today's farmed animals look very different from how they appeared when they were first domesticated. Chickens once weighed just over 1 kg and only hatched a small number of eggs each year. Over time they were selectively bred to grow faster and produce more meat and eggs. Nowadays, chickens bred for meat weigh around 8½ kg, and those bred to produce eggs lay about 200 yearly.

Watch this video to discover how domesticated animals have changed over time: https://youtu.be/4BMd8XVqusY

Watch this video and discover why some animals can become domesticated: https://youtu.be/RMpMxaX3Kdg

Where Did Early Agriculture Begin?

Historians believe that agriculture began in various areas around the world at approximately the same time.

Mesopotamia and The Fertile Crescent

The Fertile Crescent is a crescent-shaped area of land located in the Middle East. The Fertile Crescent starts around the Nile River in Egypt and continues to the Tigris and Euphrates rivers in modern Iraq. It covers what is now known as Southern Iraq, Syria, Lebanon, Jordan, Palestine, Israel, Egypt, and parts of Turkey and Iran. Mesopotamia is the area now known as Iran, between the two rivers.

Map Reference: Nafsadh, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons

This area was one of the earliest known sites of agricultural production. Archaeologists have found evidence of crops and equipment used for food preparation from around 11,000 years ago.

Wheat, peas, lentil, barley, figs, pomegranate, apples, pistachios, and dates were commonly grown in this area by the early Mesopotamian farmers that lived and worked on the land. Goats and sheep were herded and raised in the surrounding hills by shepherds for a few months at a time.

The soil in the Fertile Crescent was rich in nutrients, hence the name. This rich and fertile soil provided nutrients that enabled plants to flourish. Several factors contributed to the fertility of the soil in this region.

Geographical Features

From March to June, the two rivers, the Tigris and Euphrates, would overflow. This flooding occurred due to snow melting in the nearby Zagros Mountains, far north of Mesopotamia. This flooding deposited nutrient-rich soils on the river flats, increasing the soil fertility and resulting in grasslands perfectly suited for growing crops and grazing animals. The farmers lived on the river flats and used the river to transport food and waste.

Evidence for the success of agriculture in the Fertile Crescent included the discovery of a wide range of crops and domesticated animals in the area. These crops included barley, chickpea, einkorn and emmer wheat varieties, flax, lentils, and peas. Domesticated animals included cows, goats, pigs, and sheep, with horses living nearby.

Climate

Rainfall

People living in Mesopotamia and the Fertile Crescent experienced four seasons: summer, autumn, winter, and spring. However, they had two main seasons: a dry season and a wet season. The dry season occurred during summer and winter. At this time of the year, nights became very cold, and the average rainfall was around 25 cm. The wet season occurred in autumn and spring.

Temperature

During ancient times, the average temperature for the entire year was around 26°C. Winter temperatures were as low as 0°C, while summer and spring temperatures could peak around 43°C.

The availability of water and the warm climate of the Fertile Crescent enabled experimentation with plants and the development of annual plants. Annual plants were favoured because they produce more edible seeds than perennial plants, which die each year and reappear the following growing season.

Technology

Access to water and frequent flooding by the river resulted in the farmers devising a method to distribute water to crops, requiring little manual labour. Consequently, the farmers invented irrigation, which helped crops flourish. Irrigation meant that farmers could give their crops and plants a continuous water supply and manage the amount of water they received. The flooding also enabled the farmers to make canals and channels to irrigate more easily.

Watch this video to discover how the Fertile Crescent earned its name: https://youtu.be/BQNcK9XMzYk

Watch the first three minutes of this video about early civilisations: https://youtu.be/H3DUVFNEsfo

The Nile Valley – Egypt

Egypt was another region where people first practiced agriculture on a large scale. There is evidence of agriculture occurring in ancient Egypt as early as 8000 BCE. Ancient Egyptian farmers grew various staple crops for consumption, including emmer (a type of wheat grain), chickpeas, lentils, lettuce, onions, garlic, sesame, corn, and barley. They also reared chickens, cows, ducks, geese, goats, and pigs. Cows played a significant role in reducing the amount of labour the farmers had to undertake.

Geographical Location

Most of Egypt consists of deserts so many ancient communities established themselves along the Nile River, which flows through Egypt. The Nile River contributed to ancient Egypt's success as an early agricultural centre. Every year, the Nile River floods the flat desert land. Receding floodwaters deposit black soil from the river onto the river flats. This black soil is full of nutrients and is a natural fertiliser, contributing to the success of a range of crops. The Egyptians refer to this nutrient-rich fertiliser as 'The Gift of the Nile.'

Climate

The Nile River floods annually between June and September due to snow in the Ethiopian mountains melting and moving down to the river and the heavy summer rain. Early farmers based their three seasons on the changes that occurred to the Nile River.

Akeht (June to September) – During Akhet, the fields were flooded. Farmers spent their time either working for the pharaoh (King) or building pyramids or temples.

Peret (March to May) – The water that flooded the land receded to the river during the Peret season. Farmers then spent the next four months planting and growing various crops.

Shemu (March to May) – The first crop to be harvested during Shemu was grain. Farmers then planted and raised vegetable crops. At the end of Shemu, all the crops and plants were cut down and removed, allowing farmers enough time to prepare for the river to flood again.

Technology

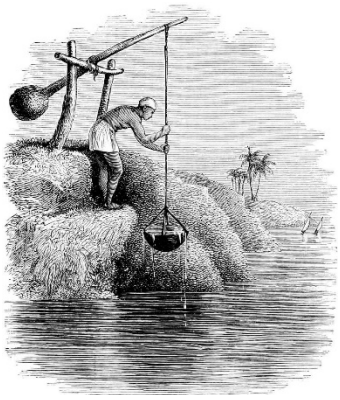
The farmers farmed a large amount of agricultural land. Consequently, they developed and/or used a range of technologies that assisted them with farming.

Hand and Ox-drawn Ploughs

An essential part of agriculture is ploughing a field to sow seeds. Ploughing involves breaking up the soil, turning it over, and making it ready to plant crops. The farmers initially ploughed fields using handheld hoes with long wooden handles and wooden blades with bronze edges that helped cut through the earth. Ploughing an area with a handheld plough was time-consuming. This led the farmers to invent two types of ploughs that donkeys or oxen drew. The first plough was suited to cutting furrows in the soil, while the second plough was much lighter and turned the soil. Developing both of these ploughs saved the farmers time and energy preparing fields for planting.

Irrigation

The farmers developed various forms of technology to ensure their crops received enough water, including canals and the shaduf. They directed water away from the Nile River by digging canals around their crops. Gates were built within these canals to help control water levels and reservoirs built where the farmers could store water during drought. The farmers also invented the shaduf, which is still in use today. The shaduf consisted of a long horizontal pole balanced on a cross beam with a rope and bucket at one end and a heavy weight on the other. This invention enabled the farmers to move water from canals to where it was needed.



Egyptian Shaduf

Watch this video to discover how important the Nile River was to Egyptian agriculture: https://youtu.be/HE89JWKMROI

Watch this video to find out what the Egyptians ate: https://youtu.be/CMLslLqbIvM

Mesoamerica

Mesoamerica is another region known for its contribution to early agriculture. Domestication of animals and plants occurred in this area around 7000 years ago. It consists of various countries in southern North America and Central America, such as Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala, Belize, and central to southern Mexico.

Three important crops for early Mesoamerican farmers were beans, maize (corn), and squash (pumpkin). Beans provided people with a vital source of protein. Maize was important because it could be stored for long periods and made into flour. The squash seeds supplied a valuable source of protein and could be transported easily. Planting these three crops together also helped retain and replenish soil nutrients. The farmers also grew avocadoes, beans, chilli peppers, guavas, peppers, prickly pears, and tomatoes. They raised domesticated animals such as dogs and turkeys.

Climate

Mesoamerica covers a vast geographical area with a range of climates and terrains, including humid tropical regions, deserts, mountains, and low coastal plains. Agriculture differed from one place to the next because of the diverse environments. Mesoamericans who occupied low-lying regions around the Pacific, Gulf of Mexico, and the Caribbean Sea experienced subtropical and tropical climates. Those living in the highlands were likely to experience cooler temperatures with moderate rainfall.

Geography and Technology

A significant problem for the farmers was the lack of suitable land for farming; the region had 25 mountainous areas with rugged highlands, coastal lowlands, and smoking volcanoes. The farmers needed to use this land for farming. As a result, they developed a farming system where terraces were built into the slopes of mountain valleys. These terraces were sometimes made using stone walls or by cutting trees and shaping soil around them. This terrace farming system created more space for planting crops and raising animals. Other Mesoamerican cultures used similar techniques by raising artificial fields on swampy areas. These artificial fields, known as chinampas, consisted of layers of mud and decaying vegetation stacked on wetlands to create more agricultural land.

Technology

Early farmers used the knowledge and skills they gained overtime to practice crop rotation and use fertilisers and irrigation systems.

Over time, the farmers observed that the quality of crops deteriorated when the same crops were planted in the same field every year. Eventually, they realised they needed to replenish the nutrients in the soils. Consequently, these farmers used a system of intercropping called milpa, which involved planting different crop species in the same space. After two years of cultivation, the farmers would leave the land fallow (empty) for 8 years to allow the nutrients in the soil to replenish.

To improve soil quality, the farmers added fertilisers to the soil. They used dried llama dung, guano (excrement of sea birds and bats), and fish heads to fertilise the soil. These practices led to more successful crops.

These farmers also developed the knowledge and skills required to perform irrigation on a large scale. They diverted water from rivers to fields or chinampas, which enabled the crops growing in these areas to flourish.

Watch this video to find out more about terrace farming in Mesoamerica: https://youtu.be/qXKoJQ5Nx6s

Watch this video to learn more about the Maya, an ancient Mesoamerican society: https://youtu.be/tFuNTP6odKI

Written Activity

Select one or more of the activities listed in the grid below that equal the value of three points.

Complete these tasks and submit them to your teacher.

1 point	2 points	3 points
Flash Cards Create flash cards of the words listed below. Each flash card must include the term, definition, image, and term in a sentence. Agriculture, crop rotation, cross-breeding, cultivation, domestication, fertilising of soil, harvesting, irrigation, and selective or plant breeding.	**Cartoon Sequence** Use images from the internet or draw a cartoon sequence to demonstrate your understanding of a food system in the Fertile Crescent, The Nile, or Mesoamerica. Include captions within the cartoon sequence.	**Digital Presentation** Develop a digital presentation of the factors that influenced the early development of agricultural food systems in one of the following areas: • Sub-saharan Africa • The Mediterranean • Eurasia • East Asia and Oceania
Fact Sheets Create a series of fact sheets about three crops or plants farmed by early agriculturalists. Include the following information on your fact sheet: • The origins of the crop or plant • Types of varieties • The climate the crop requires for growth. • Culinary uses for this crop or plant food. • A picture of what this crop or plant may have looked like in ancient times and what it looks like now.	**Mind Map** Create a mind map that identifies the factors that impacted early agricultural development. In the mind map, provide an example of when this factor has played a significant role in the development of food in a particular ancient farming region.	**Timeline** Research one of the areas where early agriculture began. Create a timeline of how agriculture evolved in this area. Include notes and pictures about key events or developments in the timeline.
Pictorial Images Draw a visual image of each of the seasons experienced in one of the regions listed below. Under each picture, include some notes about the climate and/or geographical features that influenced the changes. • The Fertile Crescent • The Nile, Egypt • Mesopotamia	**Children's Book** Create a children's book about the factors that affected the development of agriculture in one of the areas studied.	**Newspaper Article** Write a newspaper article about how ancient farmers have helped feed the people of today.

Practical Activity One

Any Bean 'Meatballs'

Legumes were one of the earliest types of crops grown, and they played a crucial role in the diets of ancient farmers. This crop was not only nutritious, but it enriched the soils for future crops.

In this task, you will have an opportunity to taste a range of meatballs made from different legumes.

1. Divide into small groups and select one of the cans of legumes listed below (each group will need to choose a different variety).
   - black beans
   - borlotti beans
   - brown lentils
   - butter beans
   - cannellini beans
   - chickpeas
   - edamame beans
   - red kidney beans
2. You will need to work in groups and follow the recipe for meatballs.
3. After making the meatballs and cleaning your work area, you will be required to share your meatballs with the other students in your class.
4. You will then conduct a sensory analysis of the meatballs made from different legumes and complete the written activities provided.

Note: After tasting each meatball variety, you might like to eat the remainder of the meatballs with pasta sauce.

Any Bean 'Meatballs'

Ingredients:

1 x 440g can of legumes
½ teaspoon salt
1/3 cup quick oats
1 teaspoon garlic powder
2 teaspoons onion powder
1 tablespoon oil for frying

Method:

1. **Collect** and **measure** ingredients.
2. **Drain** and **rinse** the legumes.
3. **Mash** the legumes.
4. **Combine** all ingredients (except the oil) until well combined.
5. **Roll** the mixture into small, even-sized balls.
6. **Place** oil in the fry pan and **heat** on medium.

Pasta Sauce

Serves 2

Ingredients:

2 teaspoons olive oil
1 clove garlic, crushed
500g fresh tomatoes
1 - 2 teaspoons mixed herbs
1 - 2 teaspoons red wine vinegar
Pepper and salt

Method:

1. **Collect** and **measure** ingredients.
2. If desired, **remove** the skins from the tomatoes (see video below).
3. **Heat** oil in a medium saucepan. **Add** crushed garlic or infuse the oil with a clove of whole garlic and then remove.
4. **Add** the tomatoes, herbs, red wine vinegar, and a pinch of salt.
5. **Simmer** for approximately 10 minutes until the tomatoes have softened.
6. If desired, **blend** using a hand-blender to adjust the consistency.
7. **Serve** with meatballs.

Watch this video to find out how to remove the skins from tomatoes: https://youtu.be/QliTTXJidZw

Practical Record - Any Bean 'Meatballs'

Sensory Evaluation

1. **Conduct** a sensory evaluation of each of the meatballs made using different legumes.
2. **Record** the results of your sensory evaluation below.

Varieties of Legumes	Appearance			Texture			Aroma			Taste			Total Score
1. black beans	1	2	3	1	2	3	1	2	3	1	2	3	
2. bortolli beans	1	2	3	1	2	3	1	2	3	1	2	3	
3. brown lentils	1	2	3	1	2	3	1	2	3	1	2	3	
4. butter beans	1	2	3	1	2	3	1	2	3	1	2	3	
5. cannellini beans	1	2	3	1	2	3	1	2	3	1	2	3	
6. chickpeas	1	2	3	1	2	3	1	2	3	1	2	3	
7. edamame beans	1	2	3	1	2	3	1	2	3	1	2	3	
8. red kidney beans	1	2	3	1	2	3	1	2	3	1	2	3	

3. **Add up** the total scores for each meatball made from the different legumes.
4. Which meatball did you like the most? What characteristics of this meatball were the most appealing?

5. Which meatball did you like the least? What characteristics of this meatball were the least appealing?

6. If you made this product again, what would you do differently?

Practical Record - Any Bean 'Meatballs'

Research Task

Read the information at this website: https://www.taste.com.au/healthy/articles/legumes-use-them/dlunldyr

1. **List** some varieties of legumes.

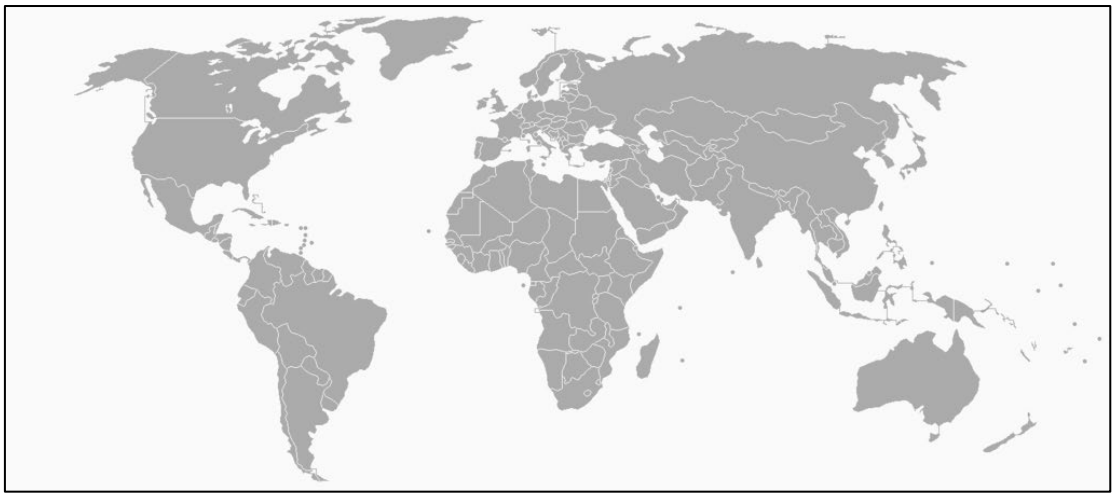
2. **Name** the nutrients that legumes contain.

3. Legumes are found in two food groups in the Australian Guide to Healthy Eating.

   Identify these two groups and **provide** a possible reason why they are found in these two groups.

4. Legumes were one of the earliest types of crops grown.

   Research the origins of the legumes used in today's activity and **locate** these regions on the map below.



Source: Smurfy, CC BY-SA 3.0 <http://creativecommons.org/licenses/by-sa/3.0/>, via Wikimedia Commons

5. **Discuss** why legumes were an important food source to people when agriculture began.

6. Ancient farmers used crop rotation to ensure the soil was enriched for future crops.
   Conduct some research to **determine** why legumes enriched the soil for future crops.

Practical Activity Two

Cheese Making and Sensory Tests

Anatolia is also known as Asia Minor and is located in modern-day Turkey. It is surrounded by the Black, Aegean, and Mediterian Seas.

It is believed that Anatolia was first occupied by Hunter-Gatherers from the fertile crescent and then agriculturalists from other parts of Europe. As time continued, Anatolia was occupied by various groups of people migrating or taking control of it from other lands.

Archeologists digging at the Barcın Mound, northwest Anatolia, discovered that *cheese*, yoghurt, and butter were *first* produced 8,600 years ago during the Neolithic Era. The Neolithic Era began when some humans gave up the nomadic, hunter-gatherer lifestyle to start farming.

Sheep and goats, pigs, and cows were some of the first livestock domesticated by people in Anatolia. The farmers likely made cheese from sheep, goats, and cows milk.

Watch this video to find out more about the history of cheese: https://www.youtube.com/watch?v=QKae1k1BDdA

Make the Cheese

Ingredients and Materials	
Turkish White Cheese (Beyor Penir) – Cow's Milk	**Turkish White Cheese (Beyor Penir) – Goat's Milk**
☐ 1 litre of cow milk (not UHT)	☐ 1 litre of goat milk (not UHT)
☐ 140g plain unsweetened yoghurt	☐ 140g plain unsweetened yoghurt
☐ 1 metal spoon or spatula	☐ 1 metal spoon or spatula
☐ 1 medium-sized saucepan	☐ 1 medium-sized saucepan
☐ 1 large cheesecloth	☐ 1 large cheesecloth
☐ 1 colander	☐ 1 colander
☐ 1 elastic band	☐ 1 elastic band
☐ 1 small glass jar	☐ 1 small glass jar
☐ 1 teaspoon salt	☐ 1 teaspoon salt
☐ 1 black permanent marker and sticky label	☐ 1 black permanent marker and sticky label

Safe and hygienic work practices

1. **Tie** back long hair.
2. **Wash** your hands before preparing this dish and after touching your hair, eating or using the bathroom.
3. **Wear** a clean apron.
4. When boiling the milk, **place** a large metal spoon in the saucepan to prevent it from boiling over.
5. **Place** the hot saucepan on a cooling rack rather than directly on a workbench.
6. **Use** oven mitts when handling hot equipment.
7. **Sterilise** the jar before storing the cheese in it (instructions on how to do this are included in the recipe).
8. **Do not** touch the insides of the jar when filling it with salted water.
9. **Leave** about ½ to 1cm gap at the top of the jar to reduce the amount of oxygen in the jar.
10. **Label** the jar with a description of the food, the date it was made, and the expiry date.

    The cheese can be consumed around 3 to 4 days after making it.

Procedure

Day One

1. **Highlight** each step demonstrating the safe and hygienic work practices you implemented. Ensure that you photograph each of these steps.
2. Working in pairs, **decide** who will make the goats and the cow's cheese.
3. **Collect** and **measure** the ingredients. **Collect** the equipment.
4. **Boil** the milk in the saucepan.

   Ensure the milk does not bubble up and spill over the sides of the saucepan. Placing a large metal spoon in the saucepan may help prevent the milk from boiling over.
5. When the milk starts boiling, **add** the yoghurt and **boil** for a few minutes. It will begin to develop a thick curd (lumps of cheese that have coagulated).
6. **Turn off** the heat and **cool** the mixture for about 15 minutes.
7. **Place** the cheesecloth inside a large colander. **Place** the colander over a large bowl.

   Pour the boiled milk and yoghurt mixture into the cheesecloth.
8. **Tighten** the cheesecloth around the curd and **secure** it with an elastic band.
9. **Place** the cheese in the cloth in a colander over a clean bowl.
10. **Place** a heavyweight on top of the cheese. **Leave** it for about 2 hours (or overnight).

Day Two

1. **Sterilise** the glass jar by p**reheating** the oven to 160°C.

   Wash the jar in hot soapy water. Do not dry it.

   Stand the jar upside down on a tray while it is still wet.

   Place the jar in the oven until it is needed.
2. **Boil** 250ml water. **Add** 1 teaspoon salt and mix until the salt has dissolved.
3. **Ladle** the salted water in the sterilised jar.
4. **Open** the cheesecloth and **cut** the cheese into squares or rectangles.
5. **Place** the salted water in a glass jar. **Allow** the water to cool.
6. **Put** the pieces of cheese in the jar and **secure** the lid.
7. **Place** in the refrigerator for 2 to 3 days before consuming. Keep refrigerated.

The cheese is best eaten within 2-3 weeks but will keep up to 4 weeks.

Conduct a Sensory Analysis

The five senses are appearance, texture, taste, aroma, and sound. All the senses influence what people choose to eat. Each of your five senses sends a message to your brain about what you are eating, and you then decide whether you like the food or not.

For this activity, you will **conduct** a sensory test on the two kinds of cheese you made in the previous experiment.

Sensory Analysis

Instructions:

1. **Wash** your hands.
2. **Place** a sample of each cheese on a white plate.
3. **Study** the cheese.
4. **Record** the characteristics that you want your cheese to turn out like in the table below.
5. **Give** a rating out of five for each characteristic. For example, 1 = poor and 5 = excellent.

Characteristics	Cream colour					Firm					Tangy					Smooth				
Turkish White Cheese, Cow's Milk	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Turkish White Cheese, Goat's Milk	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

1. **Watch** the video at this link to find out how to record your results using excel: https://youtu.be/EYdtytyEKok
2. **Create** one or two radar graphs using the results you collated in step 5.
3. **Insert** the radar graph in the space below.

Written Evaluation

Answer the following questions.

1. **Identify** the cheese that best meets the characteristics listed.

2. **Discuss** the similarities and differences in characteristics between the two kinds of cheese.

3. **List** some other recipes this cheese could be used in and **explain** why this type of cheese is used in these recipes.

Recipes	Why use this type of cheese in these recipes?

Summary Activity

Answer the questions below.

Write down a selection of keywords from the key knowledge and key skills.
Use this selection of words to outline what you have learned about the beginnings of agriculture.
In your own words, define the terms domestication and cultivation.
List the animals, crops, and plants that early farmers domesticated.

Identify three regions around the world where agriculture began and describe some factors that influenced agriculture in these regions.

Region	**Factors influencing agriculture in this region**

Exam Preparation

Multiple-Choice Questions (5 marks)

Choose the response that is correct or that **best answers** the question.

1. Animals suitable for domestication needed to:
    a. Eat small amounts of food.
    b. Have a calm temperament.
    c. Be able to sleep outdoors.
    d. Survive for days without water.

2. Plants chosen for domestication were those that:
    a. Produced a crop that was small in size.
    b. Produced a crop that needed to be harvested every month.
    c. Produced few offspring.
    d. Produced a crop with desirable characteristics.

3. Agriculture started:
    a. Around the same time, throughout the world.
    b. In Mesopotamia.
    c. As a result of food shortages throughout the world.
    d. In several different places at different times.

4. Forms of technology used by early agriculturalists used included:
    a. Irrigation.
    b. Hand and ox-drawn ploughs.
    c. Crop rotation.
    d. All of the above.

5. Geographical features that influenced agricultural farming in Mesoamerica included:
    a. Mountainous terrain and the Tigris and Euphrates rivers.
    b. Mountainous terrain and the Nile river.
    c. Flooding.
    d. All of the above.

Short Answer Questions (15 marks)

Question 1 (4 marks)

Name and briefly **describe** two foods that early farmers first grew.

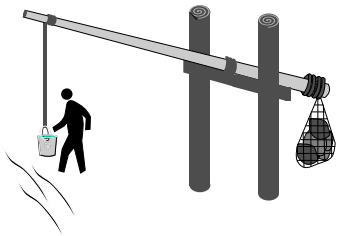
Foods that early farmers grew	Description

Question 2 (4 marks)

Explain the differences between cross-breeding and plant breeding. 4 marks

Question 3 (2 marks)

The shaduf (pictured below) is a form of technology used by early Egyptian farmers.



Using the diagram, **explain** how the shaduf assisted Egyptian farmers.

Question 4 (5 marks)

a. **Identify** one region in the world where early agriculture began. 1 mark

b. **Explain** two reasons why this region was a suitable place to start agriculture. 2 marks

c. **Explain** one form of technology people from this region invented or used on a farm to assist them in farming. 2 marks

Check for Understanding

Multiple-Choice Questions (5 marks)

Answer the following multiple-choice questions.

Select the most appropriate answer:

1. Animals suitable for domestication needed to:
    a. Eat small amounts of food.
    b. Have a calm temperament.
    c. Be able to sleep outdoors.
    d. Survive for days without water.

2. Plants chosen for domestication were those that:
    a. Produced a crop that was small in size.
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    a. Irrigation.
    b. Hand and ox-drawn ploughs.
    c. Crop rotation.
    d. All of the above.

5. Geographical features that influenced agricultural farming in Mesoamerica included:
    a. Mountainous terrain and the Tigris and Euphrates rivers.
    b. Mountainous terrain and the Nile river.
    c. Flooding.
    d. Mountainous areas with rugged highlands.

Short Answer Questions (13 marks)

Question 1 (4 marks)

Name and **describe** two foods that early farmers first grew.

Foods that early farmers grew	Description
Millet	Millet is a wild grain that requires little watering and grows well in dry and cold climates.
Legumes	Legume is the term used to describe the fruits or seeds of some plants.

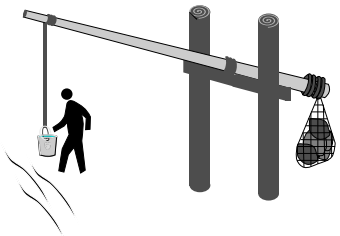
Question 2 (4 marks)

Explain the differences between cross-breeding and plant breeding. 4 marks

Cross-breeding occurs when farmers mate or reproduce two different species, breeds, or varieties of plants and animals. In contrast, plant or selective breeding involves the selection of specific plants with specific desirable characteristics and using the seeds from these plants to produce more plants with the same traits.

Question 3 (2 marks)

The shaduf (pictured below) is a form of technology used by early Egyptian farmers.



Using the diagram, **explain** how the shaduf assisted Egyptian farmers.

A long pole was used with something that would weigh it down at one end, allowing a bucket to be dipped in canals filled with water. The pole could then spin around and deposit water where it was needed.

Question 4 (5 marks)

a. **Identify** one region in the world where early agriculture began. 1 mark

The Nile River

b. **Explain** two reasons why this region was a suitable place to start agriculture. 2 marks

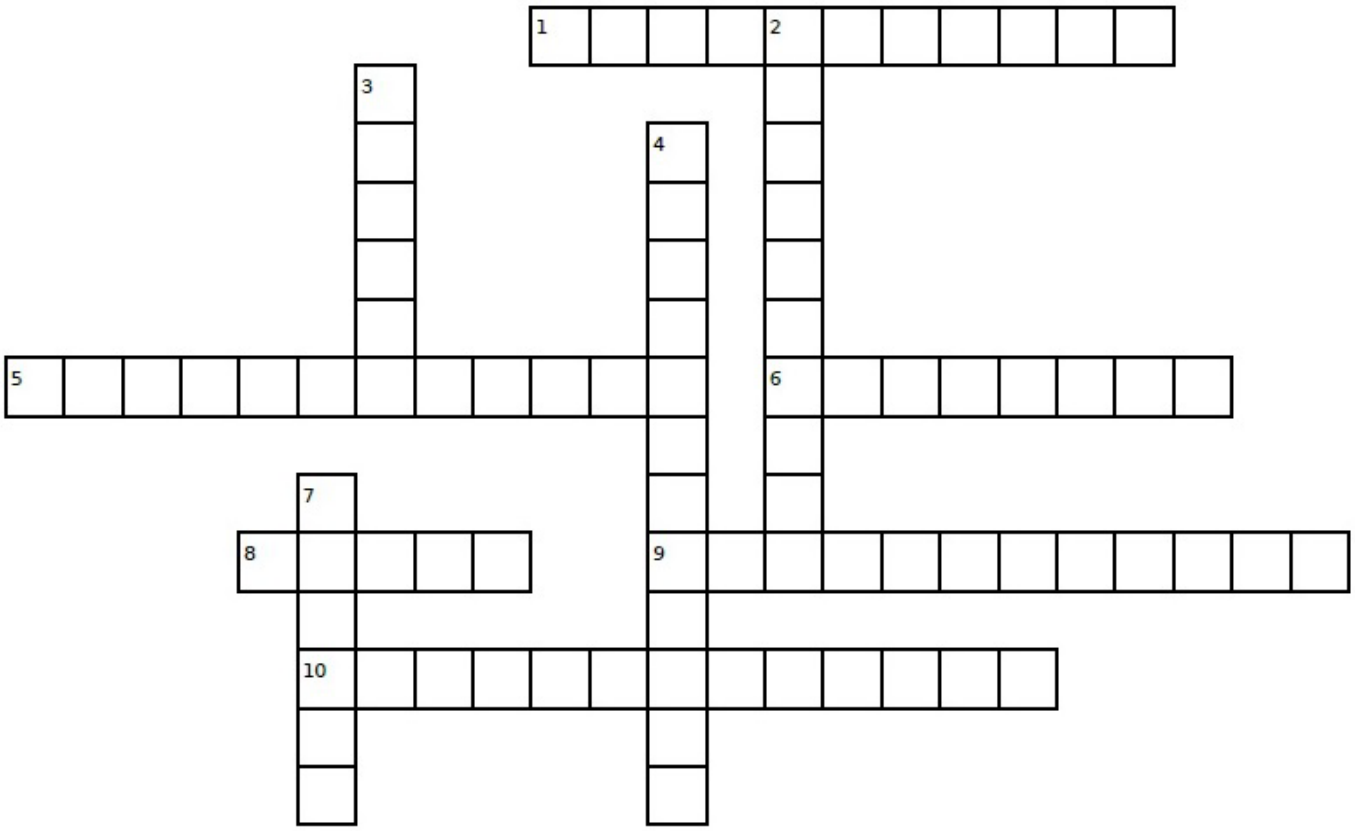
Every year, the Nile would flood; the water that would flood the flat desert land brought with it black soil from the river. This black soil was full of nutrients; it would spread out onto the land surrounding the riverbanks. This nutrient-rich soil was a form of natural fertiliser and contributed to the success of a range of crops.

c. **Explain** one form of technology people from this region invented or used on a farm to assist them in farming. 2 marks

Egyptian farmers invented two types of ploughs that donkeys or oxen drew. The first plough was suited to cutting furrows in the soil, while the second plough was much lighter and turned the soil. Developing both of these ploughs saved them time and energy preparing fields for planting. This made planting crops quicker and easier for Egyptians.

Starter Activity

Record the answers to each of the clues in the crossword below:



Down:

2. A form of technology where plants were supplied with a constant supply of water.

3. This plant is an excellent source of protein.

4. Planting these three crops together also helped to retain and replenish nutrients in the soil.

7. This consisted of a long horizontal pole balanced on a cross beam with a rope and bucket at one end and a heavy weight on the other.

Across

1. This involves loosening and breaking up the soil, removing weeds, and adding water and air to the soil.

5. The three seasons in this region were akeht, peret and shemu.

6. These were built into the slopes of mountains to provide farmers with more space for planting crops and raising animals.

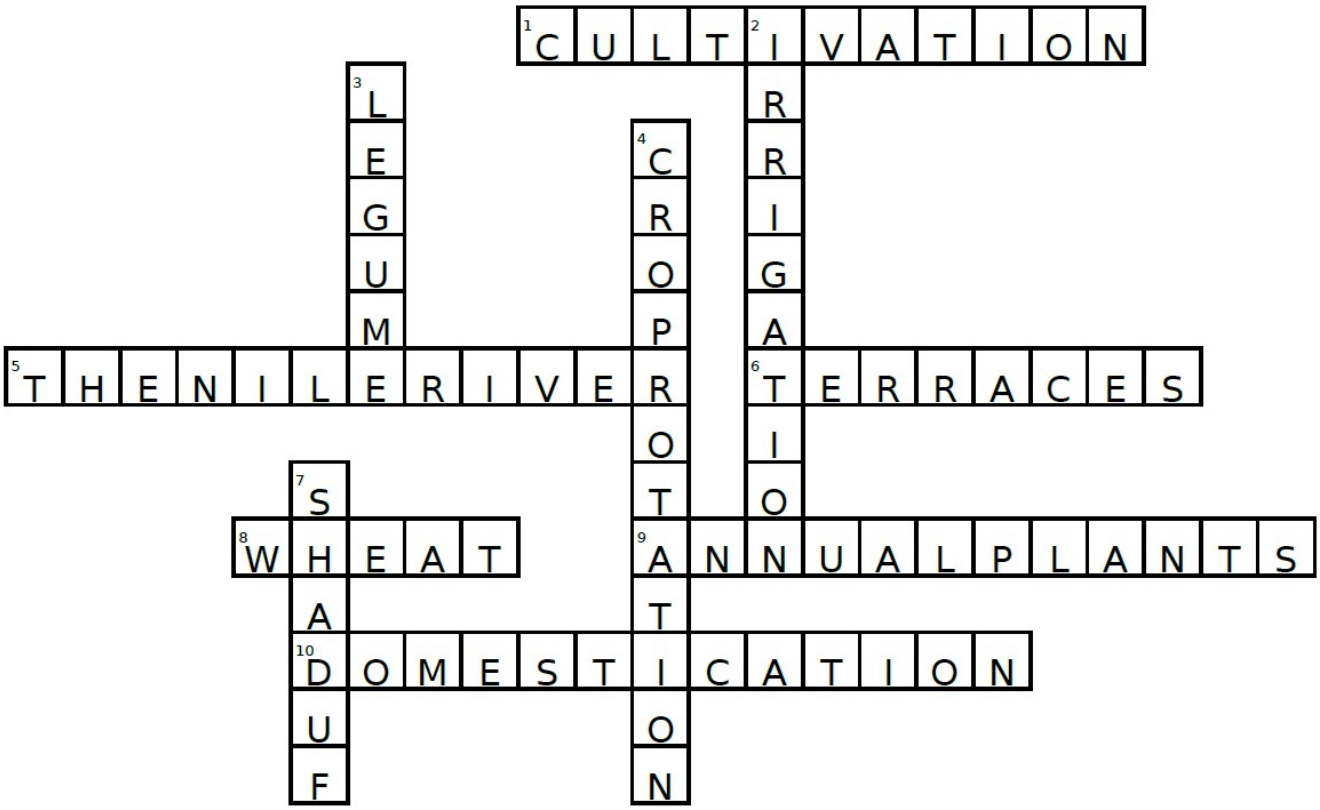
8. The first kinds of these to be planted were emmer and einkorn.

9. These sprout from seeds or bulbs, mature, and produce new seeds (offspring) in one year or growing season.

10. The selection of specific wild plants and animals to be reared for food, labour, textiles and medicine.

Starter Activity

Record the answers to each of the clues in the crossword below:



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