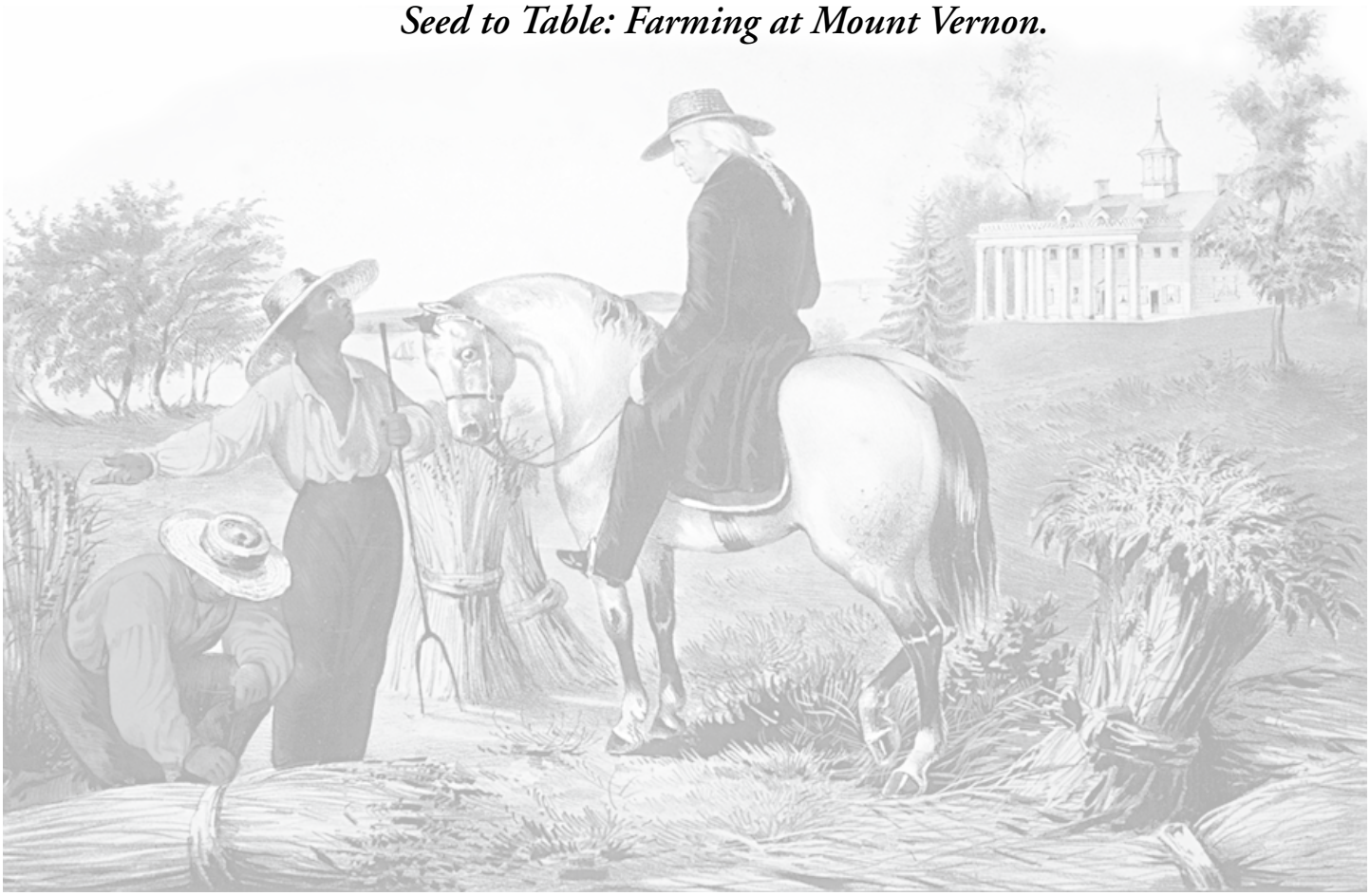
SEED TO TABLE:
Farming at Mount Vernon

This teacher manual is filled with background information for teachers and includes instructional ideas to use before and after viewing *Seed to Table: Farming at Mount Vernon.*



Previewing Instructional Ideas

- Create a K-W-L chart, filling in "What I Know" and "What I Want to Know" before viewing the program.
- Discuss the roles that George Washington played in his life, including farmer, surveyor, soldier, leader, president, husband, and father.
- Read a biography about George Washington and discuss important aspects of his life. Tell students that George Washington was a farmer.
- Fold a sheet of paper in half. Ask students to draw a picture of their home on one half of the paper. Discuss with students what they know about George Washington's home and what they think it looked like. Record students' responses on a chart. Then ask students to draw on the other half of the paper George Washington's home.
- Assess student knowledge of George Washington by playing Four Corners. Ask a question such as, "What was George Washington's main job?" Provide four answers and indicate to the students which corner of the room corresponds to each answer, such as soldier, president, husband, and surveyor. Allow students to travel to the corner they pick, but then discuss each answer.
- Discuss life in the past and the present. Create a T-chart with the students to reflect what life was like in George Washington's time compared to today.
- Discuss what a gristmill is.
- Look at samples of flour and corn meal. Engage children in a hands-on experience. Let them handle flour and corn meal. Have students share differences between the two and how they think the process to make flour and corn meal might differ.

Postviewing Instructional Ideas

- Complete the "What I Learned" of the K-W-L chart.
- Encourage students to make comparisons between their lives and George Washington's life. Students may use a Venn diagram.
- Complete a web of farm jobs, showing how the jobs are connected and dependent on each other.
- Create a class ABC book for things learned about George Washington's farm.
- Discuss the economic choices George Washington needed to make on the farm. Talk about economic choices students and their families make today. Incorporate economic vocabulary specific to the grade level.
- Make a T-chart showing the goods and services used on the farm.
- Create a bird's eye view map of George Washington's farm. Include the sixteen-sided barn, the garden, the paths, and the river. Discuss the cardinal directions.
- Create an acrostic poem about George Washington.
- Have students discuss how the economics of Mount Vernon's farm compare with the economics of the ancient cultures they have studied.

George Washington

George Washington was an ambitious and practical man, whose passion was working on and improving his land. From the time of his early adventures as a surveyor along the Virginia frontier, he began to purchase land, considered to be a primary indicator of wealth and prestige in 18th century society. By the time of his death in December 1799, he owned more than 70,000 acres of land. His attention focused primarily on his home, Mount Vernon. Over the course of 45 years, he built his Mount Vernon estate from 2,000 acres to a plantation of 8,000 acres with a population of over 300 slaves, indentured servants, and hired laborers. Washington had divided his property into four working farms: Dogue Run, Muddy Hole, River, and Union farms, where approximately 3,200 acres were under cultivation.

In addition, there was one non-agricultural farm, the Mansion House Farm, which was the seat of his plantation. Through his determination to transform the estate into a profitable business venture and fashionable gentleman's seat, Mount Vernon became one of the largest and most prosperous plantations in the Chesapeake region by the end of the 18th century.

The Farmer
Teacher Background Information

To understand George Washington's vision, it is necessary to look beyond his roles as military and political leader and examine his extraordinary efforts to improve American agriculture. He possessed a fundamental belief that the success of the new nation lay in the ability to export American products to international markets. Washington believed that large planters like himself had the obligation and financial means to determine the most productive methods of crop production, thus leading the way for small farmers. In 1790, the second year of Washington's administration, 90% of the American population were farmers; and the vast majority of those individuals held relatively small landholdings. Washington saw that the future of the country lay in their success.

Throughout the 17th and 18th centuries, the majority of farmers owned between 100 and 300 acres, and their labor force consisted solely of their families. Some middle class farmers owned one to two slaves, which allowed them to greatly increase their output of tobacco. Large landowners such as George Washington had the labor force and land to produce vast quantities of tobacco; however, by the late 1760s, Washington had become frustrated with the English monopoly on tobacco grown in the colonies. Profit was strongly controlled by taxes set by the British government as well as by a fluctuating tobacco market. Additionally, American farmers were dependent upon factors, or agents, in London to handle their business. At times the fees, which included insurance in the event a ship was lost at sea, export duties or taxes, and broker fees and commissions, could equal as much as 80% of the value of the shipped tobacco. Washington did not like being economically dependent upon what he believed was an unreliable system.

In the mid-1760s, Washington began to experiment with growing wheat, which although regulated by law, could be sold in Europe, the West Indies, Virginia, and Maryland, as well as England. A major advantage to growing wheat was that if the market were bad, the crop could be used to feed the Washington family, slaves, and livestock. Washington also built a gristmill to process the Mount Vernon wheat into flour, which he also sold. In 1764, he sold 257 bushels of wheat; and by 1769 his output of wheat sold was 6,241 bushels. Although he continued to grow some tobacco, by the early 1770s, wheat had become Washington's primary cash crop.

Workforce – Human Resources

Like other large planters of the period, George Washington relied on slave labor to maintain his vast estate. By 1799, Mount Vernon was home to over 316 enslaved African Americans who tilled the fields, harvested the crops, milled the grain, constructed the buildings, ran the forge, spun the wool, cooked the food and did a hundred other tasks necessary to keep a large plantation running smoothly. Washington was an innovative and progressive businessman and farmer; however, most of the ideas and experiments he created to improve his farming methods were implemented by slaves working on the estate.

In addition to field hands who planted, cultivated, harvested, and processed the crops grown at his four working farms, Washington owned skilled artisans and craftsmen such as blacksmiths, carpenters, gardeners, seamstresses, weavers, spinners, and cooks, who supplied almost all the goods and services necessary to make his home a relatively self-sufficient community. Slave brick masons and carpenters built the Mansion, outbuildings, and treading barn. Ben, an enslaved miller, worked side by side with Washington's hired miller to run a profitable gristmill. Three enslaved coopers, Tom, Jacob, and Moses, constructed the containers that Washington used to store and ship goods. In addition, slaves harvested fish from the Potomac to support Washington's fishing industry and worked in Washington's distillery.

Because of the variety of jobs and skills necessary to maintain the estate, the experience of working at Mount Vernon would not have been the same for every slave. Labor on the estate was divided into three categories: skilled, domestic, and field. According to Washington's 1799 census of slaves, there were 316 slaves at Mount Vernon. Of that number, 132 people were either too old or too young to work. Of the remaining 184 people, 52 were considered skilled artisans or domestic workers. Most of the skilled and domestic workers at Mount Vernon were men – only 14 women were listed in the census as skilled laborers.

The majority of the Mount Vernon slaves were fieldworkers; and in 1799, well over half of the field workers were women. Their jobs varied with the seasons. In the spring, they planted and cared for

the crops. The slaves worked in "gangs" of eight to ten people. Each gang had a specific task such as hoeing or plowing. Each of the four outlying farms had slaves who lived and worked at the site, under an overseer. Washington had several slave overseers who maintained the work on the farm and reported directly to Washington's farm manager.

Farming Innovations and Use of Natural Resources

George Washington constantly looked for ways to improve his farming practices. He paid careful attention to new methods and ideas, particularly those coming from England. By the last quarter of the 18th century, Washington had become a proponent of the "new husbandry" an agricultural reform movement designed to modernize farming methods. By using many of the principles and practices of "new husbandry," he re-made his farming operation at Mount Vernon.

What is a farm without good soil? Maintaining the quality and productivity of soil was essential to a farmer. Washington felt that the conservation of his soil was the most important aspect of his farming at Mount Vernon. He experimented with a number of practices that he felt would ensure the productivity of his soil. Although, two hundred years ago, George Washington and other farmers of his day knew nothing about soil chemistry or the biochemistry of plant nutrition, they did recognize that soil could become "exhausted" or depleted of nutrients essential to the productivity of their fields. Thus, Washington experimented with a number of different soil "enhancements", carefully observing and recording the results of his experiments. He wrote regularly, while away, to his farm managers to ensure that his careful plans were being carried out according to his very specific instructions. These soil enhancers included:

- **Manure:** The organic content of animal manure improves the soil, and its nutrients make it a natural fertilizer. George Washington built one of the first dung repositories in America, where manure fermented until it was ready to be used on the fields. Animals were also pastured in fields to provide a natural fertilizer.
- **Creek Mud:** Washington used dark mud from creeks, which is high in organic content and would have worked in much the same way as manure.
- **Fish Heads:** These provided nutrients and organic materials as they decomposed in the soil.
- **Marl:** Marl was chalky clay. Chalk is a calcium carbonate – or lime. Today, lime is applied to soil to lower acidity and create a more favorable growing medium for many crops.
- **Plaster of Paris:** This is made mostly of calcium sulfate, which is also known as gypsum. Gypsum is still used today as a soil amendment that loosens heavy, clay like soils. Gypsum also adds calcium and sulfur to the soil, which are important for plant growth.
- **Green Manure:** Buckwheat, clover, and peas were plowed under by George Washington to replenish the soil. Washington called them "green manures" and today we know that they help add nitrogen to the soil.

Although unaware of chemical reactions, through experimentation and observation, Washington improved the quality of his soil; and many of the enhancements he used were effective because of the nitrogen added to the soil.

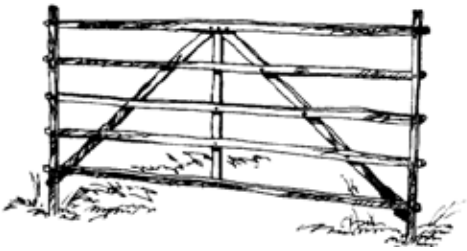
Crop Rotation

Another important method George Washington devised to conserve his soil and improve long-term productivity was a seven-year crop rotation schedule. George Washington and other farmers of his time believed that by rotating crops, their fields would not become "exhausted" or the soil depleted of nourishment. Washington was not the first farmer to use crop rotation, but he was one of the first to develop and use an extended plan of more than three years. His seven-year rotation of several crops emphasized the soil as much as crop production.

Enclosures

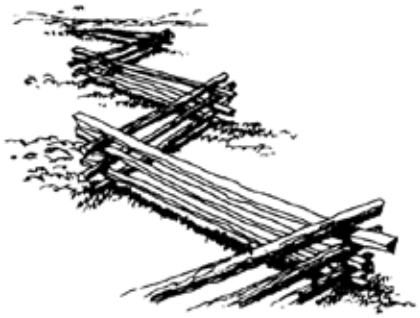
George Washington was very advanced in his use of enclosures. While it may seem difficult to imagine the purpose of fencing in maintaining the quality of soil, Washington used a variety of fences to keep animals both on and off fields. He wanted livestock pastured in fields of grasses because their manure acted as a natural fertilizer.

Fence Types at Mount Vernon

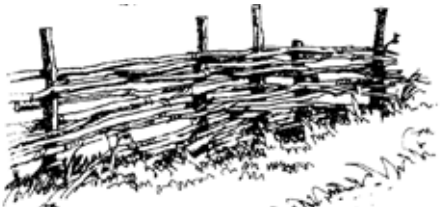


- Hurdle fences were small and moveable and used primarily to keep animals in an area for grazing and manuring.

- Post and Rail was a permanent fence to mark boundary lines and keep animals on and off permanent fields.



- Split rail fences were moveable fences used primarily around fields. The advantage to a split rail fence was they could be laid around trees and other obstacles.



- Wattle fencing was a tightly woven fence primarily used to pen poultry and other small domestic animals. This provided protection against predators such as fox.

Livestock

George Washington believed that raising livestock was a vital part of his farming operation. In the colonial period, there were no tractors or other heavy machinery that could be used to plow fields, harvest crops, and move heavy objects. Colonial farmers depended on the power of animals such as oxen, mules, and horses to work their fields. Animals also provided food for the table at both the Mansion House and the slave quarters. Their wool and hide provided material for clothing. And, they provided fertilizer to keep the soil replenished. No part of an animal went to waste – even the bone and horn were used to make utensils, buttons, combs, and other small items.

- At any one time, George Washington owned between 600 and 1000 sheep, which were used to provide wool to make clothing for the slaves, as well as lamb and mutton to feed the Washington family and the slave community. At Mount Vernon, you will see Hog Island Sheep, the same breed raised by George Washington two hundred years ago.
- Oxen are steers of any kind that are specially trained to work in the fields. Much stronger than a horse or mule, oxen are also very hardy and easier to keep. They were often called the "poor man's work animal" because they were not expensive to keep and the simple yoke they wear to control them could be made at home. Washington used oxen to haul logs from the forest, remove stumps and to pull plows, harrows, and carts.
- George Washington is sometimes called the "father of the American mule" because he played such an important role in promoting the use of mules in this country. A mule is a hybrid animal whose father is a donkey (jack) and mother is a horse (mare). Mules inherit the best qualities of both parents – from the jack it receives its long ears, short mane, small feet, its sure-footedness and endurance, and its braying voice. From the mare, it receives a large, well-shaped body, strong muscles, and ease in adapting to a harness. Washington received a Spanish jack from the King of Spain that he used to breed mules at Mount Vernon. In less than 15 years, he had 58 mules working on his estate. They were very important to the colonial farming system because they were so strong, durable, and easy to keep – unlike horses.
- Pork was an important source of food for every member of the Mount Vernon community. George Washington raised Ossabaw Island Hogs, which were descended from pigs left by Spanish explorers 400 years ago. The hogs were allowed to run loose in the forests of Mount Vernon. In the fall they were captured, penned, and fattened for slaughter. They were an important source of ham, bacon, sausage, chitterlings, and lard. Today, Mount Vernon exhibits Ossabaw Island Hogs.

Crops

Washington was a progressive farmer who experimented with growing over 60 different crops at Mount Vernon.Through his experimentation with crops, he was instrumental in changing farming methods of his time. He was one of the first farmers to realize that tobacco depleted the soil, and in the mid-1760s, he switched to wheat as his primary cash crop. He did not believe in the common practice of the time of using land until the soil was worn and then moving on. He believed it was wasteful and that through careful land management and soil conservation, fields could and should remain productive. By the late 1760s, Washington's main cash crop was wheat. He also grew corn to feed his workforce, family, and livestock. Other minor crops, called sundries, included potatoes, buckwheat, oats, barley, flax, peas, beans, turnips, carrots, cabbage, broccoli, cauliflower, cotton, and pumpkins.

George Washington The Businessman

Teacher Background Information

Tools

Throughout his life, George Washington looked for ways to improve his field preparation and crop processing. He continually experimented with the latest technology in farming. When he was not able to find tools to suit his needs, he would change or adapt machines or invent his own machine to meet his needs. He invented a plow, adapted a barrel seeder, and designed a machine to sow turnips. As a leader of the "new husbandry" Washington believed in the careful cultivation of soil before planting. This led him to use better tools and farm implements.

What does it mean to cultivate the soil? Cultivating means to prepare the soil for planting and the caring of the growing plants. Tools used in this process were designed to turn and loosen the soil, break up clods of dirt, and create level fields for planting. Tools were also used to spread fertilizer and to weed.

Perhaps George Washington's most innovative "tool" was a 16-sided treading barn he designed and had constructedat Dogue Run Farm. Wheat was traditionally threshed by hand with a flail, or it could be repeatedly trampled by horses on the bare ground to break the grain free. Washington's innovative design greatly improved the process of treading the grain out of wheat. In the circular barn, horses and mules tread out the grain on the second floor. The grain then fell through 1 1/2 inch gaps in the floor to the first floor where it was gathered, cleaned, and stored. It was a much more efficient and clean process than treading out of doors or using a flail to beat the grain out of the wheat by hand, and reduced damage to the wheat caused by what Washington termed "vicissitudes of weather."

George Washington was an innovative farmer, who worked to expand and diversify his farming operations in order to create a profitable business. By the late 1760s, Washington switched his cash crop from tobacco to wheat. The switch to grain crops gave Washington a dependable cash crop, something tobacco did not provide. In 1770, he began construction on a new mill, replacing an older mill inherited from his elder brother, in order to grind his wheat crop into flour for sale locally as well as in Europe and the West Indies. With an expanded and more efficient gristmill, Washington could turn his corn and wheat into cornmeal or flour. The gristmill produced goods and also provided a service for local farmers, who could bring their grain or corn to the mill to be ground. Rather than pay cash, local farmers would pay a toll of 1/8th of the output for this service. Washington also purchased grain from local farmers in order in increase his output of flour for sale. He would pay his suppliers either in cash or credit, which could be redeemed at local merchant stores where Washington had an account.

In 1797, Washington constructed a distillery at his gristmill complex, where he generated another product – whiskey –from his grains as well as an expanded base to obtain cash. By 1799, the distillery became his third most profitable industry after his fisheries and mill. By 1799 the gristmill complex consisted of Washington's merchant mill, one of the largest distilleries in Virginia, a cooperage, the miller's cottage, animal pens, and a small wharf on Dogue Creek where barrels full of flour were loaded onto boats which carried the goods for sale at local markets and as far away as Europe and the West Indies.

The Millworks – Natural and Capital Resources

A gristmill functions like a large machine operating under a system of gears and levers. Like most colonial mills, Washington's mill was water powered. The millpond, which provided the water source, was located on a higher elevation approximately two miles from the mill. Water traveled through a man-made millrace, which connected the mill and the millpond. At the mill, water flowed from the millrace into the flume, a wooden trough that carried water to the interior waterwheel. The flow of the water was controlled by sluice gates. The gates, made of wood, could be manually opened and closed, and functioned like an "on-off switch."

Eighteenth century gristmills generally had one of four different types of waterwheel: overshot wheel, pitch-back wheel, breast wheel, or undershot wheel. Washington's gristmill had a pitch-back wheel, which turned counter-clockwise. At any one time, approximately 1/3 of the 40 buckets on the wheel were full at once. The wheel was 16 feet in diameter and was four feet wide. Each bucket held 30 gallons of water, or approximately 250 pounds. The weight of the water caused the wheel to turn and powered the mill machinery.

The main face gear was connected directly to the waterwheel by a large shaft. The main gear powered smaller gears that operated the millstones located on the second floor. Each set of stones consisted of a bedstone and a runner stone. The bedstone, which remained stationary, was recessed into the stone floor. The runner stone, connected by a shaft to the gears below, moved and cut, or sheared, the grain into flour or meal. The miller used the lighter staff to set the machine into motion and also to set the distance between the runner stone and bedstone, thus determining the consistency of the product. When the stones were set close together, the flour or meal was finely ground; setting them farther apart created a coarser ground product.

Washington's merchant mill had two sets of stones. He ordered French buhr stones in 1772. These fine quartz stones produced superfine flour, which could be sold for a greater profit. His second set of stones, made of granite, were referred to as the country stones and were used largely to grind corn, barley, and rye. After being ground, the flour or meal was packed in wooden barrels and stored on the mill's third floor. The barrels were raised to the upper floor by a gear and pulley system.

Labor at the Mill – Human Resources

Between 1770 and 1799, Washington employed three different millers to operate his mill: William Roberts, Joseph Davenport, and Patrick Callahan. The job of the millers was to operate the mill machinery, oversee the workforce, and record all business transactions. William Roberts was also a trained millwright. A millwright could not only operate the mill but also repair the machinery as needed.

In addition to the hired miller, several slaves worked at the mill complex. Ben was an enslaved miller who ran the mill in the absence of the hired white miller. Forrester worked in the mill as well. He probably helped clean the mill and pack the barrels. Tom, Jacob, and Moses worked in the cooperage, which was located at the mill complex, constructing the wooden barrels used to ship goods to market.

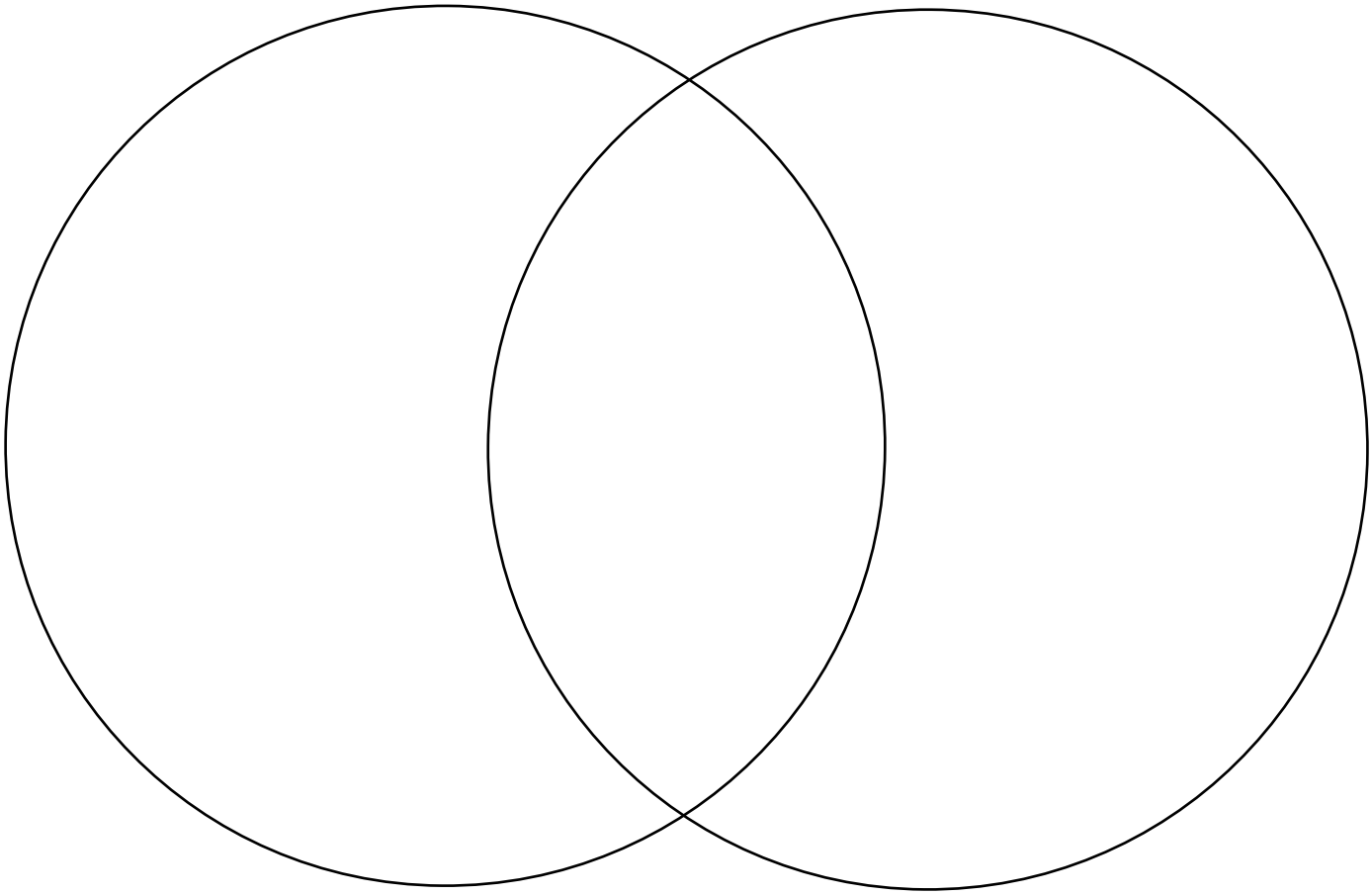
George Washington's gristmill complex demonstrated his creativity as a businessman and entrepreneur. By 1799, both his gristmill and distillery provided profitable means to diversify his agricultural output and highlighted his belief that American success lie in agriculture and the ability to diversify and sell American products around the world.

This manual was adapted from
"Seed to Table: Farming at Mount Vernon" created
by George Washington's Mount Vernon Estate & Gardens
Educational Department and Fairfax County Public School teachers.

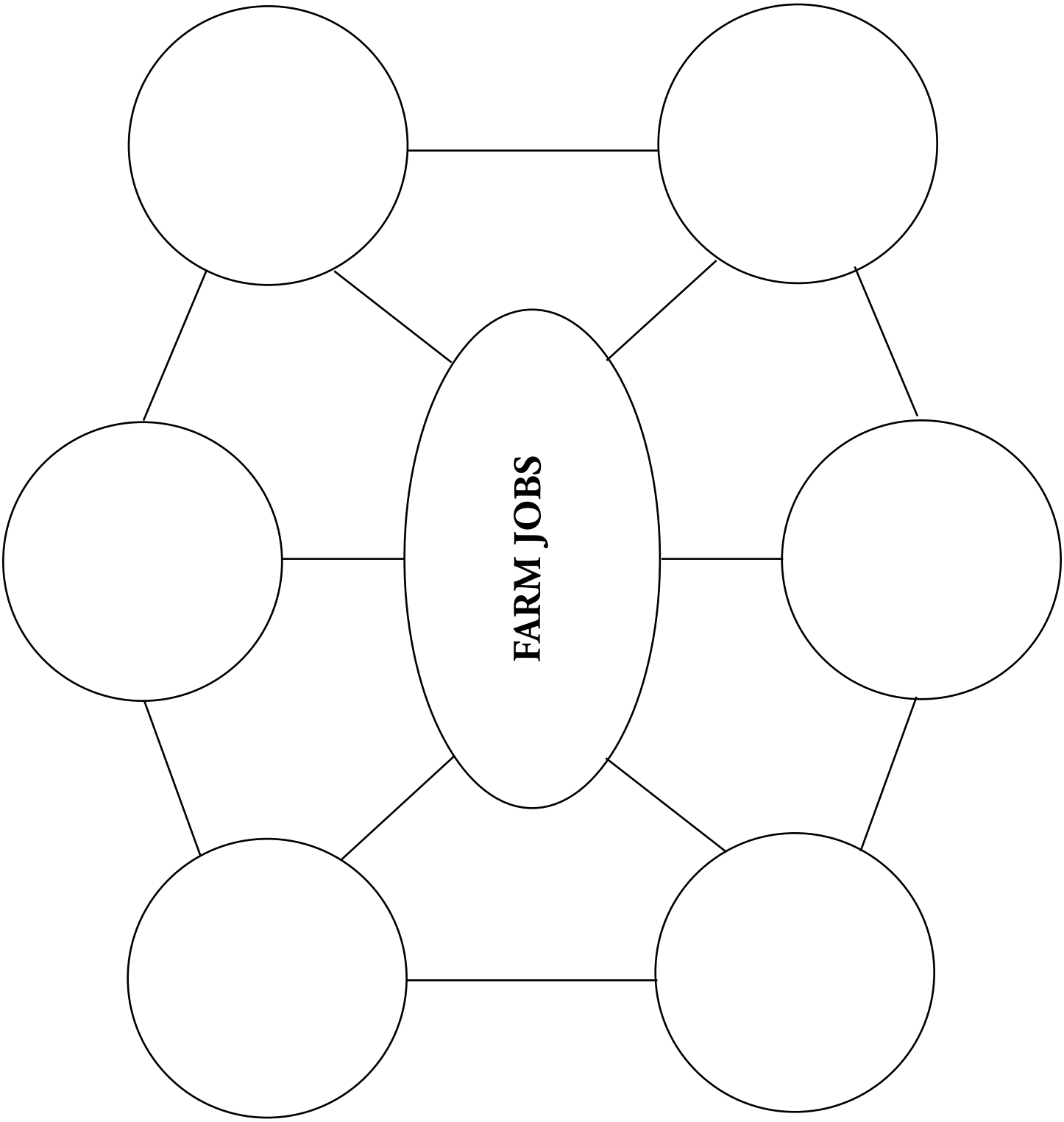
KWL CHART

What I KNOW about _____	What I WANT to know about _____	What I LEARNED about _____

VENN DIAGRAM



JOB WEB



T-CHART

Goods	Services