



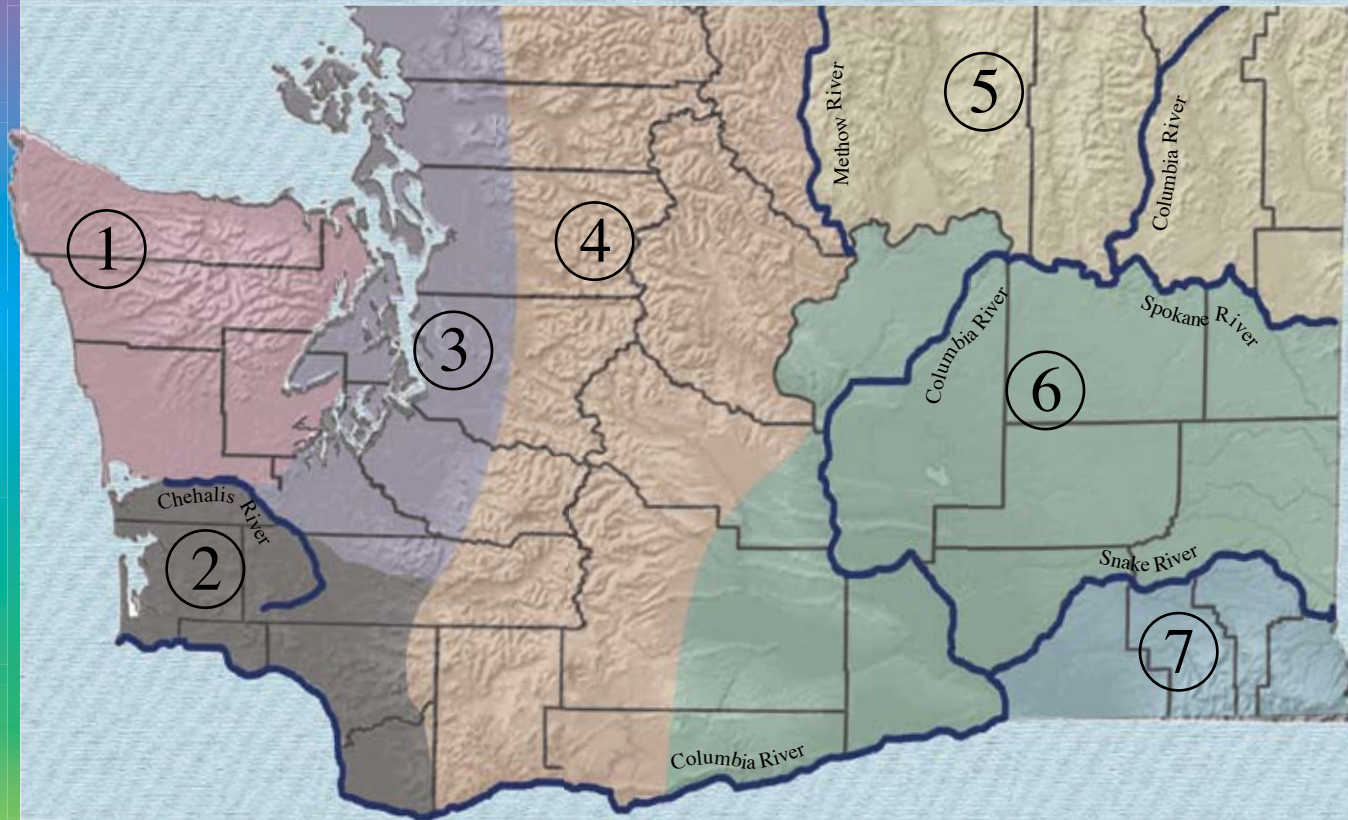
Ag@School

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Grown in Washington

Our state is divided into seven growing regions defined by topography, precipitation, and the state's river systems. Food comes from 39,500 farms and ranches in Washington state, to feed you and many others around the world.



- ① Olympic Peninsula
- ② Willapa Hills
- ③ Puget Sound Lowlands
- ④ Cascade Mountains
- ⑤ Okanogan Highlands
- ⑥ Columbia Basin
- ⑦ Blue Mountains



Today's Children... Tomorrow's Leaders

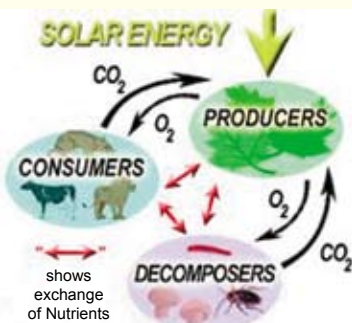
ag•ri•cul•ture (ag' rə' kul' chər), n. growing plants and animals for food and other uses



AGRICULTURE IS EVERYWHERE

Agriculture starts with the growing and harvesting of food, fibers, forests, and flowers. **Agriculture is important to each of us because we all eat food.** Not only do farms and ranches produce the food we eat, but also the cotton t-shirts and jeans we wear, leather shoes, and important ingredients for the fuel for our cars, soap, glue, many medicines, tires, books, and thousands of other things we use in our daily lives. Much of agriculture is growing and harvesting plants. **We cannot live without plants.** As you can see in the food web below, plants provide all the food we eat—either directly as crops, or indirectly as food for animals. They also make the oxygen we breathe, clean carbon dioxide from the air, cool our surroundings, and prevent soil from eroding. People in agriculture grow all sorts of plants, raise animals, and manage forests— all things humans use for food, clothing, shelter, even fuel.

IT'S ALL RELATED



Food Web

Agriculture: is Science and Technology

Agriculture is the nation's largest industry. It is everywhere, and so are more than 250 different ag careers. The ag industry consists of about 24 million people who produce, process, transport, sell, and trade the nation's food and fiber. Fewer than 2 million people are actually farmers. America's farmers are the world's most productive. They produce 16% of the total world food production on just 10% of the world's land. US farmers grow more food using fewer resources than ever before. Growers produce the raw products and other people turn them into the things we eat and use every day. Consider all the jobs from farm to your table, closet, or fuel tank. Explore Ag careers at www.agriculture.purdue.edu/USDA/careers

Seven Growing Regions of Washington

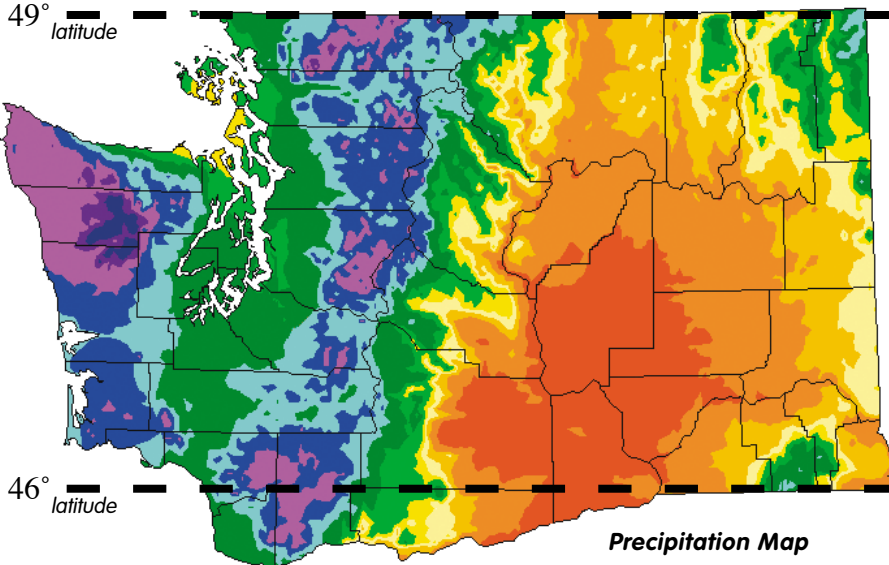


- 1 Olympic Peninsula** Known for its glacier capped mountains and a rain forest, the Olympic Peninsula also has agricultural interests in forest products called Western Greens. One, an evergreen shrub named salal, is shipped to florists nationwide. Lavender is a favorite floral crop from this region.
- 2 Willapa Hills** The coastal hills in southwest Washington are ideal for growing Christmas trees. This region also produces cranberries, almost 17% of the oysters eaten in the US, and is home to many farm markets and community supported agriculture (CSA) operations.
- 3 Puget Sound Lowlands** Situated between the Olympic Mountains and the Cascades, the Puget Sound Lowlands are best known agriculturally for dairies, raspberries, tulips, vegetable seed, nursery products, and shellfish.
- 4 Cascade Mountains** The Cascade Mountains are part of the Ring of Fire—a ring of volcanoes that encircles the Pacific. The lower elevations, or foothills, provide grazing areas for cattle and land that grows apples and timothy hay.
- 5 Okanogan Highlands** The Okanogan Highlands are rugged foothills between the Cascades on the west and the Rocky Mountains to the east. Beef cattle, horses, and sheep graze among another valuable renewable resource, trees. The region also grows apples, peaches, pears, cherries, and other fruit.
- 6 Columbia Basin** The dry region east of the Cascades is a huge lava plateau with rich soils. The heart of the basin receives less than 10 inches of precipitation, yet this region is our state's most productive agricultural region. The reason is **irrigation**. The Columbia River and its tributaries provide water for a region that has ideal conditions for alfalfa, potatoes, corn, mint, grapes, apples, cherries, and many other crops. The Palouse, in the southeast corner of the Columbia Basin is a region of giant wind-blown soil dunes that are excellent for growing grains, peas, lentils and garbanzos without irrigation.
- 7 Blue Mountains** The Snake River skirts around the Blue Mountain Range in the southeast corner of our state before it feeds into the Columbia River. Cattle graze among sagebrush and timber. Wheat, barley, asparagus, onions and grapes are grown here. This region also boasts the most inland seaport serving the **Pacific Rim** at Lewiston-Clarkston, part of the nation's largest wheat and barley exporting corridor.

AG DEPENDS ON CLIMATE

Climate depends mainly on **latitude**. Latitude governs the angle of the sun's rays, length of day, and even prevailing winds. Washington lies between 45° North and 49° North. That puts it in the temperate climate zones (between 30° and 60° latitude). Our basic zones are Maritime and Steppe. Maritime is generally along coasts and has large amounts of rainfall and moderate temperatures. The Steppe Zone is located inland with an average rainfall of 10 - 20 inches. It has hot summers and cold winters. Within the Steppe Zone, Washington has two other zones: Desert, which has less than 10 inches

of rainfall, and the Highlands. The Highlands Zone is found in any mountainous area and temperature and precipitation vary with elevation, not latitude. **Our different climate areas are a main reason our state produces such a wide variety of crops.** Use the precipitation map to help answer the questions.

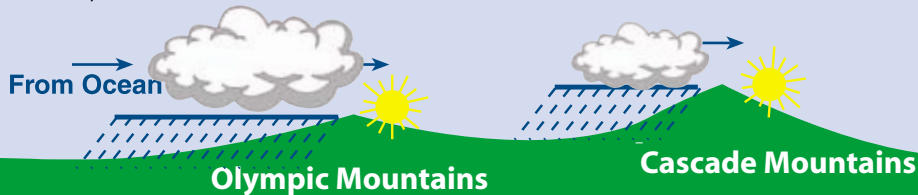


1. Outline Washington's wettest area. It is really a rain forest!
2. Which side of the Cascade Mountains gets the most rain? West or East?
3. Where is the Maritime Zone? Where is the Steppe Zone?
4. Most of the wheat is grown in Eastern Washington. Does that crop need a lot of rain?
5. Draw a circle around the desert. Why is this area our most productive agricultural region in the state? Hint: take a peek at page 2
6. Does this precipitation map give clues about where the Highland Zones are located?

Legend (inches of rain per year)		
Less than 10	25 to 30	80 to 100
10 to 15	30 to 40	100 to 140
15 to 20	40 to 60	140 to 180
20 to 25	60 to 80	more than 180

The Rain Shadow

Some parts of Washington receive over 100 inches of rain each year. As moist air from the ocean blows east it must rise over our mountain ranges. The air cools as it rises. Cold air cannot hold as much moisture so the clouds must release their moisture in the form of precipitation (rain, sleet, snow or hail). This results in an area that receives less precipitation on the other side of the mountains (the rain shadow). Where are the rain shadow areas West of the Cascades?



Washington's Top Five



My Washington Plate

Hints:

- Roundish, crispy fruit, red, green or yellow
- Beverage produced by cows
- Grain most often consumed by humans
- Root vegetable, mashed, fried, baked, or chipped
- Animals that produce steaks and burgers

A	E	X	J	A	E	A	S
P	L	N	D	N	O	E	U
P	T	C	L	I	O	W	B
L	T	O	K	T	T	X	I
E	A	R	A	P	A	T	S
S	C	T	D	P	E	S	D
Y	O	A	F	O	H	G	Y
P	K	L	I	M	W	I	U

Draw a line from the hint to the food group on My Washington Plate where it belongs. **WOW** – Each of Washington's top five are represented in a food group!!

Dairy

Cat

do-mes-ti-cate, v. To
to live with and be of



She may look bony, but this Holstein cow has been bred to be a milk-making wonder! Most US dairy cows are Holsteins, a breed that tends to produce more milk per cow than other breeds.

Washington ranks #10 in milk production in the US. We have

251,000 cows producing an average of 23,510# of milk each year. That equals **44,781 cartons per cow per year** for your school lunch! (Washington ranks fourth in production per cow) **How many cows does your school need to provide milk for lunches this year?**

To produce so much milk, dairy cows eat hay, silage, and grain. Silage is fermented corn, wheat, or forage plants. Cows eat 50# of silage as well as 40# of grain and hay each day, for a total of 90#. Dairy cows also drink 25-50 gallons of water each day. **How much feed would a 2000 cow herd eat every year?**

Yakima, Whatcom, and Grant counties have the most dairy cows. In recent years dairy production has shifted from the North Puget Sound to Central Washington. Feed production is close by and there is less human population. The climate is drier and there are thousands of acres of crop ground; both facts are useful for manure handling. There is room to have much larger operations; many dairies in Central Washington exceed 2000 milking cows. However, the milk must then be transported back to the populated areas for distribution.



A dairy cow must have a calf to produce milk. Cows have calves once a year, and are milked for 10 of the 12 months. Before the next calf is born, the cow takes a two-month vacation (then she is called a "dry" cow). Calves receive the first (colostrum) milk from the cows, and from then on are hand-fed by farmers. Heifers are kept to become replacement cows in the milking parlor, and male calves are raised for meat.

Cattle were domesticated by man for meat (beef and veal), as dairy products, and as draft animals (pull



Aurochs

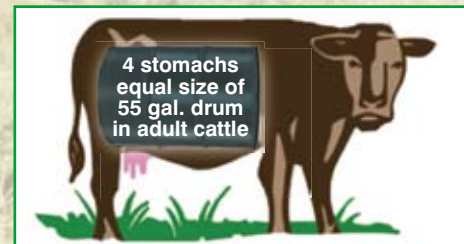
The Aurochs was a large species of cattle that lived in Europe about 2 million years ago and living until 10,000 years ago in Poland. They stood more than six feet tall and weighed more than a ton, and roamed Europe. The first cave paintings drew pictures of these giant cattle.

VOCABULARY

- Cow—female after she has had a calf
- Heifer—young female from the time she is born
- Bull—male
- Steer—neutered male
- Ox—(plural oxen) fully grown steers

Why can cattle eat grass and other plants?

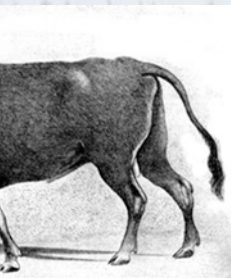
Cows, sheep, goats, deer, and elk are **ruminants**. They have four-part stomachs that can break down the fiber (cellulose) in plants without chewing well. Later, when they eat large amounts of food (called a **cud**) to fill their stomachs, chewing breaks the food into small pieces. They spend eight hours a day chewing their cud in the rumen, billions and billions of bacteria and digest the cellulose. Humans cannot digest fiber, although we eat high-fiber foods like broccoli, and fiber passes through our digestive tracts.



Cattle

train or adapt an animal
use to humans

n for three purposes: as livestock
animals for milk and other dairy
ing carts and plows).



ch
f cattle existing from as far back as
627, when the last survivor died in
x feet tall at the shoulder, weighed
pe and Asia. Prehistoric man often
on cave walls.

calf
time she is born until her first calf

beers used as draft animals

d hay?
re among a class of animals called
tomachs and digestive systems that
) in plants. Ruminants eat very fast,
resting, the animal burps up small
o chew and chew and chew. This
ler pieces. Cows will spend up to
d. In the stomach chamber called
acteria and other microbes ferment

gh we do benefit from vitamins in
from the fiber pushing other foods

How Big

A human stomach can stretch to the size
of a small balloon after a really big meal.
A large dairy cow would require a 55
gallon drum to hold her four stomach
chambers! But then again, on a hot day
that cow will drink a bathtub of water
(25-50 gallons).

Beef

Cattle and the Environment

Not all land can be used to grow crops. Some is too steep, or too rocky, or might erode if tilled. The growing season may be too short or too irregular. If it is to be used to produce food, such land needs to be grazed by livestock. Worldwide, (and in the US), 50% of land that can produce food can only be used for grazing.

US Beef Facts

Cattle are raised in every state in the US (and in every county in Washington). Cattle/calves are the largest US agricultural commodity. In Washington state, cattle/calves rank between 3rd and 5th in economic value of all commodities. **Give three reasons why the rankings would change from year to year.**



Black Angus is a popular beef breed (they are naturally polled—born without horns)

What do cattle eat?

Cattle graze on pastures while grass is growing. In the winter they eat hay (dried forage). Calves gain 50-70% of their adult weight before they are weaned (separated from the cow), by eating mostly their mother's milk and grazing alongside their moms. After weaning, most cattle are 'finished'. They are fed hay, silage, grain and by-products such as apple, potato, or carrot processing waste, cottonseed meal, cereal by-products, etc. These extra calories cause the animal to gain weight faster and to deposit fat inside the muscles. Our methods of finishing cattle result in juicy, flavorful, and tender meat from cattle less than two years of age.

True or False? The world can support more vegetarians than meat eaters. 🌿🐮🌿🐮🌿🐮🌿

THE ANSWER IS UPSIDE DOWN. animals there would be less food, not more. If we didn't have grazing steep or too rocky for crops. If we didn't have grazing animals there would be less food, not more. These acres are too cold, too dry, too growing crops there are almost 4 acres of land that can less food, not more. For every acre of land suitable for Answer: If all humans became vegetarians, there would be

TWO MAJOR RIVERS IN WASHINGTON

- █ COLUMBIA RIVER
- █ SNAKE RIVER

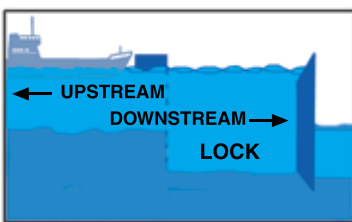
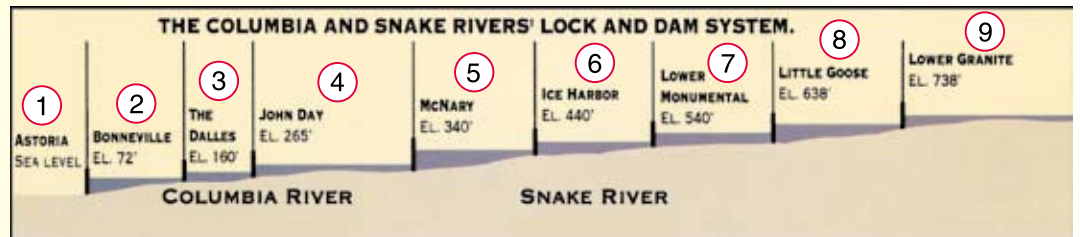
Washington is blessed with great soil and a climate for growing many different crops. That's not all! Our mighty rivers and ocean ports help us move all kinds of products throughout the Pacific Rim at an affordable cost. That means that wheat trucked from Montana and potatoes grown in Idaho, as well as items from our own state, can travel by water to ports around the globe.

GATEWAY TO THE PACIFIC

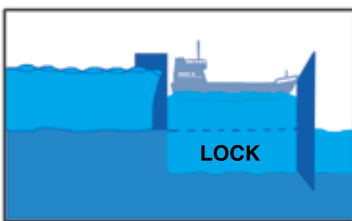


A Water Stairway

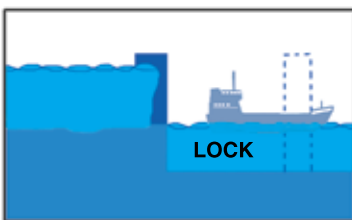
The Columbia and Snake Rivers form a highway for boats and barges. This could not happen without a series of 8 locks and dams that make a stairway in the river. Between the port of Clarkston and the Pacific Ocean the rivers drop over 700 feet. Like a water stairway, the locks allow boats to move up and down the rivers.



(Fig. 1)



(Fig. 2)



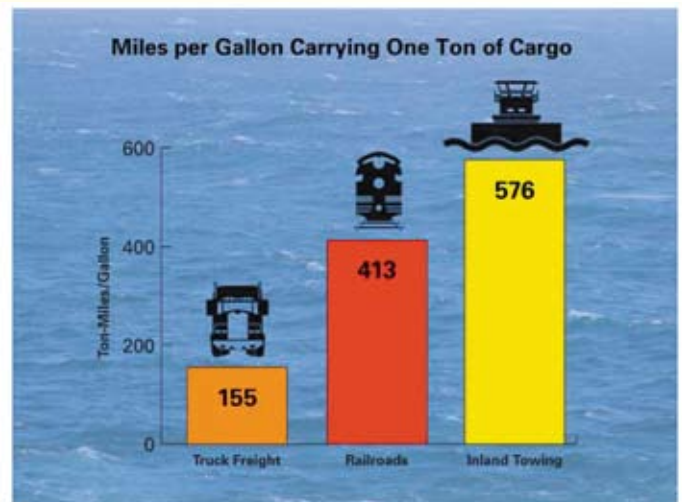
(Fig. 3)

A lock and dam work together. The dam holds back water, creating a pool. The lock is a rectangular water chamber near the dam with watertight gates at each end.

To lower a boat or barge, the lock is filled with water to the upstream level. The barge moves into the lock. The upstream gate closes and water is drained out of the lock, lowering the barge to the downstream level.

The downstream gate opens and the barge leaves the lock.

Boats can travel the other direction, too, moving from lower to higher water levels. Through locks, boats can travel past dams, waterfalls and other obstacles.



Source: US Maritime Administration

The Columbia-Snake River system leads the nation in the export of both wheat and barley. This is very important since Washington farmers export 85- 90% of the soft-white wheat variety that we raise. It is a variety suited to flat breads, cookies, cakes, crackers, and cereals. Over 60% of Washington's wheat exports travel by barge from ports along the 400-mile Columbia-Snake river system to Portland.

Potatoes



Washington farmers produce more potatoes per acre than any other region in the nation. Not only do we have rich volcanic soil and abundant irrigation water, Washington has a great climate for potatoes. Because of our latitude, we enjoy long daylight hours in the summer. Long, sunny summer days give better production. The more sunlight a potato plant absorbs, the more potatoes it produces. We have a longer growing season than other potato producing areas (150 to 190 frost free days in the Columbia Basin). Our temperatures are ideal (warmer in the early spring when the potatoes are planted to encourage faster sprouting; not too hot in May and early June when the plant sets the potatoes; and warm days but cool nights during July and August when the potatoes enlarge). Farmers are able to provide the exact water and nutrients that the potato plant needs through electronically controlled irrigation systems. Washington farmers average 61,500# per acre compared to a national average of 41,400# per acre.



Potato harvesters are complicated machines that must dig the potatoes out of the ground, separate potatoes from other plant material, dirt, and rocks. Harvesters must do all this while being gentle enough to prevent bruising.

Tater Trivia

- Potato, tater, and spud are all names for a vegetable grown under the ground, that is actually a large **tuber** -- a food-storing body that grows from the end of an underground stem.
- Farmers don't plant actual seeds, but cut tubers into pieces called "seed". Each "seed piece" must have at least one bud or "eye" to sprout. The sprout uses the tuber for energy as it emerges from the ground.
- Potatoes originated in Peru. Spanish conquistadors brought potatoes to Spain in the mid-1500s. By the 1800s they were being grown all over Europe and the United States.
- Thomas Jefferson introduced french fries to America.
- 87% of Washington's potato crop is sold to processors for fries, chips, and mashed potatoes.
- Japan buys about 65% of our exported french fries.
- By controlling the temperature and humidity, potatoes can be stored for nine months or more.

Potatoes are Nutritious

A potato is approximately 80 per cent water, 15 per cent carbohydrates, and 4 per cent protein. It is rich in vitamin C (45% of the daily requirement) and has as much potassium as a banana. Yes, you can eat the skin... it is an excellent source of fiber and tasty too!

Career Profile

Name: Heath Gimmetad

Job Title: Agronomy Manager at Friehe Farms

Education: Bachelor of Science

Description of job: Fertilizer, water, and plant protection recommendations for potatoes, sweet corn, bluegrass and wheat.

What I like best about this job: Mostly outdoor activity with different things happening every day. Continued learning about plant health and what I can do as a manager to produce low cost, high quality crops for the processing industry. Meeting people from all around the world and learning from them as well.





Washington Agriculture Leads the Nation!



Washington ranks 12th in the nation for total value of agricultural products, but is second in terms of the diversity of crops that we grow (only California has a larger variety). We lead the nation in the production of several crops. Rich volcanic soils, different climates, and an amazing river system all contribute to this abundance.

~ But Washington is #1 ~ in the production of several crops (2010 crop data). Identify the counties or regions that are named below.

1 Red Raspberries – 92.3% of US supply – Delicious and nutritious, grown for eating fresh, or in jams, jellies, and pies, raspberries can be harvested mechanically. Whatcom county leads the state with over 90% of this crop. www.red-raspberry.org



2 Hops – 79.8% – Hops are used to flavor beer. The Yakima valley produces three-fourths of the state's hops. The dry climate along with lots of irrigation water from the Yakima River create ideal conditions for this crop. www.usahops.org



3 Spearmint Oil – 74.6% – Grant and Adams counties lead the state in production of mint. Every pound of oil will flavor 30,000 sticks of gum or 1000 tubes of toothpaste. Washington also produces 27.7% of the nation's peppermint oil.



4 Apples – 59.7% – Apples are the crop that consumers most often link with Washington state. Five areas all share ideal growing conditions -- weather, soil and water. These areas can be seen at www.bestapples.com/growers/regions/index.shtml (Okanogan, Lake Chelan, Wenatchee Valley, Columbia Basin, and Yakima Valley)



5 Sweet Cherries – 49.9% – Cherries are one of the fastest maturing fruits. In just 60 days blossoms mature into sweet, tasty fruit. They are picked, packed, and shipped to markets in the U.S. and more than 42 countries around the world. Leading cherry counties are Yakima, Grant, Chelan, Benton, and Okanogan counties. www.nwcherries.com



6 Pears – 47.9% – The pear has been grown by man for more than four thousand years. Washington pears are picked by hand, and are prized for their flavor and long storage life. Yakima county has the most acres of pears, followed by Chelan, Okanogan, Grant, and Douglas. www.usapears.com



7 Concord Grapes – 43.4% – These are the grapes used to make grape juice and jams and jellies. We also grow 25.4% of Niagra grapes which are used to make white grape juice. All these grapes are harvested by machine. Yakima, Benton, and Franklin counties grow the most concord grapes.



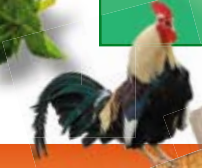
8 Processing Carrots – 36% – These carrots are harvested in October or November. Carrot waste from processing is used in dog food, livestock feed, and a small portion of cull carrots are used for carrot juice. Counties with the largest acreage are Benton, Franklin, Grant, and Klickitat.



Potatoes and milk are both sold by the hundredweight (cwt).
How many hundredweight in a ton?
How many hundredweight of Washington potatoes per acre?
How many hundredweight of milk does the average Washington cow produce?

Choose a commodity from this list. Write the amount produced by Washington state as a percentage, as a decimal, and as a fraction.

50% .5 1/2



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