



Welcome to Ag@School!

Class sets of this magazine, aimed primarily at 4th grade level, are FREE to subscribing Washington teachers. Instructions for subscribing are on page 4. Back issues are available at www.waic.net.

This is the first of three issues for 2012-2013. Delivery of the next two issues will be in January and April.

Produced by Washington Ag in the Classroom, Ag@School is designed to help teachers meet student educational goals as well as develop agricultural literacy. The teacher guide connects activities to specific GLEs and EALR's that will help your students meet state requirements.

This issue is designed to help students understand:

- The economic importance and diversity of Washington agriculture
- The importance of agriculture to their lives
- Washington geography and climate and how these influence agriculture
- The benefits of dams and how locks enable river transportation
- Domesticated cattle provide milk and beef
- Potatoes are an important export product

Reproducible activities in the teacher guide expand on concepts covered in the magazine. Included in the guide are vocabulary activities and post tests.

Why Agricultural Literacy?

Agriculture is society's lifeline and an integral part of our heritage. Unfortunately as our country moved from agrarian to urban, people lost contact with the main industry necessary for survival—food production. America's largest industry has dropped from public discourse except for the occasional media splash. Yet we all eat, and it is important that we have an understanding of where our food is produced and who we depend upon to deliver it to our tables.

Less than 2% of the US population is involved in production agriculture (farming) yet 24 million American jobs are dependent upon it. Agriculture is more than working the land and tending the animals. This huge industry—production, processing, transportation, and marketing—generates billions of dollars each year. Agriculture is vital to national security, a stable economy, and the US trade balance.

Vocabulary Words

- Each issue will introduce several words or word combinations that may be unfamiliar to students. These will appear in bold type the first time they are used.
- Words in this issue include: Pacific Rim, precipitation, latitude, weather, climate, irrigation, locks, ruminant, cud, tuber, hundredweight (cwt).

GLE & EALR Connections

Science:

- APPA TG page 2,3
- APPG pages 2,4,5,6,7,8
- APPH page 2 TG page 2,3
- PS3E TG page 3
- LS1E page 3,7 TG page 6
- LS2C page 2

Math:

- 4.1.F,I,J pages 4,8 TG pages 4,6
- 4.2.D page 8
- 4.4.B page 8

Health & Fitness

- 1.5.1 and 1.5.2 pages 3,7 TG page 6

Social Studies:

- 2.2.1 pages 1-8
- 2.2.2 pages 6,7
- 2.4.1 pages 3,6 TG page 3
- 3.1.2 pages 2,3

Reading:

The articles and activities throughout the magazine link to most reading standards. They can be used to build skills in outlining, vocabulary, comprehending important ideas, reading factual material, or reading to learn new information.

Writing:

The post test is designed to help prepare students to write. The prompts include the four modes of writing: expository, narrative, descriptive and persuasive.

Cover - Grown in Washington

The products shown on the margin are shown by farmgate value to Washington's economy, from apples to corn. See the complete list of the top forty at http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/2011/ab4.pdf

Discussion starters:

1. Which of the crops or products around the edges of the cover have you seen growing? What crops and animals are raised where you live?

Use the Map to have students identify the 39 counties and place the county seats.

Ritzville, Prosser, Wenatchee, Waterville, Dayton, Pomeroy, Pasco, Ephrata, Montesano, Coupeville, Ellensburg, Davenport, Colville, Colfax, Everett, Cathlamet, Bellingham, Stevenson, Mount Vernon, Friday Harbor, Asotin, Port Angeles, Vancouver, Kelso, Republic, Port Orchard, Goldendale, Shelton, Chehalis, Okanogan, South Bend, Newport, Tacoma, Port Townsend, Yakima, Seattle, Walla Walla, Olympia, Spokane

Page 2 – Agriculture is Everywhere

Every organism needs to obtain energy in order to live. A food chain is a sequence of who eats whom. The usual order of a food chain is sunlight, plants, herbivore, omnivore and/or carnivore. In the diagram on page 2, producers would be photosynthetic plants that make their own food from sunlight. Consumers could be herbivores, carnivores, or omnivores. They get their energy from eating producers or other consumers. Decomposers are bacteria and fungi, but the group also includes scavengers like vultures, worms, flies, ants, crabs, etc. This group gets its energy from consuming decaying matter. Food chains that are related in an ecosystem form a food web. Food chains and food webs start with the energy (heat and light) from the sun (see Ag@ School Vol. 9, Issue 1, page 7 for a discussion of photosynthesis). Students should understand that we depend on plants to convert that energy into food for animals and for us. Check out www.science.pppst.com/foodchain.html for free power point presentations on this topic. Also Bill Nye has some engaging YouTube presentations.

Ag is Science and Technology

Have students brainstorm jobs that are needed to bring food to their tables. Have them research related ag careers like agronomist, entomologist, mechanic, irrigation manager, satellite guidance technician, or food photographer.

Think

If we had no farmers, how would your life be different? Would your parents have the same jobs as today? Would you have different chores? If we didn't have transportation would your diet be the same? Would the foods you eat change with the seasons?

Seven Growing Regions of Washington

Discussion starters:

1. What geographical features make WA such a diversified agricultural state? (Next to Pacific Ocean; deep-water ports in Puget Sound; Columbia River for navigation, irrigation and power generation; Cascades split state; volcanoes have provided the rich ash component of our soils; elevation goes from sea level to the top of Mt. Rainier)
2. Discuss individual growing regions and what factors make each an ideal place to grow specific crops or products.

Page 3 – Climate

Discussion starters:

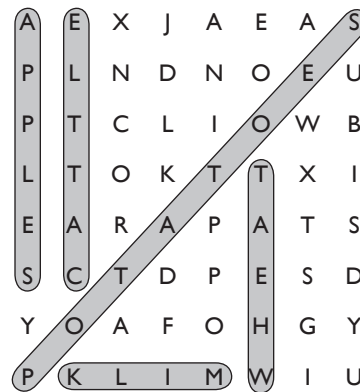
1. Why are different crops and animals raised in different regions of Washington? (They all have unique requirements for climate, rainfall, terrain, and soil to thrive)
2. What is meant by a “rain shadow”? (as clouds rise they lose moisture causing a dry region east of the Cascades) How does it affect the types of crops grown east of the Cascades? (With irrigation, anything can be grown, without irrigation farmers are limited to grain, grass seed, legumes,

and some oil seed crops) Using the precipitation map, have students find rain shadow areas caused by the Olympic Mountains.

3. Track the fruit growing areas in Washington. They follow the banks of major rivers and lakes and the Columbia Basin irrigation project. There is enough water in these areas to make “micro-climates” that are warmer in the winter and cooler in the summer.

Washington’s Top Five

Answers are apples, milk, wheat, potatoes, cattle



Page 4/5 – Cattle

It is important that students understand that domesticating animals requires the responsibility to care for the animals. Farmers and ranchers provide feed, water, shelter, health care, and protection from predators. They select gentle animals for handling ease and as a result, the animals are ill-prepared to care for themselves. Although other countries may still use cattle as draft animals, in the US, we use them for milk and beef.

Q & A:

- 1) The number of cows needed to supply milk for your school is calculated by number of students, times the number of school days, divided by 44,781 cartons. 2% milk weighs 8.4#/gal., so the average production of 23,510# is divided by 8.4# and then multiplied by 16 (cups or milk cartons/gal) to get the answer of 44, 781 cartons/cow/year.
- 2) A 2000 cow dairy would consume 90# X 365 days X 2000 = 65,700,000# or 32,850 tons
- 3) Asking students for three reasons why commodity rankings change annually is a good exercise in critical thinking. The economic value is calculated by multiplying:
 - a) the number of units (animals or acres) produced
 - b) yield per unit (pounds, gallons, bushels, boxes, etc)—often affected by weather
 - c) the price per unit---often determined by global rather than local marketsThis explains why Washington is #2 in potato production. Assuming that prices are the same for all states, although Washington leads the nation in yield, Idaho has a far greater number of acres planted, so the total production is more in Idaho.

Page 6 – Rivers, Dams and Locks

Remind students that **technology involves changing the natural world to meet human needs or wants**. Our rivers are excellent examples of this. With our system of dams and locks, we provide water for irrigation, electricity production, recreation, cities and industry. We have flood control, transportation, and still provide for the needs of salmon. Discuss how engineers found solutions to many problems to better serve our citizens and our economy. This in turn has improved the quality and quantity of crops we can raise.

Background:

1. Rock Island dam was the first large dam on the Columbia (1933). Bonneville Dam was second, built in 1938 for electricity generation. Grand Coulee was authorized as one of the many projects to put men back to work after the depression and was built to supply irrigation water for the Columbia Basin Project, using the sale of electricity generated by the dam to pay for the construction of the dam and the irrigation delivery system. In 1948 the Snake and Columbia Rivers crested simultaneously and created a flood that wiped out a section of Portland. River-use planners turned their attention to flood control (as well as navigation and power generation) as the remaining dams were completed on the two rivers.
2. Deep water ports are those capable of handling a fully laden Panamax ship. That is a ship that is the maximum size that can still fit through the Panama Canal. As the Panama Canal undergoes its current expansion, the list of ports will change. It is also important that we dredge the Columbia River channel to keep the necessary depth clear for these huge ships to reach the largest Columbia ports. Other ports like Bellingham and Olympia are not equipped to handle Panamax ships. Bremerton is a large port for the US Navy.
3. Discuss the different ways people use and depend upon the Columbia and Snake Rivers (recreation, irrigation, water supply, power generation, flood control, wildlife habitat, transportation and commerce. Can the students think of more?)

Think & Discuss:

Have students name three renewable energy sources. (hydro-electric power, wind power, and solar power). Why is hydroelectric energy the most reliable?



Discussion starters:

Hydroelectric power is the most reliable because water behind the dams can be released through the generators at any time to supply electricity. If the sun is not shining or the wind is not blowing, solar and wind energy do not produce

electricity. In fact, hydroelectric power is called upon to deliver electricity when these other power sources wane.

Hydro-electric power is possible on the Snake-Columbia system because of the drop in altitude between the source of these rivers and the ocean. A large river like the Mississippi is unable to use hydro-electric generators because it is relatively flat along its' length.

Fossil fuels are sources of energy derived from plants and animals that lived long ago, such as coal, oil, and natural gas. They are carbon based and release carbon dioxide into the atmosphere when burned. Our clean, renewable hydropower keeps the Northwest's carbon footprint at half that of the rest of the nation. Removal of the Snake River dams would add 5.4 million tons of carbon dioxide to the atmosphere each year. Replacing the energy capacity lost by Snake River dam removal would take at least three nuclear power plants or six coal-fired or fourteen natural gas-fired plants.

It would also take an additional 120,000 rail cars or more than 700,000 semi-trucks annually to move the cargo that now travels by barge on the Snake-Columbia river system. That traffic would stress already overtaxed bridges and highways.

Sensible solutions have been found and implemented to benefit fish and yet protect the value of the Columbia-Snake River system to Northwest families and businesses. Additional hydropower generation would seem to be logical.



More info at:

www.nwriverpartners.org/issues-river-benefits

Page 7 – Potatoes

Be sure to visit the Washington Potato Commission website, www.potatoes.com choose the Potato Kids tab and then select publications

- [Cool projects with potatoes](#) Dams generate electricity, but so do potatoes. Make a potato battery.
- [The Amazing Washington Potato](#) 14 page activity book
- [Teaching Taters](#) 35 page, week-long curriculum on potatoes

A Potato Tale

Once a long time ago, there were two farmers. Poor Jack went to Big Fred, a rather greedy man, and asked to rent some land.

Big Fred thought about it and said, "All right. But only if we share."

"Share what?" asked Poor Jack. Big Fred replied, "Well, I take the top of the crop for my share and you take the bottom." Poor Jack agreed and as soon as he left, Big Fred slapped his thighs and laughed out loud. He knew Poor Jack had made a poor bargain. Everybody knows the crops are on the top and the bottom is only roots.

Poor Jack plowed and planted and weeded until it was time to bring in the crop. "We've got a fine crop, Big Fred," he said. "You better come take your share, because I'm ready to dig my potatoes."

Big Fred looked at the field of wilted potato plants and swore Poor Jack would never outsmart him again. So the next year when he rented the land he told Poor Jack he wanted the bottoms this time.

Poor Jack plowed and planted and weeded until it was time to bring in the crop. "We've got a fine crop, Big Fred," he said. "I've taken all my wheat from the top. What do you want to do with your straw from the bottom?"

Big Fred was hopping mad. "Next year," he shouted, "I'm going to take the tops and the bottoms!" "What does that leave me?" asked Poor Jack, scratching his head. Big Fred chuckled when he answered, "The middle, of course."

Big Fred was sure he'd outsmarted Poor Jack this time. But Jack went out and plowed and planted and weeded until it was time to bring in the crop. When Big Fred looked at the field and saw what was growing, he screamed.

Poor Jack had planted corn. Big Fred got the stalks and tassels and Poor Jack got the ears of corn.

The next year Jack and Fred struck a new deal. They each got half of everything and Jack wasn't poor anymore.

Page 8 - CWT Answers

100# = one cwt (C is Roman numeral for 100, wt. is abbreviation for weight).

There are 20cwt in a ton; 615cwt average potato production; 235.1cwt milk per cow. Students should note that adding two zeros to a cwt value results in the number of pounds.

Conversely, reducing the pounds by two decimal places will give the cwt conversion. Also, since dollars are on a decimal system: \$15/cwt = 15 cents/#

Answers to TG pages 5-6

It's All About Agriculture

1. Agriculture 2. irrigation 3. locks, dams 4. Climate, Weather 5. ruminants 6. tuber 7. producers, consumers, decomposers 8. Raspberries, Cherries, Apples, Concord Grapes, Pears

That's a Lot of Wheat

8,873,400,000# divided by 2000#/ton = 4,436,700 tons

1. 60,000 tons divided by 3500tons/barge = 17.14 barges to fill Panamax ship

17.14 X 117 trucks = 2005.38 trucks

2. Referring to graph on page 6 Ag@

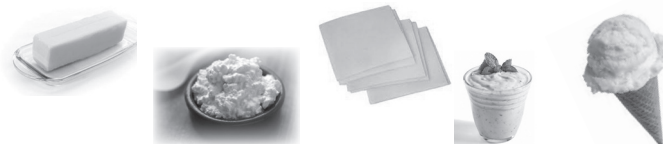
School: rail = 413/576 = .717 or 71.7% as efficient as barge. Truck = 155/576 = .269 or 26.9% as efficient as barge.



How Much Milk Does It Take?

Students can guess at these answers, or do research to find the correct response. Although eggs are displayed in the "dairy case" at the supermarket, they come from chickens, not cows, and are not a dairy product.

Butter (39); yogurt (1); ice cream (11); eggs (0); cottage cheese (12); American cheese (19); evaporated milk (4)



Learn More About Nutrition

Excellent materials are available at the dairy council website www.eatsmart.org Check it out: WA teachers can receive **\$20.00 FREE materials** each calendar year.



Get the Facts

www.nass.usda.gov/wa/ - WA State agricultural statistics

Become a Washivore

Check out the brand new website www.washivore.org for fun facts and profiles of Washington Ag products.

Publication and Credits

Ag@School is a publication of Washington Agriculture in the Classroom, a non-profit entity created in 1981 to encourage and help teachers increase agricultural literacy in their students. Both public and private groups including the WA Dept. of Agriculture, WSU, commodity commissions, farm organizations, agri-businesses and individuals, support the mission. Teachers may reproduce any pages for use.

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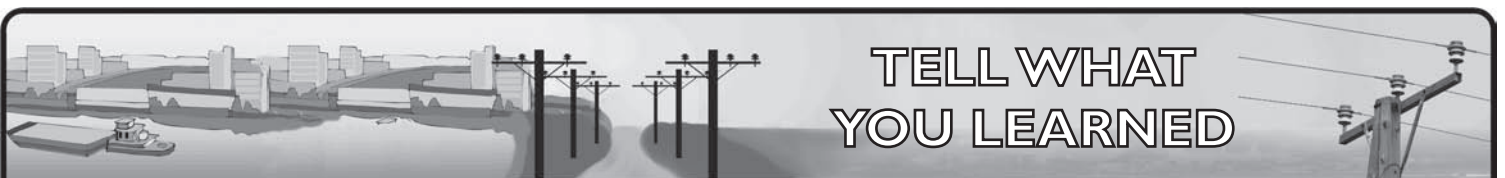
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Thank you in advance for your feedback. Sorry, subscriptions are not accepted by phone

It's All About Agriculture!

Fill in the blanks below, referring back to the magazine if necessary.

1. What is our nation's largest industry? _____ .
2. The Columbia Basin has a desert climate, but is the most productive ag area because of _____ .
3. What two things work together to make a water stairway in the Columbia and Snake Rivers?
_____ and _____ .
4. _____ is the long-term average of all the conditions in an area's air, including temperature, humidity, precipitation, windiness, cloudiness, and atmospheric pressure. _____ is the short-term and local version of these conditions.
5. Animals with four-chambered stomach systems are called _____ .
6. A potato is a _____, which is a food-storing body that grows from the end of an underground stem.
7. Food webs have three important groups _____ .
_____, _____, _____ .
8. Washington leads the nation in the production of five fruits. Can you name them?
_____, _____,
_____, _____, _____ .

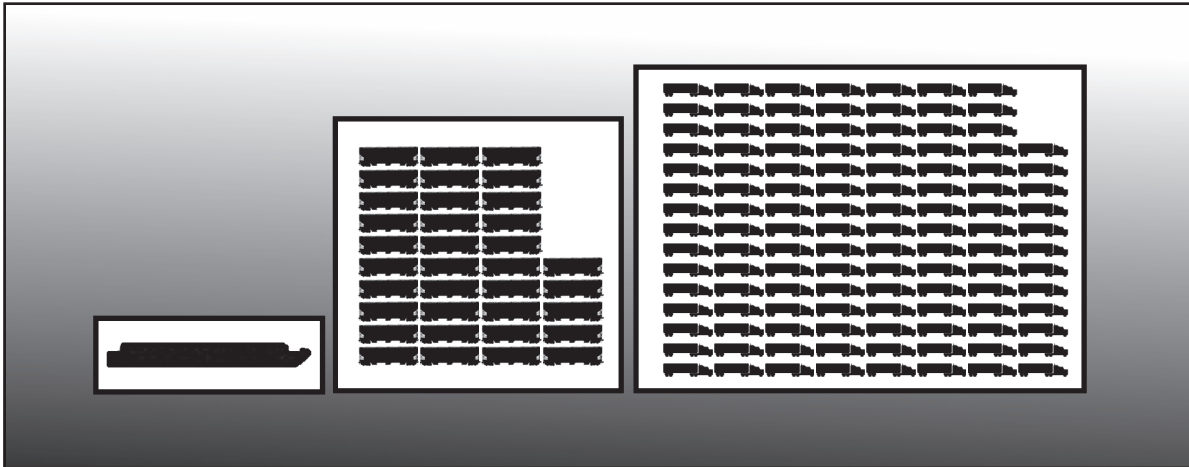


TELL WHAT YOU LEARNED

1. Create a narrative about how the potato first arrived in the state of Washington. Who brought it? When? By what mode of transportation?
2. Tell why weather and climate are important to farmers. For instance, which fruits can we raise in Washington, and which ones will not survive here?
3. What is your favorite food grown in Washington? Describe how it looks, smells, and tastes. What color and texture does it have?
4. Some people believe that the lock and dam system on the Snake and Columbia Rivers should be removed. Do you agree or disagree? Write to persuade a friend of your opinion. Give reasons to support your position.

That's A Lot of Wheat!!!

In 2010, Washington farmers produced 8,873,400,000 pounds of wheat. How many tons is that? Nearly 85% of the crop is exported. Barges are the most efficient transportation to deep water ports.




3500 tons of wheat shipped on 1 barge = 35 Rail Cars = 117 Semi Trucks

Questions:

1. If a Panamax ship holds 60,000 tons, how many barges are needed to fill it? If we had no barges, how many trucks would it take?
2. Refer to the graph on page 6 of Ag@School. With a barge, one ton of cargo can be transported 576 miles using one gallon of fuel. In comparison to a barge, how efficient is rail and truck transport?

How Much Milk Does it Take?

Milk is made into many different dairy foods. Guess how many cups of milk it takes to make each of the products listed below. Draw a line from the food to your guess.

- | | |
|----------------------------|---|
| a. 1 pound of butter |  12 cups of milk |
| b. 8 oz of yogurt |  11 cups of milk |
| c. 1/2 gallon ice cream |  Not a dairy product |
| d. A dozen eggs |  39 cups of milk |
| e. 1 pound cottage cheese |  19 cups of milk |
| f. 1 pound American cheese |  4 cups of milk |
| g. 2 cups evaporated milk |  1 cup of milk |

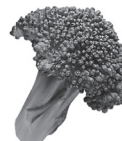
Which Do You Choose?

To get the calcium in just one glass of milk you would have to eat:

12 servings of whole grain



2.5 cups of broccoli

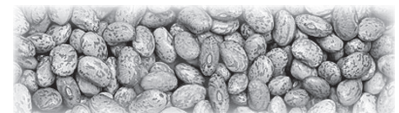


10 cups of raw spinach

or



4 cups of pinto beans



You need 3 cups of milk or milk products each day!