



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 2011-2012. 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
- The importance of forestry as a renewable resource
- How butter is made from milk

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, edge, board foot and butterfat.

GLE & EALR Connections

Science:

- APPA TG page 2
- APPG pages 2,4,5,6,8
- APPH page 2,8,TG page 2,3
- LS1E pages 1,2,8
- LS2B,C page 2, TG page 2,5
- PS2A pages 3,8
- PS3A,B page 2, TG page 2

Math:

- 4.1.F,I,J TG page 4,6
- 4.2.D page 5
- 4.4.B TG page 6

Health & Fitness

- 1.5.1 and 1.5.2 page 2, TG page 2

Social Studies:

- 2.2.1 pages 1,2,3,4,5,6,7,8, TG
- 2.4.1 pages 3,4,5,6 TG page 6
- 3.3.1 pages 2,4,5,6

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 - Food Needed for Life

In the US, we do indeed have the least expensive food. We spend just 10% of our disposable income on food; 51% for food eaten at home, and 49% for food eaten away from home. In comparison other countries spend much more: Italy 14%, China 33%, Indonesia 43%, and Pakistan 46%. (source: USDA-ERS)

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?
2. How does your county rank in ag value and food processing value? Go to the Washington Dept. of Ag website to download useful maps for the answers: www.agr.wa.gov/AboutWSDA/FoodCropMaps.htm Teachers might also want to view the WSDA video "Our Farms to Your Table".

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, bees, 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 More Than “Cows and Plows”

Washington is full of agriculture. It is everywhere! Yet, agriculture is different in each part of the state due to our diverse geography and climate. Agriculture is much more than farming. The industry includes producing raw products, transforming them into things people use, distributing them around the state, nation, and world, and marketing them to consumers. These steps employ thousands of people in hundreds of different jobs. 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.

Your Food For Life

Students can compare the cover graphic with the Choose My Plate food plan. Nutrition is essential to health. Food supplies the energy we need to build and maintain our bodies. Making good food choices is a personal responsibility that should be fostered even in elementary school. Have students keep food diaries and then chart how their actual diet compares to My Plate. Which food groups have insufficient entries (i.e. are you eating your veggies)? Make a plan to improve, and then do another food diary. Stress that we need to eat the foods in our plan first, before we have extras (like desserts). It would also be a good idea to keep track of minutes of physical activity. Students should be familiar with the terms **empty calories** (too many calories; too few nutrients) and **nutrient dense** (lots of nutrition for the calories involved). Encourage students to try new foods, especially fruits and vegetables. Have students compare the variety in their diets. Which of the foods consumed is produced in Washington state?

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.

Pages 4/5 – Grown in Washington

Convert the percentages to fractions and then to decimals.
Ex. 92% = $\frac{92}{100}$ = .92

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 (have students refer to the boxes on pages 4-5)
3. Four regions produce crops that were not always considered part of agriculture: timber from the Olympic Peninsula, Cascades and Okanogan Highlands; and Christmas trees from the Willapa Hills region. Discuss how forests are a renewable resource (see Ag@School page 7).

Have students place the county seats on the map. List three farm products grown in your county. Have students list ag products they ate or used yesterday.

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?

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.nriverpartners.org/issues-river-benefits



Page 7 – Trees a Renewable Resource

In Washington, we separate the value of timber from ag sales of crops and livestock. About 52% or 22 million acres of land in Washington is forest. Just over one third of forested land is owned privately, nearly two-thirds is managed by government. Our timberlands have the highest average per-acre yield of any state in the nation. Even though Washington has some of the strictest Forest Practices Rules in the nation we continue to rank in the top states in the production of softwood lumber. The rules protect soils, water, fish, wildlife, and roads from damage by timber harvest.

In 1926, the state's lumber harvest hit an all-time high of 7.6 billion board feet. In 2008 harvest was down to 2.76 billion board feet due to global market demand, trade agreements with Canada, and a depressed housing market.

In Eastern Washington, forest managers primarily use selective harvesting to remove small groups of trees, leaving behind trees of various age and size classes. This provides for improved regeneration during natural reseeding. In Western Washington, forest managers often practice clearcut harvesting. By removing all the trees in an area, the competition for sunlight is reduced for the planted seedlings.

Page 8 - Wanted - Your Art Work, Stories, & Poems

Attention Teachers: You can meet some of OSPI's requirements for yearly accountability in social studies, and the arts as outlined in RCW 28A.230.095 by encouraging your students to enter our Art Contest.

Your class could win a prize! **Visit our website for the complete rules at www.waic.net**

Don't Miss It--My American Farm's Ultimate Challenge!

The Ultimate Challenge is the newest addition to My American Farm, the free online educational resource sponsored by Pioneer, Hi-Bred a DuPont business.

The Ultimate Challenge has students select a farmer avatar & take on the challenge of building a virtual farm as they play all of the games in My American Farm. In true board-game fashion, players will also experience several curve ball and quick challenges that provide important information about the impact America's 2.2 million farms and ranches have on their daily lives.

Answers to TG pages 5-6

Top Six Crossword

1. Wheat 2. Hay 3. Apples 4. Cattle 5. Potatoes 6. Milk

Ranking by \$ value in 2009: Apples, Milk, Potatoes, Wheat, Cattle, Hay

The value of hay in 2008 pulled it into 5th place ahead of cattle (which was the first time this had happened.) Wheat, potatoes, and cattle have often exchanged places between 3rd and 5th in order. Why? Students should understand that the total value of each crop is dependent upon three factors: 1. the price per unit, 2. the yield per acre or animal, and 3. the number of acres or animals produced.

If for instance you tell your class that Washington raises more potatoes per acre than any other state, why does Idaho lead the nation in the production of potatoes. (Because Idaho raises so many more acres of potatoes than Washington.—We assume price per unit would be the same for both states).

It's All About Agriculture

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

That's a Lot of Wheat

7,385,100,000# divided by 2000#/ton = 3,692,550 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. Convert % to decimal 514 miles X .39 = 200 miles/gal. of fuel for rail
514 X .115 = 59 miles/gal. of fuel for semi trucks

Moo Math

1. 8.6# X 7 gal. = 60.2#; 7 gal. X 16 cups = 112 Cups
2. 72,170# divided by 8.6#/gal. = 8392 gal/year divided by 365 days = 23 gal./day
72,170# divided by 2.2#/kg = 32,805 kg
3. 5 gal X 8.6#/gal X 52 weeks = 2236 #of milk/year
2236# X .0325fat = 72.67# fat3
2236# X .01fat = 22.36 # fat

the difference is 50.31# of fat that is not consumed if you switch to 1% milk.

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

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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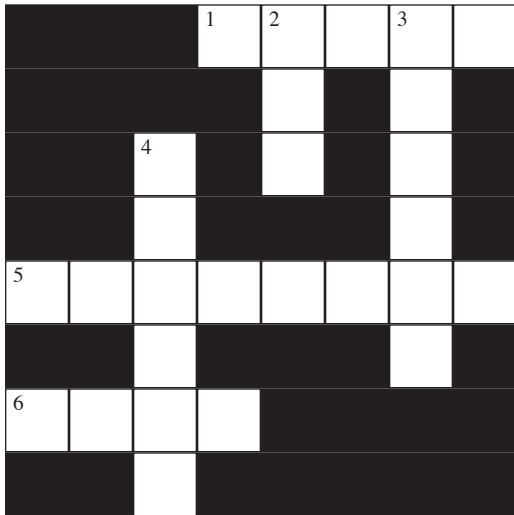
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Top Six: Here are clues to Washington's top six agricultural commodities based on dollar value



These top six commodities account for 60.92% of the total value of ag production in Washington (2009). Can you place these top six in the order of their dollar value?

ACROSS

- 1 Grain that is ground into flour for bread
- 5 Vegetables grown underground; can be baked, fried or chipped
- 6 Beverage made by dairy cows

DOWN

- 2 Dried and baled alfalfa and grasses
- 3 Red, yellow, or green fruit: make tasty pies
- 4 Animals that provide beef

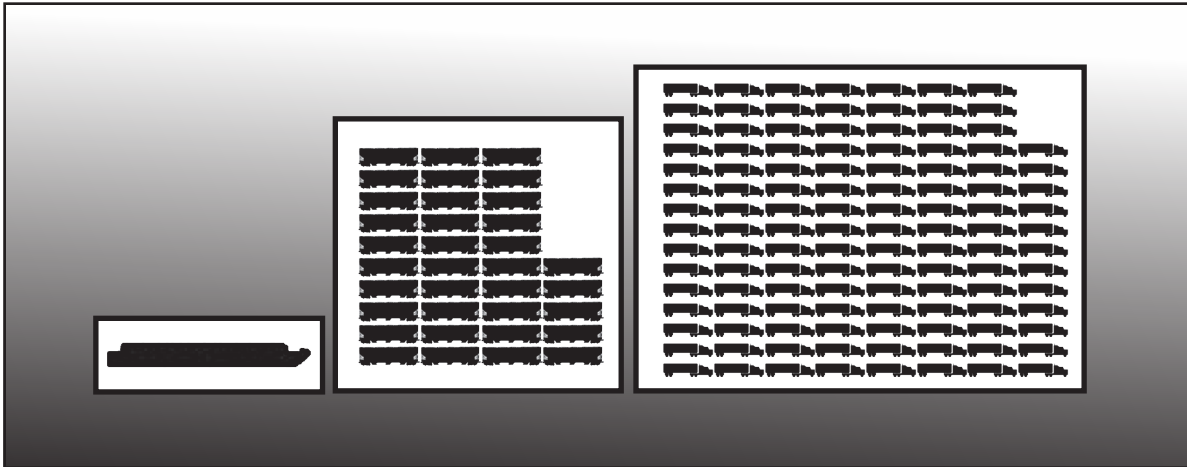
It's All About Agriculture!

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. _____ is a habitat term describing the border between two areas and is an important part of shelter.
6. The process that breaks globules of butterfat into tiny particles that stay suspended in milk is called _____ .
7. Food webs have three important groups _____ .
_____, _____ .
8. Washington leads the nation in the production of five fruits. Can you name them?
_____, _____ .
_____, _____ .

That's A Lot of Wheat!!!

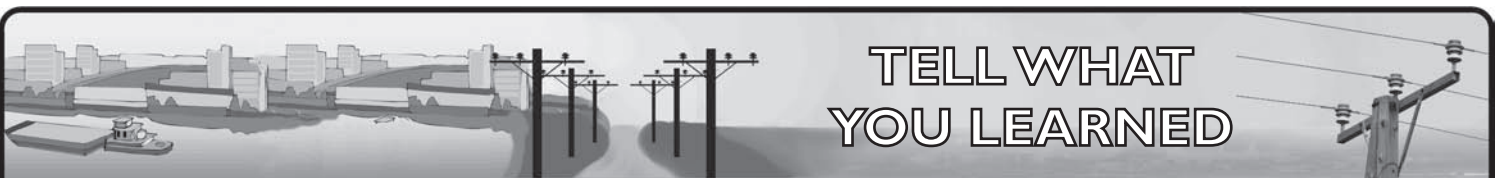
In 2009, Washington farmers produced 7,385,100,000 pounds of wheat. How many tons is that? Nearly 85% of the crop is exported. Barges are the most efficient transportation to deep water ports.



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. With a barge, one ton of cargo can be transported 514 miles using one gallon of fuel. Railroad transportation for the same ton of cargo is only 39% as efficient, so how many miles will be traveled with one gallon of fuel? Trucks are only 11.5% as efficient as a barge; how many miles will be traveled using one gallon of fuel?



TELL WHAT YOU LEARNED

1. Pretend you take a drive across the state of Washington and pass through four different growing regions. Write a narrative about the agricultural production you might see as you cross the state.
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.

Moo Math

1. One gallon of milk weighs 8.6 pounds. An average cow will produce 7 gallons of milk each day. How many pounds is that? How many cups (or 1/2 pint cartons) is that? (Hint: there are 16 cups in a gallon).
2. In 2010 a cow in Wisconsin produced 72,170 pounds of milk in one year. WOW!! How many gallons a day is that? If one kilogram equals 2.2 pounds, how many kilograms of milk did the champion cow produce in one year?
3. Extra Credit--If your family drinks 5 gallons of whole milk (3.25% fat content) each week, how much less fat per year would your family consume if 1% milk were used rather than whole milk? (Hint: start by converting gallons to pounds)

