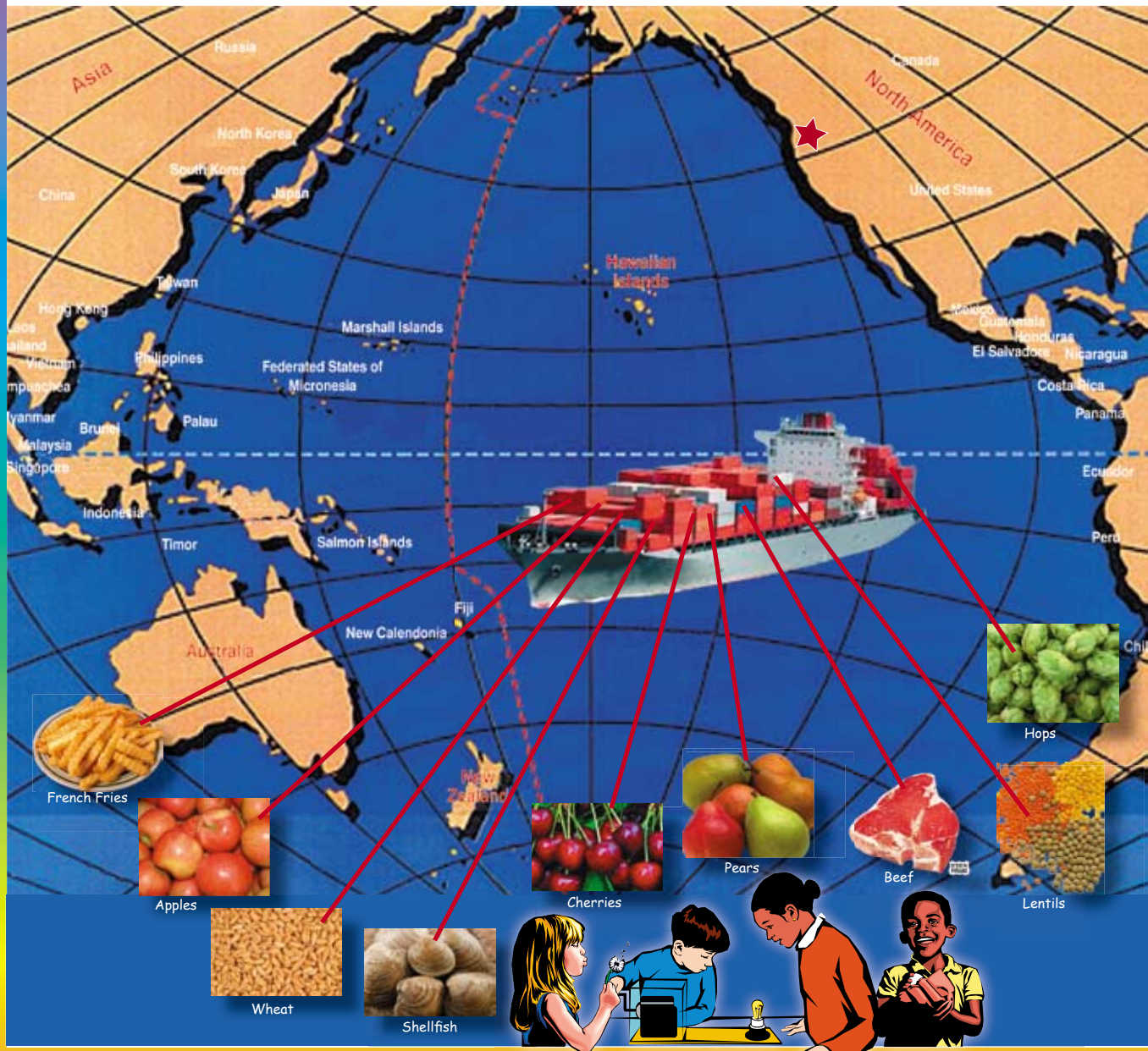
Ag@School

Volume 12, Issue 2 2012/2013

Published by Washington Agriculture in the Classroom

Pacific Rim Trade

Thanks to our location on the Pacific Rim and deep water ports, Washington has a favorable international trade advantage. By sea, our ports are about two days closer to Asian markets than California ports. Washington is the third largest exporter of food and agriculture products in the US.



Today's Children...Tomorrow's Leaders

tech•nol•o•gy (tek nol´ə je), n. using scientific knowledge to find a better way of doing something.

Sweet Cherries

This juicy, ruby red fruit originated in Asia Minor, spread throughout Europe, was brought to America with settlers in 1629, and traveled to the Northwest by ox cart in 1847. The US leads the world in sweet cherry production, and Washington accounts for about 50% of the total. Northwest cherries are bigger, plumper, juicier, and sweeter. Our micro-climate is the ideal mix of warm sunny days and cool crisp nights. Plus we have nutrient-rich soil. Northwest cherry season is mid-June to mid-August.

Amazing Agriculture

Farmers and ranchers rely on scientists and engineers to provide new discoveries, resulting in advancements in farming techniques for all crops, and livestock too. That is technology – using scientific knowledge to find a better way of doing a job. US agriculture is very successful at applying technology. While one US farmer could feed 19 people in 1940, today a single farmer feeds 155 people! Even more amazing, farmers and ranchers are able to do this without cultivating more land. This **high-yield agriculture** depends on increases in production based on science and technology.

Roses & Cherries Strange Relatives

The rose family (Rosaceae) includes many important crops like apples, pears, almonds, peaches, apricots, plums, cherries, strawberries, raspberries, and cut roses.

High-Yield Agriculture

Farmers grow more food on each acre by using technology. They choose improved seeds and plants, add plant food (fertilizer) to the soil, manage pests, and use better equipment and techniques to increase production.

Happy Birthday President Washington!

February 22, 1732

Did young George Washington chop down a cherry tree? Probably not. This is an example of a legend, meaning that no one has any records to say that the story really happened. The noteworthy part of this legend is to remember how important it is to tell the truth. When young George's father asked who chopped the bark off his cherry tree, reportedly George replied, " I cannot tell a lie, it was I". We do know that George Washington was known for his honesty. We also know that cherry trees grew at his boyhood home at Ferry Farm and later at his plantation at Mount Vernon.

A Faster Way to Grow Cherry Trees

Today it takes two to three years to fill orders for young cherry trees. Cherry trees are started in outdoor nurseries. It takes a year to start **rootstock** from a whip (young branch planted in the soil). Then the rootstock is old enough to be grafted to the **scion** (a living shoot or bud that becomes the fruit-producing part of the tree). The nursery waits at least another year for the graft to heal. Being out in the open, the young trees can be attacked by frost, pests, and disease.

To try to grow trees faster, Washington State University student Matthew Allan and graduate student Tyson Koepke grew rootstock materials in the lab. They placed the plant tissue into a gelatin-like mixture of vitamins, minerals, and carbohydrates. Small rootstock trees sprang up, and the trees were then transplanted into soil. About 16-20 weeks later, the rootstock was ready to graft. Allan also grew the scion shoots using the same method. He then snipped the tip of a scion to graft onto the rootstock.

Successful micro-grafting in the lab would allow producers to grow three to four batches of trees each year. This faster, more reliable supply of trees would let growers respond more quickly to market demands for cherries and new varieties.

Rooted cherry rootstock generated using micropropagation, ready for micrografting. Photo: Tyson Koepke/Washington State University.

TRADE IS A WASHINGTON TRADITION

Washington is the most trade dependent of the 50 states. (It has the highest per capita export value at over $6000/ resident.) Agriculture and food **exports** account for about 23% of total exports from Washington.

People of Pacific Rim countries love our sweet cherries! In 2011 our top markets were located in Canada, China/ Hong Kong, and Taiwan. Passing the free trade agreement with Korea doubled their consumption of cherries. Even though cherries are the second most expensive fruit in Korean markets (blueberries are the most expensive) the biggest seller of fresh cherries in the world is a Costco store in Seoul. Other consumers can be found in Australia, Japan, and SE Asia. In Mexico, 80% of the people have never eaten cherries. But when they have a taste, the majority want to buy more.

Can you locate these trading partners on the map on the cover?

We also export bulk commodities, like shiploads of wheat, as well as high value processed products like meats, dairy items, dried and canned fruits and vegetables, packaged food, and wine. As people in other countries have increased income, these foods become a larger part of our exports. About two-thirds of all Washington agricultural exports are destined for Asia. The ports of Seattle and Tacoma are the 2nd largest in the US and have excellent rail/ road/air links.

We **import** foods because that allows us to have fresh fruits and vegetables available throughout the year, as well as some commodities like coffee, tea, and cocoa that we cannot produce.

THE DEFINITION OF EXPORT IS:
to send to another country for trade or sale

THE DEFINITION OF IMPORT IS:
to bring in from another country for trade or sale

"Life is a Bowl of Cherries" for Washington growers in 2012. We had excellent weather this year. Winter conditions were mild and warm spring conditions allowed for an excellent bloom and resulted in good pollination. Production was up 17.5% from 2011.

Cherry trees in bloom in Washington DC

Unfortunately cherry production in Michigan **"was the pits"**. Michigan is normally the largest producer of tart cherries (those used for pies and preserves). Record high temperatures in early spring led to premature development of the trees. This was followed by several frost events throughout the state. Also pollination conditions were poor. The majority of growers lost their entire cherry crop this year. Michigan production was down by 96% from 2011. Across the nation tart cherry production was down by 68%. A reduced supply means that cherry pies may be more expensive this year.

"Pretty Please, With a Cherry on Top!"

A delicious red cherry is often placed on top of a cake or an ice cream dessert to make it even more appealing to the eye and the tastebuds. So the "cherry on top" is the final touch that makes something as attractive as possible. If you say "Pretty please with a cherry on top", it means you are trying to make your offer as attractive as possible. That cherry is probably a maraschino cherry.

How a Maraschino Cherry is Made:

The modern maraschino cherry is (often a Queen Anne cherry) soaked in a calcium salt brine to remove its natural color and flavoring. They are then pitted and soaked in a sweetener for around a month. The final step is dipping in artificial coloring to give the maraschino its brilliant red color (or any other color desired).

Almost all fruit trees are grafted onto a rootstock, which will determine a tree's size, pest and disease resistance, and cold hardiness.

INTEGRATED PEST

Integrated Pest Management (IPM) is an environmentally sensitive way to help farmers prevent unacceptable levels of damage to their crops from insects, weeds, and plant diseases. IPM combines closely observing nature with state-of-the-art weather monitoring and scientific understanding of pest and disease cycles. IPM takes advantage of all appropriate pest management options including the wise use of **pesticides**. The goal is to minimize risk to the environment and public health.

What are Pesticides?

Pesticides are chemicals that control or eliminate pests. Examples of pests include germs, weeds, harmful insects, or rodents. A rose growing in a wheat field is a pest. We use pesticides daily all around us. We use them in hospitals, schools, homes, restaurants, as well as on farms. Using antibacterial soap on your hands or mouthwash to kill germs are examples of pesticides.

Without pesticides food production would drop by half and we would have to farm more than twice as much land to produce the same amount of food. Pesticides can save lives, save land, save wildlife, and generally make our lives more comfortable.

Pesticides are also expensive and we need to take care that they are targeted to a specific area at the appropriate time.


Orchard Sprayer

How does IPM work?

IPM is not a single pest control method but is a series of management evaluations and controls. IPM programs use up-to-date information on the life cycles of pests. The four steps include:

1. Set level to take action

Before taking any pest control action, IPM first determines how many pests must be present before action is taken. Sighting a single pest does not mean control is needed.

2. Monitor and Identify Pests

Not all insects, weeds, and other living organisms require control. Many insects are beneficial, helping to naturally control crop pests. IPM programs work to monitor for pests and identify them accurately. This removes the possibility that pesticides will be used when they are not really needed or that the wrong kind of pesticide will be used.


Green Lacewing
Green Lacewing larva will devour 200 or more pests or pest eggs a week


Lady bug larva eat aphids

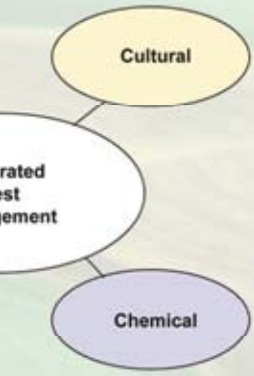
3. Prevention

As a first line of pest control, IPM programs work to manage agricultural crops to prevent pests from becoming a threat. This may mean using cultural methods, such as rotating between different crops, selecting pest-resistant varieties, and planting pest-free rootstock. These control methods can be very effective and cost-efficient and present little to no risk to people or the environment.

What is the most commonly used agricultural pesticide type in the US?

79% of all pesticides are herbicides to control weeds and grasses

MANAGEMENT (IPM)



4. Control

If pest control is required, IPM programs evaluate the proper control method. Effective, less risky pest controls are chosen first, including highly targeted chemicals, such as **pheromones** to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring indicates that less risky controls are not working, then additional pest control methods would be used, such as targeted spraying of pesticides. The goal is to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.


Pheromone Trap

Benefits of IPM

- Protects beneficial insects and wildlife
- Less expense for producers, keeps food costs down
- Better protection of soil, water, and air quality
- Healthier food and farm products
- Safer working conditions for ag workers and their families

The IPM approach can also be used in non-agricultural settings, such as the home, garden, and workplace. Organic food production applies many of the same concepts as IPM but limits the use of pesticides to those that are produced from natural sources, as opposed to synthetic chemicals.

When is a rose growing in an orchard not a pest?

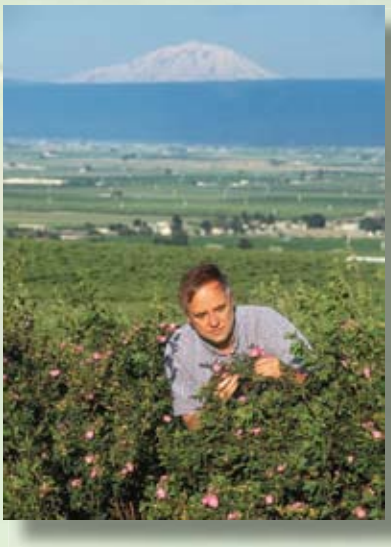
When roses are used as links in a complicated food web. The roses harbor insects called strawberry leafrollers. A parasitic wasp feeds on the leafroller caterpillars over the winter. In the spring the wasps emerge to attack caterpillars of several tree fruit leafroller moths. In the caterpillar stage, these insects eat the leaves and fruit of apple, pear, or cherry trees, sometimes causing yield losses greater than 50 percent. In heavily infested areas of central Washington, tree fruit growers may need to spray their orchards two to four times a season to reduce the leafrollers' appetite for destruction. Making orchards more hospitable to the parasitic wasp could ease or even eliminate the need for spraying with chemicals.

Check out the whole story at www.ars.usda.gov/is/AR/archive/jan04/rose0104.pdf

This parasitic wasp (about 2 millimeters long), attempts to sting a larva of the oblique-banded leafroller. The wasp must take care, however, because the caterpillar is 20 times larger than she is, and can be quite belligerent about intruders. The wasp's stinger (protruding from its abdomen) injects a toxin that causes the leafroller to spin extra-thick webbing around itself. The wasp starts laying her eggs in the webbing . About 20 wasp larvae hatch from the eggs, crawl down the webbing to the caterpillar, and start sucking on its body, thus killing it.

Career Highlight

Researchers like entomologist, Dr. Tom Unruh working at the Yakima Agricultural Research Laboratory (Wapato, WA) seek new and more effective ways to control insect pests of fruit and vegetable crops. Part of the lab is an **insectary** where technicians raise both the pests and the beneficial insects for research purposes.



Entomologist Tom Unruh looks for parasitic wasps on roses in an experimental garden next to an apple orchard.

Potatoes -
The Crop that Changed the World

When Spanish conquistadors invaded the Incan empire in Peru in 1532, they discovered gold and jewels and maybe more importantly, the potato.

There were many strange varieties of potatoes grown in Peru. The Incas developed a way to preserve potatoes. They would dig the potatoes from the ground and leave them outside for several days. In the cold, dry mountain air, the potatoes gradually became freeze-dried. The Incas would help the process along by walking on the potatoes to squeeze out the extra moisture and to flatten the potatoes so they took up less storage space. This product was called chuñu.

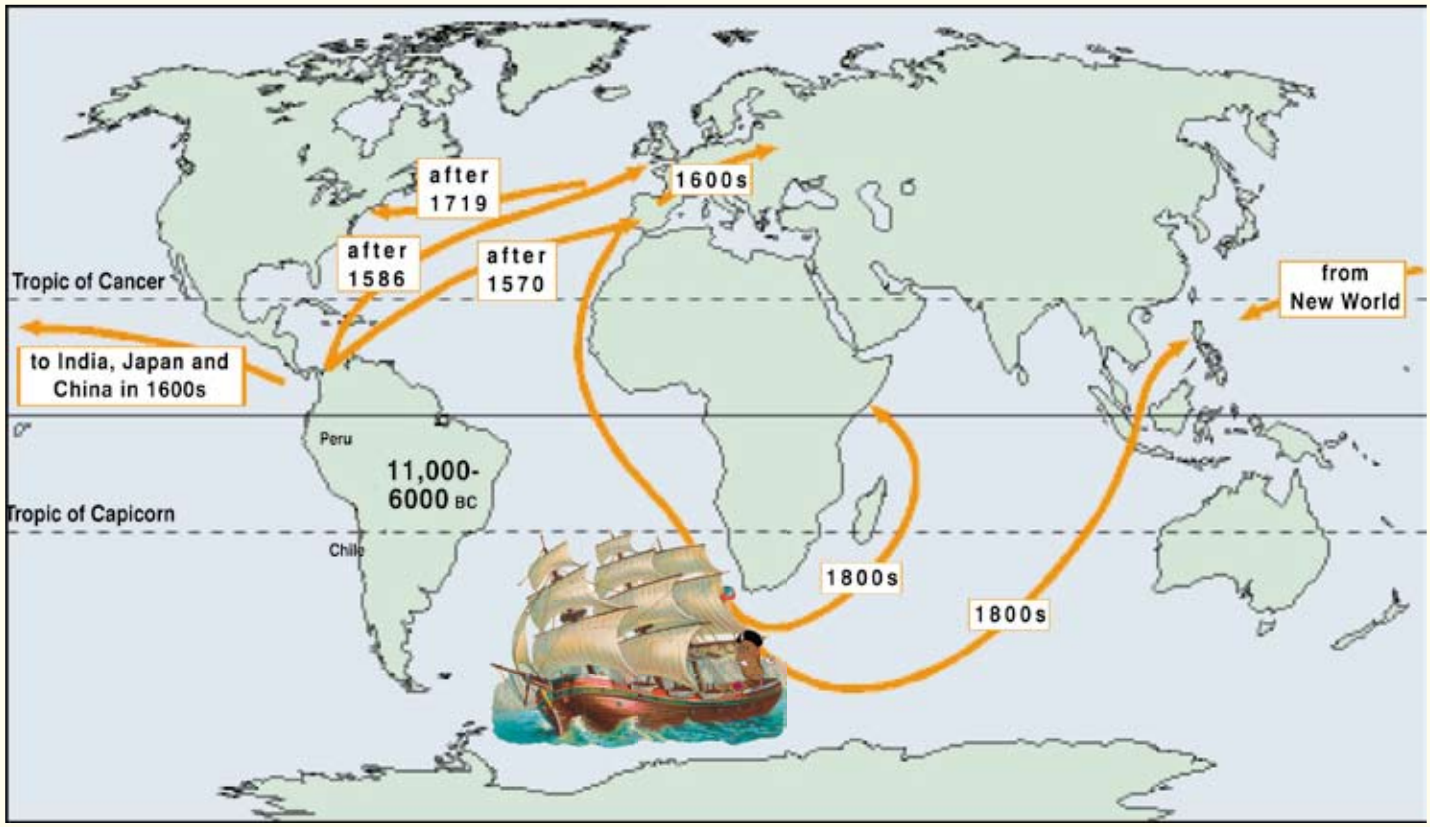
Potatoes were carried back to Spain by 1570 and the English explorer Sir Francis Drake brought them to England in 1586. People thought potatoes were very strange. They were ugly and misshapen and there were rumors that they might be poisonous or even cause leprosy. Mostly they were raised for animal food.

European immigrants introduced potatoes to North America several times throughout the 1600s, but they were not widely grown in the US until Scotch-Irish immigrants started cultivating them in 1719.

Scientists of the time recognized the nutritional importance of the potato and saw this crop as a way to provide food when the grain crops failed (as they often did). Just like a good advertizing campaign today, by the late 1700s, all sorts of efforts were made to promote the potato. Marie Antoinette wore potato flowers in her hair as a fashion statement. Some rulers offered rewards for planting potatoes, others threatened punishment for not growing them. Frederick of Prussia planted a royal field of potatoes and stationed guards to protect it. The peasants assumed that anything worth guarding was worth stealing, and snuck into the field to dig plants and put them in their home gardens.

With a dependable food supply the population boomed across Europe. In fact in Ireland, the population doubled between 1780 and 1840. Highly nutritious potatoes also helped prevent many diseases, like scurvy (caused by a shortage of Vit C).

In 1845, a fungus called "late blight" devastated the crop in Ireland. The people who were almost totally dependent on potatoes for food suffered greatly. The Great Irish Famine resulted in one and a half million people dying of starvation or immigrating to other countries to find food and a place to make a living.



Name the BIG FOUR!

There are about 380,000 kinds of plants. About 100 are regularly grown and eaten as human food. Amazingly, over half of the world's food comes from only four plants. Three are grains, and one is a tuber vegetable.

Which one does NOT grow in Washington?

First grown by ancient tribes in the mountains of South America, this food is actually an underground storage unit. The roots collect more water and food than the growing plant can use at one time. The plant stores the excess food in oval shapes, called **tubers**. This crop produces more pounds of protein per acre than corn, rice or wheat. Idaho leads US production but **Washington grows more pounds per acre.**

One-seventh of all the farmland in the world is used to grow this grain - far more land than for any other food crop. It is a staple food for 35% of the world's people and is used to make breads, cookies and noodles. Kansas, North Dakota, Montana, Washington, Texas and South Dakota were the leading production states in 2011.

Christopher Columbus found this grain growing in North America in 1492. American Indians helped the Pilgrims survive by teaching them how to plant and cultivate it. Today, it is our country's number one agricultural crop. Iowa, Illinois, Nebraska, Minnesota and Indiana lead US production.

It's a staple food for half the world's people. Native to Asia, it has been grown and eaten there for thousands of years. It grows in warm areas and plants must be under water for most of the growing season. In the US, it is grown mostly in Arkansas, California, Louisiana, Texas, Mississippi, and Missouri.

Cereal – edible seeds of grasses. Crops such as wheat, corn, rice, oats, rye, barley, and triticale are in the grass family. Their seeds, called grains, are made into flours for breads, breakfast cereal, tortillas, cakes, and many other foods.

Lets 'Hatch a Plan'!

How about having a classroom project to incubate and hatch eggs? The American Egg Board is funding the purchase of complete incubator/brooder kits for nine classrooms to keep.

To be eligible to win a complete hatching set, submit the following information to info@waic.net by February 15, 2013:

1. Why does your class want an incubator/brooder kit?
2. How do you plan to use the incubator/brooder kit in your classroom? How will this project be incorporated into subjects other than science?
3. Where will the chicks go when they are ready to leave the brooder?

Contact info@waic.net for more information.

Eating Healthy

Agriculture provides an amazing variety of wholesome, nutritious foods at a relatively low cost. In the US, Americans spend less than 10% of their disposable income on food (that includes eating away from home). It is important that we spend our food dollars on food that will provide nutrition and energy. Unfortunately, many Americans have very poor diets, because of the food choices they make. They are consuming too many calories, and not getting enough nutrients. This leads to obesity, disease, and shorter life spans. **It's all about the choices we make!** Here are some tips to follow to make your choices the best:

1. Eat the foods in the—My Plate plan first, before treats and dessert.
2. Who needs soda? Even diet soda is harmful to your teeth and bones. **Drink WATER** and three servings of milk.
3. Dump that super sweet cereal. Try fruit on top of whole grain cereal.
4. Eat fruits and veggies for snacks, not chips, cookies and candy.
5. Be aware of all the sauces, salad dressings, and other toppings you put on your food. Read the labels, know how much sugar and fat they contain.
6. Turn off the TV, computer, and video games. Get at least 60minutes of physical activity each day.

Label Sleuth

*Collect nutritional information from a carton of milk, a can of soda, and a box of fruit juice. Compare the total calories and the amounts of vitamins and minerals in each. Which one is the most **nutrient dense** (gives the highest amounts of vitamins, minerals, and protein for the amount of calories per serving)?*

Fruit

Eat pieces of fruit because they have fiber. Drinking too much fruit juice can add unnecessary calories. Get tips at: www.choosemyplate.gov/food-groups/fruits-tips.html

Dairy Group

Milk, yogurt, and cheese provide calcium, Vit D, potassium, protein, and other nutrients to build growing bones. You need 3 servings every day.

Make half your plate fruits and vegetables!
www.fruitsandveggiesmorematters.org/

Grains

Make half your choices whole grain. Read labels and choose products that name a whole-grain ingredient first on the list. ("Whole wheat", "oatmeal", "bulgar", "brown rice" are examples) Saying a product is "100% wheat" doesn't necessarily mean there is any whole-grain.

Vegetables

Choose vegetables rich in color—red, orange, or deep green! Brighten your salad by using colorful vegetables like sliced red or green peppers, radishes, shredded red cabbage, carrots, beets, spinach, or sweet peas.

Meat, Fish, and Eggs

Eat a variety of foods from this protein food group. Try dishes made with dry beans, lentils, nuts, eggs, or seafood. You only need 5 to 7 ounces of protein foods each day.

My Washington Plate