Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
1997 Volume VII: Environmental Quality in the 21st Century

From the Farm to Your Table: Where Does Our Food Come From?

Curriculum Unit 97.07.07
by Roberta Mazzucco

The Unit

The unit is being written for 3 rd graders but can be adapted to use with fourth and fifth grades. The suggested teaching time for the unit is from 5 to 6 weeks, but can easily be extended depending on the interest of students and teacher. The general outline of topics to be covered in the unit are as follows:

I. Where does our food Supply Come From? What do they farm in Connecticut?

What are the major agricultural areas in the U.S.?

What foods do we get from other countries?

II. How do air, water, and pesticides affect our food supply? How does pollution work itself through the water cycle?

How do pesticides and other toxic substances influence the foo

chain.

III. How do food additives adversely affect our food? How are we visually influenced by foods?

How do advertisers use appearance and taste to make us buy their products?

How can we make better choices?

By framing the unit into a group of questions, I hope it will keep unit and the children focused. While some basic nutritional facts will be given the unit will not be a focused on “nutrition” per se. I am interested in presenting nutrition insofar as it relates to contamination of the food supply and its affects on humans.

Introduction

The last generation of children has virtually grown up on fast foods and convenience meals. First finger foods are now McDonald's French fries and chicken McNuggets. Sugary cereals and fattier foods are now present in school breakfasts and lunches. In many schools children can buy chips and so called juices in the school cafeterias. Children and snacks have always found a way to get together but now there is less monitoring of what kids eat by most parents. Students of all ages seem to have a quarter or two to buy snacks on a daily basis.

With more single parent families and working moms there is less monitoring of snacks and daily meals. It is not unusual to have students come with MacDonald's bags filled with junk food on days they need to bring lunch. There are also usually more chips and that blue juice. Add to wrong food choices the pollutants that make their way into our food supply and it is easy to see that there is much to discuss with children and their parents. Of course the nutritional value of these foods has long been questioned and now fast food and convenience food producers are trying to market their products as nutritional with different claims about, additives, sugar and fat content. I believe that the important thing about speaking to children or even adults for that matter is that we all enjoy the occasional cheeseburger and fries or that bag of chips. Eradicating these things is not our goal but having students make wise choices about how much of these things they eat is the realistic approach.

Having been brought up in this fast food and pop it in the oven kind of eating many students do not have the faintest idea what they are eating and where it comes from. Say to many of them that pigs are used as food and many will groan and go "yuck." However, on closer conversation they will all admit to eating bacon, or pork chops. An education of where their food comes from is a bit of a shock. To most the food chain stops at Stop and Shop or Super Kmart.

I would like my students to see just how fragile the food supply is. I want them to see how we depend on our natural environment to provide our nutritional needs. They should also understand that community as it relates to food production is not only Connecticut, or even the United States, but now extends to a world wide operation. More and more of our foods are coming from outside of the United States; thus, throwing us into a global economy where food production is not always held up to strictest environmental standards. I believe this unit can make students more aware of the global relationships we now have, and their need to be careful consumers. Hopefully students will develop a sense of respect for the fragility of our environment, and the need for them to be advocates for government laws regarding pollution, pesticide, and waste disposal reduction.

Where does our food come from?

The first farms

It is interesting to note that humans did not begin farming until 10,000 - 8,000 B.C. It seems very obvious to us now, but prehistoric peoples basically lived on hunting and the gathering of some berries or mushrooms, etc. It is not known how humans came to farm but it was probably an accidental discovery that led to the first farms. The result of farming was dramatic. People did not have to live nomadic lives and given the abundance

of crops that could be grown there was a steadier and surer supply of food. This improvement in nutrition led to growth in total population on the earth and longer lives. As the early farmers progressed they made tools to ease their work like hoes and plows. Later they put animals like oxen, camels and, the water buffalo to work. It is estimated that by the year 3,000 B.C. the population on the earth had grown to nearly 100 million people. That is 30 times the number that lived before the advent of farming. [1]

Farming in the United States

The United States has advanced its production to a point where we do not farm worry, for the most part, about feeding our population. In fact, there is usually enough food to be used for trade with other countries or storage for crises such as famine or war. However, in the rest of the world seven out of ten people go to bed hungry. One third of the world's deaths are the result of starvation or a number of diseases resulting from hunger and malnutrition. For many areas for many people there is food but it is not of a variety that provides a balanced healthy diet.

The result of a country's food situation has greater economic importance. If people are working to feed themselves they cannot worry about economic growth. They cannot get new machinery, high yield seed or new irrigation ideas if they have no money. When the economy grows people can also choose foods that are better tasting and have more variety. However there is a down side to this since people may not eat a balanced meal choosing foods that add unnecessary calories, fat and/or sugars which can adversely affect their health.

There are three basic steps that are used in getting our food to the table. They are - production, processing, and transportation. Production is basically the growing of the food product on a farm whether it is chicken, lettuce, corn, or eggs. Processing is what happens after the crop is ready for picking. Usually eggs are checked and graded, meat is cut and labeled and, milk must be pasteurized for safety. Almost all foods undergo some kind of processing even if it is simple packaging. The last step is transporting the food to various stores. In the United States the most common mode of transportation used is by truck, although rail and ships are also widely used. [2]

Agriculture in Connecticut

Almost every state has local crops, or food products that they are known for. Connecticut is no exception. Many people would not think that such a small state in land area would be so wide in scope and variety. Connecticut ranks #1 in New England in mushroom production, aquaculture production and value, horse numbers, greenhouse and nursery sales(per square mile), tobacco acreage, pear production, 1995 milk production per cow, peach production, total farm marketing income. Connecticut was 2 nd in New England in sweet corn production, chickens for egg production, beef cattle and turkey production(per square mile) and farm equity. 60 - 65% of Connecticut's 4,872 square miles of land are farms, open spaces and forests. There is 1 acre of forest land for every 2 and 1 acre of farm land for every 8 people. [3]

While the United States produces a staggering array of crops there is still a market for foreign agricultural products in the United States. Fresh fruits and vegetables are coming to us from many parts of the world especially Central and South America. As we will see later the regulations in foreign countries on chemicals used in food production is a significant one for the food supply in the U.S.

Water, Air, and Chemicals

The many chemicals that man has introduced into the environment basically reach the food supply through

the air, water, or by being put directly on plants to help them grow, or to enhance the growth of livestock and the output of milk and eggs.

Water:

Water makes up the majority of the earth's surface, the human body, and is the major element in our food and drink. Items such as tomatoes, and lettuce are 95% water. Broiled chicken is 61% water and soda is 88% water. Ice cream contains 62% water but the milk within it contains 87% water. [4] The water in our food ultimately comes from rain. That water has gone through the rain cycle. Water falling on the earth filters into the ground or in streams and lakes and then flows into rivers and oceans. Some of it finds it way into public water supplies or into underground wells. In any case its route often takes it into contact with pollutants. Water can become polluted in a variety of ways from the air, by moving through soil picking up pollutants like pesticides, and by the public water we drink coming from streams and rivers that are contaminated with factory wastes and other pollutants that made their way into drinking water supplies. [5]

Many communities in our country still dump untreated or partially treated pollutants into the water. When communities downstream draw their drinking water it can have residue of whatever pollutants have found there way into the system. When human sewage, sewage from animal feed lots and waste waters from stockyards and food handling pollutants are dumped into our rivers and lakes, there is a threat that disease-carrying bacteria may be polluting our water. Some of the possible illnesses include typhoid fever, dysentery, cholera, and gastroenteritis, along with milder illnesses like nausea, vomiting and diarrhea. [6] Water treatment plants can kill most of the bacteria but as pollutants become more numerous more complex, and more toxic it is easy to see that water treatment plants will not be able to do an adequate job.

Chemicals

Agricultural chemicals pollute the water we drink and the food we eat. In fact pesticides are a greater threat to our water supply than sewage. [7] Again using the example of the rain cycle which carries our water supply it is easy to see how that water traveling through the ground of farms and lawns can pick up numerous chemical residues and carry them to our water supply. Some of the most commonly found food pollutants include: DDT, arsenic, nitrate fertilizers, radiation, lead, and, mercury. [8]

DDT: once a popular insecticide it lasts almost indefinitely. Its half life is about 18 years which means that its concentration will be reduced to half its strength in 18 years and then the remaining DDT will be reduced to half of its strength again in another 18 years and so on. DDT stays in the body about 40 years while DDE, the breakdown product of DDT lasts 70 years. [9]

ARSENIC: is another poison that makes it way into the water supply through pesticides it is used in. Arsenic is also found in some household cleaners and can only be removed from water in highly sophisticated sewage treatment plants. [10]

NITRATE FERTILIZERS: can be dangerous because if they enter the human body they can be converted into highly toxic nitrite by the bacteria that live in the intestinal tract. [11]

RADIATION: can get into the water supply from low level nuclear explosions and wastes which are discharged from nuclear power plants and other experimental production plants within the nuclear industry. Many radioactive elements including strontium 90, which can damage bone marrow, and cesium 137 which affects

the muscles. The radioactive element tritium can combine with the water molecule and be carried to all parts of the body. [12]

However many scientists believe we are at greater risk for radiation exposure through radon. Radon is a natural radioactive gas that is caused by the decay of radioactive materials present in some rocks, soil., minerals, water and natural gas. The effects are usually greater inside homes especially those weather tight. It is invisible and latent. Its victims may become ill and die years after exposure.

There are simple tests that can easily detect radon. Ventilation of the home can also help lower levels. [13]

LEAD: in some cases water contamination by lead is a result of old plumbing which used lead piping or solder. However, the major source of pollution from lead is still industry which is discharged into the air and make their way to the water. Lead also occurs in food wraps (lead acetate) and solder on cans. [14]

MERCURY: may contaminate our water from many sources. It is often present in industrial waste which has been estimated to be about 5,000 tons per year worldwide. Mercury comes from chimney stacks and vents of power plants, factories, and heating systems which burn bituminous coal and crude petroleum. Since both of these fuels contain mercury, their burning releases mercury into the atmosphere. Most of the mercury found into rocks and soil as well as in the tissues of plants and animals including man is harmless. While the mercury released into the water is not particularly toxic it can mix with certain methylating bacteria which exists in soil, and the sediments of lakes, rivers, and oceans, and convert inorganic mercury into highly poisonous compound methyl mercury. Mercury may bioaccumulate in some fish like tuna and swordfish. [15]

Air:

While the pollutants we have spoken about so far have come through our water many also travel through the air. As the saying goes whatever goes up must come down. Likewise whatever pollutants we throw into the air they soon come back down and enter the ground and/or our water supply. A study done at

California Institute of Technology had scientists cutting holes into the Arctic ice and taking out cylindrical samples of ice from sheet as that had accumulated for centuries. It showed that between 800B.C. and 1750 A.D. the lead content had risen slightly. After 1750 the lead content went up dramatically. This indicated that at about the time of the Industrial Revolution the lead content rose dramatically. By 1940 it had grown four-fold and between 1940 and 1965 it had risen 300 times. This rise they attributed to the increased use of gasoline containing leads additives. [16]

Pesticides

Throughout history man has battled insects and other pests such as members of the rodent family. Pesticides are used to kill or suppress a wide number of organisms that are pesky in certain situations. These pesticides include:

¥ fungicides which are often used to coat seeds so they will not pick up fungi living in soil.
¥ Bactericides which control harmful bacteria
¥ Insecticides which kill insects and are the best known and most widely used pesticides.
¥ herbicides which are chemicals used to kill weeds or other undesirable vegetation.
¥ miticides which kill mites and ticks.

¥ rodenticides which kill rats, mice, moles and other rodents. [17]

This is not to say that pesticides didn't have their benefits. First they allowed us to grow more food and feed people who were once starving. It also allowed people to be saved from the ravages of some killing diseases. However the affects have not been found to be so good. Of the 800,000 species of insects less than 1% are harmful to plants, animals, or human beings. [18] We have killed many species off by spraying these chemicals indiscriminately. Some of those insects we have destroyed pollinate other helpful plants. Many of those insects help to counterbalance other undesirable insects. Also many of the fungi help to convert dead matter in the soil into the nutrition which plants need to grow. Thus we have unwittingly thrown off the balance of nature. These members further down on the food chain often pass on these poisons and they accumulate as they climb further up the food chain. The poisons may not kill a fish or bird but they can pass on their affects to humans who may eat them. Likewise plants treated with these poisons may have residue on them which we eat.

Growth Enhancers

Not all chemicals used on our crops are insecticides. Sometimes farmers add chemicals to help fruits grow such as alar which apple farmers formerly used to keep apples from falling prematurely off the tree. Other types of chemicals hasten the ripening of crops. Sprout inhibitors are used on root crops like potatoes and onions. One of the most commonly used inhibitors - maleic hydrazide was injected into baby mice who developed liver tumors within the year. Over a twenty year period most people ingest more maleic hydrazide from potatoes alone to more than equal the amount given those mice. [19]

Feed Additives

The pesticides we have talked about not only contaminate the plants and water people consume but also find their way to livestock through the feed that theses animals eat. As the animals eat their feed the chemical residue builds up in their fatty tissues. When people eat the cattle and poultry the chemicals are passed on to them. While most of this type of contamination often get in accidentally through shoddy farming practices. However, there are chemicals that are used on animals to hasten their growth and increase their size. Arsenicals, antibiotics, tranquilizers, and hormones have been among the most widely used feed additives. [20]

Since 1950 arsenical additives have been used to help chickens lay more eggs. [21] Antibiotics are added to the feed of cattle and poultry to make the animals fatten quicker than they would if they were simply allowed to graze naturally. Tranquilizers are used to make animals gain weight rapidly. It increases their appetites making them eat more. They can boost the weight of an animal as much as 25%. Over the years however, nothing has increased animal weight as quickly as the use of hormones. [22]

All of this accelerated fattening of beef not only carries a risk of chemical residue but also alter the proportion of protein in meat and the quality of its fat. The carcass of a free range animal contains 15% protein and 5%

fat. By comparison an animal that has been given feed additives is likely to be as little as 10% protein and 30% fat. Only 2% of this fat is in the soft, yellow, partially unsaturated fats, which the human body can use for building nervous tissue and the walls of blood vessels. The remaining 98% is composed of hard, white, saturated fats which are known to contribute to heart disease in humans, by building up high cholesterol deposits in the arteries. [23]

How do food additives affect our nutritional health?

Food Additives

Since ancient times people have added vinegar, salt and sugar to food to keep it from rotting. When they couldn't get fresh food as in winter they turned to this preserved food for nourishment. Today the things that are used to preserve foods are now called additives. Additives can be natural as salt, or they can be made from chemicals. Basically additives are things we don't normally eat by themselves for food, hence their name.

Additives not only preserve food but they often make them look, taste, or feel better. The Romans added natural soda to their vegetables to make them have better color and they also tried to make their bread look white instead of the natural brown color. In the 1700s so many people wanted white bread that bakers added dried ground up bones, chalk, and even poisonous white lead . While this may seem laughable, the idea of changing the appearance, taste, or feel of food is more popular than ever. [24]

One of the most popular uses of additives is in making processed foods. More than half of the foods we buy are processed. We process foods ourselves when we bake, boil, or fry them. However, most of the time food is processed even before it reaches the grocery store. The reason for this is easily explained. With many people living in cities distant from farm areas it is impossible to bring in fresh foods. Processing helps to keep food fresh longer eliminating waste. Through processing people are also able to eat a variety of foods that their own geographical area may not grow, and out of season foods are also readily available year round.

While processing food has positive aspects to it , there are also a few drawbacks. Processed foods usually lose some of their vitamins and minerals. Sometimes new and less healthy ingredients are added as part of the process. The more processing a food undergoes the more additives it generally contains.

Companies are always trying to come up with new products that look and taste different. More than half the foods on the store shelves right now did not exist ten years ago. Many of these foods have been so processed that little food value exists. Many have too much sugar, starch, and fat to be healthy choices.

Over 10,000 additives now are used by food companies. Many of these can create flavors, textures and color of a food without actually containing any of it.

The most important additives used nowadays are preservatives, antioxidants, emulsifiers, stabilizers, flavorings, colorings, and fragrances. [25]

Preservatives and Antioxidants

Preservatives are the most important additives because they help to keep food fresh. They help to stop food from decaying and going bad. They also prevent molds and bacteria from growing. Nitrate and nitrite preservatives are used in smoked fish, ham, sausage, and other processed meats usually found at the deli

department of most food stores. Sodium nitrite is capable of being converted to nitrous acid when it is in some foods taken into the human body. In tests on animals nitrous acid caused high rates of cancer. However it is still in use.

Some of the chemical preservatives help to slow the rate of growth of bacteria, molds, or yeast. Chemical compounds like sodium diacetate and lactic acid are frequently added to bread to delay the growth of bacteria. Sorbic acid and potassium sorbate, are added to flour, bread, cheese, and mayonnaise to inhibit the growth of molds. Benzoic acid and sodium, benzoate which can produce severe allergic reaction and even death in some people, are added to margarine, fruit juices, and carbonated beverages. Sulfur dioxide which is another toxic preservative is used in dried fruits and molasses. It is also used to prevent brown spots from forming on prepared fresh foods such as potatoes and apples. Sulfur dioxide conceals inferior quality of fruit by almost bleaching out rot spots. It also, however, destroys vitamin B (thiamin).27

An antioxidant is an additive that prevents decaying when food is exposed to oxygen. Oxygen is a key ingredient in helping bacteria make things decay. When an apple is sliced and left exposed to the air it will turn brown. However, if lemon juice is squeezed over it the apple will not change color. That is because lemon juice contains two natural antioxidants: citric acid and ascorbic acid.

Antioxidants prevent fatty foods from spoiling and becoming rancid.(27)

BHT (butylated hydrxytoluene) and BHA (butylated hydroxyanisole) are two of the moist widely used and controversial of all antioxidants. They are in nearly every processed food on the market. Tests on both BHT and BHGA have had very alarming results. Test animals exhibited a number of symptoms when fed these two chemicals. A number of countries like Sweden , Romania, Australia and Great Britain have severely restricted the use of these additives. However, in the U.S. the use of these chemicals has actually increased. Generally antioxidants are used in small amounts because scientist are still not sure of their affect. [28]

Emulsifiers, Stabilizers, and Thickeners

In general emulsifiers, stabilizers and thickeners change the texture of foods. Emulsifiers prevent the ingredients in mayonnaise and ice cream from separating into globs which would not be appetizing to consumers. They also prevent the oil in peanut butter from separating from the mashed peanuts. All natural peanut butter has a layer of oil on top that has to be mixed into the crushed peanuts before eating. When emulsifiers are used as a substitute for a natural shortening they give a smoothness, even texture, and longer shelf life to bakery goods, cake mixes, and frozen desserts. [29]

Stabilizers are like emulsifiers in that they are used to stop ingredients from separating. In fact after an emulsifier is used to stop separation of ingredients, a stabilizer is often used to keep the ingredients from recombining. Stabilizers are particularly helpful in keeping coloring agents and dyes evenly dispersed through natural and artificial drinks. [30]

Thickeners are added to thicken foods like pudding, yogurt and other foods. Many thickeners, emulsifiers, and stabilizers come from natural things like, eggs, tree saps, seaweeds, and wood pulp. Those which are made from a combination of chemicals have names like polysorbates and propylene glycol. [31]

Colorings

Color is a big factor in what foods we choose and how much we enjoy a food. Manufacturers seek to enhance

or change the colors of foods to make them more appetizing. Food dyes such as Yellow AB, Violet No.1 , and Citrus No.2 are used everyday to color butter, and margarine yellow , to dye the skins of oranges, and potatoes and to color popcorn, maraschino cherries, hot dogs, jellies, jellybeans, carbonated beverages, and a host of other foods and beverages. [32]

About 90% of all coloring agents are synthetic dyes, many of which are derived from coal tar. [33] Many food dyes have been banned through the years because they were shown to cause cancer. Food colorings usually have no food value and are purely added for their color. While some food colorings are natural 95% of those used today are artificial. [34]

Many foods like strawberries and peas turn brown when canned. Coloring is added or the consumer would think they had received tainted food. Coloring is sometimes added to food before it is produced. Chickens that are allowed to roam around a barnyard usually produce an egg with a golden yolk. At large egg farms the chickens are more restricted and they may not eat grains that will produce that golden yolk. Since egg yolks can range from pale yellow to deep orange the large farms will add red or yellow colorings to the feed to control the yolk color.

Flavorings and Enhancers

Flavorings are the most common food additives and may be natural or artificial. There are over 2,000 different flavorings now in use. Flavorings are often made from a large number of chemicals. However, manufacturers do not have to list all the ingredients. They simply list the flavor as “real,” “natural,” or “artificial” on the label. The FDA now tests additives and those not known to be harmful are put on a list called “generally recognized as safe” or GRAS. [35]

MSG (monosodium glutamate) has been used as a flavor enhancer. It was found to cause damage in laboratory mice so the government banned its use from baby foods. It is, however, still used in many foods. MSG was first used by Japanese cooks . They added a type of seaweed to water and cooked it. The liquid did not have a taste of its own, but when added to other foods it did improve their taste. MSG can also be made from sugar beets, corn, and other substances. It is used in processed foods from instant soups to potato chips. [36]

Sweeteners

Most processed foods contain sweeteners. Most are made from sugar, but many are artificial sugar substitutes. Additives made from sugar include: brown sugar, honey, corn syrup, and sugars ending in -ose, like dextrose and glucose. [37]

Sugars substitutes like saccharine and aspartame make foods taste sweet but have no natural sugars in them. Studies concluded that saccharin increased the incidence of bladder cancer in laboratory animals, so now all foods carrying it must carry a warning label. [38]

This is by no means an exhaustive list of all the additives our foods have. It must be remembered that additives are not always a negative. Vitamin B added to bread virtually stamped out the disease pellegra which is characterized by skin eruptions and nervous disorders. Also, adding vitamin D to milk helped to wipe out rickets which resulted in malforming bones.

Likewise, there are problems with food that come from mishandling and storage. With families eating out

more there are more cases of food poisoning due to harmful health conditions. Also frozen foods are often mishandled and bacterial problems occur. Most of these problems are right in our own homes and careless handling of food is something we can easily avoid. While accidents can happen and we cannot always know what goes on in the kitchen of a restaurant, the better educated we are about how foods can become dangerous, the better we can keep ourselves and our families healthy.

Activities suggested for Section I - Where Does our food come from?

Lesson 1. What Grows in the U.S. and/or Connecticut?

Objectives:	1. Students will research in small groups agricultural products grown in the main areas (Northeast, West, Central, Southwest, and Southeast) part of our country, or those products grown in Connecticut.
	2. Students will fill in map outline of the state/ country with pictures of the items and where they are grown.
Materials:	reference books that will help students find needed information.
	Map outlines for the U.S and/ or Connecticut.
	Pencils
	paper

Procedure:

1. Discuss the fact that each region of the country is suited for specific agricultural products.
2. Divide class into small groups - each assigned to a different region of the U.S.
3. Work with library media specialist to arrange for small groups to have access to reference books that will show major agricultural products grown in parts or the U.S.
4. Have students take notes on what they find.
5. Allow time for students to work on filling in their map with drawings or magazine pictures.
6. Have each group report to the class on what they found .
7. Display the regional maps. The teacher can also compile the information on a larger bulletin board map for display.

Lesson Plan #2 - Where did my Apple Juice come from?

Objectives:	1. Students will learn to read the label on their juice container.
	2. Students will identify the countries which contribute to their morning juice.

3. Students will understand why the pesticide laws in other countries are important to us.

4. Students will use an atlas to find the countries on the label and color them in on a blank world map.

Materials: Apple juice containers from school breakfast or lunch atlas blank map of the world

Procedure:

1. Have students collect apple juice containers from their school breakfast or lunch. The *Natural Country* brand that the New Haven schools have in their breakfast and lunch programs has juice concentrate from Argentina, Austria, Chile, Germany, Hungary, and the U.S.
2. Have students research what is *concentrate* and how it is made.
3. Students read the side of the container and list the countries where the apple concentrate has come from.
4. In small groups the children use an atlas to find the various countries and label them on a blank outline map of the world.
5. Children share their findings with the larger group and why we are using foreign apples.
6. Given that many of these countries have less stringent laws about the use of pesticides how can we judge the relative safety of this juice?

Lesson Plan #3 My 4 _ Acres!

Objectives: 1. Students will learn that they annually use the food and clothing products which are produced on 4 _ acres of land.

2. Students will prioritize the items they would to produce if they were farmers.

Materials: piece of construction paper

pencils

crayons

magazines to cut out pictures from

Procedure: 1. Students brain storm items that are made from farm products (including: clothes, paper, furniture, etc.,)

2. Students are given construction paper that they label *My 4 _ acres.*

3. Students draw or cut out pictures of items they would produce on their land and paste them to the construction paper.

4. Students share their project with others in small or whole class meeting.

Activities suggested for Section II - How does the air, water and, chemicals affect out food supply?

Lesson Plan # 4 - How do Pesticides and Chemicals get into our Food?

Objectives:	1. Students will learn that the chemicals and toxins in the soil are taken into the plant when it absorbs water.
	2. Students will learn how these toxins are passed on to humans and animals when we eat.
Materials:	stalks of celery
	food coloring
	jar of water able to hold celery stalk
Procedure:	1. Fill container with water.
	2. Add food coloring. This is to represent toxic chemicals in the soil and water.
	3. Put stalk of celery in the water
	4. Observe the celery stalk for 24 hours. Students should see the stalk turn color as it absorbs the food coloring.
	5. Ask children what would happen if they ate this celery?

Lesson Plan # 5 How does the water cycle work?

Objectives:	1. Students will understand the Water cycle.
	2. Students will see how the cycle can help to carr toxic chemicals.
	3. Students will construct rain cycle stick puppets .
	4. Students will be able to act out the rain cycle
Materials:	scissors
	craft sticks
	patterns made by teacher of sun, raindrop, flower, and cloud
	tag board or colored construction paper
	crayons and glue
Procedure:	1. Students will trace out puppet figures and cut them out.
	2. Students glue each piece to a craft stick.
	3. Students color in puppets if desired.
	4. Students practice acting out the water cycle showing the cloud passing over and finally a rain drop is released. The rain drop falls onto the ground and a flower grows. The sun is out and the raindrop evaporates and becomes part of a cloud once more.

Lesson Plan # 6 How toxic levels grow in the Food Chain?

Objectives:	1. Children will learn how toxic levels build up as the food chain progresses.
	2. Students will understand why we need to worry about life further down the food chain.
Materials:	fish patterns in 3 sizes.
	Colored circle stickers in various colors
	colored paper
	scissors
Procedure:	1. Cut out 8 small fish.

2. Have a student hold each fish and make believe the absorb toxins from the water filtering through their gills. Each one adds a sticker to their fish to represent the toxins.

3. Next have two students holding the middle size fish act out their fish eating 4 of the smaller fish. They will each add 4 stickers to their fish. Students can visually see the toxic level for the second fish growing.

4. Finally have the last student with the largest fish act out eating the two medium ones. This fish will then have 8 stickers put on them.

5. Finally, show that if this fish were caught and eaten by a human, they would have a large concentration of toxic chemicals introduced into their system.

Activities suggested for Section III - How do Food additives Affect our food?

Lesson # 7 - Why do we need Preservatives?

Objectives: 1. Students will learn how some foods rot when expose to the air.

2. Students will learn that some additives are good.

3. Students will see how much appearance has to do in our food choices.

Materials: apples

fresh lemon

knife

plates

Procedure: 1. Students peel and slice an apple.

2. On each plate students place apple slices.

3. The apples on one plate are covered with lemon juice.

4. Students observe the apples for an hour or so. They should see that the untreated apple has browned, while the other is still white.

5. The question to be asked is which one would you eat and why? Students may try each apple to see if there is a change in taste.

Lesson Plan # 8 - Find the Sugar!

Objectives: 1. Students will learn to read a can label carefully.

2. Students will identify words like sucrose, fructose, glucose, maltose or lactose as also meaning sugar.

3. Students will keep a list of foods they find in their homes that contain sugar.

4. Students will learn that sugar may be hidden in products that may not taste sweet

Materials : Chart for each child consisting of three columns labeled (1) *Food, (2) Sweet? (3) Does it contain sugar?*

If you wish to do this activity in class you would various food wrappers and containers. Otherwise students can do this at home.

Procedure: 1. Students should be given a list of other sugar synonyms they may see on a label.

2. Students also need to know that even though they may try to limit their sugar intake they can be eating sugar in foods they did not think of.

3. Have students read labels of their favorite foods at home and fill in the chart.

4. Construct a classroom chart and add to it different foods and their sugar content.

Bibliography

Cobb, Vicki. *Lots of Rot.* New York: J.B. Lippincott Junior Books, 1981.

Discusses what causes rot and the role it plays in the cycle of living things and presents facts about mold. Bacteria, and mildew. Includes experiments.

Dadd, Debra Lynn. *The Nontoxic Home and Office: Protecting Yourself and Your*

Family from Everyday Toxics and Health Hazards. *New York: St. Martin's Press, 1992.*

A very comprehensive review of potentially hazardous materials we use in our daily life and how we can avoid them by using safer materials.

Gonick, Larry and Alice Outwater. *The Cartoon Guide to the Environment.* New York: HarperCollins, 1996.

Uses caricatures and cartoons to give a very readable account of the environmental problems confronting us.

Jaspersohn, William. *Cookies.* New York: Macmillan Publishing Co., 1993.

A behind the scenes look at how chocolate chip cookies are made at a Famous Amos cookie factory.

Johnson, Sylvia. *Potatoes.* Minneapolis: Lerner Publications, 1984.

Describes the development of the potato, including information on how the plant grows, diseases and insects that can affect it, and some of the history of the potato.

Jones, Clair, et al. *Pollution: The Food We Eat.* Minneapolis: Lerner Publications, 1974.

Describes the various additives used in food, discusses contamination of food by bacteria, and examines the danger from agricultural chemicals.

Kirkus, Virginia. *The First Book of Gardening.* New York: Franklin Watts, Inc., 1956.

An easy to understand but comprehensive book about planning a garden. Covers such topics as what kinds of flowers or vegetables you can grow as well as garden tools, and common garden pests and good insects.

Meltzer, Milton. *The Amazing Potato.* New York: HarperCollins, 1992.

An interesting story about the origin of the potato and how it became a major food. Includes interesting historical facts and folklore about this amazing vegetable.

Nottridge, Rhoda. *Additives.* Minneapolis: Carolrhoda Books, Inc., 1992.

Focuses on food additives, discussing the different kinds, their uses, and whether they are harmful. Includes recipes and additives.

Nottridge, Rhoda. *Fats.* Minneapolis: Carolrhoda Books, Inc., 1993.

Introduces different types of fats, explains why they are both useful and harmful to the body, and discusses ways to cut down on unhealthy amounts of fat by eating correctly and exercising. Includes recipes and activities.

Nottridge, Rhoda. *Sugars.* Minneapolis: Carolrhoda Books Inc., 1992.

Focuses on sugars in our diet, explaining where they come from and how our bodies process them. Includes recipes and activities.

Ontario Science Centre. *Foodworks: Over 100 Science Activities and Fascinating that Explore the Magic of Food.* Reading: Addison-Wesley, 1987.

Discusses the role of food, what it does and how it acts inside the body, through explanatory text and science activities.

Patent, Dorothy Hinshaw. *An Apple A Day: From Orchard To You.* New York: Cobblehill/ Dutton, 1990.

An overview of growing apples, from planting and harvesting to the grocery shelves.

Seixas, Judith S. *Water: What It Is, What It Does.* New York: Greenwillow Books, 1987.

A simple introduction to water, describing its properties, uses, and interaction with people and the environment. Includes five basic experiments.

Spiller, Gene. *The Super Pyramid Eating Program.* New York:Random House, 1993.

This book gives an explanation of the five food groups and the pyramid configuration now used as a framework to explain a healthy plan.

Sweningson, Sally. *Indoor Gardening.* Minneapolis: Lerner Publications, 1975.

An introduction to the identification and care of several varieties of house plans, terrarium plants, and plants in dishes. Includes a section on African violets.

United States Department of Agriculture. *What's to Eat? And Other Questions Kids Ask about Food.* Washington, D.C.: U.S. Government Printing Office, 1979.

This was the 1979 yearbook of the Dept. of Agriculture. It highlights topics of interest to children from the history of farming to food in other countries, milk production, and how to start a garden.

United States Department of Health and Human Services. *The Surgeon General's Report on Nutrition and Health.* Washington, D.C.: U.S. Government Printing Office, 1988.

In 1988 then Surgeon General, C. Everett Koop, issued this report on the status of health and nutrition the U.S. Speaks to the relationship of diet and the occurrence chronic diseases.

Versfeld, Ruth. *Let's Talk About: Why Are People Hungry?* . New York: Gloucester Press, 1988.

Good book for children which explains hunger in the world and why it occurs. It also answers such seemingly simple questions as Why don't we just grow more food? and Why don't the richer countries help more?

Wargo, John. *Our Children's Toxic Legacy: How Science and Law Fail to Protect Us from Pesticides.* New Haven: Yale University Press, 1996.

The book points out the failing of current law and government to help handle the increasingly complex spread of toxic substances in our food water supply. The book focuses in on the fact that our failure to act is most profoundly felt by children who are more

vulnerable to the affects of these toxic substances.

Ziegler, Sandra. *A Visit to the Bakery.* Chicago: Childrens Press, 1987.

A group of children visit a bakery and see how bread is baked. Good Illustrations.

Notes

---

1. United States Department of Agriculture, *What's to Eat And Other Question Kids Ask About Food* , (Washington, D.C., 1979) pp. 8-9
2. U.S.D.A. 22-23
3. Connecticut Farm Bureau Statistic 1996.
4. Claire Jones, et al , *Pollution: The Food We Eat,* (Minneapolis: Lerner Publishing, 1974) 9
5. Judith S. Seixas, *Water: What It Is, What It Does,* (New York, Greenwillow Books, 1987) 37 - 41
6. Debra Lynn Dadd, *The Nontoxic Home and Office,* (Los Angeles, Jeremy P. Tarcher Inc., 1992) 162 - 163
7. John Wargo, *Our Children's Toxic Legacy: How Science and Law Fail to Protect Us From Pesticides,* (New Haven: Yale University Press, 1996) 177
8. Wargo, 147 - 152
9. Wargo, 176 - 177
10. Dadd, 109
11. Jones, 22-27
12. Dadd, 162-163
13. Jones, 22
14. Dadd, 163 - 166
15. Wargo, 139 - 144
16. Jones, 30-32
17. Jones, 38
18. Jones, 50-53
19. Wargo, 114 - 120
20. Dadd, 107 - 109
21. Dadd, 109
22. Dadd, 108
23. Rhoda Nottridge, *Additives,* (Minneapolis, Carolrhoda Books, Inc., 1992) 5
24. Nottridge, 8
25. Nottridge, 10-11
26. Jones, 66
27. Jones, 67
28. Nottridge, 13
29. Nottridge, 15-18
30. Nottridge, 13
31. Jones, 70-71
32. Dadd, 105
33. Nottridge, 15

34. Nottridge, 19-21
35. Nottridge, 20-21
36. Nottridge, 21
37. Nottridge, 2