FACT: 80 PERCENT OF CORN RAISED IN THE U.S. IS FED TO ANIMALS WORLDWIDE

LESSON 1: A Food Pyramid Built From Corn (Science)*
LESSON 2: Meaty Numbers (Math)*
LESSON 3: The Web of Life (Multidisciplinary)*

**All Lesson Plans are adaptable for ALL ages*!

ANN LEARNS A SECRET FAMILY RECIPE

1964

It was time to grind feed for the pigs, again. Ann couldn't believe how much they ate! Every day her dad ground corn for them, and every day they ate it all. He said they were supposed to gain a pound a day, which was hard to imagine. If Ann did that, she'd weigh more than 365 pounds in one year!

The "Hammermill" he used for grinding the corn was a loud pounding machine, so she usually tried to stay away. But today was different. Today she was going to learn the secret recipe for making the feed. Her dad said it was important for her to learn so she could pass it on to the next generation. He said it was an important part of raising healthy animals.

Her grandma had told her it was important because it affected the bacon and other meat they ate. She was always telling Ann, "You are what you eat. It's true for pigs, and true for kids."

Ann couldn't argue with that. She thought the food from her farm was the best in the world. She knew it was all connected too. Good corn came from good soil. Good pigs came from good corn. And meat from pigs was important to keeping **her** body healthy and strong.

She wondered if the Evans' recipe for pig feed was better than the one on the neighbor's farm. She was going to learn how her dad made it, but she wondered if the pigs would be happier if her mom made their food instead of her dad. She wondered what they'd think of food made by a 10-year-old.

Finally, he started the lesson. He showed her the screen he was going to put in the bottom of the grinder. It was divided into quarter inch holes because the pigs were still little and needed their food ground into small pieces. The cows could eat bigger pieces, so he used a screen with bigger holes for them. The Hammermill grinder would keep pounding until all the corn went through the holes, so the smaller the holes the longer it took to get all the food through them.

Ann didn't think the pigs were so little any more. When they were little and pink she could cradle them in her arms. Now they weighed more than she did—80 pounds! Sometimes they knocked her down when she was giving them water. Her dad sold them when they were about 220 pounds. That was colossal, gigantic!

She remembered the first time she'd ever seen baby pigs. She was 3 years old, and had stood on the fence watching them drink milk from their mother. She'd drawn a picture of all those babies, then cut it out. It was still in her baby book.

Oh, her dad was telling her to pay attention. He was putting the screen in the grinder. As she watched, he hooked it to the tractor and backed it to the corncrib. Corn was piled high in that building, all the way to the roof. He started to shovel it into the grinder. He shoveled and shoveled; she helped.

Ann had never seen so much dust. And the noise was terrible. But it was amazing to watch the big ears of corn go in one end, and come out the other in small bite-size pieces. She couldn't believe the pigs ate the corn AND the cob.

Not all farmers fed the whole cob. Sometimes, even her dad hired men to shell the corn off the cobs first. Ann loved that because she could climb on the pile of cobs left behind. Today he explained that the feed would be better if he didn't use the cobs. It would fill the pigs up faster. But he wanted to teach her the traditional family recipe, and that called for whole ears.

He said ground corn was rich in carbohydrates, like the bread food group. It gave pigs energy and helped them grow fast. Ann couldn't argue with that either. After she ate corn on the cob, she always had energy to spare.

She needed some energy right now! They'd spent an hour shoveling corn, and she was tired. It had been flowing into a mixer wagon. Finally, when it was three-fourths full her dad said they had the right amount.

They drove the mixer wagon to the shed where the "concentrate" was stored. This was something her dad bought in big brown bags at the local co-op store. They were filled with soybean meal, vitamins and minerals. The soybean meal had lots of protein in it, and Ann knew protein was important to young animals growing fast. Protein was important to growing kids, too. Her grandma always said, "Eat your meat to get your protein."

It seemed amazing that such a little amount of protein added to feed could turn into meat so high in protein. Pigs must be factories for protein, she thought!

Ann counted the bags as her dad poured them in. He said the recipe called for six. He poured them right on top of the corn. It reminded Ann of her mom pouring all the ingredients for cookies into a bowl, one on top of another.

Then it was time to stir. Her dad turned on the mixer. It looked like a blender working. It pulled the food into the bottom, then up the sides, and back down in the middle. Over and over, around and around, the feed cycled, until it was perfectly blended and Ann couldn't tell the concentrate from the corn.

Then her dad asked if she wanted to taste it.

She paused. It didn't look too bad, but it didn't look too good either. Her dad was watching her. She thought some more. She didn't want to disappoint him, but she didn't want to get sick either. Well, he wasn't going to tell her to do something that made her sick, so she put a little in her mouth.

She could taste the vitamins first. Then, after she got through the dusty taste, she could taste the corn. It wasn't too bad, crunchy and chewy, pasty with chunks in it, but not bad. It wasn't anything she would ever order in a

restaurant ("I'd like to order pig feed, Evans' style please."). But she'd had worse. It was like tasting flour. Maybe if her mom mixed this stuff into pancakes and she could put a little syrup on top, it would be good. Maybe.

Still chewing, she watched her dad drive into the pig yard and unload the wagon into a big metal feeder. Ann watched the pigs crowd around. They lifted the covers of the individual compartments with their noses, then dug in. They shoved, pushed, squealed and grunted. They were thinking only about their food, and nothing was going to get in their way.

"They like it!" smiled the chef.

LESSON 1: A FOOD PYRAMID BUILT FROM CORN

SUBJECT: Science
OBJECTIVE: Students will learn the multiple roles of corn in the USDA Food Guide Pyramid, and will build their own corny one.
MEASUREMENT: Students understand the Food Pyramid and understand the importance of corn in it.

BACKGROUND FOR TEACHERS:

The Food Guide Pyramid is an outline of what to eat each day based on the USDA 1995 Dietary Guidelines. It's not a rigid prescription but a general guide. It calls for eating a variety of foods that will provide the vitamins, minerals, carbohydrates and protein needed for good health.

Meat is an extremely important part of the American diet. It is also important worldwide. When per capita income rises in any country, meat consumption also generally increases. Unit 8 discusses the export of corn worldwide, which is closely linked to both per capita income and animal agriculture in those countries.

Corn is a key link in the meat production chain. It's a very important ingredient in animal feed, providing the major source of energy, as well as many other nutrients.

- Many new kinds of corn are being developed that can meet the nutritional needs of animals even better. Unit 4 discusses the genetic advances being made. For pigs specifically, there are now corn hybrids available that provide higher oil levels. Oil or fat has approximately 2.2 times more metabolizable energy value than carbohydrate so is a greater energy source for animals requiring energy dense diets—such as growing pigs.

Corn is therefore a very important component of the Food Guide Pyramid! As a food/cereal grain, it can be found in the foundation level. As a vegetable, it can be found in the middle level. As a hugely important component of livestock diets, it plays a key role in the meat category. It is also a component of the oils and sweet things that make up the very tip of the Pyramid! (See Unit 9 for more information on food uses of corn.)

STUDENT ACTIVITIES:

1. Ask students to read the story Ann Learns a Secret Family Recipe. Then discuss the "recipe." Ann is learning to provide the proper diet for pigs so they can stay healthy and grow fast! Their diet is balanced: it has corn as a foundation (3/4 of a wagonload), then has concentrate added which includes protein from soybean meal, and many vitamins and minerals. The food for these pigs must be nutritious. It must be

ground into small enough pieces that it can be easily eaten.

- If it's possible, this would be a good time to let the students look at various kinds of animal feeds. Samples are available from feed stores, farm cooperatives or local farmers. Students can read the labels or ask exactly what ingredients are in the feed. (Sometimes feeds include medications or growth hormones, so don't let the students taste the feed unless you know all the ingredients.)
- Dog food, cat food, bird food and fish food are available at pet stores, and can be used to make the point that's important here: ***Animals need a balanced diet, just as children do!***

2. Be sure to point out how important corn is for animal feed. (Lesson 2 provides statistics that document the importance of corn for animals.) Even dog food uses corn as a major ingredient!
   - Ask students why they think corn is so important in all these feeds. You can refer them back to the story in which Ann learns that corn is rich in carbohydrates and provides ENERGY for animals and humans. (Unit 7, Lesson 1 talks about Corn for Energy in another respect—energy to run our cars and other engines.)
   - **But this kind of energy is the kind that fuels the cells in our body!** Older students might want to study this more, and write a report on carbohydrates as a fuel source that powers our body. This fits well into a study of metabolism and calories.

3. Show students the picture of the USDA Food Pyramid and describe each category and the number of servings recommended per day. (Example 1)
   - Ask students to fill in the blanks on their own worksheet.(Worksheet 1)
   - Ask students to draw corn every place they think is relevant. They will likely only think of corn in the vegetable section, so may need some insight into all the other uses for corn. They should be aware of corn's importance in meat production after reading the story of Ann. And Unit 9 has a complete listing of all other food products made from corn oil, corn syrup, and cornstarch.
     - Discuss the role of corn in cereals, corn breads, tortillas, etc. in the bread/grain section.
     - Discuss the role of corn in the meat and dairy sections. (Corn is a key component of animal feeds.)
     - Discuss the role of corn in oils, starches, and syrup sweeteners in the fats/sweets section.

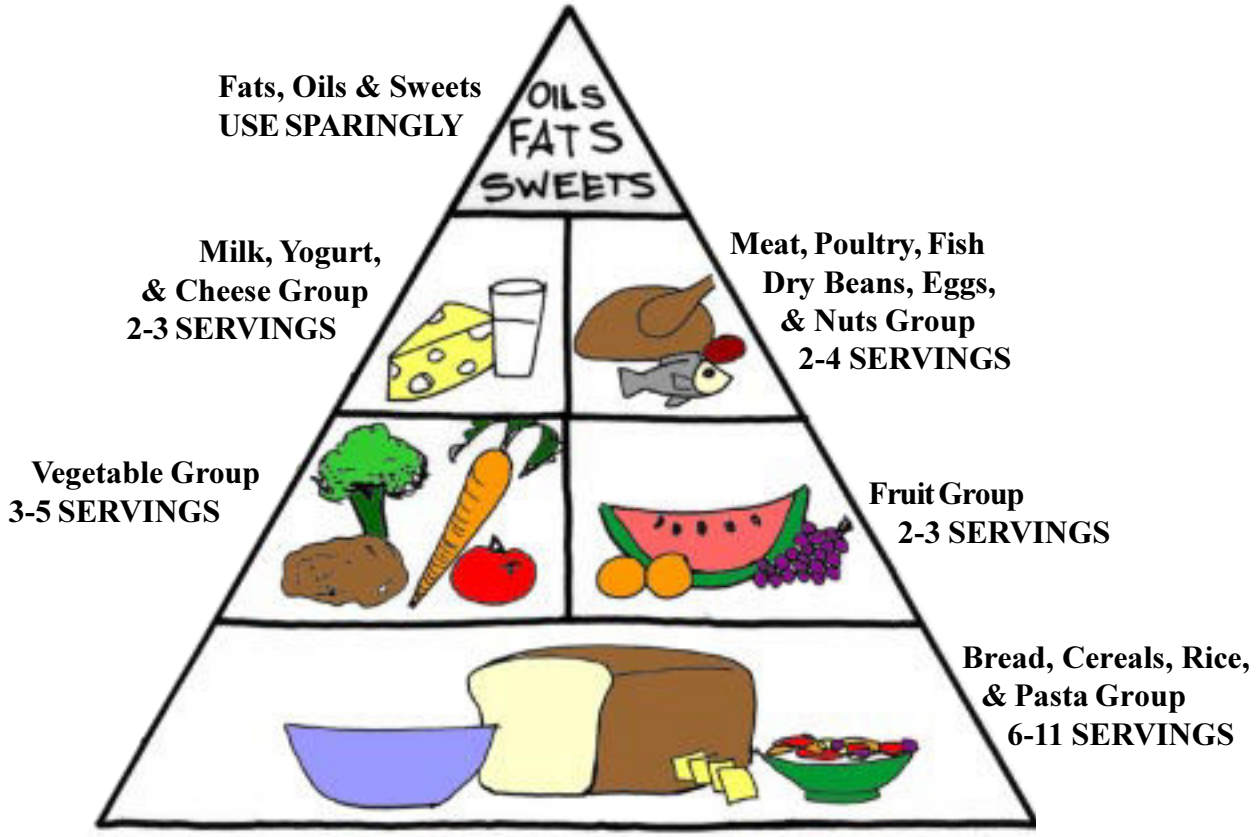
4. Ask students to create a 3-D model of the Food Pyramid. This can be made from Legos, clay, paper, fabric, wood, metal, building blocks, corn, pillows, or anything they can think of. They can use real food (dried only), paper, or clay models to represent the food groups.
   - Ask students to vote for the CORNIEST one! (Give a food prize made from corn.)

5. Ask students to complete at least one of the following. Others can be done for extra credit.
   - Keep track of their meals for a week, completing a chart that shows how many servings they ate from each category each day. Give extra credit if they highlight the foods made from corn.
   - Plan a meal that is balanced between the five essential food groups. Then cook it and serve it to their family, or the class!
   - Write a commercial for corn, highlighting its importance in so many of the Food Pyramid categories. Then present it to the class.

- If enough students do this project, have them vote for the CORNIEST one, and give a (corn-based) food prize.

- Choose one of the food groups and write a report about corn's role in that group. (Unit 9 will help.)

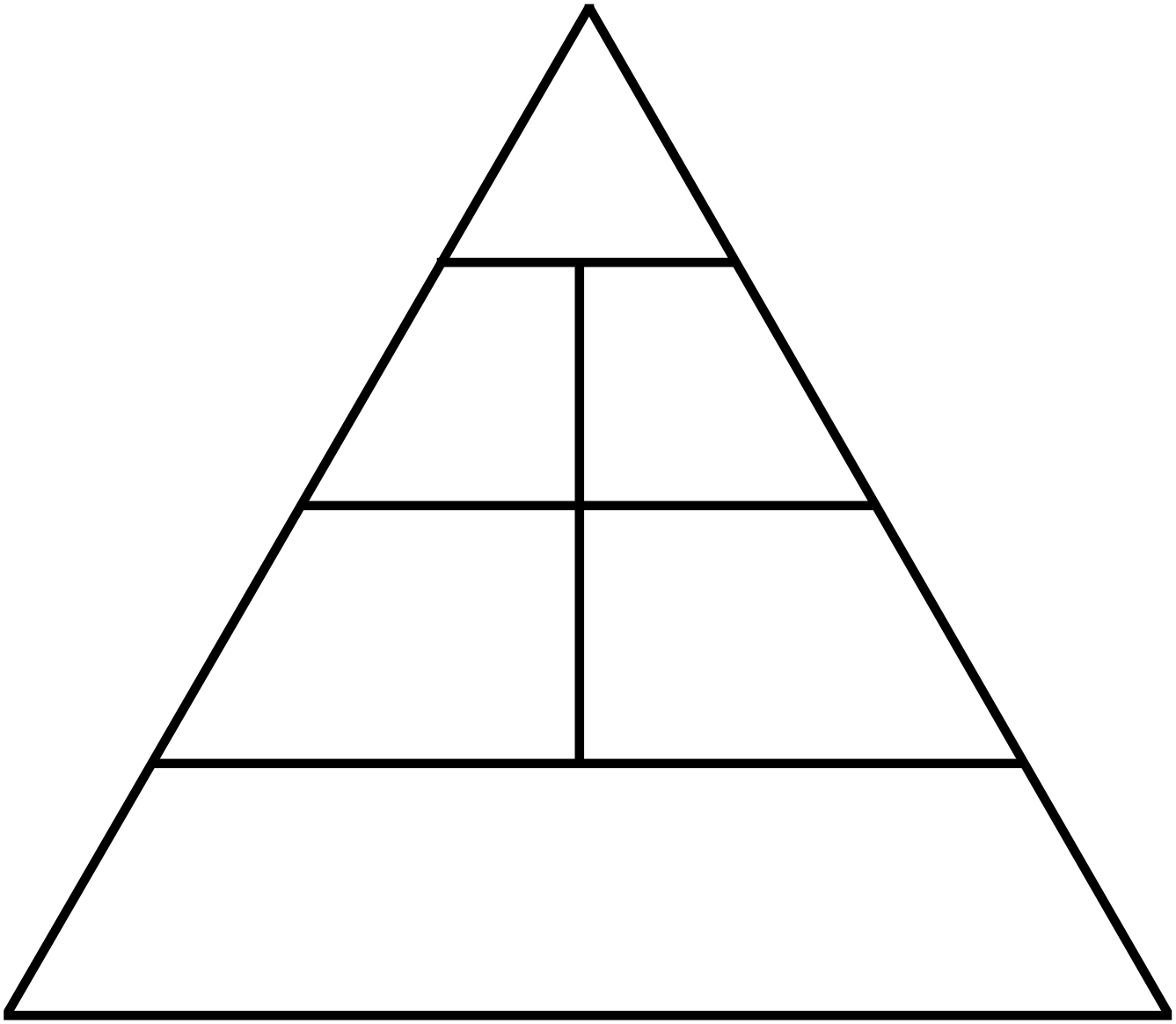
USDA Food Pyramid



FOOD GROUP	SERVING SIZE			
Bread Cereal, Rice and Pasta	1 slice of bread	1 ounce of ready-to-eat cereal	1/2 cup of cooked cereal, rice or pasta	6-11*
Vegetables	1 cup raw leafy vegetables	1/2 cup of other vegetables, cooked or chopped raw	3/4 cup of vegetable juice	3-5*
Fruits	1 medium apple, banana, orange	1/2 cup of chopped, cooked, or canned fruit	3/4 cup of fruit juice	2-4*
Meat, Poultry, Fish, Dry Beans. Eggs, and Nuts	2-3 ounces of cooked lean meat, poultry, or fish	1/2 cup of cooked dry beans, 1 egg, or 2 tablespoons of peanut butter count as one ounce of lean meat		2-3*
Milk, Yogurt, and Cheese	1 cup of milk or yogurt	1 1/12 ounces of natural cheese	2 ounces of process cheese	2-3*
Fats, Oils, & Sweets	Use sparingly			

* Recommended daily number of servings

Draw Your Own Food Pyramid



LESSON 2: MEATY NUMBERS

SUBJECT: Math
OBJECTIVE: Students will learn many number facts about the conversion of corn into meat!
MEASUREMENT: Students will know that the number one use of corn in the world is to feed livestock, and they will have an understanding of corn use and feed efficiency by animal.

BACKGROUND FOR TEACHERS:

Worldwide, the number one use for corn is providing feed for livestock! When domestic and overseas livestock industries are added together, they consume approximately 80 percent of all corn grown in the United States.

STUDENT ACTIVITIES:

1. Ask students to read the story, Ann Learns a Secret Family Recipe. See how many number facts they can find. (*For example: A pig should gain one pound per day, so if they're 80 pounds the day the story takes place and are sold at 220 pounds, they will be on the farm another 140 days...The family recipe calls for 6 bags of concentrate in a wagon ¾ full of ground corn…The screen on the grinder has holes that are ¼ inch for small pigs…)*

2. Ask students to complete the following worksheet. (Worksheet 1) A bushel is a volume measurement, but is generally defined in terms of weight, a bushel of corn weighing 56 pounds. This worksheet illustrates how many pounds of corn are required to produce one pound of four kinds of meat. Younger students can match the pounds of corn to the fish or animal. Older students can answer the math questions.

3. Worksheet 2 shows how much corn is used for each of four kinds of animals in the U.S. Younger students can match the picture with the correct percentages. Older students can answer the true and false math questions. (Worksheet 3)

CONVERTING CORN TO MEAT….

10 pounds of corn = 1 pound of beef	
4 pounds of corn = 1 pound of pork	
3 pounds of corn = 1 pound of chicken	
2 pounds of corn = 1 pound of catfish	

1 bushel = 56 pounds

1. How many pounds of beef can be produced from 1 bushel of corn?
   _____

2. How many pounds of pork can be produced from 1 bushel of corn?
   _____

3. How many pounds of chicken can be produced from 1 bushel of corn?
   _____

4. How many pounds of catfish can be produced from 1 bushel of corn?
   _____

5. Which animal or fish is the most efficient converter of corn into meat?
   _____

6. How many bushels of corn will it take to raise a 220 pound pig?
   _____

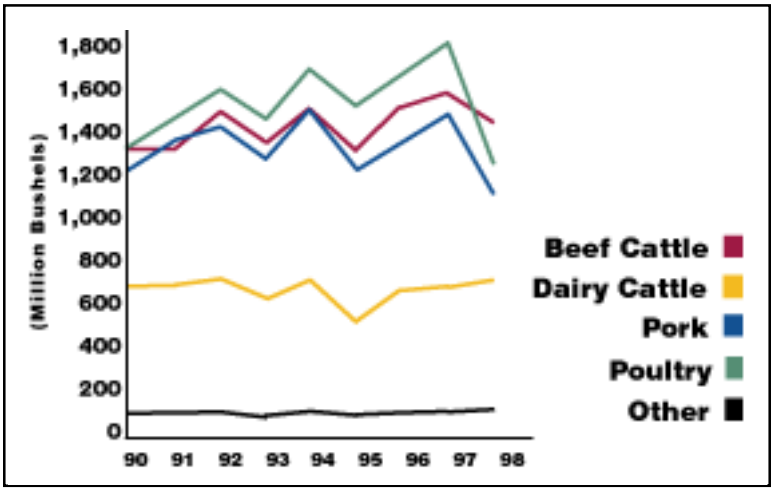
7. How many bushels of corn will it take to raise an 80 # pig to 220 pounds?
   _____

8. If you have 50 bushels of corn how many pounds of beef can you produce?
   _____

9. If you have 50 bushels of corn how many pounds of chicken can you produce?
   _____

10. Bonus question:
    If you raise 150 bushels of corn in an acre, and you have 1000 acres, how many 220 pounds pigs can you raise?
    _____

U.S. CORN FED BY ANIMAL GROUP



MEATY NUMBERS

Use the chart to answer the following true and false questions:

1. The dairy industry consumes more total corn than the poultry industry. _____
2. The pork industry used less corn in 1998 than it did in 1994. _____
3. The beef industry used more corn than any other livestock industry in the 1990s. _____
4. The poultry industry uses more than 50 percent of the total corn used for livestock production._____
5. From year to year the dairy industry is the most consistent livestock market for corn. _____

LESSON 3: THE WEB OF LIFE

SUBJECT: Science
OBJECTIVE: Students will become aware of the term "ecosystem" and will learn that all of life is interrelated in one way or another.
MEASUREMENT: Students will be able to visualize an ecosystem, and understand interrelationships in natural systems. They will know that agricultural crops like corn, livestock like pigs or cows, and humans, are also part of ecosystems.

BACKGROUND FOR TEACHERS:

"When one tugs at a single thing in nature, he finds it attached to the rest of the world."
— John Muir, American naturalist, explorer, and conservationist

STUDENT ACTIVITIES:

1. Ask students to read the story, Ann Learns a Secret Family Recipe. Ask students to discuss the paragraph in which she explains how everything is connected. "…good corn came from good soil, and good pigs came from good corn…meat from pigs was important to keeping **her** body healthy and strong…" Talk about these relationships. Do the students understand where their food comes from? Do they understand the connection between corn and meat? Between soil and corn? (See Unit 2 for information about soil feeding corn.) Between corn and meat and themselves? Can they think of more examples where they are connected to soil, crops or animals?

2. Explain that an ECOSYSTEM is: a group of organisms and their physical environment, all of which interact through a flow of energy and a cycling of materials. (Example 1)
   - The word "eco" comes from the Greek word "oikos" which means "home." See if the students can define the word "system."
   - Ask students to study the ecosystem they see on Example 1, then to tell a story about it. Be sure they add a human to the ecosystem.

3. Divide the class into groups of eight to 10 students. Each group should sit in a circle. Give each student four lengths of yarn—each about five feet long—one blue (WATER), one green (FOOD), one white or yellow (AIR) and one brown (SHELTER).

4. Each group represents an ecological community. Depending on class size there may be more than one of each of the following communities. (Or older students might want to develop their own community roles.)

Pass out nametags with a role from the community for each student.
- Community 1: girl, stream, topsoil, oak tree, owl, trout, cow, cattail, worm, corn
- Community 2: corn, boy, pine tree, squirrel, frog, river, pig, fly, grass, topsoil

4. Explain that an ECOSYSTEM is: a group of organisms and their physical environment, all of which interact through a flow of energy and a cycling of materials. (Example 2)
   - The word "eco" comes from the Greek word "oikos" which means "home." See if the students can define the word "system."

5. One by one, each student (role) needs to identify another student (role) to whom he/she is related by one or more of his/her basic needs—air, water, food and shelter. The student must identify why, then give one end of the length of yarn to the other to hold, thus connecting him/herself to the other.

   - The topsoil provides food for the corn and trees and shelter for the worms. (Soil is discussed in Unit 2). The corn and trees provide oxygen (air) through photosynthesis (See Unit 1, Lesson Plan) and also provide plant residue that serves as food for the organisms in the soil. (Clean air is also discussed in Unit 7) Trees and grass (See Unit 2) shelter the topsoil. Trees are also shelters for wildlife and animals, and provide wood for shelters for people. Windbreaks made from trees can protect cornfields from storms. Children can build shelters for the animals, and can also protect the soil. Insects and their roles are discussed in Unit 3.

6. Several rounds of this will produce a distinctive colorful web of living relationships! See the following diagram. (Example 2)

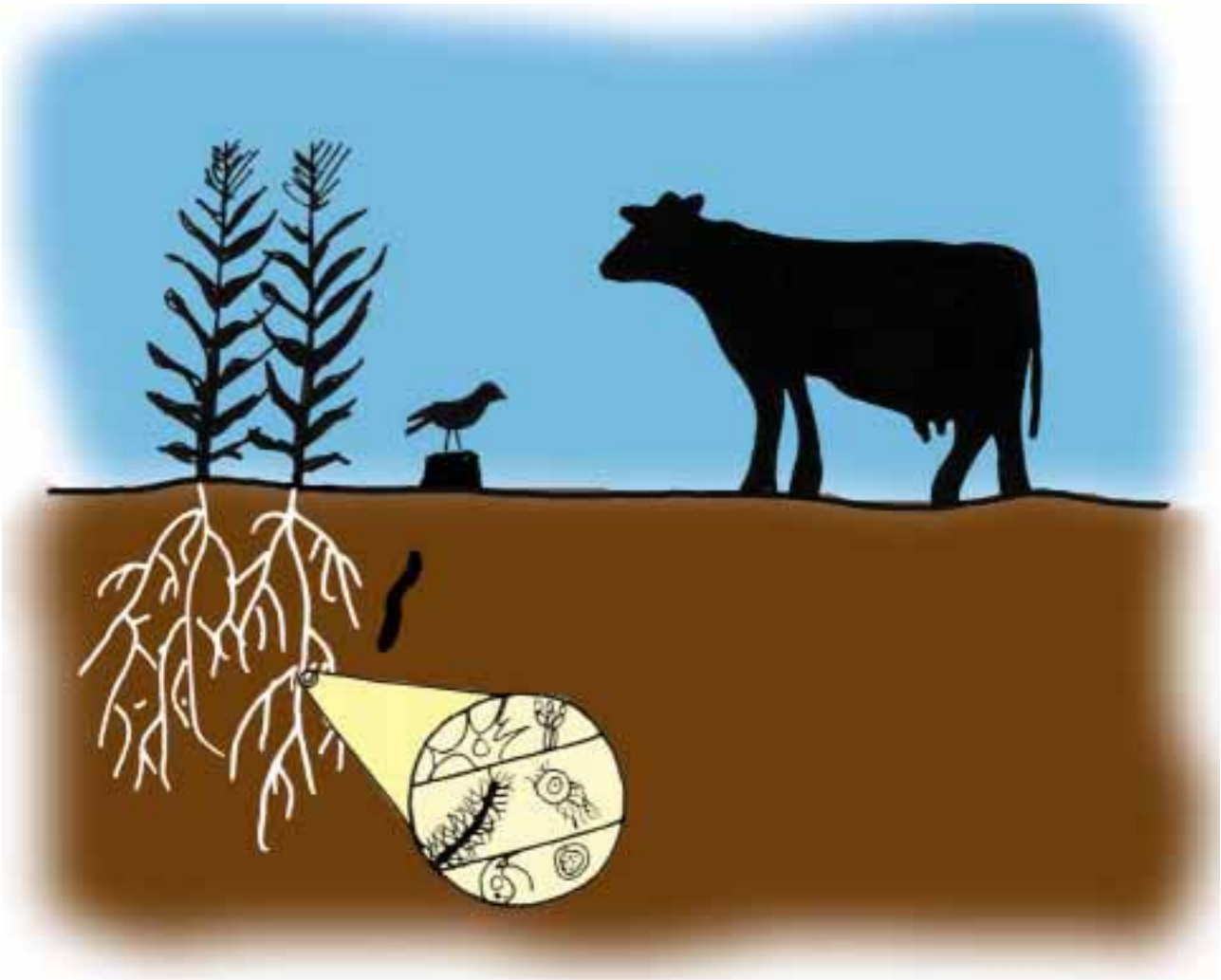
7. Ask students to portray this "Web of Life" in other ways: through writing, art, music or movement.

   - Write a poem entitled "The Web of Life."
   - Draw a picture entitled "The Web of Life."
   - Write a play entitled "The Web of Life," including many of the above characters.
   - Write an instrumental or vocal song entitled "The Web of Life."
   - Choreograph a dance entitled "The Web of Life."

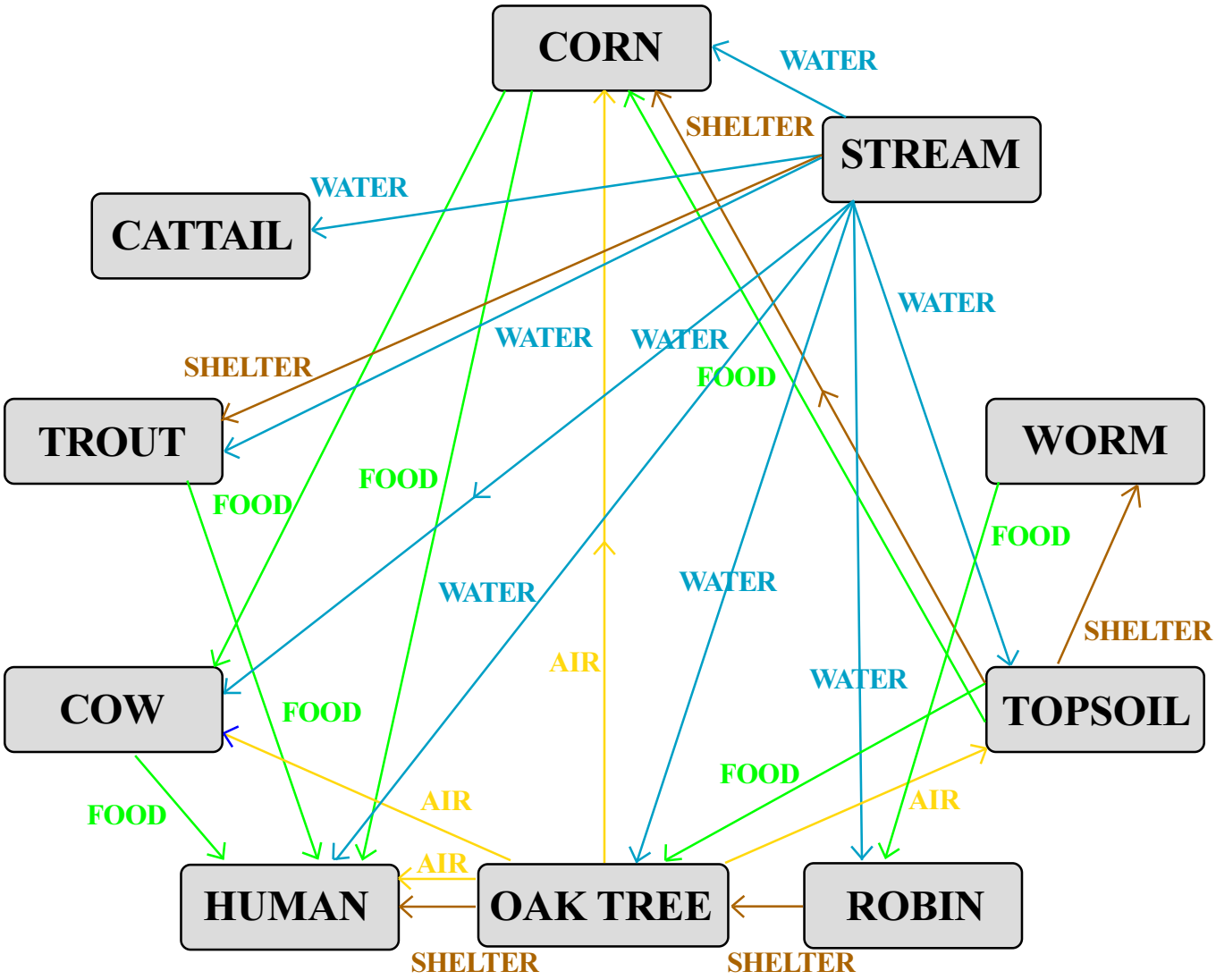
8. Take students on a field trip to a farm, or to a park, where they can explore the interrelationships that exist. Ask them to find a place to sit, then to record all the relationships they can see (including in the air) from that place. Ask them to keep a journal of their thoughts and feelings as they observe those relationships…

   - Two "virtual" field trips are possible on the Internet. One, to see a farm ecosystem is found at http://topaz.kenyon.edu/projects/farmschool/nature/ecosys.htm .
     "Corn in the Farm Ecosystem" is at
     http://topaz.kenyon.edu/projects/farmschool/nature/corn.htm.
     and "Animals in the Farm Ecosystem" is at
     http://topaz.kenyon.edu/projects/farmschool/nature/cow.htm.

Farm Ecosystem



Web of Life



Students representing different organisms

Indicate from which organism the yarn originates and to which organism it is going to satisfy a need