The Sciences of Agriculture

A Complementary Lesson Booklet for IAITC’s Summer Agriculture Institute 2010

Illinois Agriculture in the Classroom
Those Color Changing Pencils.................

During your exploration of agriculture through this Summer Agriculture Institute, we hope that you will think about the “Why” of agriculture. In your materials, you’ll find a pencil, that you should notice will change colors. Why does it change colors? Think of the possibilities…at the basic reasons you could start to formulate different hypotheses. The color changes because of ...(fill in the blank). As a hypothesis is an educated guess, you realize that you must ‘test’ these theories to decide if that is the reason. There are many possible explanations for the color changes, but the most important part is to test your creativity and ingenuity using ‘if, then’ thinking to come up with the ways to test each hypothesis.

In much the same way, we hope that you will take this opportunity to reflect on the sciences of agriculture. While the possibilities for science hypothesis (what happens to the soybean in the soil moist?) seem obvious, we hope that you will be open to thinking of other facts of agriculture including nutrition, animal care and renewable energy with an inquiry based attitude of ‘why’ ever present! If agriculture is around you, then……

The resources in this booklet are standards-aligned and are a great way to teach across curriculum areas as well as bring agriculture-themed learning into your classroom.

Complete resources may be downloaded from our web-site: www.agintheclassroom.org. Click on “Classroom Resources” or “Make-n-Takes” to download your copy. Each resource contains lessons and activities based on a central theme that can be easily implemented into your classroom.
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http://www.agintheclassroom.org
Log onto our website and learn more about the free services Illinois Agriculture in the Classroom provides!
IAITC Cool Stuff

Here is a list of some of our favorite stuff. Find ordering and website information below.

**Cotton Kits**
- Each Cotton Kit contains 35 individually wrapped cotton bolls
- Purchase for $12 from Utah AITC
- [http://extension.usu.edu/aitc](http://extension.usu.edu/aitc)

**Wool Spinning Kits**
- Each Wool Spinning Kits comes with enough carded wool to make 200-250 bracelets, 30 wool spinning hooks, and instructions
- Purchase for $12 from Utah AITC
- [http://extension.usu.edu/aitc](http://extension.usu.edu/aitc)

**Crystal Soil/Soil Moist for Beanie Babies**
- Can purchase from gardening centers (Lowes, Menards, etc.) or plant nurseries
- Look for “Soil Moist” or “Crystal Soil”
- Can also purchase from Flinn Scientific (1-800-452-1261)
- Catalog numbers, FB0381 (yellow), FB 0382 (blue), FB0383 (red), FB0384 (green), or FB 1602 (clear)
- $4.95 for 2.5 oz

**Clever Catch**
- American Educational Products, LLC
- 24” inflatable ball
- Numbered questions on various subjects
- [www.amep.com](http://www.amep.com)
- $12.95/ball

**Paper Plates**
- Look under “Categories” sidebar—“Solid Colors”
- Order by the case-10 packs of 24 plates per case
- [www.mdlmdistributors.com](http://www.mdlmdistributors.com)
- $16.80/case

**Confetti**
- Look at “Confetti By Shape”
- [www.confetti.com](http://www.confetti.com)
- 1/2 pound bag—$20
- Shaker—$3.75
- 1/2 oz pouch—$1.50

**Pony Beads**
- Bags of 1000 beads
- $3.49
- [http://store.creative-wholesale.com](http://store.creative-wholesale.com)

**Corn Packing Peanuts**
- 7 cu. ft. bag—$20
- 12 cu. ft. bag—$18
- [www.uline.com](http://www.uline.com)
- Search “Cornstarch Peanuts”

**Zipper Seal Plastic Bags**
- 2 mil 2” x 3”—1,000 bags for $21
- 2 mil 3” x 4”—1,000 bags for $27
- [www.uline.com](http://www.uline.com)
- Click on “Shop Uline” in sidebar
- Click “Bags, Poly/Plastic”
- Click “Reclosable Poly Bags” at the top
- Click “Hang Hole”
- Click “Top Side”
My daddy loved growin' apples. And when he got ready to pull up roots and leave Iowa for Oregon, he couldn't bear to leave his apple trees behind.

So Daddy built two of the biggest boxes you could ever hope to see. He set them into a sturdy wagon and shoveled in good, wormy dirt. Then he filled every inch with little plants and trees. Hundreds of them!

Daddy was ready for the most daring adventure in the history of fruit. "Apples, ho!" he cried.

Along with apples, my daddy took peaches, pears, plums, grapes, and cherries. Oh, and by the way, he took us along too. We had lots to do on the journey. Each morning I helped Momma bake biscuits, while Daddy prepared for another long day on the trail. At night Momma and I tucked in the little ones, then Daddy fiddled lullabies under the stars.

We ran into some trouble on our way to Oregon. My daddy looked me square in the eye and said, “Delicious, I’m gonna need your help.” I felt so special!

Sure enough, all Daddy's trees survived, just as if they'd come across the plains in a swanky carriage. We floated them on boats down the mighty Columbia to a pretty place near Portland. Then we planted them in that sweet Oregon dirt at last.

Gold was discovered in California not long after, and thousands of people rushed there to seek their fortunes.

But not us. We already had our fortune. Those apples, peaches, pears, plums, grapes, and cherries made us richer than any prospector.

We were happier, too. After all, apples taste a whole lot better than gold.
Apple Ag Mag - Reading Passage

Directions: Read each question and choose the best answer.

1. Who is narrating this story?
   A. Portland
   B. Delicious
   C. Momma
   D. Daddy

2. Why does the family decide not to go to California?
   A. There is no gold.
   B. They couldn't get a ride.
   C. They had no money.
   D. They were happy with their trees.

3. How does Daddy feel about his trees?
   A. He loves his trees and takes good care of them.
   B. He doesn't care about the trees.
   C. He wants to leave them behind.
   D. He wants to cut the trees down.

4. Daddy took along all of the following trees except
   A. pears
   B. cherries
   C. pecans
   D. plums
This story is an example of which genre?

A  fiction  
B  nonfiction  
C  science fiction  
D  none of the above

In this passage, swanky means about the same as

A  modest  
B  poor  
C  dirty  
D  fancy

Extended Response
Each variety of apple has its own distinct characteristics. Of the six varieties discussed in the Apple Ag Mag, which apple would be best for use in making an apple pie and why? Be sure to include information from your own knowledge along with information from the reading in your response.

Extended Response Question: An old adage indicates, “An apple a day keeps the doctor away.” Based on your own knowledge and information from the reading, why is this adage true? Be sure to include details from the reading as well as your own experience.
Objective: After completing this exercise, students will have a better understanding of reading maps as well as the diversity of specialty crops in Illinois.

Assessment Framework: 11.4.04; 13.4.11

Suggested Reading Materials: Illinois AITC Specialty Crops Ag Mag
Materials: Access to the Internet
Illinois Maps
Markers or crayons

Activity Instructions:

1. Using dark blue markers or crayons draw the Illinois and Mississippi Rivers on the map. These rivers are used to ship many agricultural products.

2. The Pumpkin Capital of the World is located in Morton, IL. Find the county that Morton is located in and draw a pumpkin inside of it.

3. Agri-tourism is a growing industry in Illinois. The Country Corner Farm Market is located in Alpha, IL in the west-central part of the state. Find the county that Alpha is located in and color it brown.

4. Apple orchards are very popular destinations in the fall because they offer u-pick apples, cider and other homemade treats. Almost Eden Orchard is located in Hancock County. Find Hancock County on the map and color it red.

5. The Horseradish Capital of the World is located in Collinsville, IL. Find the county that Collinsville is located in and color it gray.

6. Many of the peaches grown in Illinois are grown in the southern half of the state. Rendleman Orchards is located in Alto Pass, IL. Find its county and color it orange.

7. Bees are very helpful in the pollination of specialty crops. Sasse’s Apiary is located in Chestnut, IL. Find Logan County and color it yellow.

8. Many of Mason County’s specialty growers, like Ron Armbrust from Manito, use irrigation to help keep their crops watered. Find Mason County and color it light blue.

9. Many consumers flock to Christmas tree farms to cut their own tree for the holidays. Richardson’s Christmas Trees is located in Spring Grove, IL. Find its county and color it green.

10. Olthoff Farms and Dutch Valley Growers, Inc. grow onion sets for stores like Walmart and Farm & Fleet. They are located in Kankakee County. Find it on the map and color it pink.

11. Siemer Milling Company in Teutopolis, IL mills wheat into flour to be used in cookies, cakes, crackers and other goodies. Find the county it is located in and color it purple.
Tops and Bottoms

Grade Level: 2-4

Objective: After completing this activity, students will have a better understanding of how garden vegetables grow and what part of the vegetable they can eat.

Assessment Framework: 1.3.01; 1.3.06; 1.3.07; 1.3.13; 2.3.02; 2.3.10; 12.4.03; 12.4.04; 12.4.05

Suggested Reading Materials:
Tops and Bottoms by Janet Stevens ISBN: 978-0152928513
Illinois AITC Specialty Crops Ag Mag

What You Will Need:
Vegetable template from www.agintheclassroom.org  2 Paper Fasteners (brads)
Colored pencils or crayons  Hole Punch  Scissors  Glue
Two white paper plates per student

About the Book:
Tops & Bottoms, adapted and illustrated by Janet Stevens, is a story which has its origins in slave stories from the American South. In this trickster tale, a clever hare outwits the lazy bear while planting and harvesting the tops and bottoms of their vegetable garden.

Key Words:
- hare - The American form of hare is generally called rabbit.
- harvest - The gathering of a crop season. A period in which agricultural work is done and a particular type of weather prevails.

Getting Started:
Before reading the book, ask students to think of vegetables they eat. List them on a chart. Emphasize that vegetables are plants grown for food. It may also be necessary to emphasize the difference between fruits and vegetables as the list is made.

As a group, look at the cover of the book. What vegetables are pictured? What animals are pictured? Note the Caldecott Honor book Award Medal. This award is given to books that have outstanding illustrations. Encourage students to look carefully at the illustrations as the story is read.
**Activity Instructions:**

1. Have students color and cut out the vegetables from the vegetable template.
2. Next have students fold one plate in half and draw a line down the center of the plate. Color one half of the plate blue and the other half brown.
3. Now have students glue the vegetables on the colored plate. The blue space will serve as the sky, so anything that grows on “top” should be placed on the line “growing” into the blue, anything that grows from the “bottom” should be placed on the line “growing” into the brown side of the plate. When finished, all the vegetables should be lined up on the center line (fold) with the “tops” vegetables showing in the blue and the “bottom” vegetables showing in the brown.
4. Next write on the second paper plate the words “Tops” and “Bottoms” in their corresponding place on the plate. Now fold the plate in half and cut along the fold.
5. On the left side of the first plate (the one containing the vegetables) place a hole punch about 3 cm in on the line.
6. Lastly, place the two halves labeled “Tops” and “Bottoms” on top of each other and place a hole 3 cm in on the left side. This hole should line up with the decorated plate. Line all the holes up and place a brad to secure the plates. Now the bottom plate should have a cover. When the “Tops” is pulled up it should reveal the crops that grow on top and the same with the “Bottoms.”

**Lesson Extenders!**

1. **Chart:** make a chart-list of vegetables before reading Tops & Bottoms to discuss what vegetables were included in the story. Then recall from the story if it was the top or bottom of the vegetable plant.
2. **Story Dictation:** Complete a shared writing activity in which students suggest ideas and the teacher writes down a story based on one of the illustrations in the book.
3. **Letters to Bear and Hare’s Families:** Write a letter to the Bear and Hare families. Perhaps students could give them hints on growing vegetables or inquire about how their garden is growing.
4. **Writing About Your Garden:** Students who have grown a garden might be encouraged to write about their experiences. Students who do not have gardens could write about what their plans would be if they could start a vegetable garden.
Who Grew My Soup?

Grade Level: 2-4

Objective: After completing this activity, students will have a better understanding of how vegetables grow and why they are an important part of their diet.

Assessment Framework: 1.3.01; 1.3.06; 1.3.07; 1.3.13; 2.3.02; 2.3.10; 12.4.03; 12.4.04; 12.4.05

Suggested Reading Materials:
IAITC’s Specialty Crop Ag Mag

What You Will Need:
1 brad  1 small white dessert plate  pencil  ruler (optional)
1 red dinner plate or a regular white plate they can color
Color pencils or crayons  Glue  Scissors
Stem template from www.agintheclassroom.org or have students draw their own

Activity Instructions:
1. Have the students divide the small dessert plate into eighths by drawing with a pencil and using the ruler as a straight line guide. Plain white paper can be substituted for the small white dessert plates. Just have students trace the large paper plate on a regular sheet of paper and cut it out.
2. Have the students write an Illinois specialty crop fact or facts about vegetables learned from the reading of the Illinois Specialty Crop Ag Mag or Who Grew My Soup on each one eighth section.
3. Have the students cut a triangle out of the large plate. It should be 1/8th of the plate in size. It should look like a pie slice and line up with the lines drawn on the small dessert plate.
4. Have the students attach the red plate to the front of the divided fact plate with a brad.
5. Have the students glue the tomato stem to the top of the tomato.
6. Now the students can turn their tomato spinner and review the facts about vegetables, especially tomatoes!
3-D Pumpkins

Grade Level: 2-4

Objective: After completing this activity, students will have a better understanding of how pumpkins grow and why they are unique to Illinois.

Assessment Framework: 1.3.01; 1.3.06; 1.3.07; 1.3.13; 2.3.02; 2.3.10; 12.4.03; 12.4.04; 12.4.05

Suggested Reading Materials:
Illinois AITC Specialty Crops Ag Mag

What You Will Need:
Orange Construction Paper        2 Paper Fasteners for Each Pumpkin (brads)
Green Construction Paper for Vines         Hole Punch  Scissors

Activity Instructions:
1. Cut 3 strips of orange construction paper about 1 inch wide down the short side of the paper.
2. Holding the strips together in a stack, use a hole punch to make 3 holes in the strips — 1 in the middle and 1 at 1/2 inch from each end.
3. Still holding the strips together, put a paper fastener in the middle hole.
4. Cut a 1 1/2 inch square out of the green construction paper and punch a hole in the center.
5. Put a paper fastener through the hole of the green square. Then bring up the ends of the orange strips and fasten them together with the green square.
6. Spread out the strips to form your pumpkin.

Extended Response Question:
Early American settlers began the tradition of making pumpkin pie. Explain other traditions we celebrate in today’s society. Be sure to include your own experiences in your explanation.
Conversation about Conservation Terms...

In our efforts to protect the environment we sometimes confuse the terms preserve and conserve. This activity is designed to help students understand the difference between conservation, preservation, and indiscriminate use.

Directions:
Divide the class into three groups. Give each student a Tootsie Roll. Instruct each group as follows:

Group 1:
These students are to eat the Tootsie Roll immediately.

Group 2:
These students may unwrap the Tootsie Roll but they may only lick the candy, they cannot eat it.

Group 3:
These students may not unwrap their Tootsie Roll during this activity. They may look at it, smell it, measure it, but NOT eat it.

Terms:
The students in group 1 are the indiscriminate users.
The students in group 2 are the conservationists.
The students in group 3 are the preservationists.

Discussion Questions:
1. Which group uses the candy slowly so that more candy can be made?
2. Would it make a difference if we determined the reason for having the candy?
3. What if the group had not eaten in three days? Would that make a difference?
4. Which group would be the wisest group?
5. What if the goal was to have the same number of Tootsie Rolls a year from now?
6. Which group would have met the goal?

Like any area of decision making, there are no right or wrong answers. Students are encouraged to examine several aspects of the situation, make their decision and be able to defend that decision.

Applying to Areas of Conservation:
Preservationists might want to save all trees and all forests no matter what.
Indiscriminate users might cut down trees and forests no matter what.
Conservationists might want to use the forest by harvesting trees and managing the forest so that it can regenerate itself.

Adapted from Utah Agriculture in the Classroom
The Learning Tree

Grades: K-3

Objective: Students should express the parts of a tree and explore how each of these parts are used to make a wide variety of common products.

Illinois Learning Standards: 1.A.1a; 1.A.2c; 11.A.1d; 12.A.1a; 12.A.1b Assessment Framework: 1.3.01; 1.3.02; 1.4.01; 11.4.03; 12.4.01

Suggested Reading:
I Can Name 50 Trees Today by Bonnie Worth (ISBN 0-375-82277-1)
Hooray for Orchards by Bobbie Kalman (ISBN 0-86505-667-6)
Apple Picking Time by Michele Benoit Slawson (ISBN 0-517-88575-1)
Tell Me, Tree by Gail Gibbons (ISBN 0-316-30903-6)

Materials Needed:
Brown construction paper scissors
Green construction paper markers Glue sticks

Directions:
1. Trace your handprint onto green construction paper and cut out. A minimum of five hands are needed for each tree.
2. Trace the tree trunk onto brown construction paper and cut out.
3. Lay one treetop on the table. Glue the tree trunk to this top.
4. On the front write MY TREE....
5. Now on the inside, write words that describe what you like or what you have learned about trees.

Lesson Extender!
1. Turn the Learning Tree into the Giving Tree. Have each student write activities on each of the leaves (hands) that they could perform that would help the environment. Examples could be recycling, composting, etc.

Extended Response
Why is it important to protect our forests? How do trees impact animals, plants, soil and water? How do they impact humans? Be sure to include information from the Trees Ag Mag along with your own experiences and knowledge.
Earth Day Clever Catch

Grade: Can be adapted to fit K-12

Objective: After completing this activity, students will have a better understanding of our Earth Day, natural resources and how agriculture is important to their future.

11.A.2c; 11.A.2d; 11.B.2b; 11.B.2f; Assessment Framework: Standard 1B 1.4.09; 1.4.10; 1.4.13; 1.4.14

Suggested Reading Material:
Earth Care by Margaret Read McDonald; ISBN-13: 978-0874837841

Materials Needed:
• Beach ball with numbers 1-40 written on it randomly in permanent marker
• List 40 questions provided by Illinois Agriculture in the Classroom. Complete lesson can be downloaded from the www.agintheclassroom.org. Lesson comes from the Top 40 Hits of Planet Earth booklet.

Procedure:
Toss the beach ball with numbers around the room, when a student catches the ball have him/her say the number where his/her left thumb lands.

Ask that question number to the student.

Then the student tosses the ball to another classmate.

Repeat steps 1-3 until all 40 questions have been answered.
A Slice of Soil

Grade Level: 2-4

Objective: After completing this activity, students will have a better understanding of our natural resources and how agriculture is important to their future.

Assessment Framework: 6.3.03; 12.4.08

Suggested Reading Materials:

Soil is one of our most important natural resources on the earth’s surface. Many living things depend on it for food. People do too. Not all soil is good enough for plants to grow. Complete this activity to learn just how little soil we have to grow food.

An apple and paring knife are needed for this activity:

1. Cut an apple into four equal parts. Three parts represent the oceans of the world. The fourth part represents the land area.

2. Cut the land section in half lengthwise. Now you have two 1/8 pieces. One section represents land such as deserts, swamps, antarctic, arctic, and mountain regions. The other 1/8 section represents land where man can live and may or may not be able to grow food.

3. Slice this 1/8 section crosswise into four equal parts. Three of these 1/32 sections represent the areas of the world that are too rocky, too wet, too hot, or where soils are too poor to grow food. Plus, we can’t grow food on some land because cities and other man-made structures are built on it.

4. Carefully peel the last 1/32 section. The peel on this small piece represents the amount of soil on which we have to grow food. This amount of soil will never get any bigger.

Extended Response
Why is soil so important? Think about its impact on agriculture and the foods you eat. Be sure to include your own experiences along with information from the Soil Ag Mag to support your answer.
Soil Sam

Objective: Students will have a better understanding of the growth and development of a seed and the factors that affect it.

Assessment Framework: 6.3.03; 12.4.08

Materials Needed:
Knee high stockings
Untreated grass seed
Potting soil
Baby food jar or recyclable water bottle (one per student)
Water
Jiggle eyes
Fabric

Directions:
1. Using knee-high hose, place some grass seeds in the toe where you want the grass to grow. The toe of the hose is the top of the head for the Soil Sammy. The grass will look like hair when it grows.
2. Pack a handful of soil (roughly a cup to 1 1/2 cups) in the end of the hose on top of the grass seeds. Make sure that the ball of soil is slightly larger than the baby food jar or the water bottle.
3. Tie a knot in the hose under the ball of soil.
4. Completely wet the head of the Soil Sammy. Place the top of the hose (which is the bottom of the Soil Sammy in the baby food jar filled with water making sure the head is above the mouth of the jar. The end of the hose will absorb the water to feed the grass seeds, which will germinate through the hose. (You may have to poke a few small holes in the top of the Soil Sammy to help the grass get through.)
5. Now you can decorate! Suggestions are a round piece of fabric to fit over the mouth of the jar for a shirt. You can add buttons to the shirt and jiggle eyes on the face and cut out felt for a mouth.

Water as needed and be sure to cut the grass “hair” and style as desired.

Will the grass hair grow better or faster with fertilizers? Try it and find out. Add different fertilizers to the soil and water and see which grows best.

Lesson Extender: Try adding some of the following to your Soil Sammy’s water and make predictions on what the outcome will be. Make more than one Soil Sammy and have students chart the differences in the grass.
- Add to the Water: Store-bought liquid fertilizer, soda pop, apple juice, lemon scented liquid soap
- Add to the Soil: Store-bought fertilizer stick, coffee grounds, baking soda, Epson salts

Farmers have to be careful to not add too much fertilizer. They go to special classes and use math problems to figure out the right amount. You shouldn’t use too much fertilizer either, but you can experiment with different amounts.
**Between the Slices**

**Grade Level:** 4-6

**Objectives:** After completing this activity, students will be able to identify products grown on a farm and how they are processed into items eaten every day.


**Assessment Framework:** 1.4.04; 3.5.03; 3.3.19; 3.3.27; 10.3.02; 10.4.01; 12.4.03; 12.4.07

**Introduction:**

Today’s farmers make it possible for food processors to use the quality products such as wheat, pork, and milk to produce the foods we eat and enjoy. But it takes more than the farmer to get these products to our tables. Growing and harvesting crops and raising livestock is only the beginning. It takes thousands of workers to get the agricultural products to our stores and restaurants. Read below to find out what some products go through to get from the farm to the consumer.

**Wheat – A Grain**

Wheat is planted in the fall and is typically called winter wheat. In July, the wheat is ready to harvest. Farmers use a giant machine called a combine to harvest the wheat. The combine cuts the wheat stalks out of the field and separates the wheat head from the stalk. The wheat head moves into a storage tank on the combine. When the tank gets full the farmer unloads the combine into trucks or wagons using an auger. An auger is like an arm on the combine. It pushes grain through the combine and into the truck or wagon. The farmer then takes it to the elevator. The elevator then ships the wheat by truck, rail, or barge to a terminal. At the terminal the wheat is sold to the various industries, which make food or feed, and for shipment overseas. The place where wheat is shipped to make food is called the mill. The mill breaks the wheat kernels into pieces and sifts the pieces to get the bran and germ (parts of the wheat kernel) out. This is repeated three times to make the substance we know as flour. The miller then adds B-vitamins and iron for nutrients. The flour is shipped in bags to the bakery or grocery store.

**Cheese – A Dairy Product**

Cheese is a healthy, tasty food that is made from milk. The cows on the farm are milked using a milking machine that pumps the milk from the cows and into huge storage tanks. These storage tanks cool the milk until refrigerated tank trucks come to pick it up. The milk is then made into cheese. First, the milk is heated and quickly cooled. This is called pasteurizing. Pasteurizing is a process that kills any harmful bacteria. The processed milk is then treated to form a soft, custard-like substance called
The curd contains a liquid called whey, which must be taken out through a special process before cheese can be made. Special knives cut the curd into thousands of small cubes, and the whey oozes from them. Heating and motion force more whey from the curd. The curd “ball” is then lifted from the vat. The “ball” is broken up into small pieces and put into presses that keep the cheese under great pressure for a few hours to a few days. During pressing, more whey drains out, and the curd is shaped into clocks or wheels. After it is pressed, it is immediately wrapped in plastic. The cheese is then aged in cool storage rooms. The aging times vary for different cheeses. Brick cheese and others need two months to age while parmesan cheese requires about a year. After being aged, the cheese is packaged in a wide variety of shapes and sizes.

Pepperoni, Sausage and Ham – Pork Products
Pigs go to market when they are only five to six months old and at the weight of 240-260 pounds. Pigs may be sold at an auction market or sale barn, or may be bought directly by an order buyer who buys for a packer. Meat inspectors employed by the United States Department of Agriculture inspect live pigs, hog carcasses, and the entire packing plant to make sure that pork is safe to eat. The pork is ground up, and special seasonings are added. Pork is sold as fresh meat or as processed meat. Fresh meat is the sausage, pork chops, and roasts. Processed meat is the salami, hot dogs, pepperoni, bologna, and luncheon ham. Processed meats are cured with salt and then smoked, baked, or dried. About half of the pork produced in the United States is sold in supermarkets. The other half is eaten at restaurants, hospitals, schools, and business cafeterias.

Activity Outline:
1. Ask the students if they know how the food grown and raised on a farm gets to them. Using the introductory information help the students understand the processes that food goes through.
2. Discuss how food processing is the changing or preparing of food by special treatment.
3. Next, have the students write a paragraph describing how to make their favorite pizza. Remind students to use transition words in their writing such as next, first, second, and finally.
4. Pass out the “Secret Slices” worksheet. Have the students figure out what type of pizza each child ate. Answer Key: Sara – Bologna; Sam – Ham & Cheese; Sally – Egg Salad; Steven – Peanut Butter & Jelly.

*Complete lesson can be downloaded from: www.agintheclassroom.org. Pizza lesson is under teacher resources, printable material, After School Agriculture 4-6 Booklet.*
Secret Slices

Four classmates, Sara, Sam, Sally, and Steven, enjoyed their favorite pizza for lunch yesterday. Each child had a different slice. Can you match the child with the correct pizza?

<table>
<thead>
<tr>
<th></th>
<th>Cheese</th>
<th>Pepperoni</th>
<th>Sausage</th>
<th>Supreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sara</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sally</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steven</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Clues:
1. Sam had 5 different ingredients on his pizza.
2. Sara sat next to the boy who was eating the cheese pizza.
3. Steven’s pizza was not made with meat.
4. Sally always drinks soda with her sausage pizza.

Discussion Questions:
1. What is food processing?
2. Explain how food gets from the farm and to the grocery store.
3. How is wheat processed into flour?
4. How is milk taken to a dairy plant?
5. How is pork cured into processed meat?

*Find this complete lesson in the IAITC’s After School Agriculture Lesson Booklet!
Moo Mask

Objective: Students will demonstrate an ability to identify types of cattle based on markings.

Illinois Learning Standards: 4.A.1c, 4.B.1b, 13.B.1d, 12.B.1b
Assessment Framework: 1.3.13, 1.3.14, 1.3.19, 1.3.20, 1.3.27, 12.4.01
Suggested Reading Material:
Clarabelle by Cris Peterson
Click, Clack, Moo by Doreen Cronin & Betsy Lewin

Materials:
1 Large dinner plate String
2 Small dessert plates Glue or Staples
Crayons, markers, or colored pencils
Dairy Ag Mag available at www.agintheclassroom.org

Directions:
1. Have the students cut one dessert plate in half.

2. Next have students cut out eyes on the other dessert plate. Cut our circles or squares with the plate folded in half. This will make cutting easier for the students.

3. Have the students staple or glue the dessert plate with the eyes cut out of it behind the large dinner plate. They should draw a mouth on the dinner plate.

4. Next use the dessert plate that was cut in half to make two ears that are glued or stapled to the top of the dessert plate with the eyes.

5. Have the students color the cow with black and white spots.

6. Have the students add an ear tag to their mask, using their birth date in numerals.

7. Attach string to the side of the mask to allow it to wrap around their heads.
Directions: The following products are all products of beef. Give the product from the word list that is found at each coordinate.

Word List

1. _______ (3, 3)  
Baseball
2. _______ (1, 7)  
Basketball
3. _______ (5, 4)  
Candle
4. _______ (4, 6)  
Crayon
5. _______ (6, 1)  
Football
6. _______ (2, 5)  
Luggage
7. _______ (0, 4)  
Makeup
8. _______ (6, 5)  
Piano keys
9. _______ (4, 1)  
Soap
10. _______ (1, 2)  
Steak
Beanie Baby
Grade Levels: K-7

Illinois Learning Standards: Science: 11.A.2c; 11.A.2d; 11.B.2b; 11.B.2f; 12.A.2a; 12.E.2a; Assessment Framework: Standard 11A 11.4.01; 11.4.02; 11.4.03; 11.4.04 Standard 12A 12.4.03; 12.4.04; 12.4.05

Reading Suggestion:
AITC’s Soybean Ag Mag available at www.agintheclassroom.org

Materials:
- Jewelry size re-sealable bag (found in craft stores)
- Crystal Soil
- Hole Punch
- Water
- Measuring spoons
- Soybeans
- Yarn

Directions:
1. Punch a hole in the top of your bag.
2. Place a scant 1/4 teaspoon of Crystal Soil into the bag.
3. Add one tablespoon of water.
5. Seal your bag firmly.
6. Insert the yarn to make a necklace.
7. Wear your Beanie Baby around your neck and under your shirt to keep it in a warm, dark place.
8. Check your Beanie Baby several times a day for germination and record the growth.

Extended Response Question: Soybeans have many different uses in today’s society. Explain how the use of soybeans has evolved since Carver studied them. Be sure to include your own experiences along with information from the reading.
Objective: After completing this activity, students will have explored the nutritional habits of families all around the world. Students will be able to compare and contrast these countries with the United States and each other. They will also be able to investigate how weather, landscape and soil types affect agriculture all around the world.

Assessment Standards: 3.5.03, 3.5.06, 3.5.19, 3.5.28

Suggested Reading Materials:
Hungry Planet: What The World Eats by Peter Menzel & Faith D’Aluisio
Nutrition Ag Mag available at www.agintheclassroom.org

Activity Instructions:
2. Have the students pick one of the countries in the book (any country but the United States). Give the students a photocopy of the picture of their country from the book and the introductory page of each country which includes the cost of all their food purchased for one week.
3. Students should investigate the country using the internet, books, encyclopedias, etc.
4. Have the students write a report on their country including what items were purchased and how much money was spent. Have them include agricultural aspects such as weather/climate, topography/landscape, soil types, etc. Each student should use these findings in their discussion of why the people of their assigned country can grow specific foods and why they can’t grow other types of food. Students should also discuss nutritional aspects. Does the food purchased fulfill all of the nutritional needs of the people in that country?
5. After writing their report, have the students prepare a short presentation about their country. This could be done with a PowerPoint presentation or just a general sharing session.
6. After all students have shared their findings, discuss how the United States differs from other countries. What kind of land and climate do we have? What types of food do we buy? How much money do American families spend on food?

Lesson Extender!
1. Have students compare and contrast different families from the book. They could compare types of food eaten, how much money was spent on food for the week, obesity rates, birth/death rates, etc.

Extended Response Question: Nutrition is important for everyone around the world. Discuss how your diet is different from those of other families around the world. Do other families receive the proper nutrition according to our standards?
Illinois Agriculture in the Classroom

Hoofing it Through History!!

Grade Level: 4-6 Social Studies and Geography

Objective: After completion of this activity, students will be more familiar with reading maps and labeling locations on maps. Students will also learn the location of important battles of the American Civil War. Through the use of these maps, students will practice with latitude and longitude.

Illinois Learning Standards: Social Science 16.A.2a; 16.A.2b; 16.A.2c; 16.B.2d; 16.E.2c; Geography 17.A.2b Assessment Framework: 16.5.01; 16.5.02; 16.5.03; 15.5.04; 16.5.26; 16.5.27; 17.5.03; 17.5.04.

Suggested Reading Materials: IAITC Horse Ag Mag
http://www.civilwarhome.com/horses.htm

Introduction: In the time of the American Civil War, horses were an important factor in the outcome of the war. The horses that served the Confederate and Federal armies left lasting impressions on all that surrounded them. These horses worked tirelessly to carry their masters through the battle fields. The horse of a commanding officer was generally as well known to the rank and file as the general himself, and the soldiers were as affectionately attached to the animal as they were to their commanding officer. The following is an excerpt from the website http://www.civilwarhome.com/horses.htm, and is an account of General Ulysses S. Grant’s beloved war horses. Grant had a fondness for horses that can be seen in the writings of his son, Fredrick Dent Grant. For more information on war horses and their Generals, visit the listed website.

This activity relates the horse and history directly. Have students read the writings of Fredrick Dent Grant. After the reading the passage, have students complete the ISAT questions then research the sites found in the reading. Have students map the different locations on the maps provided. This exercise uses Google Earth.

Lesson Extender!
1. Have students do an Internet search for images of American Civil War horses or War horses in general and create a display or bulletin board in class with the photos they found.

This is a AITC SMART lesson! Log on to www.agintheclassroom.org to have your students learn more about horses, the Civil War and General Ulysses S. Grant.
Activity 4: King Cotton

Background

If you ask someone “What was the cause of the Civil War?” chances are they will answer “slavery.” True, but why did the South want or need slaves? Cotton. By examining this important crop, your students will grasp and be able to relate how cotton influenced the slave trade, slave culture, economic policies, the Civil War, and the industrial revolution. Cotton picking was a job for healthy adult slaves. Generally, these slaves would hand pick cotton in the fields all day, and then by candlelight they would join the elderly, infirm, or children to gin the cotton by hand.

Ginning cotton means to remove the lint or fiber from the seed. It is important to remember that the more lint one removed from the seed, the more profit from each boll. It would have been important for slaves to remove as much as possible from each seed. Your students may have anywhere from 12-42 plus seeds per boll, as did the slaves. A slave could gin one pound of cotton a day. After completing the following classroom activity, your students will be able to determine how many bolls of cotton they would need to make one pair of jeans. In fact, about 120 ginned cotton bolls weigh only one pound. Eli Whitney is generally credited with the invention of the cotton gin (1793). His idea for this machine came while he was watching a cat trying to catch a chicken in the barnyard. The cat’s unsuccessful attempt left him with a claw-full of feathers and no chicken. Whitney decided to try a similar approach with cotton. He basically wanted to “rake” the fiber from the seeds. His machine, operated by a hand-crank, revolutionized the production of cotton.

With the invention of the cotton gin, one slave could gin 50 pounds of cotton a day. Did this mean plantation owners needed fewer slaves? No, this machine meant cotton was a more profitable crop. Now plantation owners needed more slaves to produce more cotton. This was important to Southerners because their “production only” economy was in a slump. They had virtually no manufacturing. Factories for making fabric (textiles) were primarily in the North and in England. Unlike wool, which has a very long and scale-like fiber, cotton is a short and smooth fiber. These physical differences make wool easier to spin into thread than cotton, either by hand or machine. Spinning cotton by hand is time-consuming and difficult. Wool, and to some extent linen, was the fabric of choice until machine technology made cotton thread production viable. Cotton production in the South was only economical as long as they could sell it to textile manufacturers in the North.

Today, the United States produces 43 million tons of cotton annually. The largest cotton producing states are Texas, Mississippi, and Georgia. Cotton is even an important crop in the West. Arizona and California are well-known for their Pima cotton, which is a finer, more expensive cotton fiber. Cotton gins are now very large machines that do the work much faster than when it is was done using Eli Whitney’s simple machine. And what do we do with the literally mountains of cottonseed after it is ginned? Most of those fuzzy seeds are fed to dairy cattle or processed into cottonseed oil, which can be found in nearly every kind of snack food including chocolate candy bars.
King Cotton - Procedures

1. Order cotton bolls from Utah AITC, www.agclassroom.org/ut. The cotton in these kits is from California and has a longer fiber than the cotton harvested in the 1800s.
2. Share with the students the background information about cotton and slavery.
3. Give each student or group of students one cotton boll for ginning.
4. Have your students examine the woody stem and the boll holding the cotton fibers. Ask them to predict how many seeds they think are in their boll.
5. Ask students if they can understand why it was so painful to pick this plant by hand. Would gloves have been available? What may slaves have used to protect their hands from getting cut?
6. Ask students to gin the cotton, removing the seeds from the fibers. Listening to Negro spirituals while your students are ginning will enhance the experience. Slaves sang to pass time while they worked. Many Negro spirituals can be downloaded at www.negrospirituals.com. What cultural differences may be expressed by this music? Do we still use music to pass the time while we work? What does the kind of music we listen to say about our cultural heritage?
7. Ask students to compare their prediction (step 4) with the actual number of seeds. Were there more or less than they thought? How did they like the work? Why would people have had so few changes of clothing during this period?
8. Discuss the invention of the cotton gin. Ask your students how many years passed after the invention of the cotton gin until the beginning of the Civil War. Did the tension between the Northern and Southern states escalate after this important invention?

Additional Discussion Questions & Activities

1. Ask students to consider how many cotton bolls are needed to produce a pair of jeans. Want to find out? Borrow a scale from the science teacher and weigh a pair of jeans and one ginned cotton boll. Do the math: you’ll need to gin about 360 bolls (for jeans that weigh 3 pounds).
2. Have students examine the fiber under a hand lens of simple magnification lens. They will notice that these short fibers have almost a silky appearance.
3. For a historical perspective of cotton, download the PDF or order the video, Cotton, the Perennial Patriot, available from www.cotton.org/pubs/cottoncounts/resources.cfm.
4. For a discussion on modern cotton farming, share with the class an excellent online slide show: “Cotton: From Field to Fabric in Forty Frames.” This presentation describes the major steps involved in producing and processing cotton. It has great pictures and easy-to-read captions. As the teacher, you have control over the speed of the presentation which allows as much time as needed for commentary or questions. Download this free from the National Cotton Council at www.cotton.org/pubs/cottoncounts/resources.cfm.
5. To contrast wool with cotton, watch the silent film From Wool to Cloth and complete the Motion Picture Analysis Worksheet in Appendix 3. (The film may be streamed or downloaded from the Growing a Nation website Classroom Resources.

Illinois Learning Standards: 15.B.3b; 15.D.3a; 16.C.3b (US); 16.C.3c (W)
Growing Letters!

Grade Level: K-3 Science & Reading

Objective: This activity is designed to allow students to observe the germination process and what factors encourage growth and what factors can discourage growth.

Illinois Learning Standards: Reading: 1.B.2b; 1.C.2b; 1.C.2d; 2.A.2b Science:
11.A.2c; 11.A.2d; 11.B.2b; 11.B.2f; Assessment Framework: Standard 1B
1.4.09; 1.4.10; 1.4.13; 1.4.14

Materials:
Seeds Glue Crayons
Construction paper Water bottle
Wax paper or cookie sheets

Suggest Reading Material:
AITC’s Horticulture Ag Mag or Specialty Crops Ag Mag
Planting a Rainbow by Lois Ehlert
The Tiny Seed by Eric Carle
Tops and Bottoms by Janet Stevens
Pick, Pull, Snap by Lola M. Schaefer

Directions:
1. Cut large sheets of construction paper in half (hot-dog style). One 1/2 piece of paper for each student.
2. Next, write each students’ name on the construction paper strip using the crayons. Older students can write their own name.
3. Now have each student trace over their name with glue. Elmer's white school glue will work or a glue stick.
4. Once the student has traced his or her name in glue have them shake the seeds over the glue. If you use small seeds like radishes, carrots or even grass seeds you can put them in shakers to help students place the seeds easier. Old rinsed out plastic spice jars work really well.
5. Sit to the side to let glue dry.
6. Once the glue is dried place the projects on wax paper or on cookie sheets so the seeds can be spritzed with water. Do not saturate the paper but do get the seeds damp. The seeds should be kept damp to ensure growth.
Monocots & Dicots Oh My!

Grade Level: 5-8 Science

Objective: This activity is designed to allow students to observe the germination process and distinguish between a monocot and a dicot seed.

Illinois Learning Standards: Science: 11.A.2c; 11.A.2d; 11.B. 2b; 11.B.2f; Assessment Framework: Standard 1B 1.4.09; 1.4.10; 1.4.13; 1.4.14

Materials:
- Paper towels
- Magnifying lens
- 2 clear 9oz plastic cups
- Coffee filters
- Vermiculite
- Water
- Plastic spoons or popsicle sticks
- Soybeans seeds
- Corn kernels

Suggest Reading Material:
- AITC's Corn and Soybean Ag Mags
- The Super Soybean By Raymond Bial
- Cornbelt Harvest By Raymond Bial
- Corn By Gail Gibbons

Introduction:
Begin by reviewing what seeds need in order to grow. Answers may include light, water, air, soil (or something to grow in), space, proper temperature, fertilizer and time. To compare the growth and development of monocots and dicots, students will plant corn and soybean seeds.

Directions:
1. Each student should line the sides of a clear plastic cup with a damp coffee filter. Students should write their name or initials on the outside of their cups.
2. Fill the center of the coffee filter with vermiculite. Pack it softly as this will serve as the source of moisture for the seeds.
3. Between the coffee filter and the cup, carefully place 5 corn seeds and 5 soybean seeds about half way down. The seeds do not go in the vermiculite. The cup serves as a window to the seeds allowing the students to watch the seeds grow.
4. Add just enough water to dampen the vermiculite. Avoid standing water.
5. Place the cups in a warm place out of the sunlight.
6. Have students record daily observations in a chart or journal of their choice. Compare results at the end of week one and week two.

*This lesson was adapted from the Plant Magic kit. Check out the kit from your local county coordinator to view the entire lesson.*
Objective: This activity is designed to help students become more familiar with the process of raising alternative materials for fuel.

Assessment Framework: Standard 1B 1.4.09; 1.4.10; 1.4.13; 1.4.14; 12.4.03; 12.4.04; 12.4.05

Materials:
Tassel to Tank information slips
Illinois AITC’s Corn Ag Mag and Renewable Fuels Ag Mag
Corn by Gail Gibbons
Anna’s Corn by Barbra Santucci

Important Vocabulary:
Barge: a flat bottom boat designed for transporting and storing grain through water systems.
Elevator: a structure used for drying, storing and loading grains.
Fermentation: the conversion of sugar to carbon dioxide.
Distillation: the process of heating a liquid until it boils, capturing and cooling the hot vapors, and collecting the condensed vapors.
Processing: changing a product like corn into a variety of products such as livestock feed, cosmetics, and fuel.

Directions:
1. Learn about corn by reading the Corn and Renewable Fuels Ag Mags. Explain the processes involved in taking corn from the field and producing ethanol for automobiles.
2. Divide students into groups or for smaller classes give each student their own Tassel to Tank information slip.
3. Have students brainstorm about the process of making ethanol and answer the questions on each card.
4. After adequate time for brainstorming have students place the cards in the order from the beginning of growing corn to the process of making ethanol. Explain to students they should be forming a timeline that involves all the processes of production, processing, packaging and distribution of corn to ethanol.

Extended Response
Transportation is vital for ensuring the United States’ food source is delivered and distributed to everyone. Discuss how your diet might be affected without our elaborate transportation system. Use examples you learned from the Tassel to Tank activity.
What decision making skills are needed for the farmer in the first step of planting a crop? What types of decisions need to be made? Explain how these decisions might effect the crop?

What are the factors that could effect the farmer in this stage of his job? What types of impact could this have for the rest of the growing season?

What are some of the precautions a farmer needs to take with the crop as it is growing? What are some of the hazards a farmer can avoid by preplanning?

Farming equipment is expensive. Are there any ways for farmers to offset their equipment cost, if so what are they?

List all the types of transportation that is needed to make corn into ethanol. Explain how rising fuel cost could affect the cost of products, how can these be avoided?
**Elevator**

What services does a grain elevator supply to the farmer? List all the services and determine why they are important.

**Manufacturer (Ethanol Plant)**

What type of corn is processed into ethanol? Why is this type of corn used verses other types of corn?

**Grinder**

Grinding corn exposes the starch from the corn. Do you think the ethanol process would work if we didn’t grind the corn, why or why not?

**Cooker**

The ground corn is mixed with water, cooked briefly and then enzymes are added. The enzymes convert the starch to sugar. Why is heat used instead of cold water?

**Fermentation**

Yeast is added to the cooked mixture of corn. Yeast is the important ingredient to create fermentation. Define what fermentation is.
**Molecular Sieve**

Ethanol has been used by humans for thousands of years, in part because it is easy to make. Ethanol can be produced from any biological plant that contains sugar. What types of plants, other than corn, do you think ethanol could be made from?

**Ethanol Storage**

Over 4 billion gallons of ethanol are produced in the U.S. each year and many new plants are currently under construction. Name two positive impacts additional ethanol plants could have on Illinois.

**Delivery**

Illinois uses 470 million gallons of ethanol each year, this fuel is delivered in specialized fuel trucks. How could an equipment breakdown or drivers strike effect the delivery of fuel?

**Retail**

All cars sold in the U.S. are factory warranted for the use of gasoline containing up to 10 percent ethanol. Since most cars are already running on some ethanol, what advertising tactics need to be done to encourage people to use E85 fuel?

**Illinois Ethanol Facts**

- Illinois is one of the leading producers of ethanol in the U.S. and about 90 percent of the gasoline sold in Illinois contains 10 percent ethanol.
- Illinois uses about 470 million gallons of ethanol for fuel each year.
- There is currently no Illinois sales tax on E-85.
- Illinois turns out over 1 billion bushels of corn each year, of which 1/6 is used to produce ethanol.
- One bushel of corn yields 2.8 gallons of ethanol and 18 lbs. of Distillers Grains from dry mill ethanol plants.
- Over 30 percent of all gasoline sold in the U.S. contains ethanol.
- Ethanol reduces greenhouse gas emissions from vehicles.
- Ethanol fuel reduces our dependence on foreign oil.
SOME SWEET TRAITS

OBJECTIVE:
Students will demonstrate chromosome pairings and complete Punnett Squares to determine possible offspring outcomes.


Related Resources:
- Biotechnology Ag Mag
- DNA Activity available at: www.agintheclassroom.org
- DNA Basics available from the University of Utah: http://learn.genetics.utah.edu/

BACKGROUND INFORMATION:
Sweet corn varies in plant height, ear length, and kernel type. Sweet corn also varies in sweetness levels. Super sweet varieties are the result of breeding sweet corn hybrids for a high sugar concentration. The super sweet varieties start out with a high sugar content at harvest and tend to hold their sweetness through shipping and storage. Taste preference and longer shelf life make this hybrid very popular for consumers and retailers. Because science has been able to keep up with consumer preferences, fresh market sweet corn sales have increased in recent years.

The popular super sweet varieties are hybrids. A hybrid is the offspring of two plants of different varieties produced through human manipulation to obtain specific genetic characteristics. To create a sweet corn hybrid, pollen from one plant is placed on another plant. The crossing of these two plants yields an offspring and potentially another variety of sweet corn.

The nucleus of a plant cell contains Deoxyribonucleic Acid. DNA in the nucleus is grouped into 23 sets of chromosomes. In each chromosome, the DNA is grouped into genes. DNA is responsible for the expression of a variation of a trait. The DNA that makes up genes may vary. One gene may express tall plant height while the other may express short plant height.

A Punnett Square is a chart used to show/predict all possible gene combinations in a cross of parents, whose genes are known. Punnett Squares show the genotype (genetic makeup) and the phenotype (physical makeup).

This is a AITC SMART lesson! Log on to www.agintheclassroom.org to have your students learn more about corn and renewable fuels!
Answers!

Apple Ag Mag Reading Passage
1. B
2. D
3. A
4. C
5. A
6. D

Navigating Illinois
2. Tazewell
3. Henry
5. Madison
6. Union
7. Logan
9. McHenry
11. Effingham

Beef Ag Mag - Math
1. Luggage
2. Steak
3. Football
4. Soap
5. Crayon
6. Baseball
7. Candle
8. Basketball
9. Makeup
10. Piano keys
Tassel to Tank Flowchart Answer Key

- Chemical Dealer
- Implement Dealer
- Seed Dealer
- Farmer
- Planting
- Corn
- Harvest
- Manufacturing Plant
  - Grinder
  - Cooker
  - Fermentation Chamber
  - Distillation Chamber
  - Molecular Sieve
- Elevator/Storage
- All Methods of Transportation
- Ethanol Storage
- Delivery
- Retail
Recommended Reading!

Apples
- Apples to Oregon by Deborah Hopkinson ISBN: 0439800110
- Apple Picking Time by Michele Benoit Slawson ISBN: 0-517-88575-1

Specialty Crop
- There’s a Map On My Lap by Tish Rabe ISBN: 0375910999
- Scrambled States of America by Laurie Keller ISBN: 0439136482
- Hooray for Beekeeping! By Bobbie Kalman ISBN: 0-86505-668-4

Pumpkins
- Too Many Pumpkins by Linda White ISBN: 0823412458

Trees
- I Can Name 50 Trees Today by Bonnie Worth ISBN: 0-375-82277-1
- Tell Me, Tree by Gail Gibbons ISBN: 0-316-30903-6

Soil

Beef
- Amazing Grazing by Cris Peterson ISBN: 156397942X

Dairy
- Extra Cheese Please by Cris Peterson ISBN: 978-1590782460

Soybean
- Oh Say Can You Seed by Bonnie Worth ISBN: 978-0375810954
- Awesome Agriculture: Soybeans an A to A Book By Susan Anderson and JoAnne Buggy ISBN:978-0-9811335-3

Nutrition

Horse
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