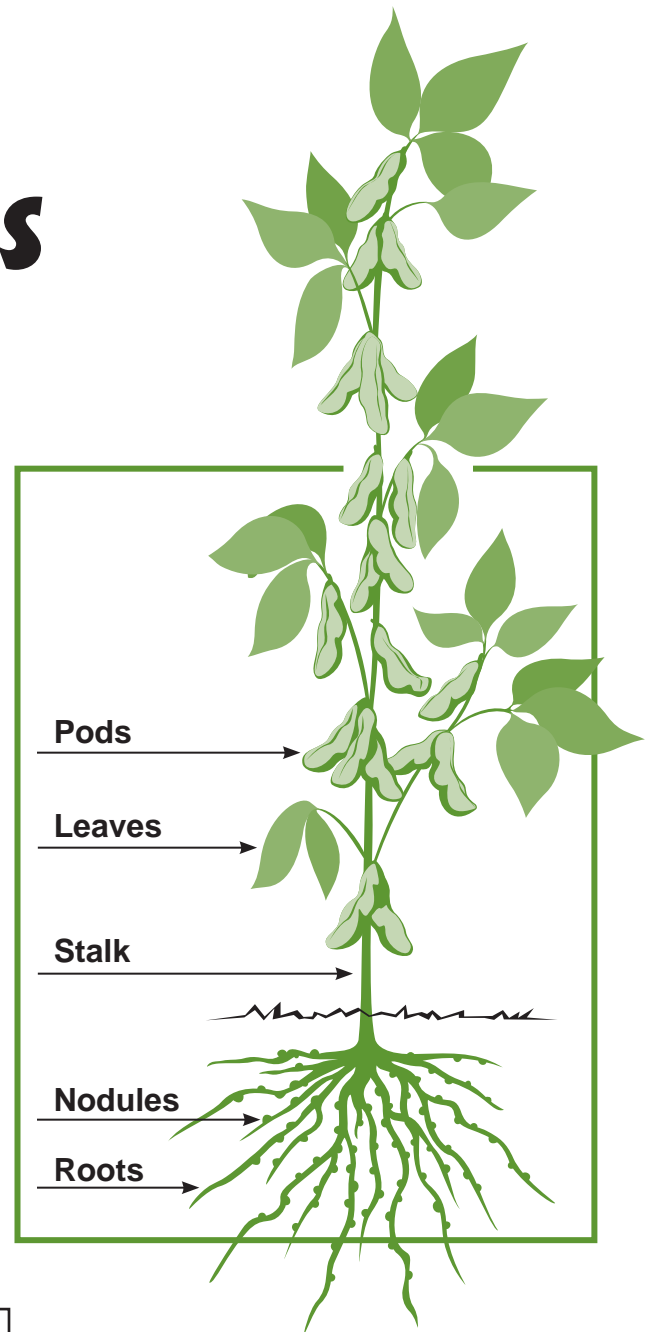


PULSE CROPS AND DRY EDIBLE BEANS

This issue of the Ag Mag focuses on the production, processing, distribution and consumption of pulse crops and dry edible beans. North Dakota ranks high in production of most pulse crops and dry edible beans, and #1 in several.

The Ag Mag's information and activities are geared primarily toward the state's third, fourth and fifth graders. The Ag Mag is distributed three times per year. Subscriptions are free, but if you're not on the mailing list or if you know someone who wants to be added, contact the North Dakota Department of Agriculture at 1-800-242-7535 or ndda@nd.gov.

The magazine also is on the Web at www.ag.ndsu.edu/agmag/agmag.htm or through the North Dakota Agriculture in the Classroom Web site at www.ndaginclassroom.org. This magazine is one of the N.D. Agriculture in the Classroom Council activities that helps you and other K-12 teachers integrate information and activities about North Dakota agriculture across your curriculum in science, math, language arts, social studies and other classes. It's a supplemental resource rather than a separate program.



N.D. Agriculture in the Classroom Mission

To cultivate an understanding of the interrelationship of agriculture, the environment and people by integrating agriculture into K-12 education

PRODUCTION

Legumes

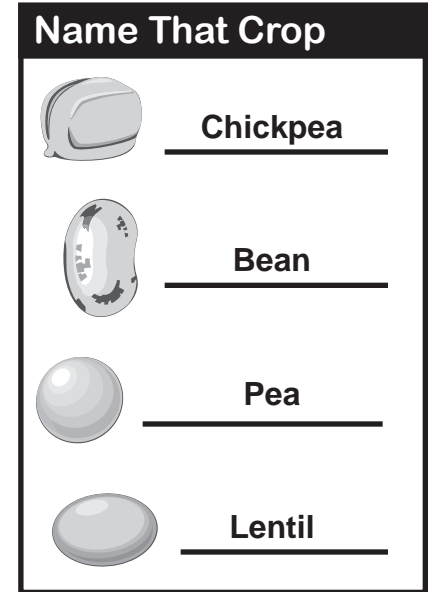
Legumes are plants that have nodules on their roots with bacteria that fix nitrogen. They also have seed pods that, when ripe, split along both sides. Pulse crops (peas, lentils and chickpeas) and edible beans are legumes.

The nitrogen-fixing capability of legumes is important because all plants need nitrogen to grow. Even after the crop is harvested, some of the nitrogen in the legume's roots stays in the soil to provide this nutrient to a crop in that soil the next year. The second crop will probably not be a legume, such as wheat or corn that would use the nitrogen rather than produce more. This is an example of crop rotation, which reduces farmers' fertilizer costs.

Idea: Have students research other kinds of legumes. Their lists might include soybeans, peanuts and alfalfa.

Idea: Define for students the difference between an annual plant, a biennial and a perennial. Sort various plants into the three categories.

Idea: Gather the different kinds of pulse crops and classes of beans so students can see what they look like.



Bean Graphs or Growth Charts

Materials:

Small plastic pots (leftover from plants purchased in the spring or margarine containers)

10 beans per week

Water sprayer

Growing medium

Procedure:

Plant two seeds each day in separate small pots. Label with date and keep moist. Remove extra seed from each pot when it becomes clear one is hardier than the other.

Keep a Record of Plant Growth:

Encourage students to devise their own methods for record keeping. "What can we do to help us remember what our seeds looked like as they grew?" Most children will think of drawing pictures and writing descriptions. Some may want to make a graph of growth. Younger students may measure the growing bean on a strip of paper, cut the strip to the length of the bean, date it and paste it on a sheet of paper.

Record keeping may include:

What I want to find out.

What I did.

What I observed.

Why I think that happened.

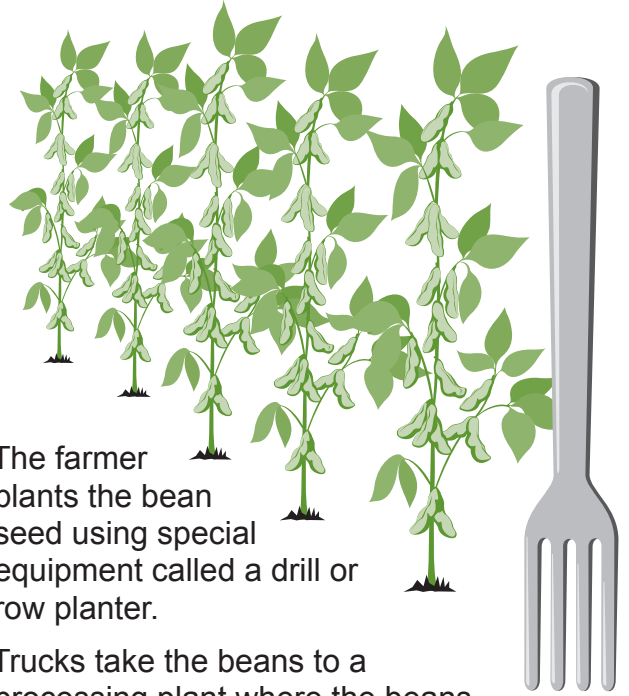
Suggestion:

As a variation to this experiment, leave some bean plants in a dark area and some in the light. Give some plants too much or others not enough water. Give some plants fertilizer and don't fertilize others. Have students record their observations daily. Develop a weekly summary to analyze the experiments.

Beans Bingo Game

Copy the BEANS bingo card from the student worksheet (see last page of this teacher's guide) and have students personalize their cards by randomly writing names of different bean classes from page 2 of the Ag Mag in squares on the cards. Give each student several beans from different classes to use as game markers. The teacher or a student leader calls out a letter – B, E, A, N or S – and a class of bean (for example, turtle, pinto, light red kidney, great northern, etc.) Students place a bean (preferably of the class called) on that square. The first student to get five beans in a row wins. The teacher or a student leader should write down which bean was called for which letter to check students' accuracy. Pulse crops could be used in addition to beans.

From the Field to the Fork Answers



- 1 The farmer plants the bean seed using special equipment called a drill or row planter.
- 7 Trucks take the beans to a processing plant where the beans are tested to determine the quality and the price the farmer receives.
- 3 When the plant has grown to its full height, small flowers begin to develop on the plant.
- 2 With soil, sunlight and rain, the bean plant grows for 12-14 weeks.
- 9 The beans are transferred into rail cars or bagged and sent by truck to canners and packagers all around the world.
- 5 The bean plant, including the pods, turns from a green color to yellow, indicating that harvest time is near.
- 4 The flowers turn into pods and bean seeds begin to grow in the pods.
- 8 The beans are sorted by color, size and quality at the processing plant.
- 6 The farmer harvests the beans and augers them into trucks.

U.S. Bean and Pulse Production Answers



Idea: North Dakota is a leading producer of beans and pulse crops. Have students research what other crops the state leads in production.

Source: Northarvest Bean Growers Association

Idea: Show the “Dry Beans from the Heart of Northarvest Country” DVD available from the Northarvest Bean Growers Association.

Food from Way Back

Dry beans were important staple foods thousands of years ago in the Americas and Asia, especially China. In the Americas, the Mayans, Aztecs and Incas grew dry beans. They left behind pottery decorated with pictures of people holding dry beans. Various American Indian tribes grew different kinds of dry beans, then traded them. For example, the lima bean was first grown in Guatemala, then traded to Mexican Indians. These Indians traded lima

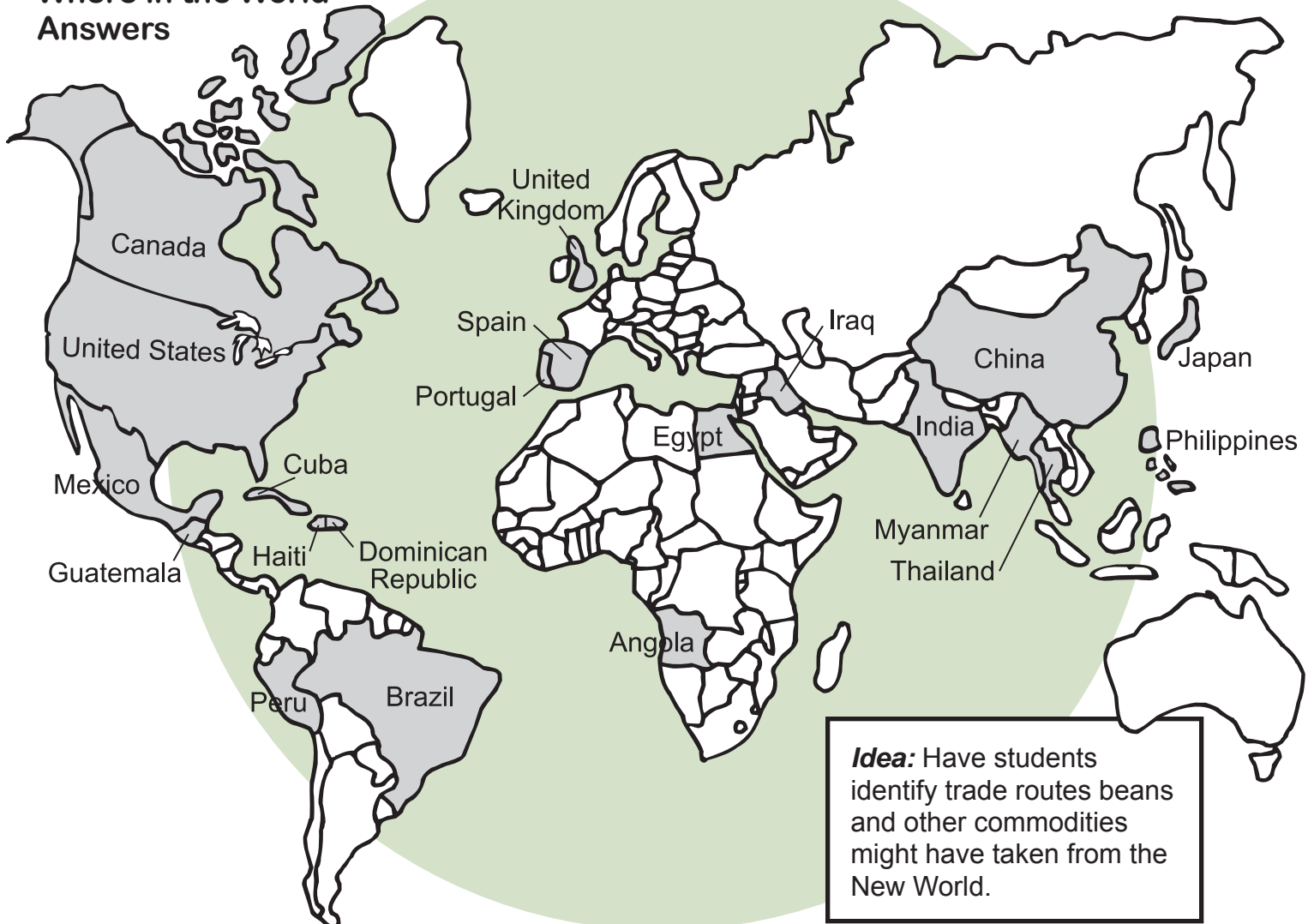
beans to North American tribes in the Southwest, Virginia and the Mississippi Valley. Meanwhile, lima beans were also traded to Peru, where the natives developed the best, biggest variety. When Spaniards came, they named the bean "lima," after the capital of Peru.

Dry beans were called the "poor man's meat." People in Europe were much better fed after dry beans, potatoes and corn were brought from the New World. This better nutrition is

one reason Europe's population grew between 1500 and 1900. In America, things were different. Settlers had much rich land to farm so they could easily raise wheat, corn and livestock. They did not need to grow dry beans for protein because they had plenty of meat. Today people realize the benefits of eating beans as well as meat and dairy for protein.

Source: Northarvest Bean Growers Association

Where in the World Answers



Around the World

Divide students into eight groups. Have each group go to the National Agricultural Statistics Service Web site at www.nass.usda.gov. Assign each group one of the eight states that the majority of dry peas, beans, lentils and chickpeas are grown in: Idaho, Washington, Oregon, Montana, North Dakota, South Dakota, Nebraska and Wyoming. Ask each group to find how many acres of dry peas, chickpeas, lentils and beans were harvested in 2007 in the state assigned to their group.

To find pulse and bean production data, go to the National Agricultural Statistics Service Web site at www.nass.usda.gov. Under Quick Stats – U.S. and State Data, select U.S. & State – Crops, and click Go.

Then:

Step 1 — Planted, Harvested, Yield, Production, Price (MYA), Value of Production

Step 2 — select the crop you want to search for

Step 3 — 2007 - 2007 to get 2007 data

Step 4 — highlight All States, United States then click Add

Step 5 — click on Get Data

Click on the Production column to get the total U.S. production then production by state most to least.

Note: An acre is about the size of a football field.

Then find the total acres produced in the U.S. of each crop.

Navigational Help: Click on Crops and Plants on the left side of the screen. In Step 1, choose “Dry Beans and Peas” In Step 2, choose chickpeas, lentils, peas dry edible or beans dry edible. Click Search.

Have the students write these numbers using all numerals. Compare the total U.S. production with the total production for these eight states. Students should realize that most all of the production comes from these states. Point out that North Dakota is the top producer of dry edible beans, dry edible peas and lentils in the U.S.

Source: National Agricultural Statistics Service

PROCESSING

Canned vs. Dry Answers

1. $1 \frac{1}{2} \text{ cups} \times 2 = 3 \text{ cups water}$
2. $6 \text{ cups} / 2 \text{ cups} = 3 \text{ cups}$
3. $40 \text{ ounces} / 16 \text{ ounces} = 2 \frac{1}{2} \text{ cans}$
4. $3 / 1 \frac{1}{2} = 2 \text{ cans}$

The Many Uses of Peas Answers

All 11 of these products may contain dry peas. They may be in foods, beverages or livestock feed to add protein, fiber or starch. Pea starch also may be used to make ethanol.

Source: Northern Pulse Growers Association

DISTRIBUTION

Idea: Have students research other career areas related to pulse or bean production, processing, distribution or consumption. Invite a farmer who grows pulse or bean crops to visit your classroom.

CONSUMPTION

Meat or Vegetable? Answers

Cheese	Bread	V	Tomatoes
Rice	V	Potatoes	Grapes
Spaghetti	V,M	Lentils	Watermelon
M Chicken	V,M	Pinto Beans	Honey
Yogurt	M	Eggs	Oats
Wheat	V	Broccoli	V,M Dry Peas
V,M Turtle Beans	V	Carrots	M Fish
Milk	Cereal		

Source: Northern Pulse Growers Association

Idea: Brainstorm other foods that might fall into more than one category of MyPyramid.

Idea: Have students go to www.MyPyramid.gov to play MyPyramid Blastoff, to estimate what and how much they need to eat, and to track their eating and physical activity.

Math Challenge Answers

- $\$1.75 + \$1.75 = \$3.50$
 $\$3.50 - \$2.50 = \mathbf{\$1.00}$
- $\$2 + \$2 + \$2 = \mathbf{\$6}$
- $3 \times \$0.69 = \mathbf{\$2.07}$
- $\$2.50 + \$6 + \$2.07 = \mathbf{\$10.57}$
- 2 cans pinto beans,
1 can dark red kidney beans,
4 cans black beans,
3 cans navy beans,
1 can great northern beans,
1 can light red kidney beans

Bean and Pulse Crop Art

Rather than simply creating a picture using different dry beans and pulse crops like your students did when they were younger, have them try to replicate famous artwork, historical places, animals, instruments or other designs by gluing different colors and textures of the seeds on tag board.

Bean and Pulse Crop Border Frames

Cut out the center of the plate or shape. Design the outer edge of the plate or shape with beans and glue in place. Cut the tag board so it fits where the center of the plate or shape was, leaving enough of an edge to glue in place. On the tag board, write or draw something you learned about pulse crops or edible beans. Glue tag board or construction paper to the back side of the frame. When finished, hang them in the classroom to remind the students what they've learned.

Source: Northarvest Bean Growers Association

Estimation

Make copies of the student worksheet (see last page of this teacher's guide), and give one worksheet to each group of students. Fill 4 containers with a class of dry beans or of a pulse crop, and label them for students to analyze.

After they complete the worksheet, ask the students how they arrived at their guesses. Determine how they could make a more accurate guess without counting all the beans. Lead to the idea of taking samples and estimating the total numbers from those samples.

Have five different students take a baby food jar sample of beans and count the number

of beans in each jar. Have one student record the number in each jar. When all samples are counted, ask the recorder to average them.

Next, the students need to know how many sample jars will fill the large jar. Have one student fill baby food jars with beans and count how many jars it takes to fill the large jar. Talk about how an average of the samples taken times the number of jars it would take to fill the large container equals a fair estimate of the total number of beans.

Source: Northarvest Bean Growers Association

Teacher and Student Resources

Northarvest Bean Growers Association

50072 East Lake Seven Road
Frazee, MN 56544
Ph: (218) 334-6351
Fax: (218) 334-6360
E-mail: nhbean@loretel.net
www.northarvestbean.org

“Dry Beans from the Heart of Northarvest Country” DVD and bean class poster – free one per classroom

Northern Pulse Growers Association

1710 Burnt Boat Drive
Bismarck, ND 58503
Ph: (701) 222-0128
Fax: (701) 222-6340
E-mail: info@northernpulse.com
www.northernpulse.com

USA Dry Pea and Lentil Council

www.pea-lentil.com

North Dakota State University

“Beans: Agriculture to Health” –
NDSU Extension Service
www.ag.ndsu.edu/pubs/yf/foods/fn602w.htm

MyPyramid Resources

www.ext.nodak.edu/food/mypyramid

National Agriculture in the Classroom

www.agclassroom.org

North Dakota Agriculture in the Classroom Activities

This **Ag Mag** is just one of the North Dakota Agriculture in the Classroom Council projects. Each issue of the Ag Mag focuses on an agricultural commodity or topic and includes fun activities, bold graphics, interesting information and challenging problems. Send feedback and suggestions for future Ag Mag issues to:

Becky Koch
NDSU Agriculture Communication
(701) 231-7875
Becky.Koch@ndsu.edu

Another council teacher resource is **Project Food, Land & People** (FLP). Using the national FLP curriculum, N.D. Ag in the Classroom provides 600-level credit workshops for teachers to instruct them in integrating hands-on lessons that promote the development of critical thinking skills so students can better understand the interrelationships among the environment, agriculture and people of the world. Teachers are encouraged to adapt their lessons to include North Dakota products and resources.

Project Food, Land & People has 55 lessons, including:

- Amazing Grazing
- Cows or Condos?
- Seed Surprises
- Schoolground Caretakers
- Could It Be Something They Ate?
- What Piece of the Pie?
- and many more.

For information, contact:

Gail Scherweit
N.D. Farm Bureau Foundation
(701) 298-2219
gails@ndfb.org

Educators may apply for **mini-grants for up to \$500** for use in programs that promote agricultural literacy. The Agriculture in the Classroom Council, working with the N.D. FFA Foundation, offers these funds for agriculture-related projects, units and lessons used for school-age children. The mini-grants fund hands-on activities that develop and enrich understanding of agriculture as the source of food and/or fiber in our society. Individuals or groups such as teachers, 4-H leaders, commodity groups and others interested in teaching young people about the importance of North Dakota agriculture are welcome to apply.

Examples of programs that may be funded: farm safety programs, agricultural festivals, an elementary classroom visiting a nearby farm and ag career awareness day. Grant funds can be used for printing, curriculum, guest speakers, materials, food, supplies, etc.

More ideas and an application are at www.ndaginclassroom.org. Applications are due Sept. 7, 2008, with funds awarded by Sept. 20, 2008.

For information, contact:

Beth Bakke Stenehjem
N.D. FFA Foundation
(701) 224-8390
bethbakke@btinet.net

The N.D. Geographic Alliance conducts a two-day **Agricultural Tour for Teachers**. The tour includes farm and field visits, tours of agricultural processing plants to see what happens to products following the farm production cycle, and discussions with people involved in the global marketing of North Dakota farm products.

For information, contact:

Marilyn Weiser
North Dakota Geographic Alliance
(701) 858-3063
marilyn.weiser@gmail.com

Agricultural Science in the Virtual Classroom is a pilot project in which middle school and high school science classes are paired with North Dakota State University agriculture faculty and North Dakota ag industry leaders. The pairs will use videoconferencing, Web pages and other technologies to share knowledge about biofuels, food safety or similar ag topics.

For information, contact:

Kim Owen
EduTech
(701) 845-7562
kim.owen@sendit.nodak.edu

Since teachers must relate work to education standards, the council worked with North Dakota State University to identify which Project Food, Land & People lessons meet North Dakota's **academic standards** for grades K-8. The North Dakota Agriculture in the Classroom Web site at www.ndaginclassroom.org includes links to these standards alignments, educational materials, statistics, resources and activities for students and teachers.

For information, contact:

Joanne Beckman
N.D. Department of Agriculture
(800) 242-7535
ndda@nd.gov

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Wayne Sanstead – N.D. Superintendent of Public Instruction

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Judge Barth – Dakota Pride Cooperative, Jamestown

Kim Alberty – Agassiz Seed and Supply, West Fargo

Ted Johnson – Kindred High School, Kindred

Mary Lou Klemisch – Prairie View Elementary School, New Salem

Ginger Deitz – Bennett Elementary School, Fargo

Steven Edwardson – North Dakota Barley Council

Shannon Berndt – Northern Pulse Growers Association

Gary Hoffman – North Dakota Dairy Coalition

Aggie Jennings – North Dakota Farmers Union, Washburn

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ndda@nd.gov



B	E	A	N	S
		FREE BEAN		

ESTIMATION

Guess which container has the most beans. Container _____

Now, count the beans in each container.

Container A has _____ beans.

Container B has _____ beans.

Container C has _____ beans.

Container D has _____ beans.

Which container actually had the most beans? Container _____ had the most beans.

Observe the container that had the most beans. Why do you think that container had more beans in it than the other containers?

Identify the class of beans in each container:

A. _____

B. _____

C. _____

D. _____