Frijoles from the Farm

Life Science, Biology or Chemistry Lesson 2

Grade Level: 3-4

Time: 1 50 minute class
Standards:
Reading - Compare and Contrast
Science - Observation skill
Math - Measurement
For Kansas standards, visit www.ksde.org

Overview:

The students will prepare a dish of refried beans while understanding the role of beans in the environment and the nutritional importance to beans in a healthy diet.

Objectives:

- The student will identify the nutritional importance to beans in a healthy diet.

Materials:

1 pound dry pinto beans
Container of water large enough to cover the pound of beans
2-qt saucepan with lid
Stove or hot plate
Blender
Skillet
2 Tbsp lard
Wooden spoon
Seasonings such as salt, garlic
Tortillas
Shredded cheese for topping

Ahead of Time:

Read the background information and gather materials: simmering water for the soaked beans

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Background Information:

Nutrition supplied by Pinto Beans

Minerals:
1 cup of pinto beans provides 44.6 percent of the recommended daily amount of iron for men, and 19.8 percent for women. Other minerals in pinto beans include calcium, magnesium, potassium, selenium and phosphorus.

Protein:
1 cup of cooked pinto beans provides 15.41g of protein. You need protein for the maintenance, growth and repair of virtually all tissues, cells and other parts of your body.

Fiber:
Pinto beans provide soluble fiber, which lowers cholesterol levels, and insoluble fiber, which promotes digestive health. 1 cup of pinto beans provides 15.4g of fiber.

Vitamins:
Pinto beans are high in folate, also known as vitamin B9, which is essential for the synthesis of DNA and for protein metabolism. Pinto beans are also a source of thiamine, niacin, pantothenic acid, riboflavin and choline.

*** Information from USDA National Nutrient Database:**

Instructional Format:

The teacher will lead a general discussion about the role of legumes in the environment and diet. Students will then identify the amount of protein recommended for a healthy diet and good sources for this nutrient. The teacher will then soak and simmer a pot of beans for the students to cook a skillet of refried beans to enjoy with tortillas.

NOTE: students will be using hot plate or stove top so be aware of safety procedures and precautions

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Conclusion Questions

1. When your body digests the proteins found in the beans, what will it be used for in your body?

2. What makes this a healthy dish?

3. Is there anything unhealthy in it? If so, how could you modify the recipe?

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Conclusion Questions and Answers

1. **When your body digests the proteins found in the beans, what will it be used for in your body?**

Hair, muscles, pigments, fingernails, enzymes (the chemicals that cause chemical reactions)

2. What makes this a healthy dish?

The protein from the beans and cheese. The students might also notice the grain from the tortilla Also the fiber, vitamins, and minerals supplied by the beans.

3. Is there anything unhealthy in it? If so, how could you modify the recipe?

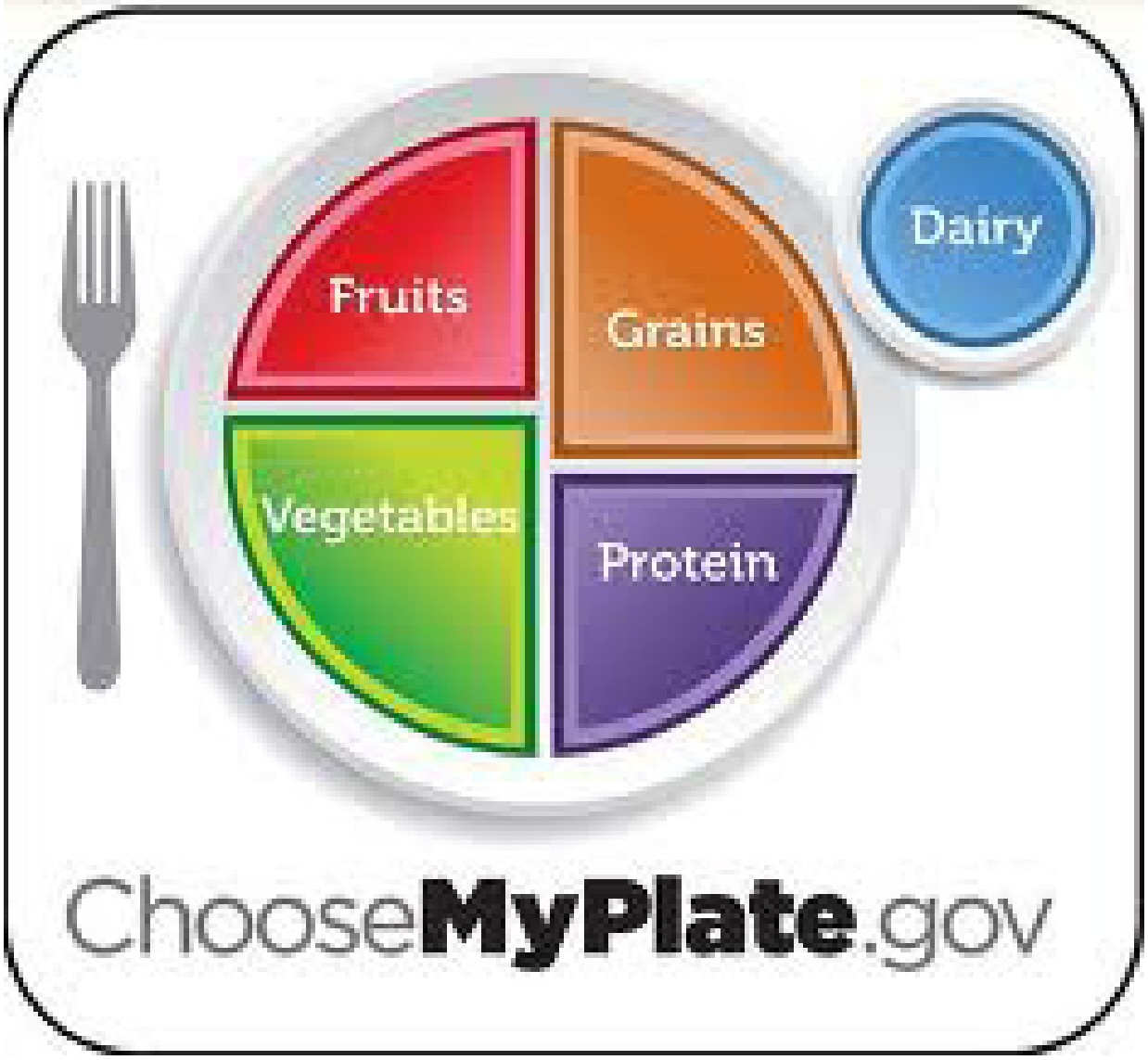
There is some fat in the lard and cheese; to modify use an oil or hydrogenated oil (Crisco) and low-fat cheese

Resources:

Kansas Natural Resources Guide, http://www.choosemyplate.gov/

Want More? Extensions

- Have the students do the activity “Tortilla in a Bag” (see Appendix B)
- Have the students set up an experiment to determine how factors such as temperature of water, type of bean, temperature of storage area, type of water or other liquids affect the percentage of water absorption by the bean seeds.
- Have the students put 5 bean seeds on a paper towel and cover with a second dry paper towel; 5 other bean seeds on a wet paper towel and cover with a second dry paper towel. Store both sets of beans in separate drawers in the room and observe after 72 hours. Calculate the percentage of germination (number of beans that sprouted divided by number of beans involved (5) and multiply by 100)
- Have the students research the “Three Sisters” relationship.


Fruits
Grains
Dairy
Vegetables
Protein
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Important Vocabulary:
amino acid: building block of proteins

chlorophyll: green material in chloroplasts that is needed for plants to make food using photosynthesis

consumer: an organism requiring complex organic compounds for food, which are obtained by preying on other organisms or by eating particles of organic matter

crop rotation: The successive planting of different crops on the same land to improve soil fertility and help control insects and diseases.

element: one of the known chemical substances that cannot be broken down further without changing its chemical properties

enzymes: protein that controls chemical activities

essential amino acid: nine amino acids (of 20) that the body needs but cannot make itself (lysine, leucine, isoleucine, valine, tryptophan, phenylalanine, threonine, histidine and methionine)

legumes: group of plants that includes beans and peas

macromolecule: large molecules containing many atoms

molecule: smallest particle of a substance that retains all the properties of the substance and is composed of one or more atoms

monomer: small chemical unit that makes up a macromolecule

nitrates: a form of nitrogen that can be absorbed from soil by plant roots

nitrogen: An element that makes up nearly 80% of the air by volume and is in all proteins and used in a wide variety of important substances including ammonia and fertilizers.

osmosis: movement of water through a membrane: moves from greatest concentration to least concentration.

photosynthesis: chemical process in which a plant cell uses energy from sunligh along with carbon dioxide and water to produce food (glucose) and oxygen

producer: any organism such as a plant that is able to make food through photosynthesis or chemosynthesis

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Tortillas in a Bag

Ingredients:

- 1 1/2 c. all-purpose flour
- 1 tsp baking powder
- 1/2 tsp salt
- 2 Tbsp shortening
- 1/2 c. hot water

In a large self-locking plastic bag, combine flour, baking powder and salt. Close bag and shake to mix. Add shortening an work into flour until fine particles form. Add the hot water and knead the dough in the bag until it forms a ball.

Remove dough from bag and place on a lightly-floured work surface; knead 15 strokes. Divide into six equal pieces; shape into balls. Cover; let rest 15 minutes.

On a lightly-floured surface, roll each piece as thin as possible. Roll from the center out, turning several times to form an 8-inch circle.

Heat an ungreased griddle or skillet over medium heat. Cook until the surface begins to bubble and the underside is speckled golden-brown, about 15-20 seconds. Cook over side. Stack tortillas under a cloth as they are done and serve warm.

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Authentic Mexican Refried Beans (Frijoles Refrito)

1.Soak 1 pound of dry pinto beans in water overnight

2.Rinse beans from soaking water; drain and put in a 2 qt. saucepan. Add water to cover beans. Put lid on and simmer on stove until tender- approximately 1 ½ hours.

3.Drain beans and blend, a portion at a time, in the blender until smooth. If too thick add a little water.

4.Prepare skillet for frying by adding 2 Tbs. lard to skillet. Add blended beans and simmer in skillet, stirring gently. Add seasonings such as salt, garlic powder to taste.

5.They are ready to be put in tortillas for burritos or to be eaten as a side dish. You can also top with shredded cheese.

Food Groups

How much food from the Protein Foods Group is needed daily?

The amount of food from the Protein Foods Group you need to eat depends on age, sex, and level of physical activity. Most Americans eat enough food from this group, but need to make leaner and more varied selections of these foods. Recommended daily amounts are shown in the chart.

		Daily recommendation*
Children	2-3 years old	2 ounce equivalents**
	4-8 years old	4 ounce equivalents**
Girls	9-13 years old	5 ounce equivalents**
	14-18 years old	5 ounce equivalents**
Boys	9-13 years old	5 ounce equivalents**
	14-18 years old	6 ½ ounce equivalents**
Women	19-30 years old	5 ½ ounce equivalents**
	31-50 years old	5 ounce equivalents**
	51+ years old	5 ounce equivalents**
Men	19-30 years old	6 ½ ounce equivalents**
	31-50 years old	6 ounce equivalents**
	51+ years old	5 ½ ounce equivalents**

*These amounts are appropriate for individuals who get less than 30 minutes per day of moderate physical activity, beyond normal daily activities. Those who are more physically active may be able to consume more while staying within calorie needs.

Food Groups

What counts as an ounce equivalent in the Protein Foods Group?

In general, 1 ounce of meat, poultry or fish, ¼ cup cooked beans, 1 egg, 1 tablespoon of peanut butter, or ½ ounce of nuts or seeds can be considered as 1 ounce equivalent from the Protein Foods Group.

The chart lists specific amounts that count as 1 ounce equivalent in the Protein Foods Group towards your daily recommended intake:

	Amount that counts as 1 ounce equivalent in the Protein Foods Group	Common portions and ounce equivalents
Meats	1 ounce cooked lean beef	1 small steak (eye of round, filet) = 3½ to 4 ounce equivalents
	1 ounce cooked lean pork or ham	1 small lean hamburger = 2 to 3 ounce equivalents
Poultry	1 ounce cooked chicken or turkey, without skin	1 small chicken breast half = 3 ounce equivalents
	1 sandwich slice of turkey (4 ½ x 2 ½ x 1/8")	½ Cornish game hen = 4 ounce equivalents
Seafood	1 ounce cooked fish or shell fish	1 can of tuna, drained = 3 to 4 ounce equivalents 1 salmon steak = 4 to 6 ounce equivalents 1 small trout = 3 ounce equivalents
Eggs	1 egg	3 egg whites = 2 ounce equivalents 3 egg yolks = 1 ounce equivalent
Nuts and seeds	½ ounce of nuts (12 almonds, 24 pistachios, 7 walnut halves) ½ ounce of seeds (pumpkin, sunflower or squash seeds, hulled, roasted) 1 Tablespoon of peanut butter or almond butter	1 ounce of nuts or seeds = 2 ounce equivalents

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The Good Source Chart

We hear so much about foods that what we "should" or "shouldn't" be eating in our diets, it's easy to forget that it's a balanced combination of specific food nutrients that keep us healthy, maintains our weight and provides the energy to be active. This chart showcases many of the nutrients important for a healthy body, along with examples of the best food sources. You'll notice that **beans** are a part of each of these nutrient and mineral categories -- that's because beans are a miracle food. They are not only delicious, versatile and economical, but they are among the healthiest, well-rounded foods you can eat in any diet.

Protein
Building blocks for muscle
-meats
-tofu
-**beans** and rice
-nuts

Calcium
Essential for keeping bones strong
-bone-in canned fish
-**beans**
-dairy products
-dark, leafy greens

Magnesium
Maintains normal muscle and nerve function, aids in calcium absorption
-**beans**
-cooked broccoli
-avocados
-yogurt

Potassium
Aids in protein synthesis, muscle functioning and nerve health
-**beans**
-bananas
-beef
-vegetables

Flavonoids
An antioxidant known to reduce incidence of coronary artery disease and cancer
-**beans**
-apples
-cranberries

Folate (Vitamin B9)
Influences growth, blood cell production and the nervous system
-**beans**
-oranges
-fortified dry cereal
-liver

Iron
Necessary for healthy blood, growth and development
-red meat, liver
-**beans**
-dark vegetables

Thiamin (Vitamin B1)
Regulates enzymes that influence the functions of the muscles, nerves and heart
-**beans**
-potatoes
-shrimp

Phosphorus
Helps build strong bones and teeth, also related to healthy metabolism
-**beans**
-dairy products
-meat

Zinc
An essential mineral that supports a healthy immune system and growth
-**beans**
-fortified breakfast cereal
-meat

Pantothenic acid (Vitamin B5)
Influences normal growth and development
-**beans**
-leafy dark greens
-whole grains
-meat

Pyridoxine (Vitamin B6)
Helps maintain healthy red blood cells, skin and nervous system functioning
-**beans**
-bananas
-pork
-fish
-potatoes

Riboflavin (Vitamin B2)
Influences energy production, healthy skin, digestive and respiratory systems
-**beans**
-dairy products
-liver
-green leafy vegetables

Niacin (Vitamin B3)
Helps produce energy and aids in maintaining healthy skin and digestive system
-**beans**
-liver
-chicken
-nuts
-whole grains

Courtesy of the United States Dry Bean Council