Growing More Food

Lesson Plan

Nebraska AFNR:
Standard 7: Students will recognize the historical, social, cultural, and potential applications of biotechnology.

- Benchmark 7.2: Investigate current and future application of biotechnology in agriculture.

Nebraska ANFR Biotechnology:
Standard 2: Students will evaluate the application of genetic engineering to solve and improve agricultural and health issues.

Objectives:

- The student will engage in discussions around genetic engineering in plants and the benefits for a growing world population.
- The student will evaluate the application of biotechnology specific to soybean production and products.

Materials:
Clickers (optional, 1 per student), KWL chart (1 per student)

Additional Enrichment Resources or Source Files:
Game Question Sources:

- Oklahoma 4-H
  http://oklahoma4h.okstate.edu/aitc/lessons/extras/facts/soybean.html
- National Soybean Research Lab
  http://www.nsrl.uiuc.edu/aboutsoy/question.html

Introduction

Students will enter this lesson with varying backgrounds and knowledge pertaining to soybeans. Begin with the activity below to get students engaged and thinking about soybeans and their impact on the world.

If available, use clickers during the True/False statements to gauge class knowledge. Read the questions one at a time, allowing feedback on the correct answer between questions.

1. The soybean, also known as the soya bean, is a legume native to East Asia. **TRUE**

2. During the Civil War, soybeans were used in place of coffee because real coffee was scarce. **TRUE**

3. One acre of soybeans can produce 32,650 crayons. **FALSE: One acre can produce 82,368 crayons**

4. Soy ink is used in about 45 percent of America's daily newspapers. **FALSE: Soy ink is used in over 95% of America's daily newspapers**

5. US farmers first grew soybeans as cattle feed. **TRUE**

6. Forty gallons of soy-diesel can be produced from one acre of soybeans (about 35 bushels). **FALSE: 50 gallons**

7. Soymilk is a soy food that contains soy proteins that help reduce cholesterol levels and prevent heart disease. **TRUE**

8. The Shedd Aquarium in Chicago was the first building in Illinois to install a soy-based roof. **TRUE**

9. Using 12% soy flour and 88% all purpose flour instead of 100% all purpose flour increases the protein content by 25%. **FALSE: It increases the protein content by 40%**

10. Soybeans are called the "Cow of China" because it is an excellent source of potassium. **FALSE: Soy beans are an excellent source of calcium**

11. 90% of the biodiesel currently produced in the United States is soy biodiesel. **TRUE**

Soybeans in a Changing World

Soybeans play a large role in our diets – both in humans and animals. (See: "Bringing Soybeans to the Table" lesson plan for further background and activities.) With the world's population rapidly expanding, soybeans will continue to play a major role in food, fiber, and fuel production.

---

1. Have students fill out the K and W sections of a KWL chart regarding their knowledge of soybean use and sustainability in a world with a rapidly growing population.

2. Once completed, combine the student input into a class KWL chart on the board or Smartboard. Use the K and W sections as a springboard for discussion.
    a. Note: Have students retain their charts for completion at the end of the lesson.

Population Increase

Students will work in a small groups to research population growth in their city or county, state, or a country of their choice, with an end date of 2050. For current world census data and predicted growth, this website may be used:
http://www.census.gov/population/international/data/worldpop/table_population.php.

To search by state, county, city, or zip code within the U.S., use this website: http://www.census.gov/quickfacts/table/PST045215/00

Optional Lesson Activities:

1. Students will use data gathered in their small groups and turn it into a presentation of some format (song, podcast, video, skit, etc.). Students will present to the class.

2. Students will use data gathered in their small groups to work collaboratively with the whole class to make a large visual representation of the growing population worldwide. Think creatively!

3. Compare the population census of a certain state (Link here: http://www.census.gov/quickfacts/table/PST045215/00) with the agricultural census of the state (Link here: https://www.nass.usda.gov/Statistics_by_State/). Compare and contrast several different states to frame a conversation around state needs and excess. View the example county data document at the end of the lesson plan. Optional extension questions are below.
    a. Why do certain states produce certain products?
    b. Does an abundance of one agricultural product in a state restrict or enhance their ability to provide for themselves?

Soybeans and Biotechnology

As a commercial crop, many varieties of soybeans have been recipients of genetic modification techniques to help decrease environmental impacts of production, increase yield and select for ideal traits.

1. Have students watch the following two videos:
    a. Soybean Genetic Modification – University of Nebraska: Lincoln (6 minutes 45 seconds)
        i. Found on Vimeo at https://vimeo.com/82024247
    b. How are GMOs Created – GMO Answers (5 minutes 31 seconds)
        i. https://gmoanswers.com/ask/how-are-gmos-created
        ii. Also found on YouTube at https://www.youtube.com/watch?v=2G-yUuiqIZ0

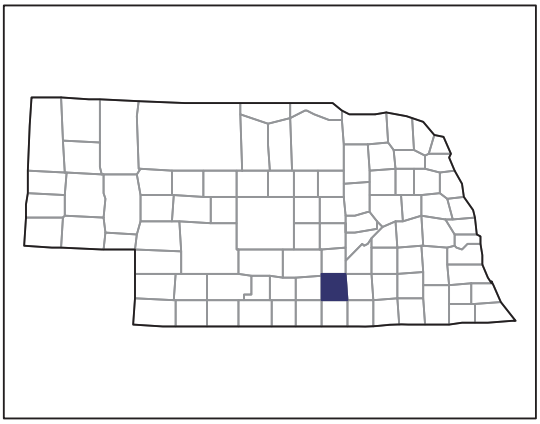
At the end of the lesson, have students revisit their KWL chart and complete the L portion. Share and discuss as time allows.

Name: _____

KWL Chart

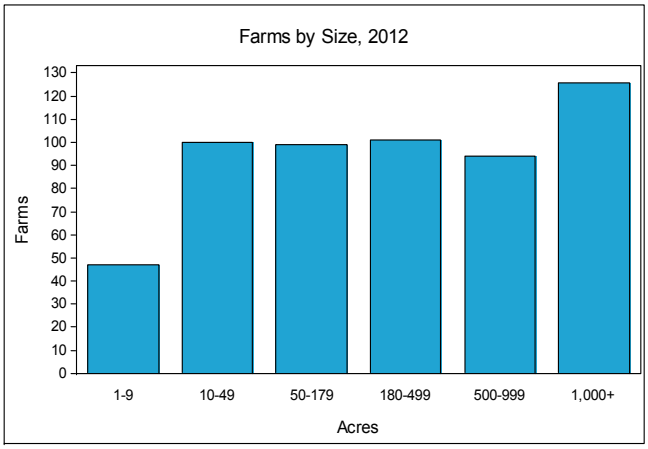
Soybean Growth, Use, and Sustainability in the World: Looking forward to 2050		
K: What I already know	W: What I want to know	L: What I have learned

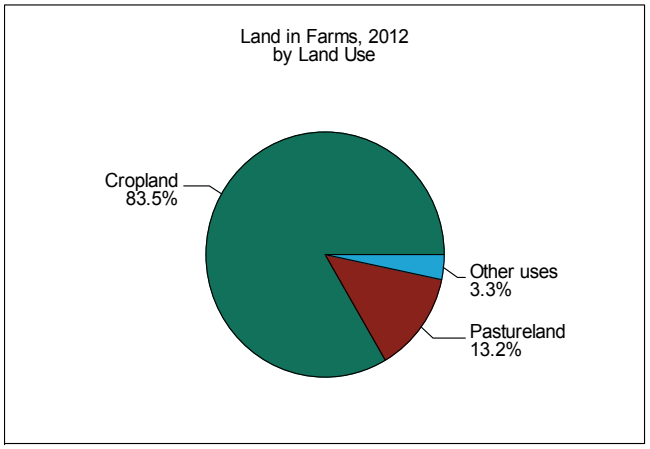
2012 CENSUS OF AGRICULTURE
COUNTY PROFILE



Adams County
Nebraska

	2012	2007	% change
Number of Farms	567	485	+ 17
Land in Farms	340,538 acres	306,373 acres	+ 11
Average Size of Farm	601 acres	632 acres	- 5
Market Value of Products Sold	$417,956,000	$249,257,000	+ 68
Crop Sales $262,135,000 (63 percent) Livestock Sales $155,821,000 (37 percent)			
Average Per Farm	$737,137	$513,932	+ 43
Government Payments	$5,673,000	$5,462,000	+ 4
Average Per Farm Receiving Payments	$14,851	$14,683	+ 1





2012 CENSUS OF AGRICULTURE
COUNTY PROFILE

Adams County – Nebraska

Ranked items among the 93 state counties and 3,079 U.S. counties, 2012

Item	Quantity	State Rank	Universe [1]	U.S. Rank	Universe [1]
MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD ($1,000)					
Total value of agricultural products sold	417,956	10	93	149	3,077
Value of crops including nursery and greenhouse	262,135	9	93	116	3,072
Value of livestock, poultry, and their products	155,821	22	93	250	3,076
VALUE OF SALES BY COMMODITY GROUP ($1,000)					
Grains, oilseeds, dry beans, and dry peas	259,860	8	91	56	2,926
Tobacco	-	-	-	-	436
Cotton and cottonseed	-	-	-	-	635
Vegetables, melons, potatoes, and sweet potatoes	64	34	66	2,064	2,802
Fruits, tree nuts, and berries	(D)	48	62	(D)	2,724
Nursery, greenhouse, floriculture, and sod	12	64	70	2,503	2,678
Cut Christmas trees and short rotation woody crops	(D)	8	24	(D)	1,530
Other crops and hay	2,173	59	93	1,265	3,049
Poultry and eggs	29	34	93	1,857	3,013
Cattle and calves	150,131	19	93	82	3,056
Milk from cows	(D)	27	55	(D)	2,038
Hogs and pigs	4,444	37	90	591	2,827
Sheep, goats, wool, mohair, and milk	(D)	(D)	90	(D)	2,988
Horses, ponies, mules, burros, and donkeys	70	55	93	2,089	3,011
Aquaculture	-	-	21	-	1,366
Other animals and other animal products	(D)	31	85	(D)	2,924
TOP CROP ITEMS (acres)					
Corn for grain	172,417	14	91	90	2,638
Soybeans for beans	83,604	25	85	336	2,162
Forage-land used for all hay and haylage, grass silage, and greenchop	8,992	74	93	1,733	3,057
Popcorn	5,200	6	35	10	286
Wheat for grain, all	4,977	35	85	982	2,537
TOP LIVESTOCK INVENTORY ITEMS (number)					
Cattle and calves	59,282	38	93	378	3,063
Hogs and pigs	9,453	44	90	644	2,889
Layers	803	40	93	2,028	3,040
Sheep and lambs	671	38	89	1,197	2,897
Horses and ponies	641	33	93	1,767	3,072

Other County Highlights, 2012

Economic Characteristics	Quantity
Farms by value of sales:	
Less than $1,000	93
$1,000 to $2,499	30
$2,500 to $4,999	16
$5,000 to $9,999	34
$10,000 to $19,999	23
$20,000 to $24,999	7
$25,000 to $39,999	11
$40,000 to $49,999	7
$50,000 to $99,999	43
$100,000 to $249,999	55
$250,000 to $499,999	50
$500,000 or more	198
Total farm production expenses ($1,000)	295,929
Average per farm ($)	521,920
Net cash farm income of operation ($1,000)	144,111
Average per farm ($)	254,164

Operator Characteristics	Quantity
Principal operators by primary occupation:	
Farming	369
Other	198
Principal operators by sex:	
Male	522
Female	45
Average age of principal operator (years)	53.4
All operators by race [2]:	
American Indian or Alaska Native	1
Asian	-
Black or African American	-
Native Hawaiian or Other Pacific Islander	-
White	835
More than one race	-
All operators of Spanish, Hispanic, or Latino Origin [2]	-

See "Census of Agriculture, Volume 1, Geographic Area Series" for complete footnotes, explanations, definitions, and methodology.
- Represents zero. (D) Withheld to avoid disclosing data for individual operations.
[1] Universe is number of counties in state or U.S. with item. [2] Data were collected for a maximum of three operators per farm.