

Renewable Fuels



Renewable Fuels Foundation



Renewable Fuels Association



Ethanol Impact on the Corn Supply

Unit 5 Lesson 2

Precepts

- A. Action
 - A5. Communicate effectively with others.
- D. Character
 - D4. Respect others.

National Standards

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- NL-ENG.K-12.6. Apply Knowledge.
 - NSS-EC.9-12.8. Supply and Demand.

Student Learning Objectives

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- As a result of this lesson, the student will ...
1. Describe how ethanol creates value-added markets for farmers.
 2. Recognize that ethanol production does not reduce the amount of food available for human consumption.
 3. Discuss the impact increasing corn prices have on feed and food prices.

Time

Instruction time for this lesson: 90 minutes.

Resources

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- http://medialab.blogs.com/our_ethanol_debate/2007/03/economic_impact.html
 - <http://www.ethanolrfa.org/resource/facts/food/>
 - <http://www.ncga.com/ethanol/main/economics.htm>

Tools, Equipment, Supplies

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- Writing surface
 - Projector
 - TM.A
 - TM.B
 - TM.C
 - TM.D
 - AS.A- one per student
 - Assess.A - one per student
 - Packet of Kool-Aid
 - One cup of sugar
 - Pitcher
 - Water
-

INTEREST APPROACH

Provide each student with a copy of AS.A. Use the Me-You-Us Moment to have students brainstorm how they think ethanol affects the economy, livestock feed prices and human food prices. Me-You-Us asks students to reflect on a question posed by the teacher (Me), and then allows pairs of students to partner in order to share thoughts (You), finally each pair shares with larger groups or the entire class in order to combine all students' thoughts (Us).



We've been talking lately about ethanol and the impact ethanol production has been having on our economy. Today we will continue that conversation and begin to think more critically about the impact ethanol production has on our economy. Before we get to that, let's do some brainstorming.

Each of you has received a handout with three columns on it. The far left column says "economy," the middle column says "feed," and the right column says "food." We know that ethanol production impacts each of these three areas. Its production impacts our economy, it impacts livestock feed prices and it also impacts human food prices.

When I say "write," we will have two minutes to list as many ways as we can that ethanol production impacts each of these three areas. Think about how ethanol production would impact our economy. How does it impact livestock feed prices? How does it impact human food prices? Try to come up with at least one item in each column. Questions? Write!

Give the students two minutes, and during this time, monitor their progress. It will be important that you are providing some hints if the students are struggling.



Time is up! Nice work! It looks like everyone got at least one in each column. Now, when I say "move," locate a partner, share what you wrote on your handout, and try to come up with at least two more for each column. You will have three minutes. Questions? Move!

Again, while students are completing this portion, monitor their progress. You will want to make sure they are staying on task and identifying at least two more ideas for each column. When time is up or most students have finished, process this activity as a class.



Again, nice work! Thanks for your hard work. Let's hear your thoughts about how ethanol impacts the economy? *Allow students to share responses.* Great job! Now, what is the impact that ethanol production has on livestock grain prices? *Allow students to share responses.* Awesome! And finally, how does ethanol production impact human food prices? *Again, allow students to share their responses.*



From what we just heard, it sounds like ethanol definitely impacts us. Even though it is known that ethanol can have an impact on our economy, there are currently many speculations and questions about the ethanol industry. As we continue our lesson today, I invite you to be curious learners as we determine the impact of ethanol production in our country.

OBJECTIVE 1. Describe how ethanol creates value-added markets for farmers.

Next, provide students with a quick visualization about the concept of value-added products using a packet of Kool-Aid, one cup of sugar, water, and a pitcher. Discuss the value of each of the ingredients separately, and then discuss their value when they are mixed together. The goal is to help the students understand the concept of “value-added” and then relate it to ethanol.



Ethanol adds value to the corn market for farmers. What does that mean? Allow students to share their ideas. Great thoughts! Simply put, value-added means a product has more value because there are more uses for that product. Let’s demonstrate the concept of value-added.

Here is a packet of unmixed Kool-Aid. Its approximate value is 25 cents. We will also need one cup of sugar which costs another 25 cents. Let’s say that the water used to make the Kool-Aid is one cent. When the price of the individual ingredients is totaled together it is 51 cents for one pitcher of Kool-Aid.

By processing these ingredients and marketing them together, they become “value-added.” A pitcher of Kool-Aid may bring \$3 when marketed at 25 cents per cup. Because the products had more than one use, they created more profit. The same applies to ethanol. The ethanol industry creates many value-added markets for farmers.

Use the Little Professor Moment to engage the students in the following content. Follow these steps to complete the activity. The content is located on TM.A.

1. *Chunk your content. Determine the portions of information. Make the portions uniform both in amount and number so that the time spent teaching each group of students is approximately the same.*
2. *Establish roles. Each student exhibits two roles—one while they are taking notes and one while they wait. While they learn from you, they are eager learners, full of wonder and interest. While they wait, they are the “invisible person,” neither sitting still and neither moving nor speaking. Note: Some students may find being “invisible” too challenging. Instead of sitting still and silent, they can read.*
3. *Establish personas. Review with students the characteristics of a stereotypical university professor. As they teach the new material they act as if they have their PhD in the subject area, and from this point forward are referred to by their peer as Dr. (fill in their last name). For ease of teaching, address the first student in each pair as Little Professor I and the second student as Little Professor II.*
4. *Teach the first chunk. Little Professor I listens and takes appropriate notes. Keep this short and to the point. Little Professor I then teaches his or her partner. This is a timed event! Give them only 30 to 60 seconds to instruct. Before moving to the second chunk of information, check Little Professor II’s understanding.*
5. *Teach the second chunk. Now it’s Little Professor II’s turn to take notes. Little Professor*

II will then teach his or her partner.

6. *Repeat the cycle. Repeat steps for as many chunks of information there are.*

I. Ethanol creates value-added markets for America's farmers, stimulating rural economies by increasing corn prices and rural income.

A. The increase in farm expenditures and employment opportunities in the ethanol industry is projected to increase annually due to additional ethanol production and use. Farmers are realizing the added benefits of the ethanol industry through ownership of manufacturing plants.

B. Ethanol production creates domestic markets for corn and adds four to six cents a bushel for each 100 million bushels used. Better prices mean less reliance on government subsidy programs and more income and independence for farmers.

C. Ethanol production will help increase net farm income more than \$6.6 billion over the next 15 years.

D. Ethanol production consumed 535 million bushels of corn in 1994.

E. Ethanol producers use more than 700 million bushels of corn annually.

F. Ethanol production uses about 7 percent of the nation's corn crop.

G. The partial tax exemption for ethanol blend fuels creates jobs, stimulates economic activity, and reduces the U.S. trade imbalance by more than \$2 billion.

H. Ethanol production adds more than \$450 million to state tax receipts results in net federal budget savings of more than \$3.5 billion.

I. Over the past 15 years, more than 12 billion gallons of high-quality, high-performance ethanol fuel have been produced using about 5 billion bushels of corn.

J. Each 100 million bushel increase in the demand for corn results in a corn price increase of 4 to 6 cents per bushel.

K. Ethanol can accounts for 14 cents of the value of every bushel of corn marketed by American farmers.



It becomes pretty clear that ethanol adds value to the corn industry, but corn producers are not the only ones that gain from ethanol production. The communities in which ethanol plants are located receive many benefits as well.

Even though the benefits of ethanol are somewhat obvious, there are still several myths out there about ethanol production. Let's examine a few of those myths.

OBJECTIVE 2. Recognize that ethanol production does not reduce the amount of food available for human consumption.



What do we use corn for besides ethanol production? *Allow students to share their responses.* That's right! We use corn for many different purposes, but will ethanol production really impact our food supply? Does it affect the corn-based products we purchase? Let's take a look.

Write the following information on the writing surface or show TM.B. Have the students write the information in their notes.

II. Ethanol production is the third largest user of corn, behind domestic livestock feed and export uses, therefore not creating a shortage.

A. Ethanol production uses field corn—most of which is fed to livestock, not humans. In fact, only the starch portion of the corn kernel is used to produce ethanol. The vitamins, minerals, proteins and fiber are converted to other products including sweeteners, corn oil and high-value livestock feed—feed which helps livestock producers add to the overall food supply.

B. Corn is used nationally for numerous purposes, in the approximate percentages: animal feed (approximately 50% of total corn); exports (23%); ethanol (13%); corn syrup, which is used in a wide variety of foods (8%); starches (4%); plastics (2%).



Ethanol critics point out that ethanol production is using too much of our corn supply and that it is decreasing the amount of food humans have for consumption. That is definitely not the case. Let's see how ethanol production impacts feed and food prices.

Objective 3. Discuss the impact increasing corn prices have on feed and food prices.

On TM.C, there is a story called the “Tortilla Crisis.” Show the information to the students, and after they have read the story use the Eye Witness News Moment to help the students brainstorm why this problem might have occurred. Follow these steps to complete the activity:

- 1. Establish the two roles each student will play. Explain that when the students are the expert they stand tall and take on the air of an expert (a know-it-all with a pleasant personality). When they are the interviewer students address an imaginary camera, with microphone (pen) in hand, and welcome the viewing audience to “Moments with Dr. (fill in the student’s name).” Then they pose questions to the expert about the “tortilla crisis” story. For example: Facing the camera: Welcome to our show. Today we are interviewing the world renowned expert in corn tortilla production, Dr. Seth Smith. Turning to the expert: Please tell us, Dr. Seth, why is this crisis so important? Point the microphone in the direction of the expert. Note: This activity works best when students generate appropriate questions prior to the interview.*
- 2. Establish the process. Explain that this activity is to aid in the topic. Share that the power lies in how well students can play the roles and use the information they just learned. It is a timed event and they will switch roles midway through the event. Note: The time allocated is dependent upon the amount of content students will be rehearsing. An average time limit is three to five minutes, switching roles midway through.*
- 3. Begin Eye Witness Moment. Have students stand, pair up, and get ready to go “live” at your signal.*
- 4. Switch roles. Midway through, get everyone’s attention. Students now switch roles. Note: The new expert usually picks up from where the other left off. If the first expert covered all the information, then the new expert simply starts at the beginning.*
- 5. Conclude the activity. After everyone has played both roles at least once, students acknowledge each other with “Thank you!” You can now randomly select individuals to share what their expert said as a way to check for understanding and increasing individual accountability for the content.*



Nice work experts! You all have great ideas about this tortilla crisis. Let’s take a deeper look at why this might be occurring in parts of the world.

Write the following information on the writing surface or show TM.D. Have the students write the information in their notes.

I. The increase in the cost of corn will lead to the increase in the cost of products produced from corn.

A. Corn is used in the feed of cattle, poultry and pork, the sources of the most widely consumed meat types. The heightened cost of feeding this livestock will lead to an increase in meat costs for meat consumers.

1. Every 56-pound bushel of corn used in the dry mill ethanol process yields 18 pounds of distiller grains, a good source of energy and protein for livestock and poultry.

2. A bushel of corn in the wet mill ethanol process creates 13.5 pounds of corn gluten feed and 2.6 pounds of high-protein corn gluten meal, as well as corn oil used in food processing.

B. Farmers switch over to corn due to increase in price, therefore the supply of other traditional crops, such as soybeans, will decrease thus increasing the costs and driving up consumer prices at the grocery store.



Ethanol production can impact all areas of our lives. It is so critical that we are educated as we determine our beliefs about this topic.

REVIEW/SUMMARY

Have the students create a “top five” list of the five most important pieces of information discussed in this lesson.



We have covered lots of ground today! Thanks for your attention and your effort. When I say “write,” locate a piece of scratch paper and write down five pieces of information you think were most important from this lesson. We will have three minutes to complete this. Questions? Write!

Allow students to write and then share with someone next to them when time is up or all have finished.



Once you have your five pieces of information written down, share with someone sitting next to you. *Allow students to share with a neighbor.* Nice work! Who will share something they found important with us? *Allow three or four students to share their ideas with the class.*

APPLICATION

Extended classroom activity: *Students are to create a “Crisis” based on identifying starch crop products in the grocery store. Each student will pick one item and create a timeline for the development of the crisis. Each timeline event is to be supported with explanation details and data (reasonable though made-up).*

Next day in class, the crises are interspersed throughout the class and small groups of students develop possible crisis management scenarios. These scenarios are discussed openly in class.

FFA activity: *Students can further research the impact of ethanol on the economy and write a speech to participate in the Prepared Public Speaking CDE.*

SAE activity: *Invite a representative from the local cooperative to speak to the class about the idea of value-added products. Have students create interview questions to ask the representative prior to class.*

EVALUATION

Assess. A

Answers to Assessment:

Essay:

1. Increase in farm expenditures, increase in employment opportunities, creates domestic markets for corn, increase tax credits for investors, improved balance of trade. (See objective one for complete list.)
2. Answers will vary

TM.A

- A. The increase in farm expenditures and employment opportunities in the ethanol industry is projected to increase annually due to additional ethanol production and use. Farmers are realizing the added benefits of the ethanol industry through ownership of manufacturing plants.
- B. Ethanol production creates domestic markets for corn and adds four to six cents a bushel for each 100 million bushels used. Better prices mean less reliance on government subsidy programs and more income and independence for farmers.
- C. Ethanol production will help increase net farm income more than \$6.6 billion over the next 15 years.
- D. Ethanol production consumed 535 million bushels of corn in 1994.
- E. Ethanol producers use more than 700 million bushels of corn annually.
- F. Ethanol production uses about 7 percent of the nation's corn crop.
- G. The partial tax exemption for ethanol blend fuels creates jobs, stimulates economic activity, and reduces the U.S. trade imbalance by more than \$2 billion.
- H. Ethanol production adds more than \$450 million to state tax receipts resulting in net federal budget savings of more than \$3.5 billion.
- I. Over the past 15 years, more than 12 billion gallons of high-quality, high-performance ethanol fuel have been produced using about 5 billion bushels of corn.
- J. Each 100 million bushel increase in the demand for corn results in a corn price increase of 4 to 6 cents per bushel.
- K. Ethanol can accounts for 14 cents of the value of every bushel of corn marketed by American farmers.

TM.B

II. Ethanol production is the third largest user of corn, behind domestic livestock feed and export uses, therefore not creating a shortage.

A. Ethanol production uses field corn—most of which is fed to livestock, not humans. In fact, only the starch portion of the corn kernel is used to produce ethanol. The vitamins, minerals, proteins and fiber are converted to other products including sweeteners, corn oil and high-value livestock feed—feed which helps livestock producers add to the overall food supply.

B. Corn is [used](#) nationally for numerous purposes, in the approximate percentages: animal feed (approximately 50% of total corn); exports (23%); ethanol (13%); corn syrup, which is used in a wide variety of foods (8%); starches (4%); plastics (2%).

TM.C

There is a “[Tortilla Crisis](#)” in Mexico! Much of the corn used in Mexico is imported from the United States and used to make tortillas. Tortillas have long been an inexpensive, but nutritious staple food for low-income families in Mexico. Tortillas are made from white corn, which is not a type of corn used to produce ethanol. The problem is that many farmers are switching from white corn to yellow corn (the type used to produce ethanol) because of the high market prices. This, in turn, is leading to higher prices of white corn, causing tortilla prices to double over the past few months. This sharp increase in price is making tortillas inaccessible to many families.

TM.D

I. The increase in the cost of corn will lead to the increase in the cost of products produced from corn.

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1. Every 56-pound bushel of corn used in the dry mill ethanol process yields 18 pounds of distiller grains, a good source of energy and protein for livestock and poultry.

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B. Farmers switch over to corn due to increase in price, therefore the supply of other traditional crops, such as soybeans, will decrease, thus increasing the costs and driving up consumer prices at the grocery store.

AS.A

Use this worksheet to record how Ethanol affects the following:

Economy	Feed	Food

Assess.A

Essay:

1. Explain how ethanol has at least two positive impacts on the U.S. economy.

2. Explain how ethanol has impacted your life? (Include thoughts from the beginning of the units until now if you never had experienced ethanol before).
