Lesson 7: From Farm to Table: The Ups and Downs of What We Buy

Overview

This lesson explores a commodity market, hog farming, from two different perspectives. Students experience a simulated large and small farm, comparing the similarities and differences among trends, including retail pork prices and availability of pork.

Learning Goals:
• Represent and interpret data on a line graph.
• Describe possible causes of oscillating price, demand, and supply by comparing simulated large and small hog farms.
• Write an editorial article based on simulation trends.

Materials:
• One computer for every 2-3 students
• Simulation online at http://www.clexchange.org/curriculum/complexsystems/oscillation/Oscillation_commoditiesB.asp
• Handouts (See pages 5-16)

Curricular Connections:
• Math: Representing and interpreting data*
• Reading: Describing connections among ideas*
• National Curriculum Standards for Social Studies: Characteristics of a market economy, how people deal with scarcity of resources, how consumers react to rising/falling prices of goods.

* Common Core Standards

Key system dynamics concepts and insights:
• Interdependencies exist among inventory, demand, and price and tend to create oscillations over time.
• Supply of a product cannot be increased or decreased instantaneously; delays exist.

Student Challenge

Investigate different types of hog farms and write an editorial article with findings.

Figure 1: Title Screen
Lesson Details

Preparation:
1. Create groups of two to three students each.
2. Copy all handouts for each student or student group.
3. Check computers to make sure you can access the online simulation.

Session 1:
1. Introduce vocabulary as needed including product, commodity, scarcity, supply, demand, price, inventory, consumers, and market economy.
2. Describe the project in which students will take on the role of reporter and write an editorial article for a local newspaper. As part of the article, they will describe the two methods of farming and make a recommendation to the “readers.” Go over the requirements and rubric. (Handout 1 on page 5)
3. Have students open the simulation and read the introduction. (Handout 1 and Figure 2).
4. Students can now set up the simulation on the “Decisions” screens (Figure 3). As they do this, have students record data and reflections as they work through the scenarios in the handouts (Handout 2 on pages 7-12 and Figure 4).

Session 2:
1. If needed, have students complete the simulation within their small groups.
2. After working through the scenarios, students can continue to the “Debrief” section (Handout 3 on pages 13-14 and Figure 5).
3. Debrief the simulation experience using
Lesson Details

Bringing the Lesson Home:

• Have students explore the “Debrief” and “Next Steps” sections (Handout 3 on pages 18-19). Note that some resources on the “Next Steps” section are YouTube videos.

• Discuss graph trends and interconnections among the parts.

• What causes price and available pork oscillations?

• What causes different trends for small vs. large farms?

• What are key leverage points for preventing wild price oscillations?

• How does the hog market compare to other markets? Other systems?

• What are benefits and tradeoffs of each farming method?

• How practical is a small farming method in terms of feeding the population as a whole?

Assessment Ideas:

• Write an editorial article.

• Describe the interactions among the main simulation elements (page 16).

4. A second, optional assessment allows students to show their understanding of the interconnections among the main simulation elements (Handout 5 on page 16). See below for one possible “story” of the loop.

Example Story: As the price rises, farmers increase breeding hogs. This allows for more piglets to be born. These piglets grow into full size mature hogs.

After hogs reach a large-enough size, they are killed and processed into pork. The more pork that’s available for customers, the more the price will fall.

At the same time, if the price goes up too much, people choose to eat less pork. It’s just too expensive! This means there will be more pork available, which will cause the price to go down. The store will have to have a sale, because there’s too much.
Acknowledgements:
Lesson 7 – Level B
From Farm to Table: The Ups and Downs of What We Buy
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This model is one in a series of models that explore the characteristics of complex systems.

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From Farm to Table: The Ups and Downs of What We Buy – Introduction

You have just been hired by a newspaper to write an editorial article about hog farming. An editorial is an opinion article backed up with proof of your opinion. In this case, you will use this simulation to learn about large and small hog farms. At the end, you’ll write your article comparing the two types of farming and giving your opinion about what type works best.

Parts of the project:

1. Handouts 1-5, complete and organized neatly in order
   - Handout 1 – Instructions, Rubric, and Introduction
   - Handout 2 – Scenario Runs
   - Handout 3 – Debrief
   - Handout 4 – Farm Comparison
   - Handout 5 – Assessment

2. Editorial Article
   - Article title
   - Name and “date of publication”
   - 500-1000 word article (Make sure to use “Handout 4” to help you write your article.)

3. Illustration for your article
   - An illustration that shows the basic issue described within the article. You can create a collage, drawing, or other representation.

Project Assessment Rubric

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Basic</th>
<th>Proficient</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handouts</strong></td>
<td>I didn’t explain what happened.</td>
<td>I recorded results that were mostly accurate. I explained what happened.</td>
<td>I recorded results that were accurate. I clearly explained what happened and why.</td>
<td>In addition, I am able to meet each challenge and can explain why I was successful.</td>
</tr>
<tr>
<td><strong>Editorial Article</strong></td>
<td>My article is missing or very little is included to show my learning.</td>
<td>I wrote an article with some facts I learned, but I did not include proof from the simulation.</td>
<td>I wrote clear article with a well-defined opinion and included proof from the simulation.</td>
<td>In addition, I gave proof by connecting learning from the simulation to other similar systems.</td>
</tr>
<tr>
<td><strong>Title Page</strong></td>
<td>My pictures are not about the system.</td>
<td>I have pictures, but I didn't show any connections.</td>
<td>My pictures have important parts of the system and how they are connected.</td>
<td>In addition, I have added words to explain the connections.</td>
</tr>
</tbody>
</table>
Click the Start button. Read the Introduction screen, the definitions, and the description of large and small farms.

a. What are ways that products people buy change over time?

b. What is one product that you buy that has changed in one of these ways. Describe the details.

c. Fill in the following:
Sows and Boars → ___________________ → ___________________ ↓
↑
___________________ ← ___________________ ← ___________________

c. What are characteristics of a large farm in this simulation?

d. What are characteristics of a small farm in this simulation?

e. Click Decisions. Click the question marks (?) for each decision and write a definition in your own words.

Breeding plan

Piglets per litter

Piglets that die per 100

Extra cost per hog

Time to raise
Scenario #1 – Large Farms:

a. Given the settings below, what do you predict will happen to the availability of pork and the retail pork price over time?

b. Set the simulation as shown below and then run.

<table>
<thead>
<tr>
<th>Decision</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of farm</td>
<td>large</td>
</tr>
<tr>
<td>Breeding plan</td>
<td>breed all the time</td>
</tr>
<tr>
<td>Piglets per litter</td>
<td>10 piglets</td>
</tr>
<tr>
<td>Pigs that die per 100</td>
<td>10 pigs</td>
</tr>
<tr>
<td>Extra cost per hog</td>
<td>$ 0</td>
</tr>
<tr>
<td>Time to raise</td>
<td>4 months</td>
</tr>
</tbody>
</table>

c. Record your results on the graphs below. Make sure to create labels and a key for each graph.
Scenario #1 - Large Farms (continued):

d. What happened to the availability of pork and retail price over time?

e. Why do you think this occurred? Include specific information about how the large farm settings affected the situation.

f. What happened to the number of piglets, mature hogs, and available pork over time?

g. How do these graphs relate to the retail pork price graph?

h. Did the farmers make money on the sale of pork over time? Use the graph to explain your response. Notice that the break even point shows zero profit. Anything above that line is profit. Anything below the line is a loss.
Scenario #2 – Small Farms:

a. Given the settings below, what do you predict will happen to the availability of pork and the retail pork price over time?

b. Set the simulation as shown below and then run.

<table>
<thead>
<tr>
<th>Decision</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of farm</td>
<td>small</td>
</tr>
<tr>
<td>Breeding plan</td>
<td>breed twice a year</td>
</tr>
<tr>
<td>Piglets per litter</td>
<td>7 piglets</td>
</tr>
<tr>
<td>Pigs that die per 100</td>
<td>20 pigs</td>
</tr>
<tr>
<td>Extra cost per hog</td>
<td>$ 8</td>
</tr>
<tr>
<td>Time to raise</td>
<td>8 months</td>
</tr>
</tbody>
</table>

c. Record your results on the graphs below. Make sure to create labels and a key for each graph.

Availability of pork and Retail pork price
Scenario #2 - Small Farms (continued):

d. What happened to the availability of pork and retail price over time?

e. Why do you think this occurred? Include specific information about how the small farm settings affected the situation.

Click on the bottom-left corner of the graph to see page two.

f. What happened to the number of piglets, mature hogs, and available pork over time?

g. How do these graphs relate to the retail pork price graph?

Click on the bottom-left corner of the graph to see page three.

h. Did the farmers make money on the sale of pork over time? Use the graph to explain your response. Notice that the break even point shows zero profit. Anything above that line is profit. Anything below the line is a loss.
Scenario #3 – My Own Settings:

a. Now it’s your turn to set up a farm. You can set up the simulation however you’d like, but consider whether the settings will work in real life.

b. Set up the simulation, record your settings, predict, and then run.
   Prediction for availability of pork and retail pork price:

<table>
<thead>
<tr>
<th>Decision</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of farm</td>
<td></td>
</tr>
<tr>
<td>Breeding plan</td>
<td></td>
</tr>
<tr>
<td>Piglets per litter</td>
<td></td>
</tr>
<tr>
<td>Pigs that die per 100</td>
<td></td>
</tr>
<tr>
<td>Extra cost per hog</td>
<td></td>
</tr>
<tr>
<td>Time to raise</td>
<td></td>
</tr>
</tbody>
</table>

c. Record your results on the graphs below. Make sure to create labels and a key for each graph.
Scenario #3 - My Own Settings (continued):

d. What happened to the availability of pork and retail price over time?

e. Why do you think this occurred? Include specific information about how the farm settings affected the situation.

f. What happened to the number of piglets, mature hogs, and available pork over time?

g. How do these graphs relate to the retail pork price graph?

h. Did the farmers make money on the sale of pork over time? Use the graph to explain your response. Notice that the break even point shows zero profit. Anything above that line is profit. Anything below the line is a loss.
Debrief
Go back to the Menu and click Debrief. Explore each of the four sections, answering the questions below.

Click 1. Hog Farm Ups and Downs.
Look at each of the comparisons. Make sure to read each of the stories and look at the graphs.

a. Which kind of farm (large or small) was most stable in terms of availability of pork, price, and animals?

Why do you think this is the case?

b. Which kind of farm (large or small) was most able to provide food for the most people?

Why do you think this is the case?

c. What would be your idea for creating a farm that best meets the needs of all?

Click 2. Hog Farm Circles. Read the story of the loop.

a. Why do the loops create ups and downs over time?

b. Draw another loop or loops based on another product.
Debrief (continued)

Click 3. Hog Farm Map.
Read and follow the directions on this screen.
How did the six parts you changed affect the system over time?

Breeding plan:                Large vs. small farm*:                Pigs that die per 100:

____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________

Piglets per litter:            

____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________

Time to raise:                Additional cost per hog:                * Hint: Large and small farms are not labeled on this map. When you clicked on large or small in the simulation, how did it affect parts that you do see?

____________________________________________________
____________________________________________________
____________________________________________________
____________________________________________________

Click 4. Connections.

a) What are some other connections you can see between product cycles (as you experienced with hog farming) and other systems in the world.
Farm Comparison:

<table>
<thead>
<tr>
<th>Category</th>
<th>Large Farms</th>
<th>Small Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hogs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail pork price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practicality in terms of feeding people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on the environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living conditions for animals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other comparison?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessment:

Describe the story of the loops. Make sure to write about each part and how it affects any other parts.