

SUSTAINABLE BIOECONOMY

FOR ARID REGIONS

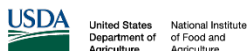


EXCEL FOR AGRIBUSINESS: OPPORTUNITY COST

OVERVIEW

This Excel video lesson focuses on opportunity cost in farming. In the lesson students will learn how to calculate opportunity cost. Students will also complete a case report by analyzing the option to either lease or farm guar on an 80-acre farm.

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Excel for Agribusiness: Opportunity Cost in Farming

STUDENT LEARNING OBJECTIVES:

After completing this lesson, students will:

1. Understand how to apply opportunity cost between two or more possibilities.
2. Understand why opportunity cost is important to consider when farming.
3. Understand ways to use Excel for agribusiness.

TIME REQUIRED:

30 to 45 minutes

10 minutes teacher preparation

RESOURCES:

1. Excel for Agribusiness: Opportunity Cost in Farming Lesson Plan
2. Excel for Agribusiness: Opportunity Cost in Farming Video Lesson
<https://youtu.be/0kWjuq3CCOc>
3. Excel for Agribusiness Case Studies Workbook

EQUIPMENT AND SUPPLIES NEEDED:

1. Computer with Excel software
2. Device with access to YouTube Videos <https://youtu.be/0kWjuq3CCOc>
3. Copies of Opportunity Cost Quiz (page 5) for all students
4. Copies of Leasing vs. Farming the Land Case Report (Page 7) for all students

THIS LESSON WOULD WORK WELL AS PART OF:

- Math curriculum
- Computer science curriculum
- Agribusiness curriculum
- Agriculture curriculum

THIS LESSON IS ALIGNED TO AFNR, FFA, COMMON CORE MATHEMATICS AND NGSS STANDARDS. Expanded standards listed on page 9.



LESSON PLAN

1. Learning about Opportunity Cost in Farming (5 minutes)

Ask students:

- Do you know what opportunity cost is? Ask students to provide possible definitions. *(A possible benefit (decision) a farmer, business, or an individual misses out when choosing one alternative over others.)*
- Why is it important to consider the opportunity cost between different options? *(Because it allows us to choose the best option among the analyzed options.)*
- Can you think of a two-option scenario with an opportunity cost? *(Example: You may fail math class and have a B in your science class. You can study for your math exam or finish a science assignment - both due the next day. But you do not have enough time to complete both, so you chose one. Opportunity cost: studying for the math exam will negatively impact the science assignment quality and you will not get an A. On the other hand, focusing on the science assignment will negatively impact the math exam performance and you will likely fail the class.)*

2. Watch Opportunity Cost in Farming Video Lesson (5 minutes)

Students will watch Opportunity Cost in Farming lesson video, stopping at 3.37. The video explains what opportunity cost is in agriculture and farming.

3. Complete Opportunity Cost Quiz (5 minutes)

Students complete the Opportunity Cost Quiz on page 5. Have students correct their quiz using the answer key on page 6 and review for understanding.

4. Complete Opportunity Cost Case Report (5 to 10 minutes)

Open Excel for Agribusiness Case Studies Workbook. Open the Case 5 worksheet with the Leasing vs. Farming the Land table. Students need to fill in the blank cells with the appropriate formula and then analyze the opportunity cost based on their decision. Students will write their answers on the Opportunity Cost Case Report (page 7).

5. Continue Video Lesson beginning at 3.41 (6 minutes)

Have students watch the video from 3.41 until the end. This section will review the Leasing vs Farming Case Report. Stop the video periodically to check for comprehension. The answer key for Leasing vs. Farming the Land Case Report is on page 8.

6. Leveling Up Questions (3 to 5 minutes)

- Ask students what are other ways opportunity cost can be explored in in Excel? *(For financial management purposes, analyzes, personal decision making, etc.)*

7. Exit Ticket Discussion (3 to 5 minutes)

- Ask students to discuss how opportunity cost helps farmers and ranchers when facing multiple options. *(It helps them to analyze and quantify possible options they face and decide which option will benefit their situation the most.)*



DEFINITIONS

Excel for Agribusiness: Introduction (Video Lesson 1)

Acre: Unit of land area (66 by 660 feet).

Cell: The rectangular area located in the worksheet.

Cell Reference: Area that shows name of cell.

Crop Yield: Refers to the amount of agricultural (crop) production harvested.

Format: The top bar where we can modify number formats, align your numbers/content, or modify the font for text.

Formulas: A formula category that includes addition, subtraction, division, multiplication, SUM, and average.

Ibs.: Abbreviation for pounds. This is the unit of mass used in yield to indicate amount of crop harvested.

Range: A group of selected cells/tables.

Table: A tool used to group data together in the Excel program.

Workbook: Excel program file.

Worksheet: Worksheet within the excel file.

Excel for Agribusiness: Charts (Video Lesson 2)

Charts: The term for graphical representation of data. Charts represent data as a symbolic alternative including bar, line, or pie charts.

Graph: A chart that specifically plots data along 2 dimensions.

Ribbon Tab: Upper nine tabs that contain File, Home, Insert, Page Layout, Formulas, Data, Review, View, and Help.

Inputs and Outputs in Crop Production (Video Lesson 3)

Firm: A business entity which operates on a for-profit basis.

Gross Sales: Overall revenue.

Inputs: Resources used to create goods and services.

Net Income: Total revenue minus total expenses.

Outputs: The quantity of goods or services produced in a specific amount of time.

Excel for Agribusiness: Variable and Fixed Costs in Farming (Video Lesson 4)

Variable Cost: Costs that varies with the level of production.

Fixed Cost: Cost that does not change regarding the production.

Total Cost: The total economic cost of the production (variable cost + fixed costs).

Excel for Agribusiness: Opportunity Cost in Farming (Video Lesson 5)

Opportunity Cost: A possible benefit (decision) a farmer, business, or an individual misses out when choosing one alternative over others.

Return on best forgone option: The higher return from one option.

Return on chosen option: The lower return from one option.

Price fluctuation: The fact that prices increase or decrease within a market.



Opportunity Cost Quiz

Name: _____

Directions: Answer each question

1. Why is opportunity cost fundamental to consider in businesses?

2. Select the right opportunity cost formula?
 - a. Opportunity Cost = Return on best forgone option (FO) + Return on chosen option (CO)
 - b. Opportunity Cost = Return on best forgone option (FO) – Return on chosen option (CO)
 - c. Opportunity Cost = Return on chosen option (CO) – Return on best forgone option (FO)
 - d. Opportunity Cost = Return on chosen option (CO) / Return on best forgone option (FO)
 - e. None of the above

3. A farmer has 10-acres of onion that approximately will produce 250,000 pounds in total. He faces a scenario where onion prices are high; however, his crop has not reached the desired quality and maturity yet. Today's market price is \$2.5 dollars per pound, this price is only given to high quality and matured onions. In addition, the market estimates a price of \$1.75 per pound for lower quality onions, a price he can obtain by selling his crop right now. On the other hand, he can wait a few more weeks to reach a higher crop quality but having the risk of lower prices due to price fluctuation. Based on this case, what is the opportunity cost if the farmer decides to sell his onions right now?



Answer Key for Opportunity Costs Quiz

1. Why is opportunity cost fundamental to consider in businesses?

It helps the decision maker to make a more economically accurate decision which can provide higher benefits/returns.

2. Select the right opportunity cost formula?

- a. Opportunity Cost = Return on best forgone option (FO) + Return on chosen option (CO)
- b. Opportunity Cost = Return on best forgone option (FO) – Return on chosen option (CO)**
- c. Opportunity Cost = Return on chosen option (CO) – Return on best forgone option (FO)
- d. Opportunity Cost = Return on chosen option (CO) / Return on best forgone option (FO)
- e. None of the above

3. A farmer has 10-acres of onion that approximately will produce 250,000 pounds in total. He faces a scenario where onion prices are high; however, his crop has not reached the desired quality and maturity yet. Today's market price is \$2.5 dollars per pound, this price is only given to high quality and matured onions. In addition, the market estimates a price of \$1.75 per pound for lower quality onions, a price he can obtain by selling his crop right now. On the other hand, he can wait a few more weeks to reach a higher crop quality but having the risk of lower prices due to price fluctuation. Based on this case, what is the opportunity cost if the farmer decides to sell his onions right now?

$$OC = FO - CO$$

$$\text{Opportunity Cost} = (\$2.5 \times 250,000 = \$625,000) - (\$1.75 \times 250,000 = \$437,500)$$

$$\text{Opportunity Cost} = \$625,000 - \$437,500 = \$187,500$$

If the farmer decides to sell now, his opportunity cost will be \$187,500.



Leasing vs. Farming the Land Case Report

Use: Excel for Agribusiness Case Studies Workbook

Name: _____

Directions: Complete the tables

1. Open Excel for Agribusiness Case Studies Workbook. Open the Case 5 worksheet, located in the workbook bottom left side. This report is Leasing vs. Farming the Land Case Report.
2. This part of the lesson focuses on two possible options for a farmer, either to lease or farm his 80-acre farmland. Students will work on filling in the four blanks in the given table with the appropriate formula (=SUM, +, -, etc.). Scroll to the left to see formulas. Then insert your totals in the Leasing vs. Farming the Land table below. Write down your final answers in the table below and explain the opportunity cost of this case in the discussion section below.

Leasing vs. Farming the Land		
80 Acre Land		
Rental Price	\$250.00	acre
Number of Acres	80	
Guar Revenue	\$1,600.00	acre
Production Costs	\$1,380.00	acre
Net Profit		acre
Net Profit on Renting & Farming 80-acres		
Rental Net Profit		80-acres
Guar Net Profit		80-acres
Opportunity Cost		OC=FO-CO

Discussion: _____



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Answer Key: Leasing vs. Farming the Land Case Report (Case 5)

Leasing vs. Farming the Land		
80 Acre Land		
Rental Price	250	acre
Number of Acres	80	
Guar Revenue	1600	acre
Production Costs	1380	acre
Net Profit	=H9-H10	acre
Net Profit on Renting & Farming 80-acres		
Rental Net Profit	=H6*H7	80-acres
Guar Net Profit	=H11*H7	80-acres
Opportunity Cost	=H15-H16	OC=FO-CO

Leasing vs. Farming the Land		
80 Acre Land		
Rental Price	\$250.00	acre
Number of Acres	80	
Guar Revenue	\$1,600.00	acre
Production Costs	\$1,380.00	acre
Net Profit	\$220.00	acre
Net Profit on Renting & Farming 80-acres		
Rental Net Profit	\$20,000.00	80-acres
Guar Net Profit	\$17,600.00	80-acres
Opportunity Cost	\$2,400.00	OC=FO-CO

Discussion:

This is my conclusion after analyzing the case and provided the missing results in the tables: If the farmer decides to farm the land with guar, he will forgo the opportunity to earn \$2,400 dollars per year by leasing the land. For this reason, the best option for the farmer is to lease his farm and earn \$20,000 for 80-acres, instead of farming guar in the farm.



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STANDARDS DETAILS (AFNR, FFA, COMMON CORE MATHEMATICS, NGSS)

AFNR Career Ready Practices

CRP.02: Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive.

CRP.02.01. Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.

CRP.02.02. Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.

CRP.03.02 Design and implement a personal financial management plan.

CRP.04: Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.

CRP.07: Employ valid and reliable research strategies. Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies.

CRP.08: Utilize critical thinking to make sense of problems and persevere in solving them.

CRP.11. Use technology to enhance productivity

AFNR Agribusiness Systems Career Pathway

ABS.02. Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations.

ABS.02.01.02.c. Recommend and select tools and services to track, record and audit AFNR business transactions that meet business needs and priorities (e.g., electronic and paper based systems, etc.).

FFA Precept

FFA.PL-A. Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.

FFA.PL-E. Awareness: Understand personal vision, mission and goals.

FFA.PL-F. Continuous Improvement: Accept responsibility for learning and personal growth.

FFA.PG-J. Mental Growth: Embrace cognitive and intellectual development relative to reasoning, thinking, and coping.

FFA.CS-M. Communication: Effectively interact with others in personal and professional settings.

FFA.CS-N. Decision Making: Analyze a situation and execute an appropriate course of action.

FFA.CS-O. Flexibility/Adaptability: Be flexible in various situations and adapt to change.

Common Core Mathematics with NGSS connections

Middle School:

MP.4: Model with mathematics (NGSS MS-LS2-5)

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (NGSS MS-LS2-5)

6.SP.B.5 Summarize numerical data sets in relation to their context. (NGSS MS-LS2-2)

7.EE.B.3 Solve real-life and mathematical problems using numerical and algebraic expressions and equations. (NGSS MS-LS2-5)

High School:

MP.2 Reason abstractly and quantitatively. (HS-ESS3-1),(HS-ESS3-2),(HS-ESS3-3),(HS-ESS3-4),(HS-ESS3-6)

MP.4 Model with mathematics. (HS-ESS3-3),(HS-ESS3-6)



HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

NGSS

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.



AUTHOR BIOGRAPHY

Luis Enrique Ramos-Coronado is an International Graduate student at New Mexico State University. Currently, he is doing a Master's in Agriculture with specialization in Agribusiness through the Department of Agricultural Economics and Agricultural Business (AEAB). Luis earned his B.S. degree in Agronomy at New Mexico State University. He is from Guanajuato, an important agricultural state in Mexico. His plan is to learn and acquire experience focused on sectors like crop production and agribusiness, and someday apply his knowledge in Guanajuato, Mexico.

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