

SUSTAINABLE BIOECONOMY

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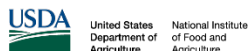


EXCEL FOR AGRIBUSINESS: INPUTS AND OUTPUTS IN CROP PRODUCTION

OVERVIEW

This Excel video lesson focuses on inputs and outputs in crop production. In the lesson students complete case reports calculating guayule pre-harvest costs and bell pepper production.

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Excel for Agribusiness: Inputs and Outputs in Crop Production

STUDENT LEARNING OBJECTIVES:

After completing this lesson, students will:

1. Understand the difference between inputs and outputs in crop production.
2. Understand the relationship between both terms.
3. Understand ways to use Excel for agribusiness.
4. Understand the importance of Excel in agribusiness.
5. Become familiar with simple Excel formulas.

TIME REQUIRED:

45 to 60 minutes

10 minutes teacher preparation

RESOURCES:

1. Excel for Agribusiness: Inputs and Outputs in Crop Production Lesson Plan
2. Excel for Agribusiness: Inputs and Outputs in Crop Production Video Lesson
<https://youtu.be/fbq5pSZNafg>
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/fbq5pSZNafg>
3. Copies of Inputs and Outputs Quiz (page 5) for all students
4. Copies of Guayule Pre-Harvest Costs Case Report (page 7) for all students
5. Copies of Bell-Pepper Production Case Report (page 9) 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 11.



LESSON PLAN

1. Learning about Inputs and Outputs in Crop Production (5 minutes)

Ask students:

- What are inputs in business? (*Inputs: resources invested*)
- What are outputs in business? (*Outputs: the product/s*)
- Can you relate both terms to agriculture and crop production?

2. Watch Inputs and Outputs in Crop Production Video Lesson (5 minutes)

Students will watch Inputs and Outputs in Crop Production lesson video, stopping at 3:27. The video explains what inputs and outputs are along with agricultural examples of each.

3. Complete Inputs and Outputs Quiz (5 minutes)

After students watch the video, they complete the Inputs and Outputs Quiz on page 5. Have students correct their quiz using the answers key on page 6 and review for understanding.

4. Complete Guayule Pre-Harvest Costs Case Report (5 to 10 minutes)

Open Excel for Agribusiness Case Studies Workbook. Open the Case 3 worksheet with the Guayule Pre-Harvest Costs table. Students need to fill in the blank cells with the appropriate formula. Students will write their answers on the Guayule Pre-Harvest Costs Report (page 7).

5. Complete Bell-Pepper Production Case Report (5 to 10 minutes)

Open Excel for Agribusiness Case Studies Workbook. Open the Case 3 worksheet with the Bell-Pepper Production Case Report table. Students need to fill in the blank cells with the appropriate formula. Students will write their answers on the Bell-Pepper Production Case Report (page 9).

6. Continue Video Lesson (8 minutes) from 3:31

Have students watch the video from 3:31 until the end. This section will review the procedures to complete the Inputs and Outputs in Crop Production Case Reports. Stop the video periodically to check for comprehension. The answer key for guayule is on page 8 and bell peppers on page 10.

7. Leveling Up Questions (3 to 5 minutes)

- Ask students how inputs and outputs in Excel are part of a whole farm budget.

8. Exit Ticket Discussion (3 to 5 minutes)

- Ask students to discuss what businesses are likely to use inputs and outputs.



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.

lbs.: 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.



Answer Key for Inputs and Outputs Quiz

1. Will production costs be considered an input or output?

Inputs

2. Explain the difference between inputs and outputs in crop production?

Inputs are resources that go into the farm, such as water, fuel, seeds, fertilizer. Outputs are the crops that a farmer has produced, e.g., onions, corn, guar, etc. Without the inputs, no crops are grown.

3. Which of the following are considered inputs?

a, c, and d (seeds, water, fuel)



Guayule Pre-Harvest Costs 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 3 worksheet, located in the workbook bottom left side. This report is Guayule Pre-Harvest Case Report.
2. This part of the lesson focuses on guayule inputs (costs related to the crop production). Fill in the blank spaces in the first 3 tables using the appropriate formulas (=SUM, AVERAGE, +, -, etc.). Scroll to the right to see formulas. Then insert your totals in the Guayule Pre-Harvest Costs table below. Provide the total guayule pre-harvest costs for 20 acres and write down your final answers in the tables below.

Land Establishment	Costs
Seed Bed Preparation	\$30.00
Seedlings	\$275.00
Plant Seedlings	\$55.00
Total	

Growing	Costs
Weed Control	\$28.00
Irrigation	\$150.00
Fertilizer	\$16.00
Insect Control	\$10.00
Total	

Overhead	Costs
Land	\$75.00
Materials and Labor	\$60.00
Management	\$30.00
Total	

Formulas	
Addition	= # + #
Division	= # / #
Subtraction	= # - #
Multiplication	= # * #
Range Addition	=SUM (#1,#2)
Average	=AVERAGE

Guayule Pre-Harvest Costs	Per Acre
Inputs	Total
Land Establishment	
Growing	
Subtotal	
Overhead	
Total Pre-Harvest Costs	
Pre-Harvest Cost for 20 Acres	



Answer Key: Guayule Pre-Harvest Costs Case Report (Case 3)

Land Establishment	Costs
Seed Bed Preparation	30
Seedlings	275
Plant Seedlings	55
Total	=SUM(C5:C7)

Land Establishment	Costs
Seed Bed Preparation	\$30.00
Seedlings	\$275.00
Plant Seedlings	\$55.00
Total	\$360.00

Growing	Costs
Weed Control	28
Irrigation	150
Fertilizer	16
Insect Control	10
Total	=SUM(C11:C14)

Growing	Costs
Weed Control	\$28.00
Irrigation	\$150.00
Fertilizer	\$16.00
Insect Control	\$10.00
Total	\$204.00

Overhead	Costs
Land	75
Materials and Labor	60
Management	30
Total	=SUM(C18:C20)

Overhead	Costs
Land	\$75.00
Materials and Labor	\$60.00
Management	\$30.00
Total	\$165.00

Guayule Pre-Harvest Costs	Per Acre
Inputs	Total
Land Establishment	=C8
Growing	=C15
Subtotal	=SUM(F7:F8)
Overhead	=C21
Total Pre-Harvest Costs	=F9+F11
Pre-Harvest Cost for 20 Acres	=F12*20

Guayule Pre-Harvest Costs	Per Acre
Inputs	Total
Land Establishment	\$360.00
Growing	\$204.00
Subtotal	\$564.00
	Costs
Overhead	\$165.00
Total Pre-Harvest Costs	\$729.00
Pre-Harvest Cost for 20 Acres	\$14,580.00

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Bell Pepper Production 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 3 worksheet, located in the workbook bottom left side. This report is Bell Pepper Production Case Report.
2. Fill in the blank spaces in the material and fertilizer blue tables by using the appropriate formulas (=SUM, AVERAGE, +, -, etc.). Then insert your totals in the bell pepper field blue table. Based on your results, find the gross sales and net income in the output green table. Once the three tables are filled in, write down your results in the tables below.

Formulas	
Addition	= # + #
Division	= # / #
Subtraction	= # - #
Multiplication	= # * #
Range Addition	=SUM (#1,#2)
Average	=AVERAGE

Material	Per acre
Black Plastic Mulch	\$240.00
Drip tape	\$320.00
Stakes	\$400.00
Twine	\$50.00
Total	

Fertilizer	Per acre
Required Fertilizer (lbs.)	500
1 bag (lbs.)	50
1 Bag Cost	\$10.88
Total Bags	
Total Price	

Bell Pepper Field	Per Acre
Inputs	Total
Land Preparation	\$150.00
Hybrid Seed	\$625.00
Transplant	\$2,000.00
Pesticides	\$220.00
Material	
Diesel Fuel	\$150.00
Water	\$170.00
Fertilizer	
Labor	\$2,700.00
Packaging	\$450.00
Cartons	\$1,500.00
Marketing & Advertising	\$2,500.00
Total Production Cost	

Outputs	
Sales	Per Acre
1 Carton	\$11.00
1 Carton Weight lbs.	25
lb. Price	
Yield in Cartons	
Gross Sales	
Net Income	



ANSWER KEY: Bell-Pepper Production Case (Case 3)

Material	Per acre
Black Plastic Mulch	240
Drip tape	320
Stakes	400
Twine	50
Total	=SUM(I5:I8)

Material	Per acre
Black Plastic Mulch	\$240.00
Drip tape	\$320.00
Stakes	\$400.00
Twine	\$50.00
Total	\$1,010.00

Fertilizer	Per acre
Required Fertilizer (lbs.)	500
1 bag (lbs.)	50
1 Bag Cost	10.88
Total Bags	=I12/I13
Total Price	=I15*I14

Fertilizer	Per acre
Required Fertilizer (lbs.)	500
1 bag (lbs.)	50
1 Bag Cost	\$10.88
Total Bags	10
Total Price	\$108.80

Bell Pepper Field	Per Acre
Inputs	Total
Land Preparation	150
Hybrid Seed	625
Transplant	2000
Pesticides	220
Material	=I9
Diesel Fuel	150
Water	170
Fertilizer	=I16
Labor	2700
Packaging	450
Cartons	1500
Marketing & Advertising	2500
Total Production Cost	=SUM(L7:L18)

Bell Pepper Field	Per Acre
Inputs	Total
Land Preparation	\$150.00
Hybrid Seed	\$625.00
Transplant	\$2,000.00
Pesticides	\$220.00
Material	\$1,010.00
Diesel Fuel	\$150.00
Water	\$170.00
Fertilizer	\$108.80
Labor	\$2,700.00
Packaging	\$450.00
Cartons	\$1,500.00
Marketing & Advertising	\$2,500.00
Total Production Cost	\$11,583.80

Outputs	
Sales	Per Acre
1 Carton	11
1 Carton Weight lbs.	25
lb. Price	=L24/L25
Yield in Cartons	1800
Gross Sales	=L28*L24
Net Income	=L29-L19

Outputs	
Sales	Per Acre
1 Carton	\$11.00
1 Carton Weight lbs.	25
lb. Price	\$0.44
Yield in Cartons	1,800
Gross Sales	\$19,800.00
Net Income	\$8,216.20



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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