



Farm Journal Foundation Learning Materials

A Teacher's Guide & Resource to:
Overview of U.S. Agricultural Systems Modules

Purpose

The purpose of this guide is to provide teachers with insight on the objectives of Farm Journal Foundation's Overview of U.S. Agricultural System e-learning modules. This guide is also intended to provide you, as the educator, an understanding of what level of learning this material can be used for, how to integrate these modules in a variety of classroom settings/subject areas, and questions to use to assess your students' retention and understanding of the material.

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Learning Levels & Overview

*Each section is about 30 minutes, not including the optional learn more segments.

Audience: Primarily consumers unfamiliar with agriculture. This guide helps take these modules into a classroom for use from the 5th grade level to introductory courses at a university level.

- **Beyond the classroom:** These materials can also be used in a training program at organizations working within agriculture such as Extension services or fellow non-profits, or outside of agriculture as a general consumer education platform.

Overview of the four sections provided:

Welcome to the Farm

This section focuses on farming history in the U.S. from the perspectives of the farmer ambassadors. It begins with an exploration of the changes that have occurred in the areas of animal wellbeing, productivity, technology, and government support of agriculture across American history. Next, it centers on the importance of family and a problem solving attitude on the farm. This leads naturally into considerations for succession planning on the farms especially since the majority of farmers are almost at the age of retirement today. This section as a whole uses more field specific jargon and may require supplementary vocabulary lessons for students from younger grades to have the greatest benefit. It is possible to divide this section into smaller subsections for use in classes at all grade levels and has particularly strong applicability to U.S. History or Agricultural Science classes at the secondary level. Alternatively, if you are having students work through this module in its entirety, this section establishes the sense of urgency with which new skilled workers are needed in the agricultural field. Moreover, it serves as an introduction to the supply chain which is revisited in the next section.

Productivity and Profitability

This section fully explains the various steps in the value food chain focusing on how productivity, technology and profitability are associated with each step. Subsection one has a special focus on transparency and how the consumer's perspective changes the actions of the stakeholders in the value food chain. Next, this section focuses on debunking the misconception that higher productivity equals higher yields. Seven distinct technologies that modern farmers use to manage risk, maintain safety and boost profits are explored after that. Lastly, the profitability subsection primarily focuses on the types of risks farmers must contend with in order to have a sustainably profitable farm; many of these risks are environmental. This section has the most technology and agriculture specific jargon and will almost certainly need to be paired with basic math or vocabulary lessons in order for students from younger grades to receive the greatest benefits. It can be divided into smaller subsections for use in classes at all recommended grades, but it has particularly strong applicability to English, General Science or Agricultural Science lessons at the secondary level. Alternatively, if students work through this module in its entirety this section provides the bulk of the practical know-how for what a farmer must pay attention to in order to be successful.

Industry Evolution

This section covers the environmental challenges, communication changes, and rising job needs of farmers looking forward. The first subsection focuses on the farmers' environmental impact and subsequent responsibilities. Next, it explores how social media is changing the ways in which producers (including farmers) communicate with consumers. It reveals and defines the new expert job opportunities that agriculture is developing. Lastly, this section synthesizes many of the key topics from previous sections including succession strategies, the problem solving attitude, and communication strategies to present a motivating call to action for consumers and agricultural leaders to be educated and active in the pursuit of sustainable and sufficient crop growth so as to provide for a rapidly growing and changing world. This section can be divided into smaller subsections for use in classes at all grades recommended, but it has particularly strong applicability to agricultural science, general science or English classroom lessons. Alternatively, if students work through this module in its entirety, this section synthesizes, applies, and concludes many of the ideas built on in previous sections and shifts the focus from the history of farming to its future.

Objectives

Viewers/Students will:

- Have a basic understanding of the various facets of the agriculture industry.
- Be able to identify the top commodity crops in the United States.
- Critically understand the role agriculture has in sustaining other jobs in our local, national and global economy.
- Understand the complexity of our growing population and the four factors contributing to the increase in our global food supply through agriculture.
- Diagram the sectors/steps through the value chain from seed to table to comprehend and explain visually the key aspects of these steps that ensure our food supply is safe, efficient and available to all.
- Evaluate technology's numerous roles and the improvements that continue to aid farmers and producers in advancing their operations with efficiency, production, safety, health and sustainability concerning both crop and animal production.

Classroom Integration

*For teachers of agricultural science, especially those at the secondary and technical school levels, the applicability of the agricultural information in this module is clear. For teachers in different subject areas and at different grade levels, the connections can be difficult to find. This section provides some suggestions, tips, and ideas to exemplify how the vital agricultural information in these Agricultural Systems Modules can be used to meaningfully supplement the existing curriculum requirements in your classes. It is divided by subject area and specifies grade level, but it is not all encompassing. This section merely demonstrates the perspective that a teacher can use to recognize how to integrate this material into their existing curriculum.

English Language

- English lesson topics (such as communication styles, authorial and reader perspectives and language change over time) can be addressed using videos from Productivity and Profitability and Industry Evolution as examples of adapting communication styles “in real life” or as a way to establish set in a lesson. For example:
 - Using the Value Food Chain subsection from Productivity and Profitability, multiple perspectives activity asking students to write a short written response over “How I get my food,” can be created. This activity would encourage them to consider their perspective from different points of view on the Value Food Chain. This would fit in with the English class goal of helping students read for multiple perspectives as well as help build their understanding of the effects of limited perspectives.
 - Using the Communication subsection from Industry Evolution, a language change lesson can be designed. This can be accomplished by connecting students’ budding language style repertoire to how the farmers have had to change the mediums they are working in, the language they use, and the audience they have in mind.
 - Using all three videos from the Linkage to Consumer Demand segment in the Communication subsection of Industry Evolution, a lesson that introduces the writing strategy of persuading the audience through connection or crafting effective hooks in introductions can be created.
- On the other hand, the full modules can be used over the course of several days to:
 - Build agriculture vocabulary lessons in connection with class content.
 - Inspire authentic writing assignments such as writing letters to farmers thanking them for their work and writing letters to policy makers advocating for support of agriculture.
 - Supplement thematic lessons for other literature, from *The Lorax* by Dr. Seuss to *Silent Spring* by Rachel Carson.

History/Geography

- History, Geography, and Social Studies curriculum lesson topics (such as cultural differences in daily life, how terrain affects agriculture and how agriculture affects society) can be addressed using videos from all three sections as “real life” examples or ways to establish set in the lesson. For instance:
 - Using the Agriculture Evolution subsection from *Welcome to the Farm*, a lesson comparing U.S. agricultural practices to agricultural practices in other countries

can be introduced. This would be suitable for a high school level social studies or geography lesson, but either way would require teacher-provided descriptions of the comparable systems in other locations.

- Using the interactive Milestones subsection found in the Agriculture Evolution subsection from Welcome to the Farm, a lesson explaining the effects of federal initiatives on their correlating sectors of life can be introduced. This example can be used to illustrate how laws and regulations impact the way things run.
- Using the videos from the Multigenerational subsection of Welcome to the Farm, it is possible to introduce a social studies lesson about how family structures affect individual social roles. After listening to these videos, comparisons can be encouraged with short reflective writing assignments or readings from journals about family life in medieval or high class family structures.
- Using the videos from the Linkage to Commands segment of the Communication subsection in Industry Evolution, how consumer structures have changed over time can be explored. This is exemplified through the explanation of how changes in distance between farmers and producers has motivated adaptation farmers' communication.
- On the other hand, the full videos can be used over the course of several days to:
 - Build agriculture vocabulary lessons in connection with class content.
 - Inspire local application projects exploring the farms and food production structures that exist in the community (interviews with farmers; studies of local/state agricultural laws and regulations; relationships between farmers, suppliers, and business owners to provide for the community)

Math

- Math curriculum lesson topics (such as graphical interpretations, ratio comparisons and managing risk/cost) can be addressed using videos from Welcome to the Farm and Productivity and Profitability as “real life” connections or ways to establish set in a lesson. For example:
 - Using the Increasing Food Productivity segment of the Agriculture Evolution subsection of Welcome to the Farm, a statistical comparison lesson with real life data from a data set generator and the graph from the video can be created.
 - Using the Preparing the Next Generation segment of the Succession Planning subsection of Welcome to the Farm, a lesson defining demographic or census data and how to compare it can be introduced.
 - Using the Commodity Markets segment of the Value Food Chain subsection of Productivity and Profitability, a lesson introducing quantity calculations based on area can be supplemented.
 - Using the Productivity subsection of Productivity and Profitability, a real life example of managing financial risk can introduce a lesson on cost benefit analysis or the value of differentiating one's portfolio..

Science

- Science curriculum lesson topics (such as sustainability, world hunger, and weather) can be addressed using videos from every section as “real life” connections or ways to establish set in a lesson. For example,

- Using the introductory video from Welcome to the Farm, it is possible to support the introductory vocabulary for a secondary agricultural science lesson.
- Using the Agriculture Heritage subsection of Welcome to the Farm, a theoretical lesson about the need for problem solving in the scientific process can be supported. Since these lessons often function as motivating lessons as well, this video can serve as the reference for a mini-lesson about the importance of a problem solving attitude in this class by reminding students about the importance it has in the “real world.”
- Using the Soil Health subsection of the Stewardship and Sustainability subsection in Productivity and Profitability, a lesson on plant growth, the soil system, nitrogen fixing, or any other soil health related topics can be clearly supported. This video is short and highly applicable to the soil health unit of secondary Earth science lessons.
- On the other hand, the full videos can be used over the course of several days to
 - Support an agriculture education unit, connecting to several of the state required science curriculum objectives.
 - Inspire local application projects exploring the farms, food production structures and the local climate’s effect on living matter (Ex: planting a class garden, asking a local farmer to talk about the soil health or their farms weather risk management plans)

Differentiation

*Differentiation according to a lead researcher and professor at the University of Virginia within teaching, Carol Ann Tomlinson, it's teaching with the awareness that each students' learning style and levels of readiness vary prior to creating a lesson plan. This section is to assist with fostering some differentiating instruction with this e-learning material to engage all students.

-Cathy Weselby, www.resilienteducator.com

1. Content

- Some students may be familiar with agriculture already, while others have no concept of growing up on a farm or in a rural setting. Accommodate for these differences by pairing students with a level of mastery to agriculture with those that are unfamiliar to share their experience and knowledge base.
- For students with lower level understanding of this e-modules content, review our assessment section or the videos yourself to create a vocabulary lesson (build understanding)
- Have students create a PowerPoint highlighting one topic area within the e-learning material that they want to expand on.

2. Process

- This learning module hits on auditory and visual learners however, it may be beneficial to expand this material to include kinesthetic learners; ways to do so include:
 - Including an experiment pertinent to the learning material
 - Going on a farm tour
 - Play a game, whether online or outside pertinent to the module

3. Product

- What can students complete that reflects their comprehension of the module's content, options include:
 - Students could write a report regarding an element of agriculture discussed in the module.
 - For those visual learners in the classroom, they can summarize a key topic in the module via an infographic.
 - For an auditory learner, they may prefer providing a synopsis of a key topic in the module via an oral report.
 - For a kinesthetic learner, have them demonstrate a key topic in the module (i.e. demonstrate how to vaccinate a beef steer).

4. Learning environment

- This varies, but always provide a quiet space. Being that our e-learning module is related to agriculture, take students outside to demonstrate some of the topics mentioned (i.e. look for pollinators, create a feed mix, load a syringe, etc.)

Assessment Resources

*These questions exclude content found in the bonus videos

Welcome to the Farm

1. Kip Tom explains how important agriculture is to our economy, its support and dependency for other industries, as well as a globally strong economy to support farm _____ overseas. Describe some of the organizations in your community that are dependent on the farmer vice versa the farmer is dependent on as well.
Answer: exports; Equipment stores/dealerships, vehicle dealerships, seed companies, local grain elevators, grocery stores, gas station convenience stores, clothing/apparel stores, cosmetic stores, restaurants, feed mills, truck drivers, train operations, electricians, etc. (this is a long list).

2. Looking at the history of the world, agriculture was a critical element to civilization. Other than possible disease or invasion by war, many civilizations fell due to agriculture/food production failing. (True or False)
Answer: True

3. Acknowledging our rapidly growing global population to feed, the supply of food has increased dramatically through (explain four contributing factors to these increases).
Answer:
 - a. Increasingly capital-intensive agriculture
 - b. Application of biological and genetic science to food production
 - c. Greater ability to save crops from pests
 - d. Better technology to preserve perishable products during transportation.

4. In the 1960's the average U.S. farm had the capacity to feed how many people in comparison to today, one farm feeding 165 people?
Answer: 26

5. Explain how growth in agriculture's technology, productivity and management practices has increased _____ stability and _____ security. What factors contributed to this?
Answer: Land Grant University System, extension services, which led to research in animal well-being, seed technologies, and improved equipment and data analysis.

6. Pick two milestones within the evolution of U.S. agriculture and research each of them to provide a brief (approx. 10 sentence) summaries citing at least two peer-reviewed and reliable sources related to your two milestones.
Answer: Will vary, ensure the milestones picked pair with the video and that there are the minimum resources required that are also properly cited.

7. Relationships, including professional partnerships, tend to _____ and are based on _____. Give at least two examples of relationships mentioned in the video that farmers build professionally.

Answer: run deep; trust; equipment companies, banks, agribusiness input services, veterinarians.

8. The average age of the top executive on farms is _____. This means that there will be a large number of family farms transferring leadership to the next generation. With these transitions comes what type of preparation/planning?

Answer: 58; succession planning

Productivity and Profitability

1. Agriculture is a key industry to building our U.S. economy. (True or False).

Answer: True

2. What are the top four crops grown in the United States?

Answer: Corn, soybeans, wheat, cotton

3. The U.S. is the world's largest producer of what three animal sourced products?

Answer: Beef, Dairy, and Poultry

4. The U.S. Pork industry is the third largest pork producer in the world. (True or False)

Answer: False; second

5. What are three examples of questions or concerns that consumers are asking today regarding their food and our value chain?

Answer: This answer will vary, they are concerned about environmental aspects to growing the crop, the care of the animal, the nutritional value of their food and the general "how" their food is grown.

6. Eight percent of U.S. farmers market their food locally, direct to consumers (True or False).

Answer: True

7. According to A.G. Kawamura, a California fruit and vegetable producer featured in this section, creating transparency means what is occurring between the consumer and producer?

Answer: When there is transparency there is learning being established between the consumer, the end user and the actual producer.

8. Draw/outline and briefly describe each point the journey from seed to table, farm to fork value chain.

Answer:

1. Input companies: All the companies essential to starting up a farm operation, it consists of the agribusiness sectors. Includes: seeds, fertilizer, crop protection, animal health and nutrition, crop insurance, food ingredients.

2. Farmers/Producers: Combine inputs to provide their main commodities within fuel, fiber and food.

3. Traders: Consolidate commodities from the producers (crops, meats, oils, meat and biofuels) to sell farther up the value chain to organizations that add value to create a consumer face product.

4. Food companies: (bakeries, meat and dairy processors and snacks). Craft products that meet the complex and changing demand of the consumer market.

5. Retailers: Provide platform and reach for consumers to purchase products

6. Consumers: End purchasers of the product, they send signals to the entire value chain based on their preferences, questions and general concerns.

9. Productivity within agriculture is not simply producing more food, it's the ratio of inputs (expenses of the farmer to produce the food) to outputs (the end product, i.e. gross livestock or gross crops). What are two examples of inputs or expenses farmers may have to produce their livestock or crops?

Answer: land, fertilizer, feed, machinery, livestock, labor, and/or land

10. Mobile devices/tablets have an advantage to farmers and producers to oversee their operation from wherever they may be in the world. (True or False)

Answer: True

11. Wireless sensors collect data on parameters such as? (List at least two of the seven mentioned.)

Answer: soil fertility, leaf temperature, leaf area index, water requirements, local climate, infestation, animal well-being (any of these, in any order)

12. Satellite technology allows plant health, soil moisture and plant cover from space. (True or False).

Answer: True

13. The goal/purpose of variable rate application is to?

Answer: maximize a field's potential by precisely planting varieties of plants that are best for the soil type and moisture availability of varying areas of a field. It's an opportunity to increase yields.

14. Explain two main purposes of precision irrigation within the agricultural industry, highlighted in this video?

Answer: 1. Allows remote monitoring and control of crop needs
2. Only applies the necessary amount of water.

15. Improving livestock nutrition and genetics has increased productivity in the U.S. livestock industry, a good diet and overall good health enables livestock to reach their full _____ potential.

Answer: genetic

16. Seed and herbicide technology reduce the use of _____ resources and aid in creating an affordable and abundant food supply.

Answer: natural

17. The number one risk for producers is _____ volatility. What are three methods created to help mitigate weather risks?

Answer: weather, production systems, planting diversified crops, seed varieties, irrigation, crop insurance

18. Technology has brought producers a long way in helping them protect their livestock animals and crops. Herbicides, seed technology, _____ and _____ have all played a significant role in protecting the health and value of both livestock and crops.

Answer: Vaccinations, animal nutrition (either order)

Industry Evolution

1. Environmental sustainability is not possible without _____ sustainability.

Answer: business

2. When considering their land and resources farmer's primary concerns involving, soil health, water quality, water management, animal well-being, natural habitat and machinery. (True or False)

Answer: False (excludes machinery)

3. Healthy soil is the best for increased yields and reducing costs and risks. (True or False)

Answer: True

4. Using practices including no-till and cover crops can help protect soil healthy and structure how?

Answer: Conserve water, prevent soil erosion and nutrient run-off

5. No-till is a way of growing crops without disturbing the top soil through tillage, it provides a layer of plant matter left after the previous harvest on the surface of the soil. This protective layer helps with what?

Answer: evaporation of water from soil, reduces weeds (hinders their growth) and insect populations.

6. Cover crops are crops grown during or after a primary crops season of growth such as radishes or turnips are used in a variety of operations including conventional and organic operations. How do they help soil health?

Answer: Deposits carbon (nutrients) in the soil, deep roots break up compacted soil, prevents erosion/run-off of soil

7. _____ zones with vegetation between cropland and bodies of water, keeps the soil intact (reducing erosion) and acts as a filter as the water flows from the field to the water way.

Answer: Buffer

8. A tile system is an earthen embankment or ridge built across a slope to intercept runoff water and reduce soil erosion? (True/False)

Answer: False, terrace

9. Tile systems are effective at reducing what?

Answer: nitrates and other potential pollutants of water.

10. Overseeing the well-being of animals is complex. Producers measure and monitor many aspects of well-being. List two of the four elements producers measure and monitor for their animals' well-being?

Answer: Nutrition, temperature, bedding and living quarters (any two of these four in any order)

11. Farmer's business sustainability is indirectly linked to consumer demand. (True or False)

Answer: False, directly

12. Investing in talent within agriculture is critical. In fact, 25% of the workforce is over _____ years old.

Answer: 55

13. At Tom Farms they have used what platform to hire many of their employees? For what reason did they use this method of sharing their job positions, and what is a key trait they are looking for, stated by Kassi Tom-Rowland from Tom farms?

Answer: social media, affordability, a passion for the industry

14. What percent of farm operators are women?

Answer: 30%