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Feature Article

Case Studies

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Contents

Applied Economics Teaching Resources (*AETR*) is an online, open access, and peer-reviewed professional publication series published by the Agricultural an Applied Economics Association (AAEA).

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4. Teaching and education commentaries (e.g. notes on pedagogy, evaluations of teaching effectiveness, evaluation and review of applied economics textbooks, and educational methodology).

Feature Article

Case-Study Research Topics in Agribusiness Economics and Management

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Abstract
Within agricultural and applied economics, the development of and methodology for case-study research receives wide discussion. Despite this, there exists no published case-study research studies based in classic case-study methodology. Case-study research is an important methodological tool in social sciences, but generally not taught in agricultural and applied economics graduate programs. The objective is to discuss two different researchable topics requiring extensive data collection that are suitable for dissertations and research. The first topic is to help inform the theoretical contributions in geographic indications by collecting supply data for food products to better understand the relative shape of supply curves and their relative elasticities of supply for such products. The second topic is to understand the depth of agricultural global supply chains in a topical area such as sustainability. Both topics would provide cross-sectional and time-series dimensions in a detailed experimental design with individual firms being the subject of each data. There are opportunities for graduate degree programs to focus on case-study research, which would be suitable for dissertations. This is especially true for graduate students in agribusiness economics and management who have a desire to teach as a career.

1 Introduction

Boland and Caķir (2018) summarized the role of teaching or decision case studies published in *Applied Economics Perspectives and Policy* (formally *Review of Agricultural Economics* (*RAE*))*; American Journal of Agricultural Economics (AJAE); Journal of Natural Resources and Life Sciences Education (JNRLSE); International Food and Agribusiness Management Review (IFAMR);* and *Case Research Journal (CRJ)*. The *RAE* published case studies from 1996 to 2010 and the *AJAE* from 2011 to 2017. The *JNRLSE* and *IFAMR* have continually published cases over time since their inception in 1998, and the *CRJ* is the highest ranked decision case journal. Boland and Caķir (2018) did not review cases published by Harvard Business School Publishing given the structure of their cases is not like that of academic journals. They found the *RAE* published 72 decision case studies from 1996 to 2010 while *IFAMR* had published 77 over the 1998–2018 time period. However, with the exception of Wysocki's (1998) dissertation, they could not identify a published case-study research based in some case-study methodology.

One of the classic case-study research readings is Penrose's (1960) case on Hercules Powder, which involved a significant collection of data through interviews. This remains the classic citation for literature on resource theory of the firm. Generally, a research case study does not generate a large number of citations or serve as a foundation for a new theory as Penrose (1960) did. It is surprising though that case-study research is not a widely used methodology in a social science such as agricultural and applied economics. Thus, while many papers describe the process of case-study research, in practice it is not being conducted, which may be because it is not taught as a methodology in doctoral programs. In an attempt to address this shortcoming, the objective of this article is to provide two examples of data collected using case research analysis and potential case-study research for dissertations.

2 What Is Case-Study Research?

Case-study research methodologies involve detailed investigation or descriptive study of a single individual or firm, group, or event to explore the causes of underlying principles. Case-study research can be single or multiple case studies that are based in theory and rely on multiple sources of evidence, including quantitative evidence. Case studies are analyses of persons, groups, events, decisions, periods, policies, institutions, or other systems that are studied holistically by one or more methods.

Yin (2018) describes several types of case studies including: (1) *illustrative*, which is used to describe an event or situation in such a way that people can become more familiar with the subject; (2) *exploratory*, which is a condensed case study to gather basic data that could be used to identify a particular question for a larger study; (3) *cumulative*, which is designed to collect information for events and aggregate them to analyze in greater generalization; and (4) *critical instance*, which are studies to examine situations of unique interest or to challenge a generalized belief.[1]

A researcher can use a variety of approaches and methods to collect data, including interviews, direct participant observations, protocol or transcript analyses, a review of documents or records, field studies, or an exploration of artifacts. Researchers may choose to use one of these methods to collect data (single-method approach), or they may use several methods (multimethod approach). Case-study researchers typically interpret their data through coding procedures. If the data set is not studied as a single set of data, the data can be segmented into smaller sets and combined into multiple data sets. This is generally the case when you have data collected in different units of time. For example, some firm data are collected on a year-end basis, which might be a calendar year, while others, especially those operating close to production agriculture at first handler level, might use a marketing year end, which could be August or September when harvest occurs in the northern hemisphere (Boland 2018).

A good starting point is the process of preparing for a human subjects review within an Institutional Review Board (IRB). Such applications require a carefully laid out data collection plan when using field interviews or direct participant observations. An IRB looks carefully at experimental design with regard to how the data will be used to make inferences. If the data collection process does not involve human subjects, then documents such as minutes of board meetings; bylaws, articles of incorporation, or similar governance documents; or corporate records in library archives can be collected in some standard reporting process.

3 Sources and Uses of Data

Yin (2018) is the usual reference for social science case-study research methodology. More than two dozen articles by agribusiness economics and management faculty describe the contributions of Coase (1937), Holmström (1979), Ostrom (1990), Williamson (2005), and Hart (2017) for their Nobel Memorial Prizes in economics and how their theoretical contributions could provide research and dissertation topics. Many of these articles suggest using case-study research as a potential topic for work in new institutional economics. However, despite these theoretical contributions, limited empirical work exists, with notable exceptions being Knoeber (1989) and Balbach (1998). Why is there limited empirical work based on case-study research? It is not the lack of data within food and agricultural markets, which have a wide variety of cultural, economic, historical, organizational, and political contextual factors and variables for consideration. These factors and associated data could be the focus in analyzing firms' decision making across competitors and within an industry through time and over space.

Data are not an issue in case-study research. A number of new data sets are available within academic units with the ability to handle confidentiality concerns and privacy, working with IRBs. Colleges of business have financial resources, and their faculty require access to Compustat, EuroStat, IRI, Nielsen, and the University of Chicago Kilts Center market research data. These data have firms categorized by their North American Industrial Classification System (NAICS). Similar data are emerging in the European Union. For example, figure 1 shows how segment data are available in Compustat. A researcher could create data for publicly traded firms in a certain NAICS industry. Figure 2 describes the business units for a supplier of inputs to a farmer. Limits exist on firms not publicly traded, but proprietary data may be available from industry sources. It is possible to combine such data with other data

[1] There are some examples of illustrative cases done in agricultural and applied economics such as Cook and Ye (2016).

including number of facilities, mergers or other business combinations, senior management tenure and changes, and/or new products introduced to create a data set to analyze industry changes using information from the U.S.

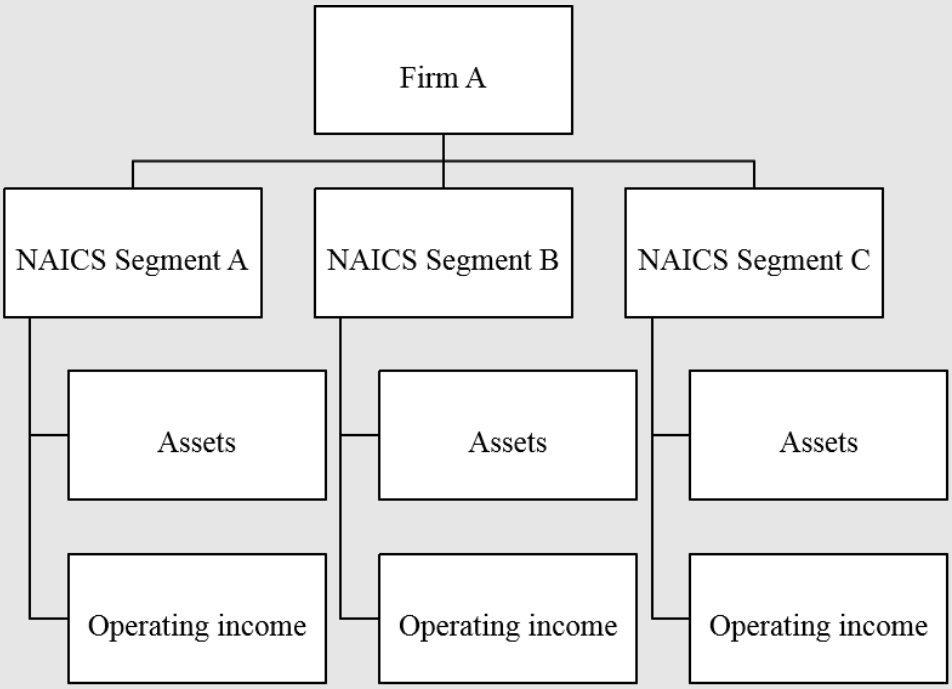

Figure 1: Overview of Segment Data in Compustat by NAICS
Source: Standard & Poor's (2019)

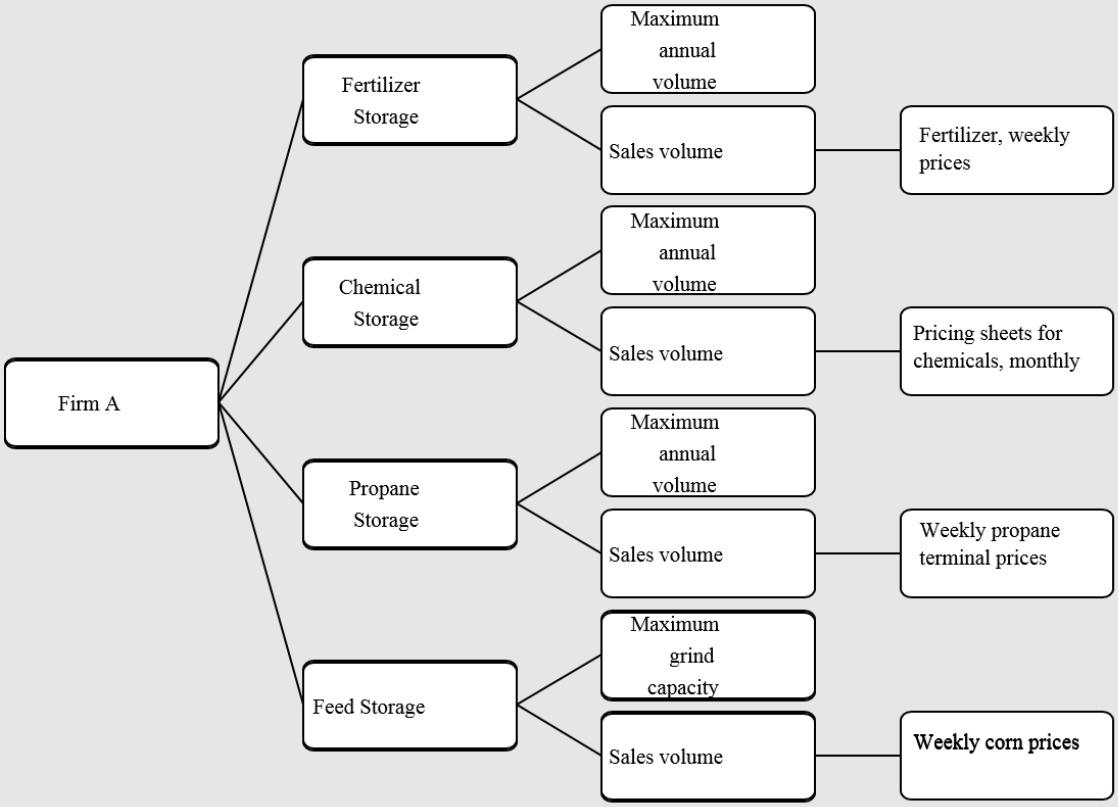

Figure 2: Overview of Business Units for a Farm Input Supplier

Securities and Exchange Commission (SEC) and trade publications. Combining this with data linked to variables from new institutional economics can provide additional theoretical applications.

Another source of data are public and private libraries, which might house corporate records for the food industry that could serve as a starting point for a research case. As an example, the Minnesota Historical Society collected annual reports and newsletters from agricultural and consumer cooperatives. These and other corporate records provide a foundation for writing a business history of a firm and its decision making using work by Penrose (1960) as an example.

Attempts have been made to conduct case research to test theories of the Nobel laureates cited earlier. To do so requires the type of data used by Goodhue, Mohapatra, and Rausser (2010) on canning tomatoes. When looking at data by trucks and farms for orchard crops such as canning peaches, pears, and fresh apples, the variability in grades or standards does not exist. In fact, when visiting with senior management and farmers of tree nut crops, pome fruit, and other orchard crops, it became apparent that twenty-first-century farming methods have resulted in most crops attaining the highest grades. For example, in any given year the amount of canning peaches sold by the California Canning Peach Association is likely to be greater than 95 percent for the highest grade. Similar statistics exist in other industries. Without variability in such crops, it becomes less interesting to empirically test contract theories. Indeed, contributions of Holmström (1979) and Hart (2017) are widely disseminated and used by farmers and firms in agriculture.

4 Two Examples of Research Topics Requiring Case-Study Research

In recent years, a number of theoretical contributions have been made by agricultural economists who suggest in the conclusions of their manuscripts that data are needed to test these theories. Two such streams of research are described below, and data collected using case-study research could help test these theories.

4.1 Geographic Indications in the European Union

Differentiated food products labeled by their geographic location, production, and processing are a widely contested issue in trade negotiations between the United States and European Union (Josling 2006). Compromise exists in the wine and spirits market, but not in food, with the exception of some cheese markets. Agricultural economists have made important theoretical contributions in understanding the role of differentiated products and how they are understood (Lence et al. 2007; Moschini, Menapace, and Pick 2008; Mérel and Sexton 2012; Menapace and Moschini 2014). Literature exists on individual products (Hayes, Lence, and Stoppa 2003), but there is little or no literature at a firm microlevel. Case-study research offers advantages for theoretical microlevel analysis, particularly with regard to the responsiveness of supply.

For microlevel analysis, there are the following four designations: (1) optional quality terms relate to a characteristic of one or more food type, farm, or processing attribute that applies in specific geographical areas, which have an EU dimension such as "Mountain-grown" and adds value to a product compared with similar products. (2) Traditional specialties guaranteed identify a product made according to a traditional practice such as "matured for 12 months" or produced from traditionally used ingredients. The name should be traditionally used to refer to the specific product and identify the traditional or specific character of the product. (3) Protected geographical indications identifies a product as originating in a particular area, which may be a whole country such as France. The product's given quality, reputation, or other characteristics should be attributable to this area, and at least one of the production steps must take place in the defined area. (4) Protected designations of origin identify a product as originating in a particular area, which, due to its geography and associated natural and human factors, imparts particular qualities or characteristics. All the production takes place in a defined geographical area, such as the three provinces in Greece for the production of feta cheese using sheep's milk that consume the grass in that region, which has unique botanical properties. In exceptional cases, this can be as large as a whole country.

Compiled in July 2018, figures 3 to 7 illustrate alternative approaches for data analysis. Figure 3 shows the four designations used with the EU in order of their difficulty in qualifying for this designation, while figure 4 shows the number of the four designations recognized by the EU in three categories. The EU does not track optional quality terms. Figures 5 and 6 show the respective number of the four designations approved by year beginning in 1996 and type of food products approved as of July 1, 2018. Finally, figure 7 shows the number of four designations approved by country.

One question that requires understanding in this issue is the relative responsiveness of supply and demand (Mérel and Sexton 2012). Case-study research could define a population of food products, such as figure 6, and

choose one type of product, with cheese or meat products likely the easiest. Stratifying the data in figures 4 and 7 could create a representative sample. Finally, consider the process shown in figure 8 to obtain data on annual supply. Collectively owned food associations exist for many of these foods with members and data existing through member association reports. Doing research on this topic generally requires second language skills and resources for remote data collection such as those used by Sánchez (2008). With such primary data collection, answers will emerge on a number of research questions. For example, the data collected in figure 8 could help inform the issue of the responsiveness of supply, which could be used to test the hypothesis of whether the long-run supply curve is perfectly elastic. As retail-scanner data becomes available, it is possible to estimate a demand system, but the supply data will likely require alternative data possibly derived from a case study.

4.2 Global Agricultural Supply and Value Chains

Kuijpers and Swinnen (2016) provide a literature review on the important contributions in understanding the welfare effects of global supply and value chains on agricultural producers, while Bellemare and Lim (2018) discuss the literature on contracts with an example of empirical results from Madagascar.[2] Gereffi, Humphrey, and Sturgeon (2005) discuss five governance models within the context of new institutional economics. Antràs (2016) provides the theory for the use of transactions costs, incomplete contracts, and property rights in value chains.[3] He describes databases used for empirical research including the U.S. Bureau of Customs and Border Protection, U.S. Related Party Trade of the U.S. Census Bureau, and direct investment data from the U.S. Bureau of Economic Analysis. Several difficulties exist in empirically testing the different theories because there is no publicly reported data.

Case-study research offers an approach to investigate firm-level boundaries and their development over time within the United States, European Union, and/or other countries. In particular, the development of agricultural global-value chains and their impact on sustainability could be analyzed using this approach. Figure 9 illustrates how to develop a database of food firms to examine each of their NAICS segments, location of manufacturing plants, trade data based on the ten-digit harmonized tariff codes, and Gereffi et al. (2005) typography for governance systems and sustainability strategies. The first data are from the SEC annual 10-k reports, which are available since 1996 for publicly traded firms. The second data are available from various trade publication annual summaries, which often contain the location and address of agricultural handling, processing, manufacturing, and distribution warehouses. The trade data are available within the Foreign Agricultural Trade of the United States (FATUS) for the ten-digit Harmonized Tariff Codes.

Obtaining the Gereffi et al. (2005) data involves working backward to examine the various certification claims made on retail food data. Boland, Cooper, and White (2016) employ the Gereffi et al. (2005) model to demonstrate an example for a dairy firm considering four sustainability strategies. This includes types of initiatives pursued internally, certification schemes, audits, and codes of conduct. Internal initiatives include software programs that optimize transportation and logistical functions to reduce miles traveled by trucks. Certification schemes are processes involving one stakeholder including International Organization for Standardization (ISO) standards and ISO 26000 Social Responsibility. Audits might include GlobalG.A.P., Rainforest Alliance, or organic certification. Codes of conduct are the most advanced because they involve more than one stakeholder and convey a high level of assurance and trust.

Firms publicize their use of these four strategies and their level of attainment in press releases, annual reports, websites, and other publicly available data. For microlevel analysis, consider categorizing each strategy for each plant and product category. Then the length of the supply chains could be traced step-by-step to see how far back they go into the supply chain. GlobalG.A.P. is a business-to-business certification system regarding sustainable farming practices. For a number of fruits and vegetables, consumers can check the 13-digit GlobalG.A.P. number against the global database. Similarly, Child Labor Free is a code of conduct strategy involving a number of firms and stakeholders in a supply chain.

[2] Boland (2018) traces the development of the words *supply chain* and *value chain* and notes how they are used in the management literature.

[3] The concepts build on a number of studies including Grossman and Helpman (2002), Antràs and Helpman (2004), and Antràs and Chor (2013).

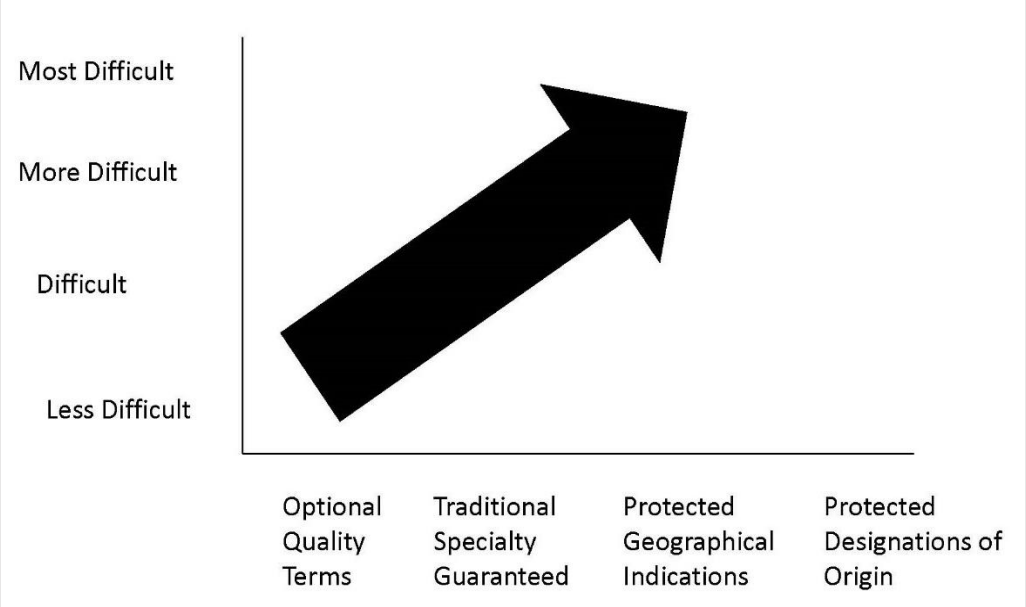

Figure 3: The Four Designations of Geographic Indications in the European Union
Source: European Commission (2019)

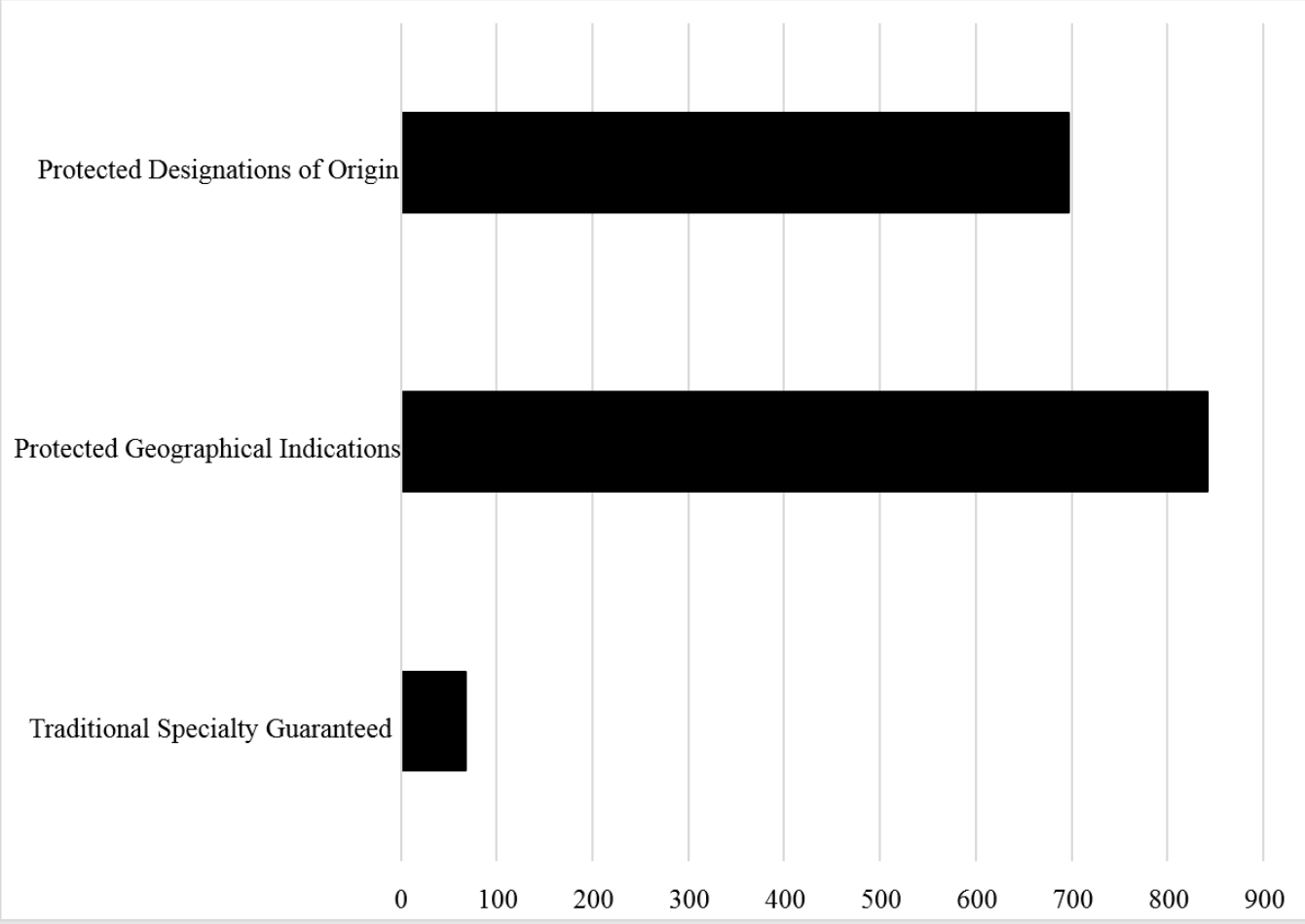

Figure 4: The Number of Designations Recognized be the European Union in July 2018
Source: European Commission (2019)

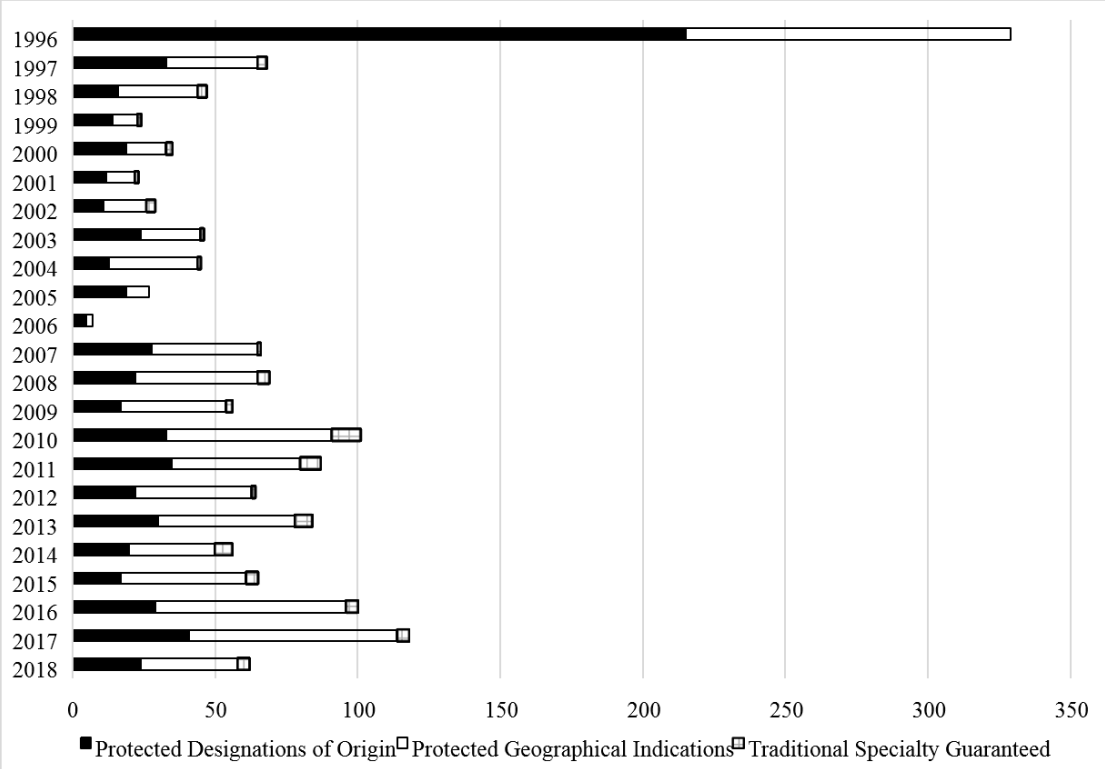

Figure 5: Number of Designations by Year of Approval in the European Union (July 2018)
Source: European Commission (2019)

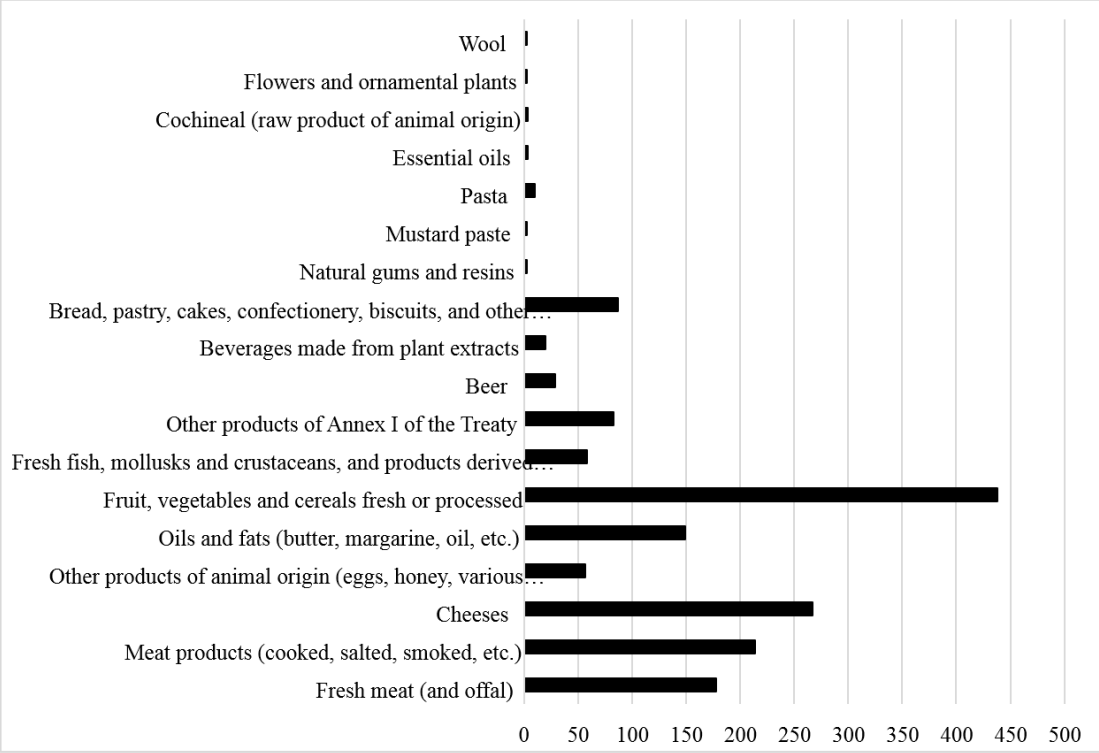

Figure 6: Type of Food Products Designated as Protected Denomination of Origin, Protected Geographical Indications, and Traditional Specialty Guaranteed in the European Union (July 2018)
Source: European Commission (2019)

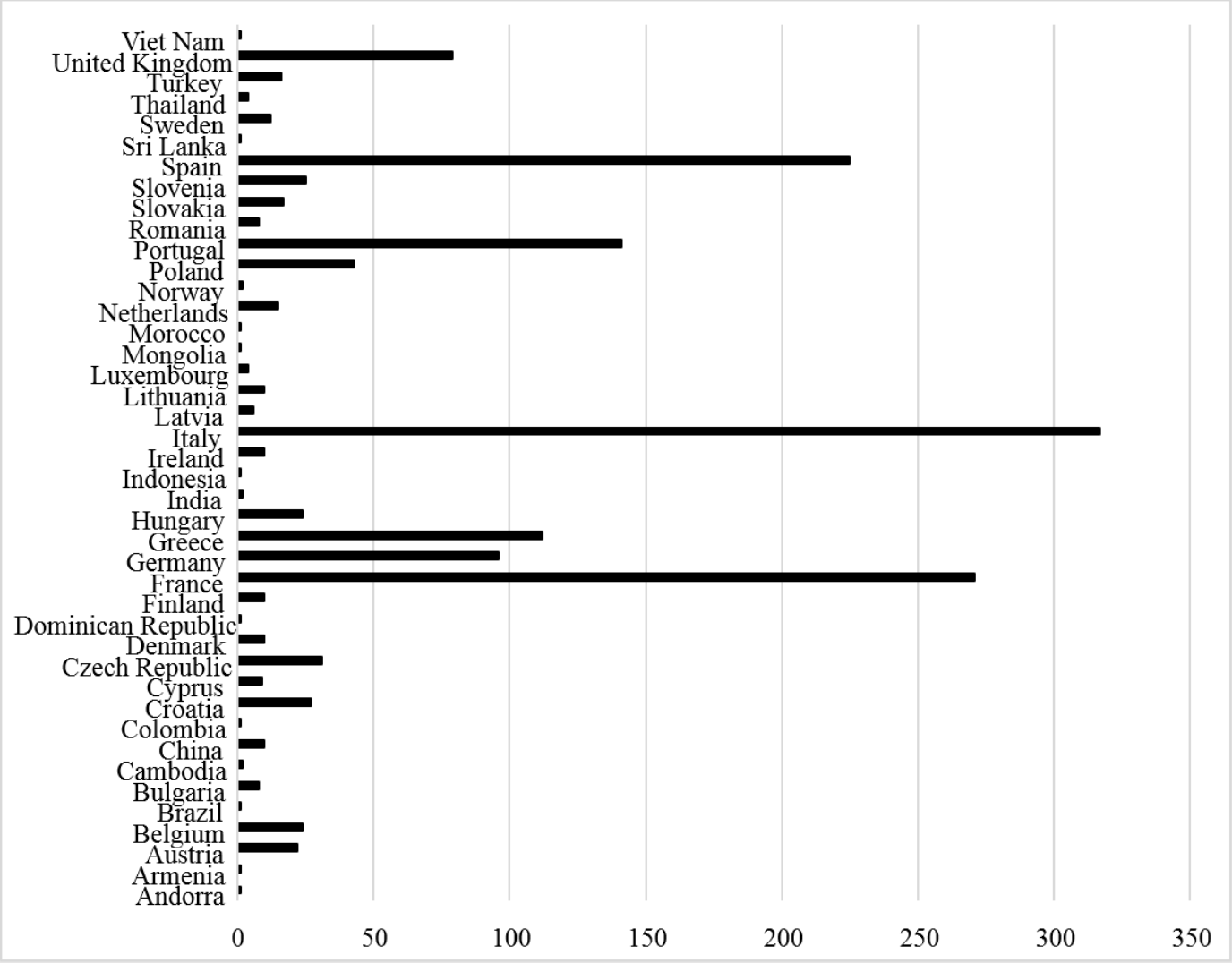

Figure 7: Number of Food Products Approved by Country (July 2018)
Source: European Commission (2019)

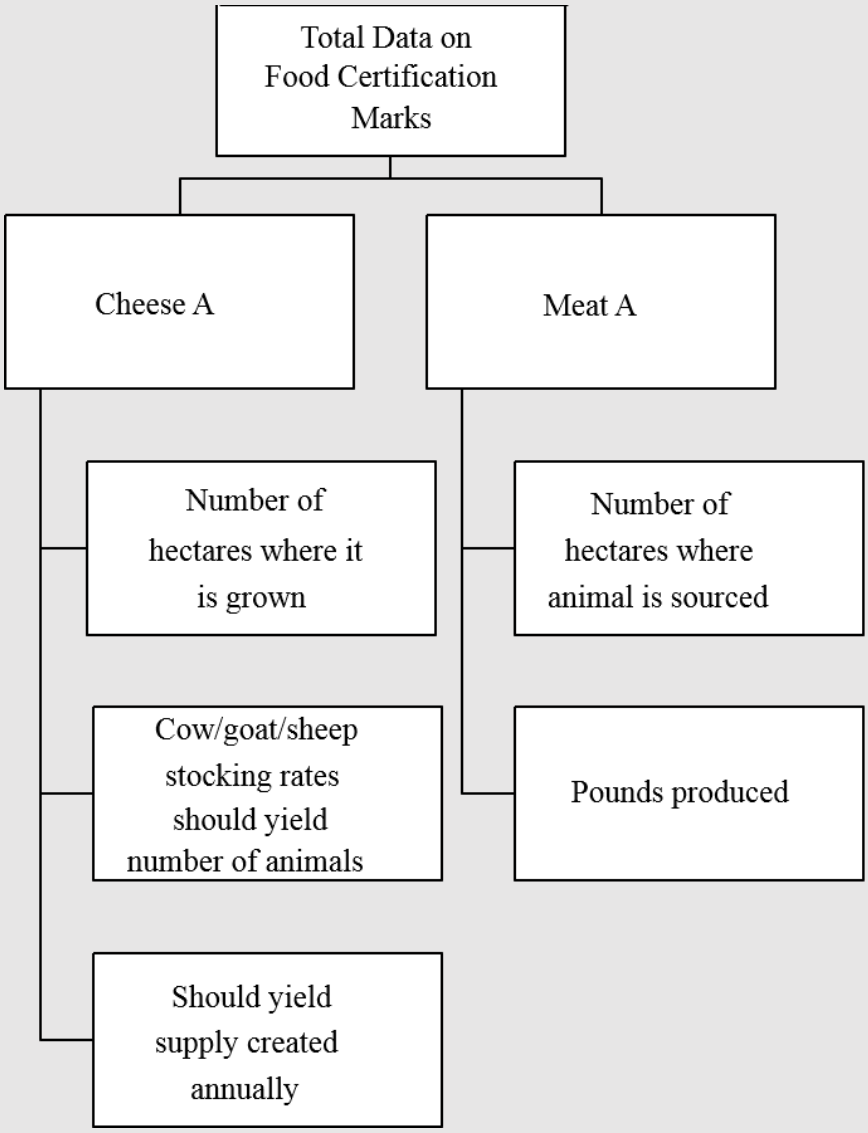

Figure 8: Example of Data That Is Available for Doing Case-Study Research on the Topic of Food Geographic Indications

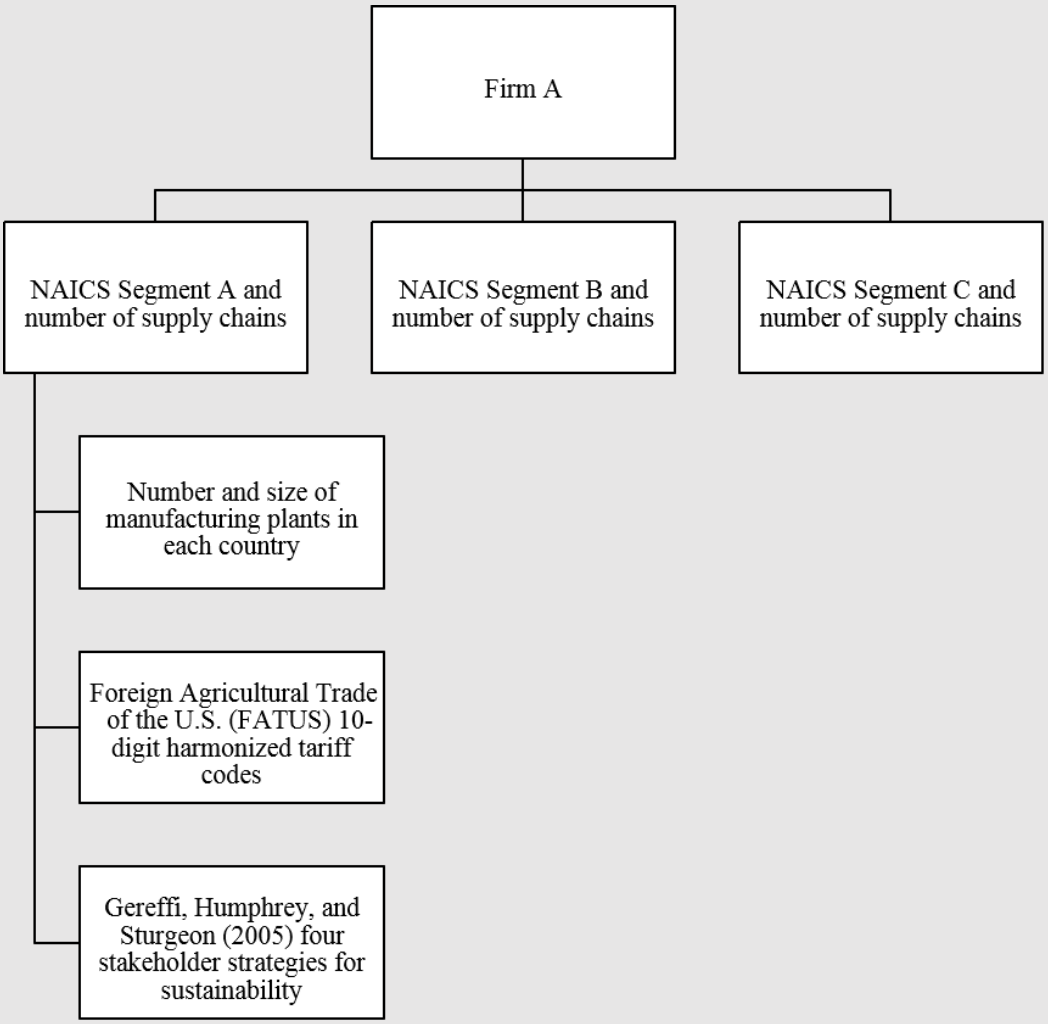

Figure 9: Example of Data Available for Conducting Case-Study Research on Global Agricultural Value Chains

Employing these data provides information on the global supply chain and how far upstream into production sustainability efforts last, how many stakeholders are involved, and how they have changed over time. Then one could employ Gereffi et al. (2005) five-governance typographies to characterize each supply chain for each firm in an NAICS segment. A hypothesis to test would be whether governance systems have really become more complex as suggested by new institutional economics. While the answer might be yes, there is no real data to support this hypothesis.

5 Summary

Case-study research is an important methodological tool in social sciences, but not often taught in agricultural and applied economics doctoral programs. Doctoral programs in agricultural and applied economics are likely to get smaller as noted by Boland and Crespi (2010) and likely to become more specialized (Boland 2009). One model is Harvard's doctorate in business economics, which is distinct from its doctorates in management or economics. The business economics degree requires field courses in business history, industrial organization, and similar concepts, in addition to microeconomic and macroeconomic courses. These field courses teach students to do scholarly research, often with case-study methodology, in-industry analyses, and other industrial organization topics. Publication outlets include *The Business History Review* and *Economic Geography*.

There is no such requirement in any existing doctoral program in agricultural and applied economics. The gradual move to more broadly applied economic topics in some historical departments of agricultural economics

would suggest that opportunities for publishing in these journal outlets would align with the mission of the academic units. This would include a course in case-study research methodology. A logical place to teach case-study research would be an interdisciplinary graduate course taught for social scientists (agricultural education, leadership, communication, public affairs, and sociology) and physical scientists (agriculture and food) in which a methodology class is still common for masters level students.[4] This could be taught in a three- to five-week module in such a course. While an agribusiness history course, such as that taught by Professor Wayne Broehl, Jr. at the Tuck School, Dartmouth College, no longer exists, a doctoral program seeking to work with graduate students in case-study research would benefit from such a course and a course in case-study research methodology.[5]

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[4] The University of Missouri, Penn State University, and University of Minnesota (there may be others) have common administrative oversight for social science departments in colleges of agriculture including agricultural and applied economics, agricultural education, agricultural communication, rural sociology, and similar departments. While their academic programs are separate, departments administered in this fashion would likely lend themselves to teaching such a case-study research class.

[5] Broehl wrote a trilogy of books on the history of Cargill and a business history of John Deere.

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Case Study

Government Cheese: A Case Study of Price Supports

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JEL Codes: A22, Q18, H50
Keywords: Agricultural Policy, Government Cheese, Government Policy, Market Inefficiencies, Price Floor, Price Support

Abstract
In this paper, we present a case study that uses a Planet Money podcast to introduce microeconomics students to several important economic concepts. The podcast, which is about a policy intervention in the dairy industry, reveals the unintended consequences of government price supports under the Food and Agriculture Act of 1977, which increased dairy price supports through government purchases of manufactured milk products. By 1981, the government was struggling to reduce its stockpile of 560 million pounds of cheddar cheese stored in caves across the Midwest. This case study examines the history of dairy price supports and the government's resulting acquisition of millions of pounds of cheese, butter, and nonfat dry milk. Available on request are detailed teaching notes with learning objectives and background materials, questions (and answers) for student evaluation, and a table displaying meta-data for each question, such as learning objective, difficulty level, and Bloom's Taxonomy level.

1 Introduction

John Block pulled out a five-pound block of molding yellow cheese, showed it to President Ronald Reagan, and exclaimed, "We've got 60 million of these that the government owns! . . . It's moldy, it's deteriorating. . . . We can't find a market for it, we can't sell it, and we're looking to try and give some of it away" (Thomas 1981). It was 1981, and Block, the U.S. Secretary of Agriculture, was trying to decide what to do with all the cheese the government had stored in caves across the midwestern United States.

Between the years 1977 and 1981, the U.S. government had purchased and stored more than 560 million pounds of cheddar cheese. Why was the government stockpiling so much cheese? Did it overestimate the amount of cheese needed by government services? No, it had purchased the cheese and other dairy products such as butter and nonfat dry milk in an attempt to support the U.S. dairy industry.

The story of government cheese stockpiles begins during the campaign of the man who was to become president in 1977: Jimmy Carter. On the campaign trail, Carter stated, "We will make sure that our support prices are at least equal to the cost of production" (Krukones 1985). To keep that promise, President Carter would need to draft a bill raising agricultural price supports. It was this bill that ultimately led to the stockpiles of cheese.

2 Objectives and Application in the Classroom

The objective of our case study is to help introduce students to government price supports and their associated benefits and costs. Before starting this case study, students should have knowledge of supply and demand, welfare measures (i.e., consumer surplus, producer surplus, and deadweight loss) and government intervention policies (i.e., price controls, taxes, subsidies, and quotas). Our intended audience is students in principles courses; however, we have also included intermediate-level questions using

abstract demand-and-supply equations (located in the appendix and available on request from the authors).

Students are expected to apply their newly acquired knowledge on government policies to the specific case presented from the Food and Agriculture Act of 1977, also known as the 1977 U.S. Farm Bill. As a result of the bill, the government set a purchase price for cheddar cheese and announced to farmers that it would purchase as much cheese at that price as farmers were willing to sell (in hopes of supporting the dairy industry). The case study, paired with NPR Planet Money Episode 862, guides students through an analysis of the impacts of this policy on the cheddar cheese market and, in turn, the dairy industry.[1] The podcast brings to light, in an entertaining way, the potential consequences of government price supports. Introducing the case study with the podcast helps students engage with the questions in Section 9. Asking students to come to class with answers to those questions will ensure that they are prepared for class discussion.

3 Mechanics of a Price Support

A binding **price floor** is a legal minimum price, set by the government, at which a good can be sold. For the price floor to be binding, it must be set above the **equilibrium** (the point at which the supply curve and demand curves meet). In Figure 1 below, the equilibrium price is P^* and the equilibrium quantity is Q^*. The binding price floor is set at P_f. At this higher price, consumers demand fewer goods (Q_d) than the equilibrium quantity, and suppliers are willing to produce more goods (Q_s) than the equilibrium quantity. Although the suppliers would like to sell more goods at a higher price, they can only sell as many goods as consumers are willing to buy. Therefore, the new market quantity (the number of goods purchased and sold in the market) is Q_d. This quantity results in fewer transactions between sellers and buyers than would occur in a laissez-faire market.

Fewer transactions reduces the benefit to consumers engaging in market trade and results in a loss to society (deadweight loss). In Figure 2(a) below, we can define the consumer surplus before introduction of the price floor as areas $A + B + F$. **Consumer surplus** is the net benefit that a consumer receives from purchasing a good, as measured by the difference between what the consumer is willing to pay (demand) and what the consumer actually pays (market price). On the graph, the consumer surplus is the area below

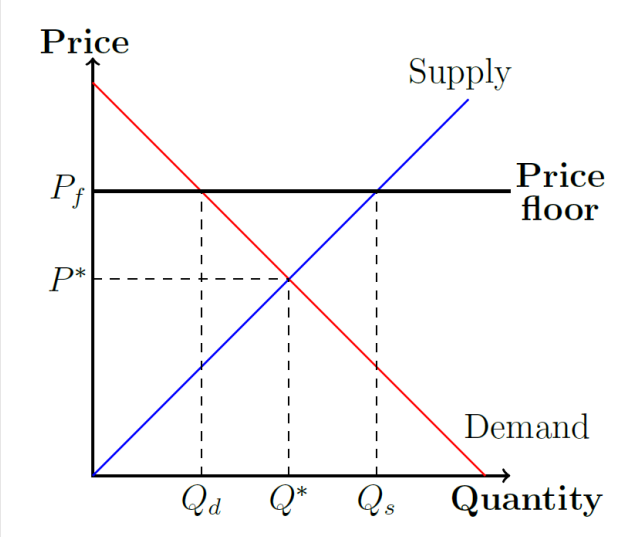


Figure 1. Simple supply-and-demand graph

[1] Instructors are encouraged to listen to the podcast, available at https://www.npr.org/sections/money/2018/08/31/643486297/episode-862-big-government-cheese, before introducing the case study to confirm that it is appropriate for their students.

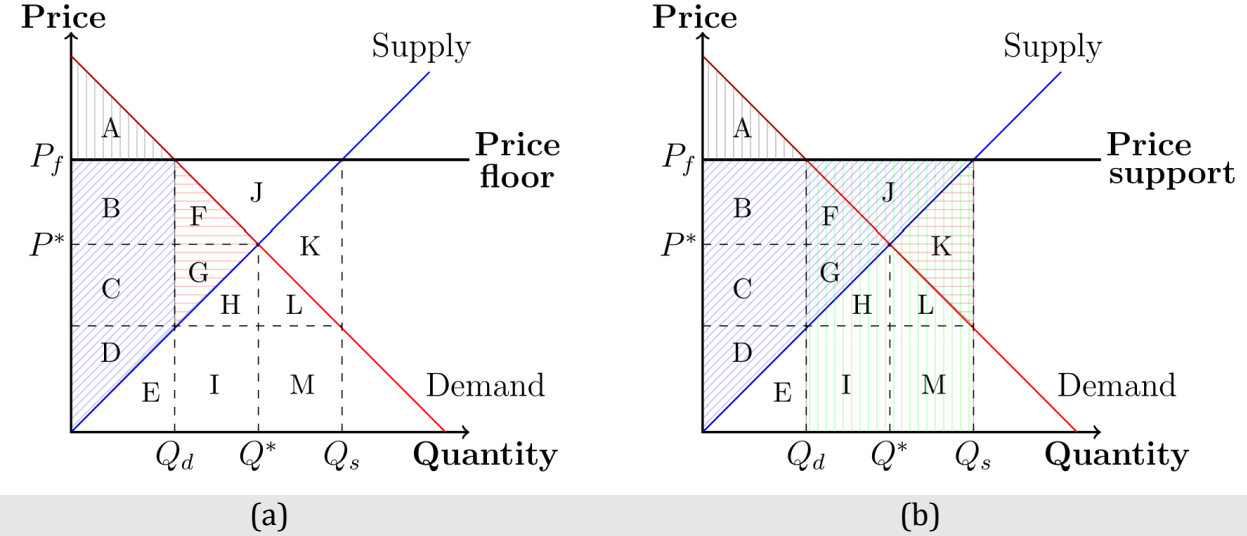


Figure 2. Surpluses, expenditures, and losses

the demand curve, above the price, and to the left of the purchased quantity. With the price floor, the consumer surplus is measured as area A (vertical gray lines). The benefit to consumers decreases with a price floor by $B + F$. The producer surplus before introduction of the price floor is measured as areas $C + G + D$. Recall that **producer surplus** is the net benefit to producers for selling a good, as measured by the difference between what the producer is willing to accept (supply) and the price the producer actually receives (market price). On the graph, the producer surplus is the area above the supply curve, below the price, and to the left of the quantity sold. With the price floor, the producer surplus is measured as areas $B + C + D$ (diagonal blue lines). In Figure 2(a), we can see the benefit to producers with the price floor decreases by area G (a loss) but increases by area B. In this situation, it is generally unknown whether producers benefit from the market intervention. However, we know that society, as a whole, experiences a loss, known as **deadweight loss**. The deadweight loss from the price floor is measured as areas $F + G$ (horizontal red lines).

A **price support**, a type of price floor, is created when the government purchases an unlimited amount of goods from a seller in a market. When the support is binding, the price that sellers receive is higher than the price they would have received had the price floor not been imposed. In Figure 1, the price support is the same as the price floor (P_f). The producers sell Q_d goods to the consumers but still produce at Q_s and sell the remaining products $(Q_s - Q_d)$ to the government. Like the price floor, the price support reduces the benefit to consumers compared to the market equilibrium (consumers are purchasing Q_d goods instead of Q^* goods). Specifically, in Figure 2(b), the consumer surplus with the price support is measured by area A (vertical gray lines). However, the producers are now better off than they would have been with both the equilibrium and the price floor. They are selling Q_s goods at a higher price of P_f rather than selling Q^* goods at a lower equilibrium price of P^* or selling only Q_d goods under the standard price floor. The producer surplus is now measured as areas $B + F + J + C + G + D$ (diagonal blue lines). As previously mentioned, the government is purchasing the surplus goods at a price of P_f, so government expenditure in Figure 2(b) is measured as areas $F + G + H + I + J + K + L + M$ (vertical green lines). The deadweight loss or loss to society is measured by area K (horizontal red lines in Figure 2(b)).

The areas are summarized in Table 1.

Table 1. Areas of surpluses, expenditures, and losses corresponding to Figure 2

	Free market	Price floor	Price support
Consumer surplus	$A+B+F$	A	A
Producer surplus	$C+G+D$	$B+C+D$	$B+F+J+C+G+D$
Government expenditure	--	--	$-(F+G+H+I+J+K+L+M)$
Deadweight loss	--	$F+G$	K

4 Dairy Price Support

As previously mentioned, price support programs set a predetermined minimum price at which commodities can be sold. The Agriculture Act of 1949 led to the establishment of many such programs. The Milk Price Support Program (MPSP) is one of the legislatively mandated programs under the 1949 act that is designed to help provide farmers with a certain level of income.[2] The MPSP does not pay dairy farmers directly. Instead, it supports them indirectly through purchases of manufactured dairy products. Specifically, the Commodity Credit Corporation (CCC, part of U.S. Department of Agriculture, USDA) purchases manufactured milk products in the forms of nonfat dry milk, cheddar cheese, and butter at a pre-determined price.

The MPSP required the Secretary of Agriculture to set a yearly minimum price support for fluid milk and manufactured dairy products without putting restrictions on the quantity of milk produced (U.S. Congress, CBO 1979; LaFrance and de Groter 1985). Until 1981, the determination of price supports was based on a parity price—a price level at which purchasing power, relative to input prices, is the same as that in some predetermined base year (Erba and Novakovic 1995; Boehm and Stucker 1978). Parity prices were determined by a formula set at the start of each marketing year (April) and remained in effect for the remainder of the year (Heien 1977). This formula converted milk weights into a pound of nonfat dry milk, cheddar cheese, and butter, and ensured that the cost of processing the milk was covered in the price.[3] It also guaranteed that farmers received a market price for their manufactured milk products that at least equaled the set support price (Chouinard et al. 2010). If the market price for nonfat dry milk, cheddar cheese, or butter exceeded the support price, the market for these goods would be in equilibrium. Specifically, producers of these manufactured milk products would supply an amount equal to the quantity demanded by consumers (equilibrium quantity) at the prevailing market price (equilibrium price).

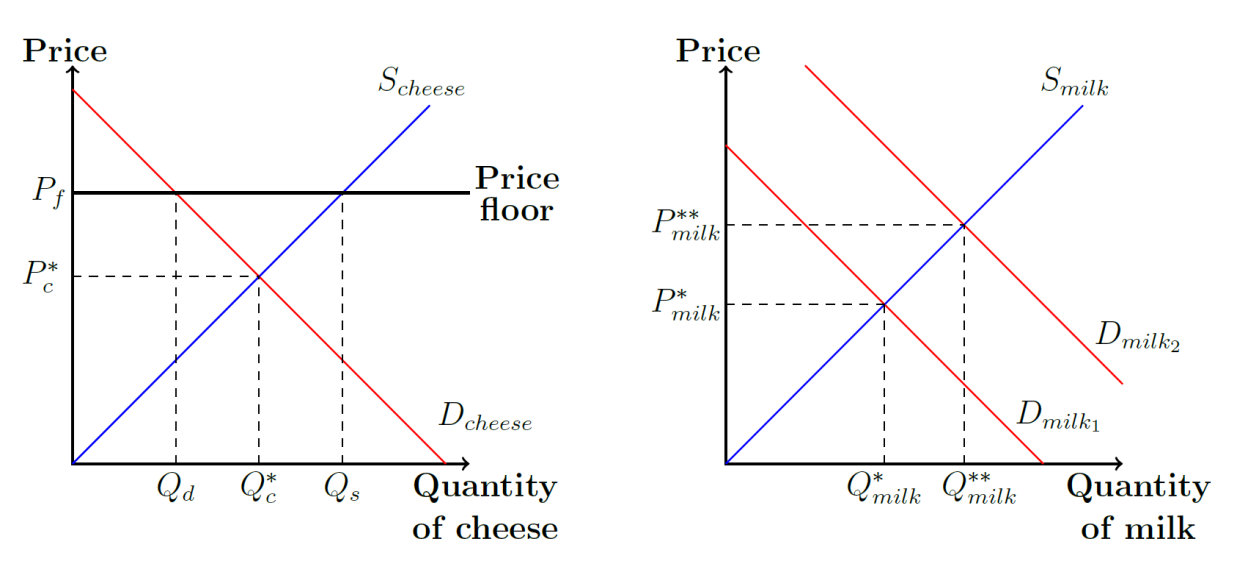
Government support of dairy farmers does not necessarily stem from direct purchases of milk. Instead, it can and did stem from purchases of nonfat dry milk, cheddar cheese, and butter, for which milk is an input. An increase in the production of manufactured milk products causes the demand for milk to shift right, which increases the equilibrium price and quantity of milk. Figure 3 below illustrates how a binding price support in the market for cheddar cheese will generate rising prices in the dairy (milk) market.[4]

First, in Figure 3(a), we will analyze the effect of a price support on the cheddar cheese market. Suppose this support is set at P_f. Consumers purchase Q_d amount of cheese, and the government purchases $Q_s - Q_d$ amount. Before introduction of the price support, the equilibrium price for cheese was P_c^*, and the equilibrium quantity was Q_c^*. With the government price support, cheese manufacturers want to produce more cheese (Q_s). To produce more cheese, manufacturers are demanding more milk because milk is an input in cheese production.

[2] Although the MPSP faced several legislative changes, it remained the main program supporting dairy farmers until 2014. The 2008 Farm Bill reauthorized the Milk Price Support Program as the Dairy Product Price Support Program (DPPSP).

[3] Milk is measured in hundredweight (cwt), which is equal to 100 pounds.

[4] The analysis to follow can also be applied to the nonfat dry milk and butter markets.



(a) Market for cheddar cheese (b) Market for milk

Figure 3. Simplified markets for cheddar cheese and milk

In Figure 3(b), the original (pre-price support) supply and demand are noted as S_{milk} and D_{milk_1}, respectively. Additionally, the equilibrium price is P_{milk}^*, and the equilibrium quantity is Q_{milk}^*. With the price support for cheddar cheese, cheese manufacturers are demanding more milk. This increase in demand for milk causes the demand curve to shift from D_{milk_1} to D_{milk_2}. The new demand curve for milk intersects the supply curve at a higher price and higher quantity. Therefore, the new equilibrium price is P_{milk}^{**} and the new equilibrium quantity is Q_{milk}^{**}. The new equilibrium price and quantity are higher than the original equilibrium price and quantity. Milk farmers can now produce more milk and receive a higher price.

Price supports were set by law at a certain percentage of the parity price. The specific percentage was determined by the Secretary of Agriculture. From 1950 through 1970, price supports were set between 75 percent and 90 percent of parity (Heien 1977). To support dairy farmers, the USDA provided support prices for manufactured dairy products due to the limited storability of liquid milk. Therefore, dairy price supports indirectly provided farmers with a parity income (Manchester et al. 1994). The CCC purchased both bulk and consumer-sized products of manufactured milk. The purchased bulk items at the support price were reprocessed and purchased for sale or donation. All repackaging of manufactured cheese products was completed by a third-party vendor that the CCC program contracted through a competitive bidding process (USDA 2011).

5 Before Government Cheese

The amount of manufactured milk products the government purchased and stored remained relatively low until 1976, as shown in Figures 4 and 5, respectively. From 1971 until 1976, the Secretary of Agriculture, Earl Butz, believed the government should not intervene in the agriculture sector. Butz thought government policies interfered with farmers' rights to produce as much as they would like. He no longer wanted agriculture to rely on the government through price supports. He believed that farmers should rely on the world's free food market (Risser, June 13, 1976). Farmers were asked to produce more and sell more, and government support programs were decreased. However, the reduced support, along with several other factors, started to create a domestic dairy shortage, causing President Richard Nixon to suspend dairy import quotas. These quotas were implemented to deter foreign competition in the U.S. dairy

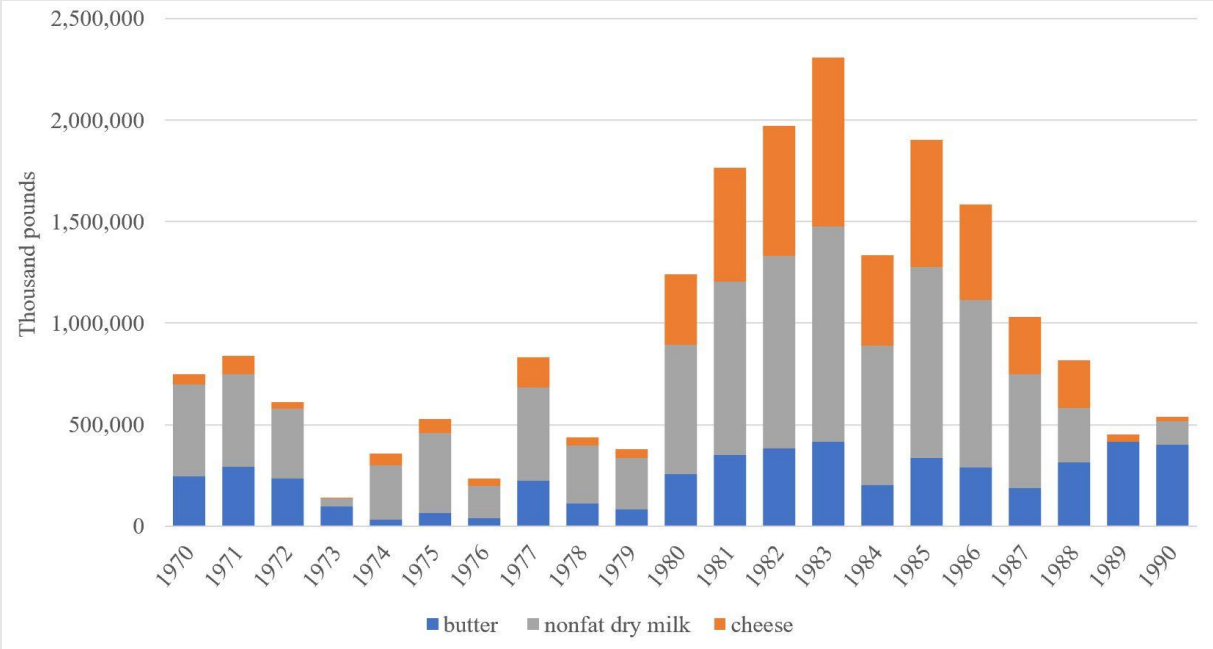


Figure 4. Government purchases of manufactured milk products (USDA 2005)

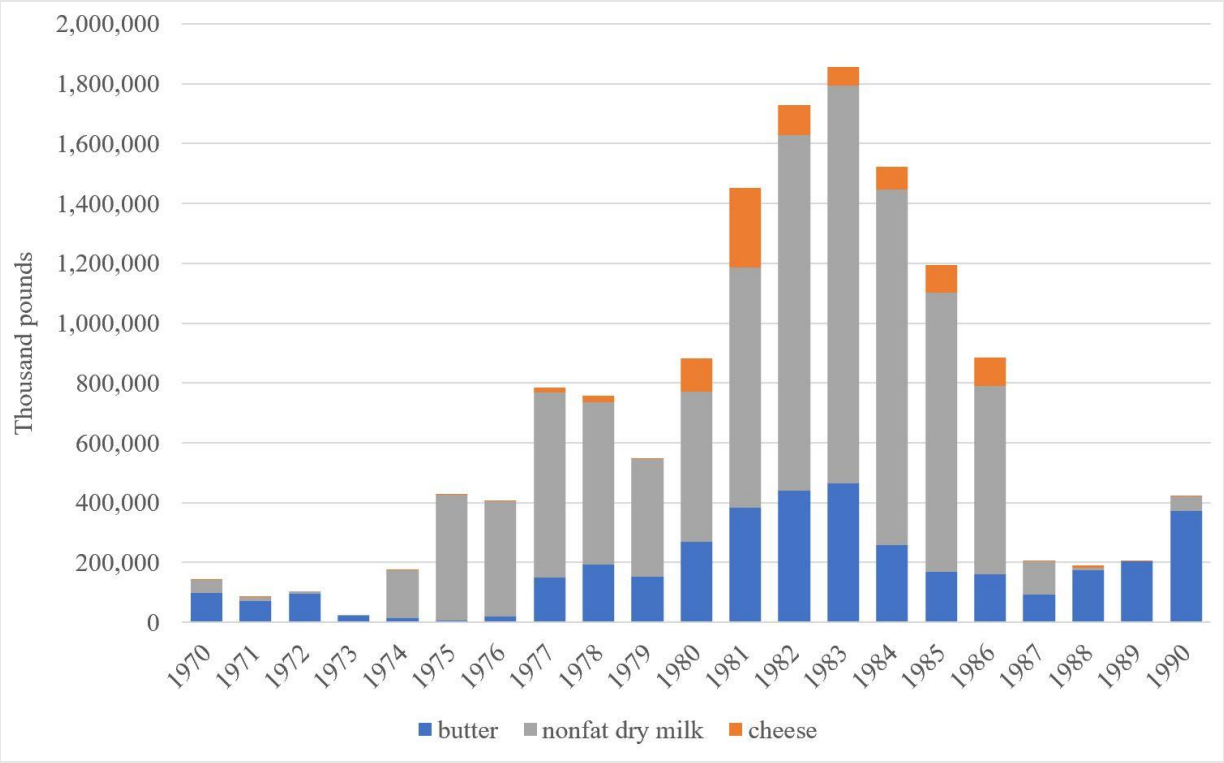


Figure 5. Government stocks/storage of manufactured milk products (USDA 2005)

industry. By suspending these import quotas, foreign dairy producers could now sell their products in the United States at a price similar to domestic milk prices. The increase in the supply of milk and milk-related products caused prices to fall, motivating farmers to lobby Congress and the 1976 presidential candidates for more government assistance/support (Erba and Novakovic 1995).

6 The Food and Agricultural Act of 1977

The Food and Agricultural Act of 1977, an extension of the 1973 Farm Bill, established support not only for dairy farmers but also for wheat, corn, cotton, rice, soybean, peanut, and sugar farmers. The act was written "to provide price support and income protection for farmers and assure consumers of an abundance of food at reasonable prices, and for other purposes" (U.S. Congress 1977).

Increasing pressure from farmers and policymakers who represented large farming communities put President Carter under the gun to make good on his promise to raise support prices during his campaign. U.S. farmers were facing economic turmoil for many reasons, including declining demand (globally), rising input costs, the removal of import restrictions, and embargos to trade with other countries as a consequence of increasing political tensions between the Soviet Union and the United States. As mentioned above, the lifting of import quotas under the Nixon administration caused domestic prices to fall as the supply of foreign-produced dairy products entered the U.S. market. Lower market prices generated a contraction of domestic production, decreasing the quantity of dairy and manufactured dairy products supplied by domestic producers. Some dairy farms exited the market. Between 1973 and 1977, the number of dairy operations decreased 21 percent while the average number of cows per operation increased 22 percent (Blayney 2002). The landscape of dairy farming was quickly becoming one of fewer and larger enterprises. The pressure to raise supports was mounting for the Carter administration.

On September 29, 1977, President Carter signed the Food and Agricultural Act of 1977 into law. This act made a couple of significant changes to the dairy price support program. First, the purchase price of manufactured milk products was to be set twice a year, rather than once a year. Additionally, the price formula was altered to include the cost of inputs to dairy farming (Chouinard et al. 2010). As a result, the support price increased by 11 percent from 1977 to 1978, and an additional 14 percent from 1978 to 1979 (USDA 2019). The increase in the support price led to increasing wholesale prices and eventually increasing retail prices (King 1978). Due to these increasing prices, unrestricted milk production, and the law of supply, the quantity of manufactured milk products purchased by the government, especially cheddar cheese, increased rapidly, as seen in Figure 4.

A portion of the cheddar cheese and butter purchased by the CCC went to school lunch and other meal support programs as well as Veterans Administration hospitals and federal prisons. The remainder was to be sent to warehouses or large underground storage caves, with the expectation that the government could sell the cheese for commercial use once the market price increased beyond the support price (U.S. Congress, CBO 1979). The government was able to send the nonfat dry milk abroad as foreign food aid through Food for Peace programs (King 1978). However, the CCC was prohibited from selling these manufactured milk products domestically for non-commercial use because doing so could depress milk prices, which would partially negate the intent of the program (Associated Press 1981a).

7 Caves of Cheese

Toward the end of the Carter administration, the federal government was spending more than $2 billion per year on manufactured dairy, as seen in Figure 6 (Erba and Novakovic 1995). By the time Ronald Reagan took office in 1981, some 20 million pounds of cheddar cheese, butter, and nonfat dry milk were being added to the government's inventory each week (Associated Press 1981a). However, as the support prices continued to increase, the government's inability to distribute surplus cheese, butter, and nonfat dry milk caused inventories to increase (Figure 5).[5] Government costs were now in the billions of dollars, and newly elected President Ronald Reagan focused on policy changes that would decrease both the inventory of cheese and butter and dairy support prices.

[5] Price supports rose to $13.10 per hundredweight in 1981 from $9.43 per hundredweight in 1977.

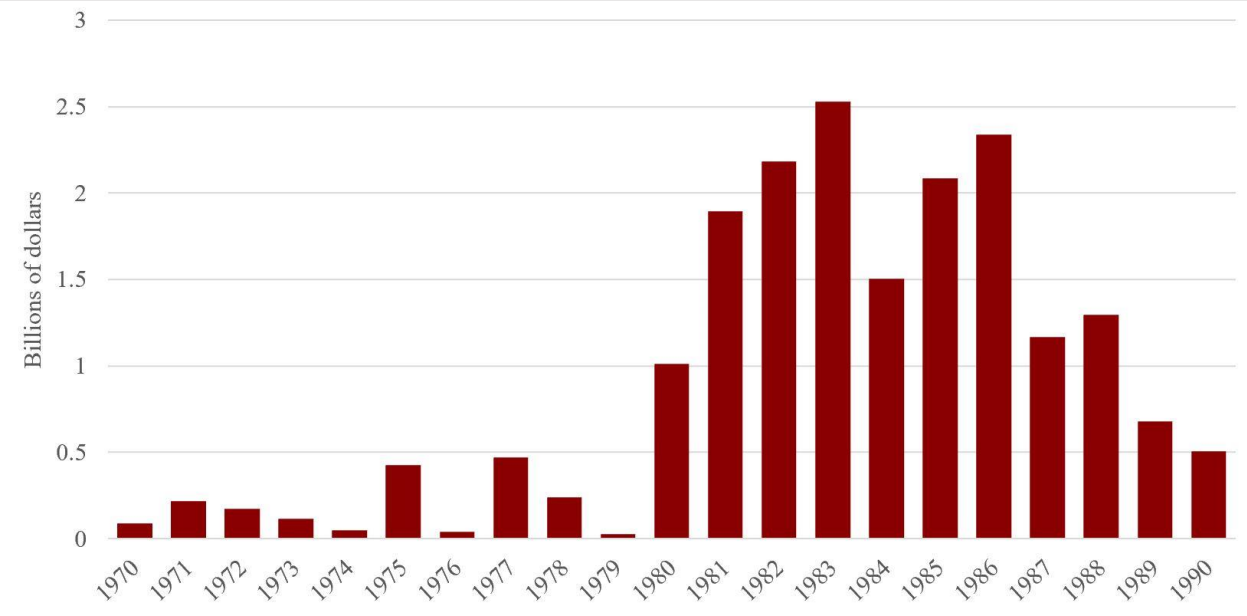


Figure 6. CCC net expenditures on manufactured milk products (USDA 1979, 1990, 2001).

In December 1981, President Reagan signed the 1981 Agriculture and Food Act, which aimed to reduce prices and the surplus of manufactured milk products. First, the bill eliminated the price support formula and outlined a minimum price support that would increase slightly once a year (Erba and Novakovic 1995). This reform was expected to decrease the amount of new cheese that the government was acquiring, but there was still the question of how to distribute the cheese stored floor to ceiling in caves throughout the U.S. Midwest. The government could not release large quantities of cheese all at once. Doing so would increase the supply of cheese, driving down prices, and this impact would not be isolated to the cheese market. Inputs used to produce cheese, that is, milk, would also be affected. In 1981, President Reagan authorized the release of an initial 30 million pounds of cheese to be distributed to states with the intent that those states would then redistribute the cheese to low-income residents through non-profit organizations (Associated Press 1981b). "Government cheese" had just been introduced to the country.

Unfortunately, this act was not as effective at decreasing government expenditures on manufactured milk products as hoped. In 1982, the government was still paying about $2 billion in milk price supports, an amount similar to that spent in previous years. Since the support prices were still high and there was no limit on how much a dairy farmer could sell to the government, farmers were producing about 10 percent more milk than the private market demanded. To make matters worse, the government stock of cheese was increasing faster than the stock of butter or nonfat dry milk, even though the cheese was being distributed to poor residents across the country (King 1982).

A second attempt to reduce U.S. milk production was included in the 1982 Omnibus Budget Reconciliation Act. This act allowed the Secretary of Agriculture, John Block, to collect a 50-cent fee for every 100 pounds of milk sold by dairy farmers. Another 50-cent deduction per 100 pounds of milk (totaling $1 per 100 pounds) was also collected but returned to farmers who decreased their milk production by a specified amount. Despite this act, farm milk production continued to increase from 1982 to 1983, causing the government inventory of manufactured milk products to continue to rise (Erba and Novakovic 1995; Associated Press 1982a; King 1983).

8 So Much Cheese: Shifting Policy

Given that imposing fees on dairy farmers did not decrease milk production, the government instead focused on expanding the policy that paid farmers not to produce. The 1983 Dairy Production Stabilization Act encouraged farmers to decrease output by paying them $10 per 100 pounds of milk if they reduced

production and thus milk sales as compared with a base amount of sales.[6] To be eligible for this payment, a dairy farmer needed to produce at least 5 percent less than his or her base amount of sales but would receive no additional subsidies for reducing production beyond 30 percent of these sales (Novakovic 1983). Additionally, the act decreased the price support for dairy products and created the National Dairy Board (NDB).

The goal of the NDB was to increase demand for dairy products through promotion and advertising activities to be funded with a $0.15 per hundredweight tax. Producers were eligible for a credit of the same amount if they were currently active in the promotion of dairy nutritional programs (Novakovic 1983). The intent of the NDB was to shift support from the government through the Dairy Product Price Support Program (DPPSP) to consumers. If it increased consumer preferences for milk and other dairy products, prices for those products would rise, and government purchases of them could be reduced.

Between 1984 and 1987, the NDB spent $78.9 million on national television advertising and an additional $43.6 million on regional television and radio advertising. The efforts of the NDB through advertising and nutritional awareness were successful in increasing the demand for milk (Ward and Dixon 1989). In short, the government was able to find another lever—demand—to support dairy farmers.

Because the government was still burdened with large stocks of butter, cheese, and nonfat dry milk, Congress then passed the Food Security Act of 1985. Under this act, the government developed the Dairy Termination Program. Approved dairy farmers were paid to cease production for five years. To pay for the program, the government collected $0.40 per hundredweight on all U.S. dairy production between April 1, 1986, and December 31, 1986, and $0.25 per hundredweight over the proceeding nine months (Stukenberg et al. 2006).

The Dairy Termination Program and declining support prices were successful in slowing dairy production growth.[7] By the 1990s, government stocks of manufactured milk products remained relatively low, as shown in Figure 5. They increased slightly from 2000 to 2003. But from 2004 until 2018, according to data published by the USDA Economic Research Service (ERS), the only stocks of manufactured milk products held by the government were 14.8 million pounds of cheese in 2008 and 4.4 million pounds of cheese in 2010 (USDA 2019).

9 Discussion Questions

The buildup of the cheese stockpile detailed in this case study exhibits the risk of unintended consequences as a result of an economic policy that ignores market forces. Efforts to distribute the cheese to low-income individuals rather than sell it in the market, out of fear of depressing dairy prices, shows how unintended consequences can be avoided when policymakers are mindful of the effects of market forces on their policy goals. Finally, the shift in policy from price supports to collective marketing of dairy products illustrates an alternative approach to policy: shifting the market equilibrium, rather than shifting the market out of equilibrium.

Throughout the case study, we have presented our analysis through the lens of the standard economic "workhorse," supply and demand. The analysis of price controls has allowed us to expose students to more complex concepts such as shortages, consumer and producer surplus, transfers, and deadweight loss. Below are several questions that will deepen students' understanding of these concepts and that can be used to evaluate the students' comprehension of the case study.

Consider the supply and demand graph in Figure 7 below. The letters are used to label areas on the graph. Use these labeled areas to answer the questions below.

[6] The base amount of sales was the amount of sales in the previous year or the average amount between 1981 and 1982.

[7] Under the Disaster Assistance Act of 1988, which sought to help dairy farmers affected by drought conditions, support prices increased in 1989, leading to higher feed prices (Stukenberg et al. 2006).

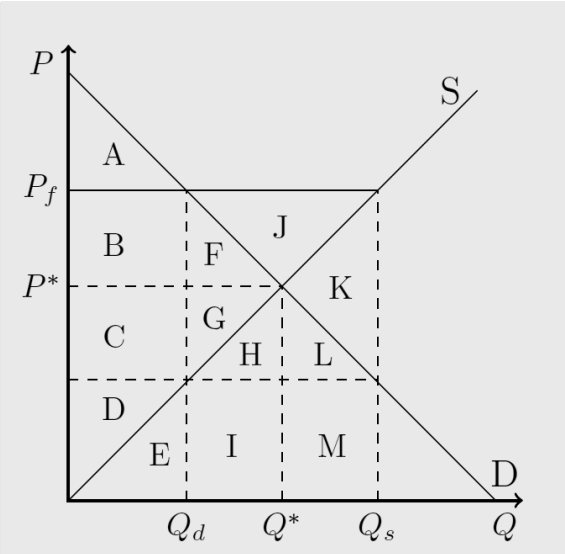


Figure 7. Simplified market for cheddar cheese

1. Using the demand-and-supply diagram in Figure 7, identify the following effects that the 1977 Farm Bill had on the cheddar cheese market.
    a. Find the consumer surplus and producer surplus before and after the policy (using the labeled areas of the graph).
    b. What area(s) represents the government expenditure on cheddar cheese?
    c. List the lettered areas on the graph that correspond to the value of the surplus cheese (transfer beneficiary surplus).
    d. What is the deadweight loss associated with this policy?
2. Using your knowledge of economics, explain why the government's concern for the milk market prevented it from releasing all the stored cheese onto the market.
3. What are other policies or programs the government could have enacted instead of a price support that also result in a higher price of P_f for farmers? Answer questions 1(a)–1(d) with each of these policies in mind.
4. In August 2018 and July 2019, the Secretary of Agriculture, Sonny Perdue, announced that the USDA would take several actions to support farmers in response to potential loss of profit from trade policies. First, the USDA's Farm Service Agency (FSA) will provide payments based on the type of commodity planted to ensure farmers receive a minimum price for their goods. Additionally, he announced a Food Purchase and Distribution Program through the Agricultural Marketing Service (AMS) to buy several types of commodities. The USDA pledged to spend $85 million in 2018 and $68 million in 2019 on the purchase of dairy products. These government-purchased products are to be donated through nutrition assistance programs (USDA 2018, 2019).
    a. Using evidence from the effect of the 1977 Farm Bill, predict what will happen to the dairy market as a result of this new price support.
    b. Would the benefits or consequences of this proposed policy change if we emphasized the fact that this price support would be implemented on the milk market instead of the cheese market? That is, are different costs associated with storing milk than with storing cheese?

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Case Study

The Ethical Choice: Confronting Ethical Dilemmas with Industry Participants in a Curriculum

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JEL Codes: A20
Keywords: Agricultural sales, ethics

Abstract
This hypothetical teaching case presents learners with two ethical dilemmas faced in an agricultural sales course. The primary dilemma consists of a salesman suggesting to a student they fabricate a ride-along experience they were to complete together. A second dilemma addresses a sales representative condoning the use of "little white lies" to customers and others as part of the sales process. The case study is designed to facilitate consideration of ethical dilemmas through context-specific decision making. It allows students the opportunity to investigate choices by considering a range of factors not limited to standards of conduct and personal values. Questions help guide use of the case, and an instructor's note is available.

1 Introduction

Professor Edwards felt a knot in her stomach as she contemplated before responding to a student's email. The student, John, was dissatisfied with his grade on a paper. His email implied he might get special consideration for his integrity which, he noted, was better than that of the industry professional he had been assigned to shadow on sales calls in the field for a day. The paper John referred to represents the report associated with one of the highlights of Dr. Edward's agricultural sales course. Students spend a day with a sales professional making calls on customers. They interpret what they observed within the context of the terminology and methods covered in the semester-long course in a written report (paper).

Dr. Edwards has been teaching the course at a midwestern land-grant university for nearly twenty years. The upper-level class is popular and often recommended by student advisors, perhaps because over half the college's graduates start their careers in sales or in a position that regularly employs sales techniques. Dr. Edwards is a popular teacher known for her accessibility. She advises two student organizations and makes it a point to regularly participate in student-, alumni-, and industry-centered events. She is considered fair and especially empathetic to the unique demands on the lives of her students. Class size is generally between 80 and 100 students.

The case is designed to facilitate consideration of context-specific ethical dilemmas. Learning objectives are to be able to: (1) list people and entities affected by the case; (2) identify how they might be affected by the scenario and its potential outcomes; (3) identify multiple alternatives for resolution; (4) articulate advantages and disadvantage of each alternative; and (5) make and justify a resolution. The case is hypothetical.

2 Background

Details are provided about the class and focus on the job shadow assignment and incorporation of discussion about ethics in the classroom.

2.1 The Assignment

Approximately 15 percent of the course grade is assigned to a job shadow assignment. The first week of class students are provided with a list of sales professionals. Information provided about the sales professional and their firm is included to help students identify those professionals working in a field of interest to them (e.g., seed, machinery, and implements) and facilitates the choice of a professional that works in or around an area that is convenient to the student. All the sales professionals on the list have either participated in the activity in a previous year and indicated they would desire to participate again; or, after reading information about the motivation behind and details of the assignment, have readily agreed to participate.

In the initial greeting email to sales professionals, Dr. Edwards encourages the sales professionals to feel free to decline if they do not have time, do not prefer to participate, or are not able to participate. Students are also free to choose a professional they know (of) who is not on the list and contact them directly once their choice has been approved by the instructor.

Students are asked to contact their professional early in the term to schedule a day to ride along on sales calls. Students generally meet their sales professional early in the day and accompany them while they call on multiple farm or firm customers. The only absolute requirement for the assignment is that the student shadow the professional on a day that the sales professional will be calling on multiple customers. This is very occasionally relaxed when the professional plans to otherwise interact with customers (e.g., when they are holding a customer appreciation dinner with an informal presentation thereafter and plan to visit with individual customers throughout the evening). When scheduling the ride along proves difficult, every attempt is made to reassign the student. In the rare cases when the student encounters a same-day surprise that the sales professional does not plan to work directly with individual customers that day, Dr. Edwards encourages and gives the student the option to ride with another professional, but allows them to write their report based on the day they spent with the original salesperson, if time constraints preclude this option. The paper is due late in the term to facilitate scheduling and, when necessary, rescheduling, the ride along.

2.1.1 Objectives

The stated objectives of the assignment, as articulated to the student, are to:

- Learn more about what a salesperson does during a typical day. Find out firsthand what it is like to be a salesperson, so that you can make a more informed career choice.
- Observe how a salesperson in your area of professional interest works with customers.
- Learn how the concepts and techniques that you study in class are applied to professionals in the field.
- Learn how to handle yourself as a professional in a professional environment. Arranging for your day with the salesperson, completing it, and writing the report will provide you with an opportunity to sharpen your communication skills, as well as get a taste of the professional environment.
- To make contacts in your area of professional interest.

2.1.2 Requirements

A guide is distributed to students at the beginning of the term that provides details of the required written report, an evaluation sheet the sales professional is asked to complete about the student, and a request to the sales professional to indicate interest in participating in future years. Instructions provided to the student are summarized here. The statements that are in bold here are also highlighted in bold in the instructions to the students.

- Identify your professional salesperson and have your choice approved by your instructor. **Note that you are responsible for making sure that your salesperson sells directly to customers in the field on the day of your shadow**. [The instructions go on to indicate what doesn't work well such as nondirect selling situations and retail store sales.]
- **Contact your sales professional, being sure that the salesperson understands that you need to see him/her make calls in his/her territory.**
- Grading for the written report will be based on the following sections: background of the salesperson and their firm; summary of the day; evaluation of the sales process and customer relationship; and evaluation of the project and the salesperson's fit for the project.

Students are instructed to focus on only one sales call for the evaluation of the sales process and customer relationship section of the report. This section is the most important, and they are told it should comprise much of the written report. Details and examples are provided about what specifically to include (e.g., salesperson preparation, opening techniques employed, the presentation and handling objections methods used, closing, and follow-up). The grading rubric for this and the rest of the assignment is clearly identified. A paragraph beginning with **Important!** indicates that the noted checklist of topics will be used to assign their grade and that, while not every sales call progresses formally through all the identified steps of the sales process, the salesperson will have done some (or no) preparation, attempted to establish rapport, met (or not met) his/her objective, closed the call, and so on. Students are to write about how the salesperson employs the strategic sales process, how he/she adapts it to his/her special needs and situation, and its effectiveness. They are encouraged to use terms and processes covered in class and in their textbook.

2.2 Ethics Presentation

Early in the term, Dr. Edwards offers a short presentation on ethics. The textbook adopted devotes considerable attention to ethics in the field of sales, and Dr. Edwards shares personal experiences. She is clear that ethics are not black and white, and reveals that sales professionals who practice unethical behavior can be successful. She defines ethical behavior as "doing the right thing" and focuses a bit on "the little white lie."

To emphasize where the little white lie can go wrong, she tells them her "brown suit story." It is a long-drawn-out tale about her decade-long love affair with a brown suit because one of her peers, who could evidently think of nothing else to say about her presentation, said they liked her suit and that it made her look professional. The truth was that they only offered this faux compliment to increase her confidence in presenting. It was a decade later when she learned her peers considered her suit frumpy and inappropriate in a professional environment. She has, at times, reflected on where she could be now in life if she had instead focused her efforts during the subsequent decade on finding a professional look.

Dr. Edwards tells students this story because they will learn from the actions and words of some sales professionals (including in her classroom) that little white lies are okay. In many cases, the teller of the lie seems to believe it is justified because, for example, there is no good way around it or they don't believe in what they were supposed to do but, rather than argue the point, they simply lie about having done it. For example, there is the representative that cites his use of nonexistent confidentiality issues to say no to the manufacturer representative that wants to ride along with him for a few days. He just doesn't like the man. He shares this story with the class from time to time; but the rest of his information and the fact that animal health representative contacts for the many animal science students are difficult to come by, result in him being invited back year after year. And, like the salesperson who is central to our case story, he is a strong university supporter and an excellent community member. In this case, he is also a good friend to Dr. Edwards.

Dr. Edwards notes during her ethics mini presentation for the first time, and repeats several times throughout the term, that students should report any situation that they are concerned might be unethical.

Associated with the class, unless it involves her own behavior, Dr. Edwards offers herself as the appropriate contact.

3 The Ethical Situation

It was an email not unlike others received from students arguing for a better grade, but this one added an accusation against a sales professional.

3.1 The Email

During finals week, Dr. Edwards received the email from John, a student in her agricultural sales course. He communicated his displeasure with the application of the grading rubric to his submitted assignment.

Dr. Edwards: You were right. The criteria for grading was laid out at one point of the many-page description of the assignment. However, I believe the actual ordering process happens largely during the fall of the year, not during the spring when the class is offered. Perhaps I completely misunderstood the purpose of the activity. I thought it was to observe what a salesperson does so that we could have a better idea of whether it is something we would like to do. Looking at the grade I received on the assignment, I can only guess that you wanted something else. Unfortunately, if I am right about what you were looking for, I couldn't deliver it unless I had a staged experience. I am kind of wishing I would have taken [sales professional] up on the offer to sit down and make up a sales experience day rather than riding along. I am disappointed that you felt my paper and real experience with the salesperson was only worth a 72%. Sincerely, John

Because of the many activities and obligations related to his position in a campus organization, John had missed an unusually large number of classes. In later discussions, he indicated he was not in class on the day the salesperson shadow activity and assignment were covered in-depth. Dr. Edwards could also not be sure if John was present during her repeated references to the situation wherein a salesperson allegedly suggested to the student shadowing them (who was a former intern with the company) that they simply fabricate the shadow day experience and base the paper on a previous experience, because they could not find a mutually acceptable day to spend together. This latter situation was relayed to Dr. Edwards by a third party (another former student) who named the sales professional as the same one implicated in our case. That is, the sales professional had evidently done this before, and the students had been warned that, although it should not occur, for whatever reason, it may. Dr. Edwards stresses that sometimes good people make poor decisions. She also offers help in finding another salesperson should this type of situation arise and stresses that this will be done without the sales professional knowing why the student was reassigned.

John's email was like a blow to the gut, not so much because it reflected an unhappy student, but because it seemed to include a second allegation against one of her most active and motivated professional participants. After the first allegation, Dr. Edwards simply hoped it would not occur again if it had in fact occurred at all. The second allegation appeared to be a confirmation of a pattern. And, it did not seem something a student would make up; almost certainly not something two independent students would make up.

Dr. Edwards followed up with John by telephone. He reiterated that he did not believe the paper's instructions were very clear and his belief that he did the right thing by reporting on what he did rather than on what he was assigned to do. Dr. Edwards reviewed with John the instructions and, when they concluded their conversation, John seemed to be somewhat more accepting about the clarity of the assignment and that he might have written about his experience in a more grading rubric–friendly manner.

Dr. Edward's specific concern was John alluding to a proposition by his salesperson to fabricate the sales experience. In the follow-up phone call, John confirmed that the salesman had shared with him his belief that this assignment would not be that useful since the student was a prior intern, and that the student was welcome to fabricate a day and the associated visit on which the bulk of the report is based. Permission to create an experience would be necessary because the students (and the sales professionals, especially this one who has participated for several years with multiple students) are well-aware that a copy of the student's paper is sent to the salesperson with her thanks to them.

3.2 The Salesman

The salesman in question has had an important role in the class. He is an extraordinary individual and gives a great deal to the class and the department. He is a graduate of the department in which the class is taught and an active alumnus. This salesman has participated in the "big three" events since the agricultural sales course was initiated two decades prior to this incident. That is, he speaks to the class in the classroom, takes students (normally two or three) for the shadow of a salesperson assignment, and participates in the cumulating experience for the students, the day they sell their chosen products to a professional acting as a customer. He contacts Dr. Edwards before the term to let her know he is ready to go, rather than the more traditional request from the instructor first.

His time in the classroom with the students is very useful, and the students like and respect him. He is incredible as a customer for the students in their final selling project. Dr. Edwards tells the sales professionals a week or so in advance who will be selling to them and what product they will be selling. When the night comes, it is clear this sales professional has done his homework. For example, if one of his students is selling an animal health care product, this professional has the label for and pricing of this product so he can ask the right questions and present appropriate objections for the student to handle. He is so good and well prepared that Dr. Edwards sometimes assigns him students selling a product (such as a wine press), which do not fit readily within the more producer-oriented product groups with which most of the sales professionals are acquainted.

In short, the sales professional cares about the students, the university, and developing great young professionals. He goes the extra mile. For example, and somewhat ironically, when Dr. Edwards sent a general email to local sales professionals asking them what sort of training they receive in ethics and what resources they have available, he not only responded to her direct questions (one of only a handful of sales professionals to do so among dozens queried), but also suggested Dr. Edwards do more work in training students about ethics, and give them practice with actual situations faced by sales professionals.

4 Resolution

Although Dr. Edwards was disappointed to learn of the situation, she was glad it was brought to her attention, and she thanked John for being forthcoming. She filed away the incident, thinking through a resolution for another time. She had six months to decide, at which time she would be contacting sales professionals to participate for the following year. Time passes quickly and she is now preparing for the class this spring, including scheduling and contacting sales professionals about who will participate and how they will participate. She is no closer to a resolution than when she hung up the phone after speaking with John.

5 Questions

The following questions will guide consideration of the ethical dilemmas faced in the case study.

1. Is there an ethical dilemma in this case on which a decision must be made? Why does the decision matter (i.e., why is an action necessary)? Is there more than one ethical choice for consideration by the instructor?
2. What might have motivated the sales professional to encourage misrepresenting an activity?
3. What are the options available to the instructor?
4. What are the considerations associated with each? What are the advantages and disadvantages? What are the risks (e.g., what could go wrong)?
5. What should the instructor do?
6. What alternatives were available to John? Did he make the right choice? Did he make the best choice?

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Case Study

Even Robots Need a House: The Robotic Milking System Facility Investment Decision Case Study

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Abstract
In a classic labor vs. capital trade-off, some dairies are opting to install automatic milking systems (AMS). AMS has the potential to increase efficiencies but comes at a cost. Although the AMS units themselves are costly, the facility that houses them can often be a more significant expense. This case presents a fictional family dairy, typical for the western United States, that is now considering adoption of AMS. The case analyzes the economics of installing AMS under three facility investment scenarios; minimal retrofit to an existing facility, building a new open-sided barn, and building a new fully enclosed barn. This case study provides an opportunity to apply capital budgeting to a modern agriculture investment and addresses broader questions related to technology investment and adoption on farm.

1 Introduction

As Billy and Kelly Clark left the branch of the local farm credit agency, they reflected on the conversation they had with their loan officer, Dave. They had come to the branch to sign loan documents for the renewal of their annual operating loan. While the renewal was completed without any major concerns, the Clarks could not help but feel somewhat discouraged as they drove back home to their 144-cow dairy. The dairy is a small, family dairy typical of one in the intermountain region of the western United States and has been in the family for multiple generations. The dairy represents the Clarks' entire way of life. However, the current dairy landscape has given the Clarks reason enough to doubt the long-term viability of their operation without making substantial changes. The Clarks stand at a turning point in their operation and are ready to make the necessary changes to continue to compete in the dairy industry. They are considering the implementation of automatic milking systems (AMS). It would undoubtedly be a costly investment, and the Clarks want to make sure they maximize the potential payoff of such an investment. The automatic milking units themselves are costly, and the facility to house the units could be even more costly. Through their own research, the Clarks had learned that there are advantages and disadvantages to the various types of facilities to house the automatic milkers. As the Clarks consider making the change to AMS, they wonder which type of facility would be the best for their operation. Which would be the most efficient? Which would have the potential to best maximize their return on investment? Answering these questions would ultimately help them make their facility investment decision when converting to AMS.

The following case study for a family-operated dairy analyzes the economics of installing AMS under three facility investment scenarios; minimal retrofit to an existing facility, building a new open-sided barn, and building a new fully enclosed barn. This case study provides an opportunity to apply capital budgeting to a modern agriculture investment decision, while addressing questions related to technology investment and adoption on farm.

1.1 History of AMS

AMS, or robotic milkers, were first developed and introduced in Europe to address labor shortages in the early 1990s. By 2000, AMS technology had made its way to the United States (W.K. Kellog Biological Station, W.K. Kellogg Farm 2019). Since that time, AMS has steadily grown in popularity and has benefited from continued technological improvements (De Koning 2010). When a cow enters an AMS unit, the teats are located using a laser and then cleaned and prepared for milking. The AMS milks all four teats simultaneously and collects useful data on each cow and milk production. The cow is enticed to come back to the AMS by the unit providing a feed grain mixture to enjoy while milking. These systems have been shown to often increase milk productivity as well as gather useful data that can be used to monitor the herd and milk productivity more fully (Rossing et al. 1997).

1.2 Current Dairy Landscape

For some time now, the U.S. dairy industry has been declining in the number of operations as well as total number of milk cows, while simultaneously the number of cows per operation has been increasing. Additionally, the industry has seen tremendous growth in average production per cow. In 2005, 9 million U.S. dairy cows produced an average of 19,550 pounds per cow. In 2018, 9.4 million U.S. dairy cows produced an average of 23,149 pounds per cow (U.S. Department of Agriculture 2019). This increase in production is in contrast to decades-long decreases in per-capita demand. In 1975, the average American drank roughly 30 gallons of milk annually, while present per-capita annual consumption has fallen to about 18 gallons (U.S. Department of Agriculture 2018). Falling per capita consumption together with increased production results in excess supply and low milk prices, which in turn results in tight profit margins. From 2017 to 2018, the number of licensed dairy farms in the United States decreased by 6.8 percent (Dickrell 2019). Dairies surviving in the industry are getting larger on average to help combat low profit margins.

Labor shortages are also currently affecting the dairy industry. The U.S. labor economy is strong, with wages and employment in many categories reaching record highs. As the unemployment rate falls, wages are pushed to higher levels to compete for laborers. The growth in wages puts increased pressure on the already tight dairy profit margins. The U.S. dairy industry relies heavily on immigrant labor. According to a national dairy labor survey conducted by the National Milk Producers Federation, immigrant labor accounted for 51.2 percent of the U.S. dairy labor pool in 2013 (Adcock, Anderson, and Rosson 2015). Tightening regulations surrounding immigrant labor only further intensifies the pressure on the already difficult dairy labor situation. Additionally, even if immigrant laborers were readily available, it is becoming increasingly difficult for dairy farmers to compete with other industries for these laborers' services. As wage rates increase in other industries, such as manufacturing, construction, transportation, and mining, it becomes more difficult to find immigrants willing to work within agriculture. Similar to the United States, birth rates in Mexico are falling, and populations are moving toward urban areas. This results in fewer people with agricultural backgrounds who would be interested in U.S. farm work.

1.3 Problems for the Clark Dairy

These trends are all too evident in the Clarks' community. They have already seen numerous other small dairies driven from the industry because of the decreased demand, tight profit margins, and labor scarcity. Lately their own profit margins have been thin, but thankfully, their herd has been healthy and production has been high. Up until this point, the Clarks have not had much of a labor problem, as they have managed to keep the dairy running by both working full-time themselves, as well as with the aid of their three children. However, with their youngest daughter Julie recently graduating high school and joining the military, the availability of qualified labor is now in the forefront of the Clarks' minds. The Clarks are in their mid-fifties, and both of them feel they are healthy and should be able to continue working for many years. However, it would take more than the two of them to continue operating the dairy. In the past, they

had always relied upon their three children to help with day-to-day operations and had always thought that one day one of the children would take over full time. Recently, they have come to the realization that passing the dairy to the children is an unrealistic succession plan. Their eldest son, Michael, received his degree at the local state university in agribusiness several years ago and is now currently working for a large seed distributor in the supply chain department. He loves his job and loves the stability of his career. Though he always enjoyed working on the family dairy, he has no intentions of leaving his career. Their middle daughter, Stacy, also enjoyed working on the dairy and loves agriculture. However, after recently marrying a potato farmer from southern Idaho, she is now unable to continue working on the dairy.

Without the help from their children, the Clarks know it will be nearly impossible to keep the dairy running without additional hired labor. Farm labor in the local community is hard to come by, expensive, and unreliable. Often farms end up competing for labor, and workers leave for greener pastures. Aside from the unavailability of laborers, the Clarks are also beginning to long for more flexibility in their lives. For as long as they have been married, they have been tied to the dairy. Running the dairy is a full-time business with no weekends or holidays off. The work is relentless, and there is no time for relaxation or vacation. With the kids grown and out of the house, the Clarks are now longing for some added flexibility to have time to make quick visits to see their children and continue to be a part of their lives.

Given the current situation, the Clarks are beginning to consider the drastic change to AMS. They are at a crossroads, and something has to give. A couple of the regional dairies have recently installed AMS. The robotic milking systems are attractive to the Clarks because of their potential to produce increases in efficiency such as increased pounds of milk per cow, pounds of feed to pounds of milk conversion, and pounds of milk per hour of labor. Of more importance to the Clarks, however, is that AMS is a classic capital for labor tradeoff. For some dairies, AMS has proven to be a successful way to innovate and manage the labor shortage problem within the industry. Almost like folklore, stories have been circulating between the local dairymen about how a family that installed AMS on their dairy recently took a quick two-day trip to attend a relative's wedding in Oregon, while leaving the dairy solely in the hands of one capable hired hand. A story such as this is enough to make any conventional dairyman envious, and the Clarks are no exception. Almost immediately upon hearing this story, the Clarks began researching AMS and exploring the possibility of installing robots on their farm. It was not long before they were completely sold. They were ready for change and felt like it was now or never, as they were making the transition to having no children available to work on the farm.

After signing the operating loan renewal documents, the robots quickly became the center of the conversation with Dave. They had explained their reasoning and benefits to implementing AMS and asked Dave what his thoughts were and if it would be something that farm credit could help finance for them. Dave indicated that he would be glad to help in getting the financing ready for their request but had some questions for them. He let the Clarks know farm credit had recently helped one of the other local dairies finance AMS and said he was well aware of the potential increases in efficiency and flexibility these systems can provide. However, he also mentioned these benefits come at a cost, specifically, the cost of the AMS units, facilities to house them, and annual maintenance and repairs. For their 144-cow dairy, Dave knew two robots would be necessary to keep up with the milking. Each robot alone would cost approximately $190,000. Dave explained that the cost of the robots is, to a large degree, fixed and out of their control.

The cost of the facility to house the robots, however, he explained is much more variable and requires important decisions on their part that could have different consequences for their operation moving forward. He asked about what type of facility investment they had planned and how they had come to that decision. The Clarks were aware that different types of facilities offered different pros and cons for an AMS dairy, but to this point had not given the facility much thought beyond thinking they would simply retrofit their existing facilities to accommodate the robots. They indicated this to Dave and explained that they thought this would be the most economical way to switch to AMS. Dave cautioned them against making this hasty assumption. He explained that the greatest efficiency gains from AMS could be expected with a fully enclosed barn, designed with cow comfort in mind. The fully enclosed barn

allows the cows to be more relaxed, free from the effects of weather, and the buildings can be designed for cows to free flow to the AMS. Efficiency gains without this level of investment in a new facility are still possible but to a lesser degree. Thus, before concluding their conversation, Dave challenged the Clarks to explore more fully the question of what level of facility investment they intended to go with. Dave indicated they could expect the terms and interest rates for the AMS and facility loans to be approximately 7 years at 5.5 percent and 15 years at 6.5 percent, respectively, each requiring a 20 percent down payment. They set up an appointment to meet again in a week at which time Dave indicated they could talk over the terms of the loans more specifically once the Clarks had made a decision on what type of facility investment they felt was best.

2 Analyzing the Investment

That evening the Clarks sat around their kitchen table and began to wonder how to answer the facility investment question presented by Dave. They knew that just because retrofitting their existing facility may represent the cheapest option it might not have the best long-term pay off potential. They knew they needed to find a way to evaluate the facility investment decision economically. They called their oldest son Michael and asked him how he would approach this problem. He told his parents he would be right over. Upon arrival, he joined them at the table and pulled out his laptop. He explained that he had taken an agribusiness class during his time at the university that covered these types of questions. He pulled up an Excel worksheet titled "Capital Budgeting Template." He told them about how they had built this template in class and what type of analysis it could handle. He dug through some old folders in his computer and found his class notes on capital budgeting. Feeling like his agribusiness professor, he began to explain the concept of capital budgeting.

> "We need to identify the key variables or what will be changing on the farm if we invest in these robots," Michael said.

Kelly pulled out a legal pad and began to build a list under the heading "Key Variables." The first key variable would be the initial cost of the project. In this case, it would be the cost of two robots and facility investment. They all agreed they would look at three initial facility cost scenarios. The first being retrofitting the current barn, the second being building a new open-sided barn, and the third being building a new fully enclosed barn. From their conversation with Dave, they knew they could expect the greatest efficiency gains with the third scenario, the lowest with the first, and the second scenario falling somewhere in between. The second key variable would be changes to production and costs due to the robots. The Clarks had previously contacted their county extension agent as they were exploring AMS, and they now recalled that he had forwarded them some research on the costs and benefits of AMS. The research provided them a range of productivity gains, cost savings, and herd health changes. This information would help them estimate the annual change to cash flow upon installing AMS under each of the three facility investment scenarios. The third key variable would be the length of the investment. They decided to rely on the information provided by the AMS manufacturer. The company claims each AMS has a useful life of 15 years. The fourth key variable would be the salvage value of the investment. This was more difficult because a strong market for used AMS did not exist, as most that had been installed in the area were still in production. Again, they chose to rely on the advice of the AMS manufacturer and use a salvage value of $40,000 per AMS. They used a simple straight-line depreciation method for annual depreciation cost over the 15-year useful life of the AMS as well as the facility, with the facility having a salvage value of 15 percent of the initial cost. The final variable would be the discount rate or opportunity cost of investing in the project. The Clarks were confused about this concept, so Michael once again pulled out his class notes and explained the purpose of the discount rate.

> "The discount rate is used to account for the time value of money, the risk of the investment, and the cost of funds used to finance the firm. I remember my professor explaining that the funds used to finance a firm could come from either debt or equity or both. The key is to figure out what the

cost of our debt and equity are and then we can get to our discount rate. If I remember correctly, he called this the weighted average cost of capital," Michael explained.

He then explained to his parents the weighted average cost of capital (WACC) method to come up with a discount rate.

WACC simply uses the cost of debt, cost of equity, and the proportions of each to estimate the discount rate. The cost of debt is simply the contractual rate of interest on loans. This rate could come from the annual operating loan, or if the farm has multiple loans, it could come from the average interest rate across all loans. The cost of equity is more difficult to estimate. In theory, the cost of equity represents the opportunity cost of having equity capital invested in the farming operation. The cost of equity can be estimated by looking at historical returns on equity (ROE). Caution should be exercised in choosing the time period to estimate cost of equity because it is dependent on the profitability of the firm. For that reason, an average ROE is preferred over a single time period measurement. The final piece in estimating WACC is to use the balance sheet to calculate the capital structure of the firm. The capital structure is the mix of debt and equity. The percentage of debt and equity provide the weights used to estimate WACC. For example, if a firm had 60 percent debt, 40 percent equity, 5 percent cost of debt, and 6 percent cost of equity, WACC could be calculated as:

$$WACC = w_d K_d + w_e Ke$$

$$WACC = (.60 * .05) + (.40 * .06) = 0.054$$

"Now that we have all the key variables," explained Michael, "we can put them into my Excel spreadsheet and estimate the net present value (NPV) of the investment."

"Wait a minute," said Billy. "What is this NPV?"

Michael explained, "NPV is simply the difference between the present value of future cash flows of the investment and the cost of the investment. If that difference is positive, then the investment is profitable. If that difference is negative, then it is not a profitable investment. When comparing NPV calculations between investments, the higher the NPV the better the investment."

Billy nodded in agreement, and then a concerned look came over his face. "What about the debt payments? We have talked about the outflow, inflows, and profitability. That is all good and well, but if we can't make the payments, what good is all this stuff. Dave will want to know if we can make the payments on the new loan."

Michael agreed and sat there for a moment. Then he scrolled down in his Excel template and saw the section titled "Financial Feasibility." He recalled his professor discussing the difference between NPV and financial feasibility.

Michael explained to his parents, "Financial feasibility uses the cash flows from the NPV portion and then subtracts the debt payments to analyze whether the project is financially feasible. Financially feasible simply means that the investment generates enough cash flow to make the debt payments. If there is not enough cash flow to make the debt payments, then the investment would not be financially feasible."

The Clarks smiled and agreed that they were ready to analyze the investment.

The Clarks first made the necessary assumptions for changes in cost and efficiency gains based off the research the extension agent had provided. Then they organized all the key assumptions and variables into two tables. In the first table, they listed all the project analysis assumptions that all three scenarios would have in common, such as the size of the dairy herd, number of AMS units required, the labor rate,

etc. This information is found in table 1. The second table contained a summary of key variables that could vary between the scenarios such as the cost of the facility, anticipated labor hour reduction, milk production change, etc. This information is summarized in table 2.

Most of the key variables contained in table 2 are intuitively understood, such as "milk production increase." This is just the increased milk production under each scenario expected as a result of switching to AMS. However, some of the variables may be less intuitively understood and warrant further explanation.

Software Value per Cow/Year: increases to income can be expected due to the increased precision management abilities afforded by the AMS computer system. The herd management software included with AMS has the ability to track and record rumination data, milk conductivity, and cow activity, and the computer can send out timely reports to managers to alert them of any significant changes or potential problems. The software also heightens mastitis and heat detection ability.

Reduced Feed Savings: it is typical on many western dairies to feed the cattle along feed bunks that are not enclosed and that are fully exposed to the weather. This results in wasted feed from rain, snow, sunshine, and birds. Covering the feeding area in an open-sided barn reduces much of this feed waste while feed waste is eliminated in fully enclosed barns.

Table 1. Project Assumptions

Assumption	Value
AMS Salvage Value	$40,000
Number of AMS	2
Cost per AMS	$190,000
Number of Cows	144
AMS Useful Life	15
Labor Rate per Hour	$15
Insurance Rate per $1,000 Value	0.5%
Tax Rate	0.15
Milk Price per cwt.	$17.91[a]
Loan to Value Ratio	0.8
Facility Loan Term (years)	15
Facility Loan Rate	6.5%
AMS Loan Term (years)	7
AMS Loan Rate	5.5%

[a] 10-year average milk price (Livestock Market Information Center 2019)

Table 2. Key Variables for the Three Facility Investment Scenarios

Variable	Scenario 1	Scenario 2	Scenario 3
Facility Cost	$70,000	$470,000	$920,000
Milk Production Increase (lbs./Cow/Day)	4.35	7.61	11.60
Repair Cost per AMS/Year	$7,000	$7,000	$7,000
Labor Reduction (Hrs./Day)	6.25	7.65	8.4
Software Value per Cow/Year	$40	$40	$40
Net Change in Utilities Per Cow/Year	$5.75	$5.75	$5.75
Increased Feed Costs	$7,129	$9,533	$13,594
Reduced Feed Savings (Eff./Waste)	$2,858	$10,426	$22,366
Facility Salvage Value	15%	15%	15%
Facility Useful Life	30	30	30

Increased Feed Costs: To produce more milk requires more feed. Notice that the increased feed costs associated with AMS can be somewhat offset by the "reduced feed savings." Net Change in Utilities per Cow/Year: while admittedly small, there is also often a noticeable increase in utilities needed to run an AMS dairy as compared with more conventional practices.

3 Results and Sensitivity Analysis

After summarizing the key variables, they all turned their attention to Michael's laptop as he quickly began inputting the assumptions for the key variables for each scenario into three copies of the "Capital Budgeting Template." It was not long before he had filled in the template with the necessary information to calculate the NPV for each of the three scenarios. They then input the debt payment information based on the terms they had discussed with Dave for both the equipment and facility loan and again calculated the NPV for the financial feasibility sections.

Michael organized the resulting calculations for all three scenarios and placed them in a single table for ease of comparison. The results for all three scenarios are summarized in Table 3.

> As the Clarks looked over the results, Kelly said, "Based on our discussions about NPV, it appears scenario 3 would be the best option because it has the highest NPV for the project analysis." Michael quickly countered, "That would be correct if we were only worried about project profitability and did not consider financial feasibility. We should focus our attention on the financial feasibility results because we are most concerned with the viability of the project when debt payments are considered."

The NPV calculations under the financial feasibility section clearly favored scenario 1; the minimal retrofit of existing facilities.

> Billy asked, "What is the IRR?"
>
> Michael responded, "IRR stands for internal rate of return. It simply represents the discount rate that would make the NPV calculation equal zero."

He further explained that the IRR could be thought of as the maximum discount rate that an investment will support. Any discount rate above the IRR would cause and investment's NPV to be negative and indicate that the investment would not be feasible.

> Following Michael's explanation Billy said, "In that case, it appears that based on IRR, again scenario 1 appears to be the direction we should take."

Michael agreed but also pointed out that all three investment scenarios had positive NPV and IRR for the financial feasibility analysis.

Table 3. NPV and Internal Rate of Return (IRR): Project and Financial Feasibility for the 3 Investment Scenarios

Level of Analysis	Measure	Scenario 1	Scenario 2	Scenario 3
Project Analysis	NPV	$160,326.78	$228,201.56	$307,177.96
	IRR	9.5%	8.5%	8.1%
Financial Feasibility	NPV	$100,781.47	$82,870.68	$64,945.74
	IRR	10.7%	8.3%	6.9%

> "All three investments appear to be doable," he said, "but it's important for us to remember that these results all assume no variance in the assumptions we input."

He explained how this could sometimes make a big difference in capital budget analysis because without allowing for variance, they essentially eliminate risk from the analysis. Michael explained that in his college course the professor emphasized the importance of considering the riskiness of an investment by considering the individual riskiness of the input assumptions.

> "For example," Michael said, "We have assumed milk production will increase in the third scenario by 11.6 pounds of milk per day. But how much do we expect this assumption could vary."

They all agreed that this was a good point and that they would need to consider the riskiness of all the assumptions of the analysis before making a decision. If the assumption of 11.6 pounds of milk per day was increased by 10 percent to approximately 12.76 pounds of milk per day in the third scenario, perhaps it would look like the more attractive option. Following this logic, Michael demonstrated how they could perform a "sensitivity analysis" of sorts by changing key input assumptions either upward or downward by a set percentage to help them get a better feel for the riskiness of each investment scenario. The Clarks agreed variables such as milk price, labor rate, salvage value, milk production increase, increased feed costs, feed savings, and the initial cost of the facility were all important variables to consider when evaluating risk. As the Clarks discussed the riskiness associated with these key variables, they began making changes to their Excel spreadsheet to evaluate the effects of variance in these key variables.

After spending many hours into the night evaluating the impacts of risk in their analysis, they eventually all felt like they had come to a consensus of what investment they should choose. All that was left was to present their results to Dave the following week and secure the financing needed to undertake their chosen investment. Only time will tell if they chose wisely!

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Case Study

Red Stick Farm: Planning for the Future

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Abstract
This case explores the relation between decision making, strategic management, and risk management in a newly established farm operation. Red Stick Farm is a family-operated, small-scale, urban farm that uses intensive growing techniques to produce vegetables, microgreens, and edible flowers in the greater Baton Rouge area. The operation has been in production for three years, and the two operators are examining two mutually exclusive strategies to grow their farm. The first strategy allows them to expand their customer base by offering a community-supported agriculture (CSA) program; the second strategy allows them to increase production capacity by acquiring more land. The case challenges students to assess the current situation of the farm and future direction following strategic business planning practices. The study highlights the importance of defining and developing an operation's mission statement, exploring growth strategies, assessing the internal strengths of the operation and external threats to the operation, and identifying respective risks. In addition, the examples illustrated through this case study will assist new and beginning farmers who are interested in urban farming practices as they monitor, identify, and manage risk on their farms.

1 Introduction

It is a sunny and cool April afternoon in Baton Rouge, Louisiana. Al and Grace are wrapping up the day, checking the tomato seedlings and the colorful containers of marigolds. Edible flowers are the newest addition to their production, and they were pleased to see that the plants sustained the volatile spring weather: weeks of rain, flash flooding in the area, and now a prediction for higher than normal temperatures. However, today was a pleasant day, partly cloudy and with a cool breeze, which helped with working in the field.

Three years have passed since they started farming on just half an acre. Red Stick Farm is an urban agricultural operation that was established in March 2015 in the outskirts of Baton Rouge. Their mission is "to provide their family and local community with the freshest, most nutritious vegetables year-round." Their "big garden," as Grace used to call it, turned into an intensive-growing, sustainable farm producing high quality vegetables based on noncertified organic practices. The farm has been their home, their shelter, and the heart of their social circle. It has brought them closer to the community and helped them establish relationships with other beginning and young farmers throughout Louisiana. Becoming farmers was challenging, coming with seven-day workweeks, strenuous physical activities, and many trials and errors, as well as coping with intellectual challenges and the uncertainty of financial returns. Still, they loved the idea of working with the soil. Thinking back, they may not have started if the conditions were not in their favor.

Grace grew up in Baton Rouge, Louisiana. She remembers seeing the vast rice and sugarcane fields that formed a natural barrier on the outskirts of the city. Two worlds, the city and the fields blending together, make it hard to see where the city limits end and where the fields start. The warm and moist Louisiana climate favored these crops, but the fertile soil also provided a great opportunity for smaller horticulture farms like the one next to her house, only half an acre growing vegetables year-round. Grace

knew that agriculture does not always mean big-scale production. Al, on the other hand, was somewhat familiar with larger row crop operations.

Al, a northeastern Louisiana native, had family in the cotton business for many years. However, they discontinued farming and filed for bankruptcy in 1987 when Al was five years old. Al had faint memories of the cotton farm, but he remembered his grandfather's stories about the time the farm was booming and cotton was "the king." He always wanted to become a farmer and continue his family's tradition, but he was appreciative of the risks and challenges that come with farming. He used to say, "There is not much you can do about weather ... but having and maintaining a financially healthy business that is a challenge." Al met Grace in college. He was an agribusiness major, and she studied psychology.

After Grace's recommendation, Al started helping at the campus community garden to get some hands-on experience. There he learned about soil, pest, and weed management. Sometimes, Grace volunteered at the campus community garden as part of her horticulture and soil classes. After all, gardening was always her passion, so she minored in soil sciences. She started her own garden in a part of her parent's backyard in high school and shared the veggies she grew with family and neighbors, enjoying seeing the smiles it brought to their faces. "Monoculture is not my thing! Why wait when you can grow crops in rotation year-round? Intensive growing techniques allow you to maximize production on limited space," she used to tell the interns at the campus community garden. After graduation, she took a two-year internship with an organic vegetable farm.

At their current capacity, they use intensive growing techniques allowing them to plant multiple times (about 3 to 4 times) on a plot, and they harvest year-round. The operation focuses on seasonal produce, herbs, and edible flowers; each accounting for 90 percent, 8 percent, and 2 percent of their production, respectively. Diversifying crops and following market trends, they were able to hit their production targets, which allowed them to meet cash flows, repay part of the loans, and increase their equity. Grace and Al take pride of their early success and plan to grow their operation. Grace would like to expand direct-to-consumer sales, adding a community-supported agriculture (CSA) operation, and keep the rental arrangements currently in place. Knowing Al, she expects he would have a different opinion, as lately he was looking into land purchasing options with their landowner.

Al and Grace know that to have a financially healthy and growing operation in the years to come, they need to have a clear business plan and make strategic decisions. They must assess their strengths and weakness, adapt to the environment, learn to identify and manage risks, and set goals they can achieve. In addition, they need to utilize the talents and expertise each one of them brings to the business. Grace has compiled a series of worksheets that would allow them to (1) define and develop a clear mission statement (Figure 1); (2) conduct a strengths, weaknesses, opportunities, and threats (SWOT) analysis (Table 1); (3) identify risks pertaining to their operation based on the five areas of risk, namely production, financial, marketing, human, and legal (Table 2); and (4) analyze strategies for growth opportunities. The farm is their sole income generating activity, so the goals they set, the decisions they make, and their future direction is of importance both for their farming enterprise and their livelihood.

2 Urban Agriculture and Urban Farming

Urban agriculture is a component of the local foods system, and its definition varies depending on the local context to which it is applied. Bailkey and Nasr (1999, p. 6) define urban agriculture as "the growing, processing, and distribution of food and other products through intensive plant cultivation and animal husbandry in [and] around cities." Goldstein et al. (2011) offer a broader definition that encompasses the mission of urban agriculture to feed local communities. Examples of urban agriculture include backyard gardening; rooftop and balcony gardening; community gardening in vacant lots and parks; roadside urban fringe agriculture; urban farms; and livestock grazing in open space (Hendrickson and Porth 2012). Through these practices, farmers can grow a variety of produce in small, compact areas. Because of the increase in mechanization within the agricultural industry, urban farming has allowed producers to provide their community with fresh produce through untraditional means (Specht et al. 2014).

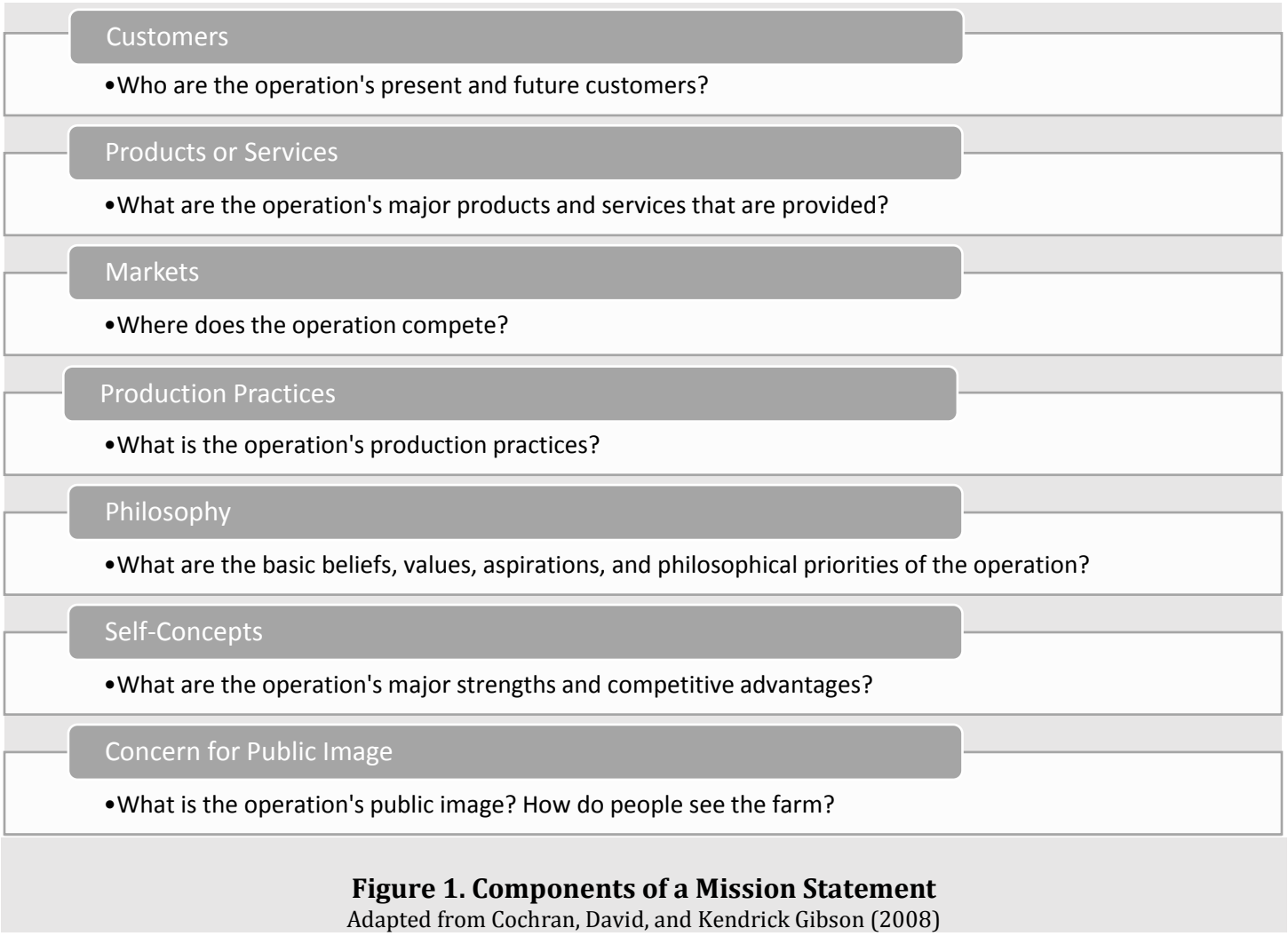

Figure 1. Components of a Mission Statement
Adapted from Cochran, David, and Kendrick Gibson (2008)

Intensive growing techniques practiced in urban agriculture allow growing a larger volume of crops on a smaller plot of land. These techniques include intercropping, vertical planting, and intensive spacing (Koski 2012). Programs related to intensive farming include the Small-Plot Intensive Program, Square-Foot Gardening, and Market Gardener. These programs promote high-productivity techniques and farming using limited capital investments with a small farmer profitability of $50,000 gross profit per year on less than one-acre plots (see Koski 2012).

Table 1. SWOT Analysis Guide

SWOT stands for strengths, weaknesses, opportunities, and threats. Below, you can find definitions of each of these aspects.

- Strength: internal enhancer; a positive that comes from within the business
- Weakness: internal inhibitor; a negative that comes from within the business
- Opportunity: external enhancer; a positive that comes from outside the business
- Threat: external inhibitor; a negative that comes from outside the business

Examples are listed in *italics*

Internal Environment	Strengths (+)	- *Al's degree in agricultural business*
	Weaknesses (-)	- *New venture for Al and Grace*
External Environment	Opportunities (+)	- *Easy access to markets*
	Threats (-)	- *Other organic farmers in the area*

Table 2. Risk Analysis Guide

Types of risk include:

- **Production risk:** Refers to an occurrence that affects the quantity or quality of a product produced.
- **Marketing risk:** Refers to uncertainty about prices producers pay and/or receive.
- **Financial risk:** Refers to a situation in which a producer borrows money to pay for an operation and any events that may affect their ability to repay that debt.
- **Legal risk:** Refers to policies imposed by governmental institutions that may affect production and the operation.
- **Human risk:** Refers to human problems and relationships that may affect an operation.

Some examples of the five risks have already been provided for you in *italics*.

Type of Risk	Examples	Strategies to Manage Risk
Production	- *Humid climate makes it difficult to grow certain crops, such as microgreens*	
Marketing	- *Not being able to label their products as organic because they are not USDA certified*	
Financial	- *New farming venture (no line of credit)*	
Legal	- *No contract for land agreement*	
Human	- *Labor intensive aspect of small-scale, organic farming increases risk for injury*	

3 The Organic Produce Industry

In recent years, the organic food industry has grown substantially. Between 1990 and 2006, organic food sales increased by approximately $16 billion (Li, Zepeda, and Gould 2007). By 2010, the organic food industry was valued between $60 and $90 billion (Starr 2010). According to the 2018 Organic Industry Survey, organic food sales reached $47.9 billion during this year (Gelski 2019). This attraction to organic produce can be attributed to increased consumer awareness about healthy and natural foods. The main reasons why most consumers purchase organic food products over nonorganic alternatives are because they are viewed as healthier, tastier, more environmentally friendly, and safer to consume (Hughner et al. 2007).

The number of organic farmers has increased in recent years. According to the 2017 U.S. Department of Agriculture (USDA) Census of Agriculture, there was a 26.8 percent increase in the number of organic farmers in the United States (USDA-NASS 2019). In Louisiana, there are currently 23 certified organic producers. This is a slight decrease from 2012, in which there were 27 certified organic farmers. To be considered "organic," an agricultural product should (1) not be produced using synthetic chemicals; (2) not be produced on land in which synthetic chemicals have been used in the past three years; and (3) be handled according to an agreed upon plan between the producer and the certifying agent (Office of the Law Revision Counsel—United States Code 1990).

Organic production faces more challenges relative to conventional and industrialized farming practices. Since no synthetic chemicals, antibiotics, and hormones are allowed in organic production practices, produce grown using these methods depends heavily on its naturally occurring environment (Hahlberg, Alroe, Knudsen, and Kristensen 2006). There are fewer counteractive measures that producers can rely on when there is a defect in the environment, such as poor soil. In addition, organic

farming does not produce food products on the same scale as conventional farming. On average, organic farms produce smaller yields than conventional farms, but these yields can vary depending on system and site characteristics (Seufert, Ramankutty, and Foley 2012). Climate and weather conditions can also affect production. For example, excessive amounts of sun can cause extensive damage to the plant's cells and tissues; this is known as sunburn. This damage hinders the plant's ability to grow and results in unhealthy and unmarketable produce. Although plants grown using both organic and conventional practices are subject to the risk of sunburn, there may be fewer natural remedies that are mandated in organic production to help mitigate this risk. Special gardening techniques, like shade cloth, help to limit the amount of solar radiation that these plants are exposed to and allow produce to be grown in harsher environmental conditions (Maughan et al. 2017).

There are many benefits associated with organic farming. According to the Economic Research Service of the USDA, organic farming practices reduces the amount of pesticide residue that is found in food and water, lowers the amount of energy used, and enhances biodiversity within the environment (Greene et al. 2017). In addition, with the current shift in attitudes toward health, more consumers are looking to purchase locally grown organic produce (Detre, Mark, and Clark 2010).

4 The Buy Local Movement

The "buy local" movement, also known as locavorism, has become a popular movement for younger generations in recent years. This movement encourages consumers to be conscious about what foods they consume and to purchase locally grown food from farmers in their communities (Coit 2008). Even though the buy local movement is not an official, cohesive movement started by a particular individual or organization, it is a grassroots movement that is embraced by consumers who are passionate about consuming food produced in their communities and driven by consumer motivation (Coit 2008).

The driving force behind the buy local movement is a combination of four factors: (1) a sense of connection, (2) quality of products, (3) environmental impact, and (4) political and social support for a particular type of agriculture (Coit 2008). These four aspects of local food motivate individuals to purchase produce grown by people in their community. When participating in the buy local movement, consumers feel like they have a connection with the producers that grow their food that would otherwise not be had if they were to purchase produce from the supermarket. This established relationship helps make the food buying process more personable and reduces the potential post-purchase dissonance felt by consumers. Having this connection with producers also allows consumers to better understand the origins of the produce that they purchase (Curtis 2014; Papaoikonomou and Ginieis 2017).

The quality of locally grown food also plays a large role in the trend of the buy local movement. Because local produce has not traveled thousands of miles, it is fresher and tastes better compared with produce purchased at the supermarket (Coit 2008; Hill 2008). Individuals enjoy these products more because they feel as if they are of higher quality than nonlocal produce. Additionally, food production is highly energy intensive. Specifically, the agricultural industry consumes approximately one fifth of the petroleum in the United States (Coit 2008). Consumers that are more concerned with the health of the planet will be more likely to purchase locally grown produce. Purchasing food products produced within the community helps to eliminate the use of fossil fuels in transportation and packaging, creating a healthier environment. Finally, the buy local movement provides financial support for farmers in local communities (Zepeda and Li 2006; Coit 2008). Participating in this movement allows consumers to feel as if they are helping to support their neighbors and make contributions to the local economy.

One of the common places that local food exchanges can occur is at farmers markets (Martinez et al. 2010). Farmers markets are local events within a specific community, indicating that food sold there is more likely to be fresh and produced within the region (e.g., Bond, Thilmany, and Bond 2009; Martinez et al. 2010). Because these food products are produced within the community, its distanced traveled to the consumer is minimized, which reduces the amount of energy and fossil fuels used in the production and transportation processes. Through the purchase of food at farmers markets, consumers are able to

directly support their local farmer and also socialize (e.g., Lyon et al. 2009; Gumirakiza, Curtis, and Bosworth 2014). This gives them a feeling of giving back to the community and strengthening their local economy.

Consumers' desire to purchase locally grown produce and establish personal relationships with farmers in the community has caused an increase in the number of farmers markets that take place in the United States (Detre et al. 2010; Starr 2010). The trend of shopping at farmers markets has grown rapidly in recent years because people place value on knowing who grew their food (Schindler 2014). Face-to-face interactions between producers and consumers experienced at farmer's markets are important motivators in the buy local movement and help consumers find value in food products (Starr 2010). Studies have shown that "personal motives, particularly the desire to purchase locally grown products and fresh produce" are what drives generations, specifically millennials, to purchase produce at farmers markets (Detre et al. 2010, p. 22).

Another avenue of buying local produce is the CSA. CSA is a program in which consumers enroll to support local farmers in their community. CSAs originally had an emphasis on organic and sustainable agriculture (Ernst and Woods 2009; Volz et al. 2016; Woods, Ernst, and Tropp 2017). CSAs can be thought of as a collaboration between producers and consumers. Producers offer quality food and produce, and in exchange, consumers shelter the producers by sharing some of the production risks, by helping to finance production. Most CSA programs benefit from consumers who purchase a portion of the farm's future production before the growing season starts. Farmers are guaranteed early cash flows, allowing them to cover production expenses (Woods et al. 2017). This exchange provides the producers with extra financial security and capital, while ensuring that consumers receive local produce. CSAs are an alternative distribution system where consumers have access to healthy food options and locally sourced produce, and also they have direct contact with farmers (Jarosz 2011; Woods et al. 2017; Samoggia et al. 2019).

5 The Red Stick Farm

Red Stick Farm operates as a limited liability company (LLC). The farm is in the South Baton Rouge area and is about 15 miles away from the city's downtown. The farmland used to be part of a sugarcane plantation, but the current owner does not farm. Instead, parcels of the land have been used for residential development, and others are leased to soybean and corn producers. The parcel that Grace and Al work on is closer to residential properties and has a barn, which they use as their home. Currently, they have a five-year lease arrangement at a pre-negotiated rate with the landowner.

Starting their business and mapping closely market needs while growing their consumer base, Grace and Al specialized in leafy green production, mostly spring mix, arugula, kale, and mustard greens. During their second year, they added cherry tomatoes, peppers, cucumbers, and eggplants. In the third year of their operation, they invested in a greenhouse and added microgreens, edible flowers, and herbs. Most of their production focuses on vegetables, with about 2 percent of their production left experimenting with new crops and varieties. Soil management is an important aspect of Al and Grace's farming operation. They follow best practices to ensure and maintain soil fertility and avoid nutrient depletion. This includes crop rotation, crop diversity, interplanting, cover crops, and composting. Cover crops allow them to suppress weeds and increase organic matter in the soil.

They participate in two farmers markets, the Oak's Market and the Garden District Farmers Market. Both of these markets support new and beginning local producers, and offer educational opportunities on nutrition and health, as well as meal preparation seminars using fresh, local produce. For this reason, these markets attract a high-income customer base. The Oak's Market is a small market that occurs every Wednesday from 9 a.m. to 12 p.m. and is located only five miles from their farm. The vendor fee for this market is relatively low at $50 per year. The Garden District Farmers Market is a slightly larger farmers market that is held every Saturday from 8 a.m. to 2 p.m. and is located twenty

miles from their farm. This market has more visitors on a weekly basis, but the vendor fee is significantly higher at $250 per year.

For the last three years, the farm has been profitable with a gross profit of about $50,000 per year, which has allowed them to repay their bank loan. However, Al and Grace still need to pay back their parents. When they started the farm, they put down $20,000 of their own savings. They received $10,000 from their parents and financed the remaining $20,000 to begin the farm. Not having to buy land allowed them to invest the money straight into their operation, and they were able to transform the barn on the property into a house. Since they only farm a small portion of land, they did not invest in heavy equipment. Most of their expenses were on site preparation, cleaning up the land, and taking care of the soil. Other expenses included irrigation infrastructure and equipment, sprayers, manure and pesticides, and seeds. A cooler and a bagging station were also purchased within the first two months of operation.

Al and Grace are the two primary workers on the farm. Apprentices and volunteers from their local community help during labor-intensive periods, which includes planting, transplanting, and harvesting. Through their new and beginning farmers network, they have offered other farmers labor hours in exchange for sharing production practices. The network provides unofficial apprentices, and participants are able to experience working with other farmers on conditions that differ from their operation and try new hands-on techniques.

6 Looking Toward the Future

Grace and Al hope to expand their business in the future. They discussed many options that would allow them to grow their operation, reach more consumers, and increase profits. Both agreed that whatever strategy they decide to go with, they should not forget they should be true to their goals and not dilute the mission of their operation. In order to implement a growth strategy, they have set aside $20,000 of their retained earnings. Through extensive discussions, they have agreed on two potential strategies that would fit their business model and budget. They still owe money to their parents, so selecting one strategy for the time is imperative because they will be applying for another loan.

Grace's preferred strategy is to add a CSA operation. Farmers are paid for their products at the beginning of the season, and consumers receive baskets with the freshest produce possible throughout the growing season. These early cash flows will allow them to pay for seeds, manure, and soil preparation costs without using their own savings. Grace also believes that integrating this program into their operation will create personal, long-lasting relationships with their customers in the Baton Rouge community. Since this is similar to a subscription service, it ensures that consumers will continuously receive produce even if they are not able to make it to the weekly Oak's or Garden District farmers markets. She compiled information on the strategy to share with Al (Table 3). Discussing with other producers that offer a CSA, she suggested pricing baskets at $30 and providing this service to twenty

Table 3. Estimated Gross Profit per Market Channel

Variable	CSA[a]	Farmers Market[b]	Total
Sales by market channel	$19,200 (~14%)	$93,600 (~86%)	$112,800
All production expenses based on market channel	$10,176 (~53%)	$48,672 (~52%)	$58,848
Gross Profit	$9,024	$44,928	$53,952

[a] CSA calculated for two growing seasons, 16 weeks per season, $30/week, 20 families.
[b] Farmers markets: 52 weeks, $30/week, 60 families
Note: Personal communication with CSA providers in Baton Rouge was used to get prices for the CSA basket and growing seasons. Estimates on the percentage of production expenses are from Pritchard and Polishuk (2018).

families. Taking into consideration their production cycle, Grace believes that a reasonable price for their CSA basket will allow them to offer a good amount of high quality vegetables. In addition, this strategy will allow them to continue going to the farmers markets and not lose their clientele.

On the other hand, Al would like to expand their production capacity by adding more land for production. He recently visited with the landowner and discussed the possibility of leasing another acre. The potential plot is next to theirs, which makes it easier with transporting equipment for land preparation and adding on existing infrastructure. This increase in acreage would allow them to grow more produce and reach larger markets, such as the larger farmers markets in New Orleans and mainstream restaurants in the surrounding areas that emphasize local and high quality cuisine. With this new land, they could continue to grow a wide variety of highly profitable produce and experiment with growing new types of produce. Al is concerned this investment may require a new loan to cover site preparation costs, but he sees the long-term potential (Table 4).

7 Discussion Questions

The focus of this study is on strategic management and business planning. It highlights the importance of defining and developing an operation's mission statement, assessing the internal strengths of the operation and external threats to the operation, identifying respective risks, and exploring growth strategies.

1. Using Figure 1, evaluate the effectiveness of the Red Stick Farm's mission statement and provide ways in which the mission statement can be improved.
2. SWOT analysis is a common tool used in business planning. Using the information provided and table 1 as a guide, conduct a SWOT analysis.
3. Based on the information on the Red Stick Farm and its' internal and external environment, please give examples of financial, production, legal, human, and legal risks that are associated with the operation. Discuss how they will be able to manage the respective risks. Use table 2 to record your answers.
4. Based on the information provided in the case study, identify the goals of the two farmers. Then discuss the two potential strategies found in the "Looking Toward the Future" section and identify advantages and disadvantages of each strategy. Refer to table 3 and table 4 for more information. Use your SWOT analysis and risk assessment to further assess the two strategies.
5. What other information would you need to be able to evaluate the two strategies?

Table 4. Costs of Acquiring Additional Land

Urban Farm Site Preparation Estimate (1-acre plot for an in-ground farm in the Baton Rouge area)		
Personnel		
Project Manager		$5,000
	Subtotal	**$5,000**
Location		
Environmental assessment		$9,000
Land acquisition		variable
Site plan		$5,000
Rezoning costs		variable
Permitting		$1,000
Liability insurance		$1,000
	Subtotal	**$16,000[a]**
Preparation		
Signage		$500
Fencing		$10,000
Contamination remediation		variable
Water connection		$5,000
Soil		$10,000
Wood chips		$0
Tractor labor to spread soil and wood chips		$5,000
	Subtotal	**$30,500**
Structures		
Wash-pack station		$2,000
Greenhouses and high tunnels		$5,000
Cooler		$5,500
Outdoor storage		$5,500
Community shade structure		$2,500
	Subtotal	**$20,500**
Subtotal of All Urban Farm Site Preparation Estimate + remediation costs		**$72,000**
Growing and Selling During Year 1 (Estimate)		
Tools and growing supplies		$15,000
Vehicle		$2,750
Utility costs (water and electricity)		$2,000
Accounting service		$500
Website and social media: hosting, upkeep, design, etc.		$1,800
Marketing and advertising		$500
Farmers' labor		$45,000
Computer		$1,000
	Subtotal	**$68,550**
Urban Farm 1 Year Estimate + remediation costs	**Total**	**$140,550**

Note: Adapted from USDA "Urban Agriculture Toolkit" to reflect relevant costs for the operation in the case study.
[a]Note: Does not include land acquisition costs.

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