

A photograph of a farm scene at dusk or dawn. In the background, two tall, cylindrical metal silos stand next to a large red barn with a white roof. The foreground is a lush green field with several cows grazing. A large tree is on the right side, and another is on the left. The sky is a mix of blue and orange.

FARM MANAGEMENT

NINTH EDITION

**Mc
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Education**

**Ronald D. Kay
William M. Edwards
Patricia A. Duffy**



Ninth Edition

FARM MANAGEMENT

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FARM MANAGEMENT, NINTH EDITION

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This book is printed on acid-free paper.

1 2 3 4 5 6 7 8 9 LCR 21 20 19 18

ISBN 978-1-260-00219-5 (bound edition)

MHID 1-260-00219-5 (bound edition)

ISBN 978-1-260-84333-0 (loose-leaf edition)

MHID 1-260-84333-5 (loose-leaf edition)

Senior Portfolio Manager: *Marija Magner*

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Content Licensing Specialist: *Beth Cray*

Cover Image: ©*Photo Researchers/Getty Images*

Compositor: *MPS Limited*

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Library of Congress Cataloging-in-Publication Data

Kay, Ronald D., author. | Edwards, William M., author. | Duffy, Patricia A., author.

Farm management / Ronald D. Kay, William M. Edwards, Patricia A. Duffy.

Ninth edition. | Dubuque : McGraw-Hill Education, 2020. |

Includes index.

LCCN 2018022851 | ISBN 9781260002195 (student edition : alk. paper)

LCSH: Farm management.

LCC S561 .K36 2020 | DDC 630.68—dc23 LC record available

at <https://lccn.loc.gov/2018022851>

The Internet addresses listed in the text were accurate at the time of publication. The inclusion of a website does not indicate an endorsement by the authors or McGraw-Hill Education, and McGraw-Hill Education does not guarantee the accuracy of the information presented at these sites.

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PREFACE

Farms and ranches, like other small businesses, require sound management to survive and prosper. The continual development of new agricultural technologies means that farm and ranch managers must stay informed of the latest advances and decide whether to adopt them. Adopting a risky, unproven technology that fails to meet expectations can cause financial difficulties or even termination of the farm business. On the other hand, failing to adopt profitable new technologies will put the farm business at a competitive disadvantage that could also prove disastrous in the long run. In addition, changing public policies regarding environmental protection, taxes, and income supports can make certain alternatives and strategies more or less profitable than they have been in the past. Finally, changes in consumer tastes, the demographic makeup of our population, and world agricultural trade policies affect the demand for agricultural products.

The continual need for farm and ranch managers to keep current and update their skills motivated us to write this ninth edition.

This book is divided into six parts. Part I begins with the chapter "Farm Management Now and in the Future." It describes some of the technological and economic forces driving the changes we see in agriculture. By reading this chapter, students will find an incentive to study farm management and an appreciation for the management skills modern farm managers must have or acquire. Part I concludes with an

explanation of the concept of management and the decision-making process, with an emphasis on the importance of strategic planning and decision making.

Part II presents the basic tools needed to measure management performance, financial progress, and the financial condition of the farm business. It discusses how to collect and organize accounting data and how to construct and analyze farm financial statements. Data from an example farm is used to demonstrate the analysis process in the chapter on farm business analysis.

Part III contains three chapters on basic microeconomic principles and cost concepts. The topics in this part provide the basic tools needed to make good management decisions. Students will learn how and when economic principles can be used in management decision making, along with the importance of the different types of economic costs in both the short run and the long run. Economies and diseconomies of size and their causes are discussed.

Practical use of budgeting as a planning tool is emphasized in Part IV. The discussion includes chapters on enterprise, partial, whole farm, and cash flow budgets. The format and use for each type of budget, sources of data to use, and break-even analysis techniques are discussed in detail.

Topics necessary to further refine a manager's decision-making skills are included in Part V. Farm business organization and transfer,

risk control, income tax management, investment analysis, and enterprise analysis are discussed. The chapter on income tax management has been updated with the latest changes available. The chapter on investment analysis includes a discussion of the concepts of annual equivalent and capital recovery values. The final chapter discusses how to separate the whole-farm analysis into profit centers and cost centers.

Part VI discusses strategies for acquiring the resources needed on farms and ranches, including capital and credit, land, human resources, and machinery. The human resource chapter includes sections on improving managerial capacity and bridging the cultural barriers that may be encountered in managing agricultural labor.

The authors would like to thank the instructors who have adopted the previous edition for their courses and the many students who have used it both in and out of formal classrooms. Your comments and suggestions have been carefully considered and many were incorporated in this edition. Suggestions for future improvements are always welcome. A special thanks goes to the McGraw-Hill reviewers for their many thoughtful ideas and comments provided during the preparation of this edition.

New to this edition:

- 2 new tables
- 68 revised tables
- 6 new figures
- 10 revised figures
- 5 new boxes
- 11 revised boxes
- 10 new glossary terms

Updated material about:

- Example farm (I. M. Farmer) throughout
- Farm Financial Standards Council guidelines
- Enterprise budget examples
- Partial budgeting examples
- Whole-farm budgeting example
- Cash flow budget example
- Crop insurance rules

- USDA commodity programs
- Land values and farm rental rates
- Agricultural labor laws
- Federal income tax brackets and rates

New or expanded discussion of:

- Biosecurity and farm records
- Double-entry accounting
- Sources of Federal tax revenue
- Federal income tax rules for depreciation, tax-free exchanges, exemptions, and credits
- Tax rules by form of business organization
- Trusts for passing on assets
- Service centers such as grain marketing
- True cost of credit
- Credit scoring to set interest rates
- Employee evaluation instrument
- Joint machinery ownership
- Present and future value factor formulas in Appendix

INSTRUCTOR RESOURCES

Instructors, are you looking for additional resources? Be sure to visit www.mhhe.com/kay9e for the Instructor's Manual (which includes the answers to the end-of-chapter questions), Lab Exercises, an Electronic Testbank, and accessible PowerPoint Presentations.

Access is for instructors only and requires a user name and password from your McGraw-Hill Learning Technology Representative. To find your McGraw-Hill representative, go to www.mheducation.com and click the dropdown for "Support & Contact," select "Higher Education," and then click the "GET STARTED" button under the "Find Your Sales Rep" section.

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REVIEWER ACKNOWLEDGMENTS

Suggestions have been received from instructors throughout the country. This is vital feedback that is relied upon for product development. We thank each individual for their comments and suggestions. The efforts of many people are needed to develop and improve a product. Among these people are the reviewers and consultants who point out areas of concern, cite areas of strength, and make recommendations for change. In this regard, the following instructors provided feedback that was enormously helpful in preparing the book and related products.

Georgeanne M. Artz
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Christian Boessen
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Donald G. Chafin
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©Patricia Duffy

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MANAGEMENT

Good management is a crucial factor in the success of any business. Farms and ranches are no exception. To be successful, farm and ranch managers need to spend more time making management decisions and developing management skills than their parents and grandparents did.

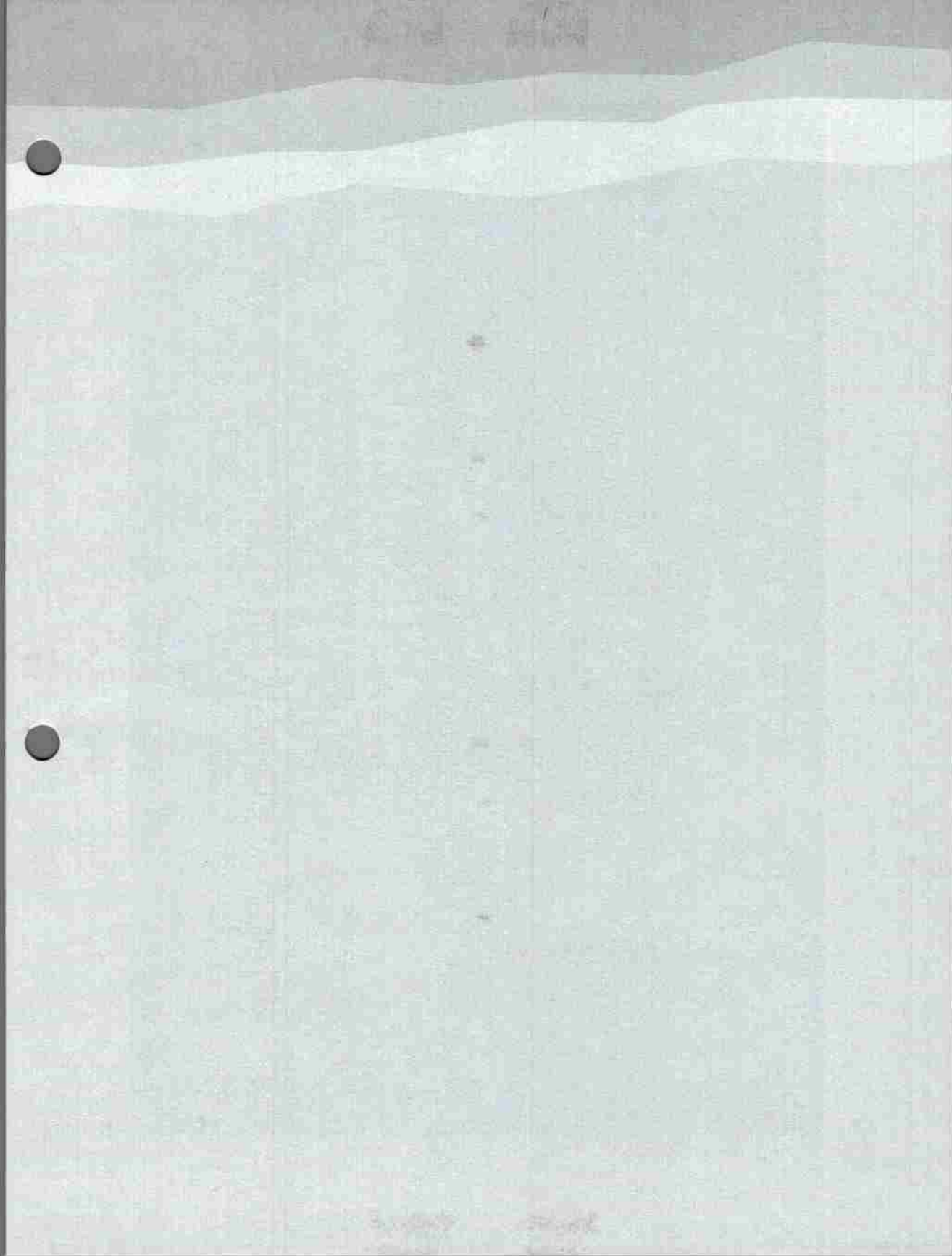
This is because production agriculture in the United States and other countries is changing: more automation, increasing farm size, continued development of new production technologies, growing capital investment per worker, more borrowed or leased capital, new marketing alternatives, and increased consumer demands. These factors create new management problems, but also present new opportunities for managers with the right skills.

These trends will likely continue throughout the rest of the twenty-first century. Farmers will make the same type of management decisions as in the past, but will be able to make them faster and more accurately. Advances in the ability to collect, transfer, and store data about growing conditions, pest and disease problems, and product quality will give managers more signals to which to respond. Moreover, future farm and ranch operators will have to balance their personal goals for an independent lifestyle, financial security, and rural living against societal concerns about food safety, environmental quality, and agrarian values.

The long-term direction of a ranch or farm is determined through a process called strategic planning. Farm families establish goals for themselves and their businesses based on their personal values, individual skills and interests, financial and physical resources, and the economic and social conditions facing agriculture. They can choose to emphasize wider profit margins, higher volumes of production, or production of special services and products. After identifying and selecting strategies that will help them achieve their goals, farm and ranch operators employ tactical management skills to carry them out. Many decisions need to be made and many alternatives analyzed. Finally, the results of those decisions must be monitored and evaluated and control measures implemented where results are not acceptable.

Chapter 1 discusses factors affecting the management of farms and ranches now and in the coming decades. These factors will require a new type of manager who can absorb, organize, and use large amounts of information—particularly information related to new technologies. Resources will be a mix of owned, rented, and borrowed assets. Products will need to be more differentiated to match consumer tastes and safety standards. Industrial uses of agricultural products will increase relative to food uses. The profitability of a new technology must be determined quickly and accurately before it is or is not adopted. A modern manager will also need new human resource skills as the number and diversity of employees and consultants increase.

Chapter 2 further explains the concept of management, including strategic planning and tactical decision making. What is management? What functions do managers perform? How should managers make decisions? What knowledge and skills are needed to be a successful manager? Answers to the first three questions are discussed in Chapter 2. Answers to the last question will require studying the remainder of the book.





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FARM MANAGEMENT NOW AND IN THE FUTURE

CHAPTER OUTLINE

Structure of Farms and Ranches
New Technology
The Information Age
Controlling Assets
Human Resources
Producing to Meet Consumer Demands
Contracting and Vertical Integration
Environmental and Health Concerns
Globalization
Summary
Questions for Review and Further Thought

CHAPTER OBJECTIVES

1. Discuss how changes in the structure and technology of agriculture will affect the next generation of farm and ranch managers
2. Identify the management skills that future farmers and ranchers will need to respond to these changes

What will future farm managers be doing as we progress through the remaining decades of the twenty-first century? They will be doing what they are doing now, making decisions. They will still be using economic principles, budgets, record summaries, investment analyses, financial statements, and other management techniques to make those decisions. What types of decisions will managers be making in future decades?

They will still be deciding input and output levels and combinations and when and how to acquire additional resources. They will continue to analyze the risks and returns from adopting new technology, making new capital investments, adjusting farm size, changing enterprises, and seeking new markets for their products.

Will anything about management decisions in the future be different? Yes. While the broad

types of decisions being made will be the same, the details and information used will change. Technology will continue to provide new inputs to employ and new, more specialized products for production and marketing. Management information systems, aided by electronic innovations, will provide more accurate and timely information for use in making decisions. Farmers and ranchers will have to compete more aggressively with nonagricultural businesses for the use of land, labor, and capital resources. As in the past, the better managers will adapt to these changes and efficiently produce the commodities that consumers and industry want.

STRUCTURE OF FARMS AND RANCHES

The number of farms in the United States has been decreasing since 1940, as shown in Figure 1-1. The amount of land in farms and ranches has been relatively constant. This means the average farm size and production per farm have increased considerably, as shown in Figure 1-2. Several factors have contributed to this change.

First, labor-saving technology in the form of larger agricultural machinery, more efficient planting and harvesting systems, automated equipment, and specialized livestock buildings has made it possible for fewer farm workers to produce more crops and livestock. Second, employment opportunities outside agriculture have become more attractive and plentiful, encouraging labor to move out of agriculture. Also during this period of change, the cost of labor has increased faster than the cost of capital, making it profitable for farm managers to substitute capital for labor in many areas of production.

Third, farm and ranch operators have aspired to earn higher levels of income and to enjoy a standard of living comparable to that of nonfarm families. One way to achieve a higher income has been for each farm family to control more resources and produce more output while holding costs per unit level or even decreasing them. Other managers, though, have worked to increase profit margins per unit while keeping the size of their business the same. The desire for an improved standard of living has provided

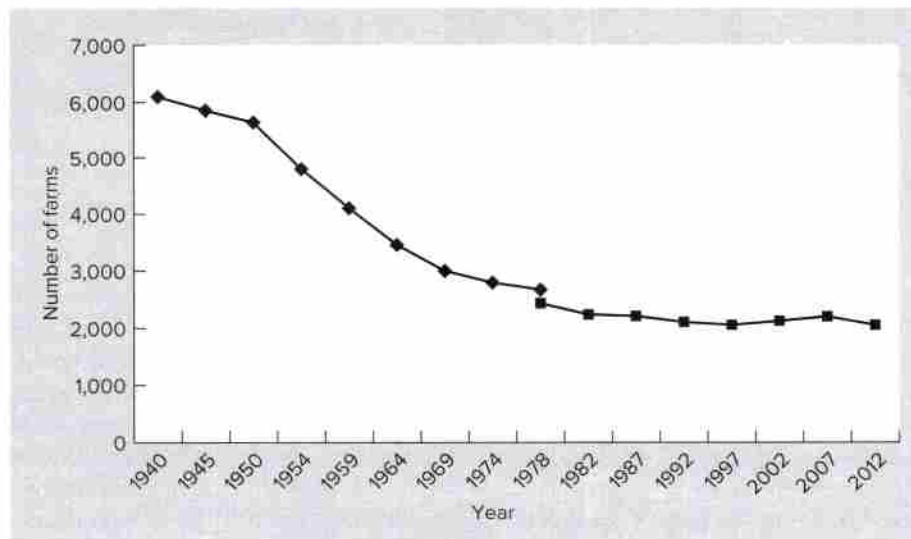


Figure 1-1 Number of farms in the United States (1000s).

Source: U.S. Census of Agriculture, National Agricultural Statistics Service, USDA, Definition adjusted in 1978.

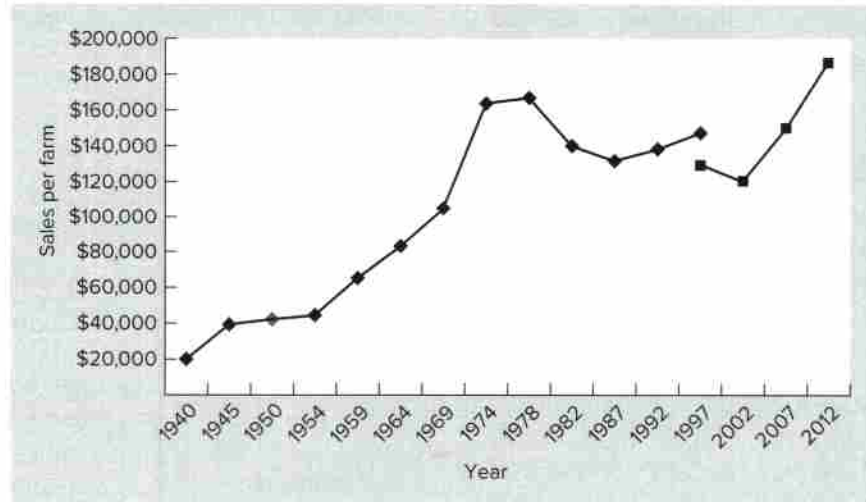


Figure 1-2 Total sales per farm in 2002 dollars.

Source: U.S. Census of Agriculture, USDA, Definition adjusted in 1997.

much of the motivation for increasing farm size, and new technology has provided the means for growth.

Fourth, some new technology is available only in a minimum size or scale, which encourages farmers to expand production and spread the fixed costs of the technology over enough units to be economically efficient. Examples include grain drying and handling systems, four-wheel drive tractors, large harvesting machines, confinement livestock buildings, and automated cattle feedlots. Perhaps even more important are the time and effort required for a manager to learn new skills in production, marketing, and finance. These skills also represent a fixed investment and thus generate a larger return to the operator when they are applied to more units of production. Chapter 9 contains more discussion about economies of size in agriculture.

Operators who do not wish to grow their individual businesses will look for alliances and partnerships, both formal and informal, with other producers that will allow them to achieve the same economies as larger operations. Examples include jointly owning machinery and

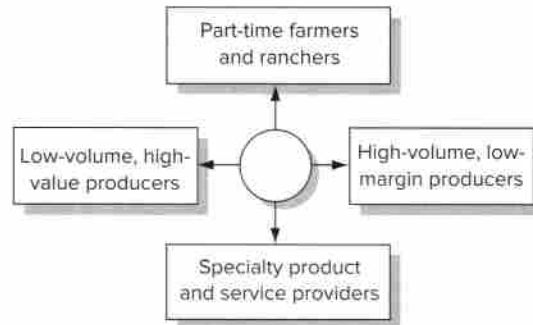


Figure 1-3 Alternative strategies for farm and ranch businesses.

equipment with other producers, outsourcing some tasks such as harvesting or raising replacement breeding stock, and joining small, closed cooperatives.

As illustrated in Figure 1-3, farmers and ranchers can choose among four general business strategies: low-volume, high-value producers; high-volume, low-margin producers; specialty product and service providers; and part-time operators.

Low-Volume, High-Value Producers

Lack of access to additional land, labor, and capital effectively limits the potential of many growers for expanding their businesses. For them, the key to higher profits is producing higher valued commodities. Some look for nontraditional enterprises such as emus, bison, asparagus, or pumpkins. Promotion, quality standards, and marketing become critical to their success. Others try variations of traditional commodities, such as organically grown produce, tofu soybeans, free-range poultry, or seed crops. Margins may be increased even more through added processing and direct marketing. Such enterprises often involve high production risks, uncertain markets, and intensive management, but can be quite profitable even on a small scale.

High-Volume, Low-Margin Producers

There will always be a demand for generic feed grains, oil seeds, fruits and vegetables, cotton, and livestock products. Many producers choose to stick with familiar enterprises and expand production as a means of increasing their income. For them, squeezing every dollar out of production costs is critical. Growing the business usually involves leveraging it with borrowed or rented assets. Profit margins are thin, so it is critical to set a floor under market prices or total revenue through insurance products and marketing contracts.

Specialty Product and Service Providers

A third strategy is to specialize in just one or two skills and become one of the best at performing them. Examples are custom harvesting, custom cattle feeding, raising seed stock or replacement breeding stock, repairing and refurbishing equipment, hauling and applying manure, and applying pesticides and fertilizers. Even *agri-tourism* can be considered a special service to consumers. Often a key component of this strategy is making maximum use of expensive, highly specialized equipment and facilities and being a low-cost provider. Marketing the

services of the business and interacting with customers are also important ingredients for success.

Part-Time Operators

Many farmers hold other jobs in addition to farming. Part-time farmers and ranchers account for about 52 percent of the U.S. total, according to data from the most recent U.S. Census of Agriculture. However, they produce only 13 percent of total agricultural sales. Many of these small-scale operations are *lifestyle* farms run by people who enjoy producing crops and livestock even when the potential profits are low. Their primary management concerns are to limit their financial risk and balance farm labor needs with off-farm employment. A combination of farming and nonfarm employment may provide the most acceptable level of financial security and job satisfaction for many families.

Farms of all sizes will continue to find their niche in U.S. agriculture. Naturally, the largest farms contribute the highest proportion of total sales of farm products, as shown in Table 1-1. The consolidation of small- and medium-sized farms and ranches into larger units will likely continue, as older operators retire and their land is combined with existing farm units.

Management and operation of farms by family units will continue to be the norm, though. This is especially true for agricultural

TABLE 1-1 **Distribution of Farm Sales, United States**

Sales class	Percent of farms	Percent of sales
Less than \$10,000	56.6	1.0
\$10,000–\$99,999	25.0	4.9
\$100,000–\$249,999	6.6	5.9
\$250,000–\$999,999	8.1	22.6
\$1,000,000 or more	3.7	65.6

Source: 2012 Census of Agriculture, National Agricultural Statistics Service, USDA.

enterprises that cannot concentrate production into a small geographic area, such as grain and cotton production or extensive grazing of cattle or sheep. Enterprises that can centralize production, such as poultry and hog production or cattle feeding, can be more easily organized into large-scale business entities. Management of these farms will be segregated into several layers, and areas of responsibility will be more specialized. Most managers of centralized production enterprises will be salaried employees rather than owner-operators.

Some family farm businesses will find that by cooperating with their neighbors and relatives they can achieve many of the same advantages that larger-scale operations enjoy. Decades ago, farmers formed grain threshing or haying crews to take advantage of new harvesting technology. Today, several farmers may join together to guarantee a constant, uniform supply of livestock or crops in a quantity that can be transported and processed efficiently. As the number of input suppliers and processing firms diminishes, producers must collaborate to maintain their bargaining position. This is one example of how a cooperative effort or *strategic alliance* can provide economic benefits. Another example is several operators forming an input purchasing group to achieve quantity discounts or purchasing large equipment jointly. A small amount of managerial independence must be sacrificed to conform to the needs of the group. However, personal ownership and operation of each business is preserved.

NEW TECHNOLOGY

Agricultural technology has been evolving for many decades and will continue to do so. The field of biotechnology offers possible gains in production efficiency, which may include crop varieties engineered to fit growing conditions at particular locations, to be resistant to herbicide damage or to certain insects and diseases, or to have a more highly valued chemical composition such as higher protein or vitamin content.

Livestock performance may be improved by introducing new genetic characteristics or by improving nutrient use. New nonfood uses for agricultural products, such as biodiesel and ethanol, will open new markets, but may also cause changes in the desired characteristics or composition of products grown specifically for these uses.

One example of a recent technology is the use of global positioning systems (GPS) to pinpoint the exact location of equipment in a field. By combining satellite reception with a yield monitor on harvesting equipment, the crop yield can be measured and recorded continuously for every point in the field. Variations in yield due to soil type, previous crops, different tillage methods, and fertilizer rates can be identified quickly and recommendations made to correct problems. Soil testing by grid sampling can fine tune nutrient recommendations. This technology is now being used to automatically adjust the application rates of fertilizer and chemicals as the applicator moves across the field. Fertilizer and chemicals are applied only at the rates and locations needed, which improves efficiency and lowers costs.

Automated GPS can also keep crop production machinery on a consistent course, when used with automatic guidance systems on tractors, harvesters, and sprayers. Field time and operator fatigue are reduced, and more efficient use of crop inputs results from less overlapping of applications. Operator errors while using equipment at night are reduced as well.

These technologies and others yet to be developed will provide the farm manager with a continual challenge. Should this or any new technology be adopted? Is it reliable? The cost of any new technology must be weighed against its benefits, which may come in several forms. There may be increased yields, an improvement in product quality, less variation in yield, or a reduced impact on the environment. Decisions about if and when to adopt a new technology will affect the profitability and long-term viability of a farm or ranch business.

THE INFORMATION AGE

Many decision-making principles and budgeting tools have been underused in the past. Individual farm data needed to use them were not available, or the process for analyzing the data was too complex. Recent years have seen rapid changes in methods of data collection, analysis, and interpretation. Electronic sensors and processors used in large-scale industries are now accessible and affordable to farms and ranches, as well as to purchasers of agricultural products.

Not only will more whole-farm data be available, but data specific to small land areas or to individual animals will also become more common. These specific data will help managers customize the treatment of each acre of land or each head of livestock. Unmanned aerial vehicles, also known as UAVs or drones, are being used to provide information on the specific location of weed and insect infestations or moisture, permitting a limited, pinpoint application of pesticide or irrigation water. UAVs can also measure the canopy health of fruit trees, ponding and drainage problems in fields, nitrogen content of growing crops, and plant populations. Unlike humans, they can view crops from above and use sensitive instruments to record real-time data.

However, the farm or ranch manager is still needed to interpret the data and decide when action is needed and economically justified.

Miniature electronic sensors will be able to collect and record information from livestock by continuously monitoring individual animal performance levels, feed intake, and health status. When undesirable changes are detected, there could be automatic adjustment in environmental conditions and feed rations. This information could also be related back to genetic background, physical facilities, feed rations, health programs, and other management factors to improve and fine-tune animal performance. Ear tags, electronic implants, and detailed production records can provide *identity preservation* of both crops and livestock from the original producer to the final consumer.

Financial transactions may be recorded and automatically transferred to accounts through the use of debit cards and bar-code symbols whenever purchases and sales occur. Smaller purchases may be made with preloaded cash cards. These transactions can also be posted automatically to the accounting system for an individual farm and classified by enterprise, production period, vendor, or business unit. These technological advances mean that the



Box 1-1

Agriculture in the Age of “Big Data”

“**B**ig Data,” the ability to capture and use massive volumes of information for decision making, is growing increasingly important at all stages of the agricultural production chain. At the farm level, data collected by sensors or by drones can be used to fine-tune decisions about production strategies, such as when to plant or harvest a crop, when to irrigate a field, when to apply fertilizer, or when to treat for insects. Big data can allow livestock producers to adjust feed rations based on weather conditions or feed composition, monitor animal health,

or adjust building temperatures and ventilation for maximum animal comfort. Beyond the farm gate, applications of big data can help reduce crop spoilage and find the most efficient market channels.

Collecting data alone does not lead to better decision making. Sophisticated analytical routines must be used to filter and organize data quickly, and apply it to a decision framework. Big data can be overwhelming. The human manager must decide which information is most relevant, useful, and cost-effective for the individual business.

Box 1-2**Meeting New Challenges: Berilli Farms**

Berilli Farms, Inc. consists of only a few hundred acres. These acres have been transformed from growing common field grains to producing high-value specialty crops. Fresh vegetables are sold to a local wholesale grocer. High-protein alfalfa has been contracted to a dairy in the next county. High-quality turf grass seed goes to a chain of nurseries.

Keeping a stable work crew of 25 machinery operators, truck drivers, sorters, and crop scouts is a real test of the Berilli family's human relations skills. All of their employees are trained to gather data on crop growth and yields from monitors mounted on machinery or from drones, and to download it into their handheld computers. Each morning before chemicals or fertilizers are applied, a variable-rate application plan is read into the control units of the applicators.

The Berillis use sophisticated crop simulation computer models to formulate these recommendations, taking into account current input prices and the selling prices for their products that they have contracted or hedged. Each week they review their cash-flow position and electronically transfer operating funds into their business account. All their crops are protected by multiple peril crop insurance and are committed to delivery according to a detailed production contract.

The grocers, dairies, and nurseries they supply send them real-time data about the results of quality tests performed on their products and the varieties selling the fastest. At the end of the year, the Berillis analyze the costs and returns from each crop, field, and buyer and replace the least profitable ventures with more promising ones.

information in a farmer's accounting system can be accurate and up to date at the end of each day.

Personal computers, tablets, and smart phones have greatly enhanced farmers' capacities to receive, process, and store information and to communicate with outside data sources. Personal data recorders allow precise decisions to be made in the pickup or on the tractor, as well as in the office. The first computers were used primarily to sort data and do calculations, but increasingly computers are being designed and used as communication tools. Wireless transmission technology and global computer networks are increasing the availability, speed, and accuracy of information sharing about weather, markets, and other critical events.

Managers in the past century often found the lack of accurate, timely, and complete information to be frustrating. Modern managers may still be frustrated by information; only the cause of their frustration will be the large quantity and continual flow of information available to them. A vital task for managers will be to determine

which information is critical to their decision making, which is useful, and which is irrelevant. Even when this is done, the critical and useful information must be analyzed and stored in an easily accessible manner for future reference.

CONTROLLING ASSETS

Outside capital will continue to be needed to finance large-scale operations. Management of traditional sources of farm credit, such as rural banks, is becoming more vertically integrated, and funds will come from national money markets. Credit will also be available from nontraditional sources such as input suppliers and processors. Farm managers will increasingly have to compete with nonfarm businesses for access to capital, as the rural and urban financial markets become more closely tied together. This competition will necessitate more detailed documentation of financial performance and credit needs, and more conformity to generally accepted accounting principles

and performance measures. Farmers will need to use standard accounting methods and principles and perhaps even have audited financial statements to gain access to commercial capital markets.

Standardized records and online databases will help make comparative analysis with similar farms more meaningful. The farm manager will have to decide whether to train an employee to carry out the required accounting and analysis or hire this expertise from outside the business. Even if outside help is used, the manager must have the skills and knowledge to read, interpret, and use this accounting information.

Controlling assets is becoming more important than owning them. Farmers have long gained access to land by renting it. Leasing machinery, buildings, and livestock has been less common, but will likely increase in use. Custom farming and contract livestock production are other means by which a good manager can apply his or her expertise without taking the financial risks of ownership. When other parties supply much of the capital, the operator can produce a larger volume at less risk, although the profit margin may be smaller.

HUMAN RESOURCES

Farm managers are currently depending more on teams of employees or partners to carry out specific duties in the operation. Working with other people will become a more important factor in the success of the operation. Motivation, communication, evaluation, and training of personnel will become essential skills.

Farm businesses will have to offer wages, benefits, and working conditions competitive with nonfarm employment opportunities. They will likely have to follow more regulations regarding worker safety in handling farm chemicals and equipment and see that employees are properly trained in the use of new technologies. Many of the most efficient farms and ranches will be those with a small number of operators or employees who have specialized

responsibilities. They will have mastered the communication and teamwork skills needed in such operations.

In many rural areas the agricultural labor force is shrinking. Employers may have to reach out to workers from other regions or countries to meet their needs. Overcoming cultural and language differences and complying with labor laws become critical management skills.

Modern managers will need to take advantage of the expertise of paid consultants and advisors. For some very technical decisions, such as diagnosing animal and plant diseases, developing legal contracts, or executing commodity pricing strategies, the manager may pay a consultant to make recommendations. In other cases, the farm manager will obtain information from outside sources but do the analysis and decision making. Examples include formulating livestock rations or crop fertility programs based on the results of laboratory tests. In either case, the successful manager must learn to communicate clearly and efficiently with the consultant. This means understanding the terminology and principles involved and summarizing information in a concise form before submitting it.

PRODUCING TO MEET CONSUMER DEMANDS

Agriculture has long been characterized by the production of *undifferentiated* commodities. Historically, grain and livestock products from different farms have been treated alike by buyers if these products met basic quality standards and grades. The trend is to offer more highly specialized and processed food products to the consumer, so buyers are beginning to implement stricter product standards for producers.

For example, livestock processors want uniform animals with specific size and leanness characteristics to fit their processing equipment, packaging standards, and quality levels. Improved measuring devices, product

Box 1-3**Custom Pork Production: Producing for a Niche Market**

Howard Berkmann continues to produce traditional cross-bred, uniform lean hogs for the local packing plant. One morning each week, he delivers a load of hogs, and by evening, he receives electronically a summary of the carcass data and pricing formula from the packer. He downloads the information onto his swine production application and prints out a current summary for the facility from which the hogs came and the genetic group they represented.

A few years ago, Howard started a specialty group of Berkshire hogs designed for the Japanese market. The particular coloring and marbling of the meat earns him a premium price. He negotiated an agreement with a Berkshire breeder in a neighboring state to supply him with a regular stream of replacement gilts. Several times a week, he checks the Japanese livestock markets for forward pricing opportunities, and he has visited his marketing contact in Tokyo.

identification, and data processing will make it easier to pay differential prices to producers based on product characteristics and to trace each lot to its point of origin. As processors invest in larger-scale plants, they must operate them at full capacity to reduce costs and remain competitive. Producers who can assure the packer of a continuous supply of high-quality, uniform animals will receive a premium price. Those who cannot may find themselves shut out of many markets or forced to accept a lower price.

In crop production, the protein and oil content of grain and forages is becoming easier to measure, making differential pricing possible. Biotechnology research will allow plant characteristics to be altered and genetically engineered varieties to be produced for specific uses, regions, and production technologies.

More agricultural products will be used for industrial purposes, such as biofuels, renewable energy, pharmaceutical products, and biodegradable packaging. This will require increased attention to product quality, segregation of production, record keeping, and marketing contracts. Traditional marketing channels and price patterns will change.

Consumer groups and some food companies are asking that agricultural producers follow specific production practices in order to have access to their markets. Examples include cage-free layers, pigs raised without gestation crates, reduced use of hormones and antibiotics in livestock, and organically grown fruits and vegetables. Many of these production methods require more labor and involve more risks for growers. Managers must look for market outlets that will compensate them for their increased costs.

So-called niche markets will also become more important. Organic produce, extra-lean meat, specialty fruits and vegetables, and custom-grown products for restaurants and food services will be in greater demand. As international trade barriers continue to fall, foreign markets will also be more important. These markets may require products with special characteristics. Farm managers who seek out these markets and learn the production techniques necessary to meet their specifications can realize a higher return from their resources. The manager will have to evaluate the additional costs and increased risks associated with specialty markets and compare them with the potentially higher returns.

CONTRACTING AND VERTICAL INTEGRATION

Just as some farmers and ranchers will produce specific products, others will specialize in a particular phase of producing more generic products. Examples include raising dairy replacement heifers, harvesting crops on a custom hire basis, or producing bedding plants for home gardeners. Such operators can develop a high degree of expertise in their particular area and apply it to a high volume of production.

Many of these managers produce an intermediate product or service so there may not be a widespread market at an established market price. To ensure that they can sell their product, they may enter into a marketing contract with a processor, wholesale distributor, or other farmers. The contract may guarantee that a constant supply of product of a minimum quality and type will be delivered. In some cases the buyer may supply some of the inputs and management, such as when pigs or broilers are finished in contract facilities on independent farms. Such arrangements are called *vertical integration*.

ENVIRONMENTAL AND HEALTH CONCERNS

As the availability of an adequate quantity of food becomes ever more taken for granted, concerns about food quality and food safety as well as the present and future condition of our soil, water, and air will continue to receive high priority from the nonfarm population. Farmers and ranchers have always had a strong interest in maintaining the productivity of natural resources under their control. However, the off-farm and long-term effects that new production technologies have on the environment have not always been well quantified or understood. As more people decide to live in rural areas, the contact between farm and nonfarm residents will increase. This will lead to

increased concern about agricultural wastes and their effects on air and water quality. Pressure from nonfarm rural residents may even cause some production systems such as concentrated livestock feeding to shift to less-populated regions. Farm managers will have to choose between discontinuing those enterprises and moving their businesses.

As research and experience improve the understanding of the interactions among various biological systems, education and regulations will be used to increase the margin of safety for preserving resources for future generations. Top agricultural managers of today recognize the need to keep abreast of the environmental implications of their production practices and are often leaders in developing sustainable production systems. All farm managers must be aware of the effects their production practices have on the environment, both on and off the farm, and take the steps necessary to keep their agricultural resources productive and environmentally beneficial.

The value of agricultural assets, particularly farmland, will be affected by environmental conditions and regulations. When farms are sold or appraised, environmental audits become routine to warn potential buyers of any costs that might be incurred to clean up environmental hazards. The crop production combinations and practices allowed by a farm's conservation plan also affect its value. Farm managers will have to evaluate every decision for profitability and for how it affects the environment. The successful managers will be those who can generate a profit while sustaining resources on the farm and minimizing environmental problems off the farm.

GLOBALIZATION

Agricultural producers all over the world are finding that their success or failure is increasingly tied to weather, public policies, and consumer tastes that exist thousands of miles away. Expansion of markets through international

trade has long been an avenue by which farmers have sought to enhance the prices of their products and channel increased production to consumers. However, the governments of many countries, including the United States, have tried to protect their farmers from foreign competition through the use of trade barriers such as tariffs, quotas, and sanitary regulations.

In recent years many of these barriers have been lowered or eliminated. The World Trade Organization (WTO) is an international organization dedicated to negotiating freer trade throughout the world to increase the efficiency of food production and improve standards of living for millions of people. Other cooperative arrangements such as the North American Free Trade Agreement (NAFTA) have been able to achieve similar objectives among smaller groups of nations.

One long-term effect of such efforts is for countries and regions to specialize in products for which they have a *comparative advantage*, that is, those that their particular climate, soil, or labor supply allows them to produce more efficiently than other regions. Those countries can then exchange commodities with each other, and citizens in both countries end up with a higher and more varied standard of living. For example, since the implementation of NAFTA began in 1994, the United States and Canada have sold increasing quantities of feed grains to Mexico, allowing Mexico to increase its livestock production and the quantity of meat in the diets of its citizens. Likewise, Mexico has been able to supply more fresh fruits and vegetables to U.S. and Canadian markets, especially during the winter months. These are examples of a much larger set of changes known as *globalization*.

Along with the lowering of trade barriers, the WTO is working to reduce subsidies and other favorable treatments to farmers by national governments that would encourage them to produce more of a certain product than would be warranted based solely on competitive market prices. This is to prevent policies in some

countries from driving down international commodity prices that negatively affect producers in other countries. Losing price supports or input subsidies will cause short-term financial losses for some farmers, but it will increase the efficiency of world agriculture in the long run.

Opportunity or Threat?

Some producers and commodity groups recognize globalization as an opportunity to expand the markets for their products. Others see the trends as a threat, especially if they are unable to produce as efficiently as farmers in other countries and no longer enjoy the protection of trade barriers. They may need to develop a strategic plan that involves reducing production costs, looking for new enterprises, or finding alternative markets in which they can better compete.

Besides changing the flow of international trade, globalization can affect consumer tastes and preferences. Improved communication and transportation can introduce consumers to products and types of food with which they were not familiar previously. Several decades ago, bananas and other tropical fruits were not common in eastern European countries. Likewise, consumers in the United States were not familiar with kiwifruit or some types of imported cheeses.

Globalization also means that farmers and other producers around the world will increasingly compete for the same raw materials. Petroleum and other forms of energy are subject to wide swings in world prices. Higher transportation costs will alter trade patterns. Agricultural labor will move across borders to fill the demand for workers, regardless of immigration policies. Investment capital will flow to where the highest returns are available. Major agribusiness firms operate globally, and can easily transfer knowledge, information, and capital from one country to another. All of these changes will force successful farmers and ranchers to continually assess their external environments and internal resources to meet their long-term goals.

SUMMARY

Farmers and ranchers in the twenty-first century are making most of the same basic decisions that they made in the past century. The difference is they are making them faster and with more accurate information. Farm businesses will continue to become larger, and their operators will have to acquire specialized skills in managing personnel, interpreting data, competing for resources with nonfarm businesses, and customizing products to meet the demands of new markets. Changes in world trade policies and globalization of agriculture will have both positive and negative effects to which farmers must respond. All this must be done while balancing the need to earn a profit in the short run with the need to preserve agricultural resources and environmental quality into the future. While some farm managers will look at these trends as threats to the way they have traditionally operated their businesses, others will see them as new opportunities to gain a competitive advantage and to prosper.

QUESTIONS FOR REVIEW AND FURTHER THOUGHT

1. What forces have caused farms and ranches to become larger? Which of them are likely to continue? How can smaller businesses compete successfully?
2. How will quick access to more information help farm managers in the twenty-first century make better decisions?
3. List two examples of specialty agricultural markets and the changes a conventional producer might have to make to fill them.
4. What agricultural products from other countries do you consume? Do any of these compete with products produced by farmers in your own country?
5. List other new challenges not discussed in this chapter that you think farm and ranch managers may have to face in the future.