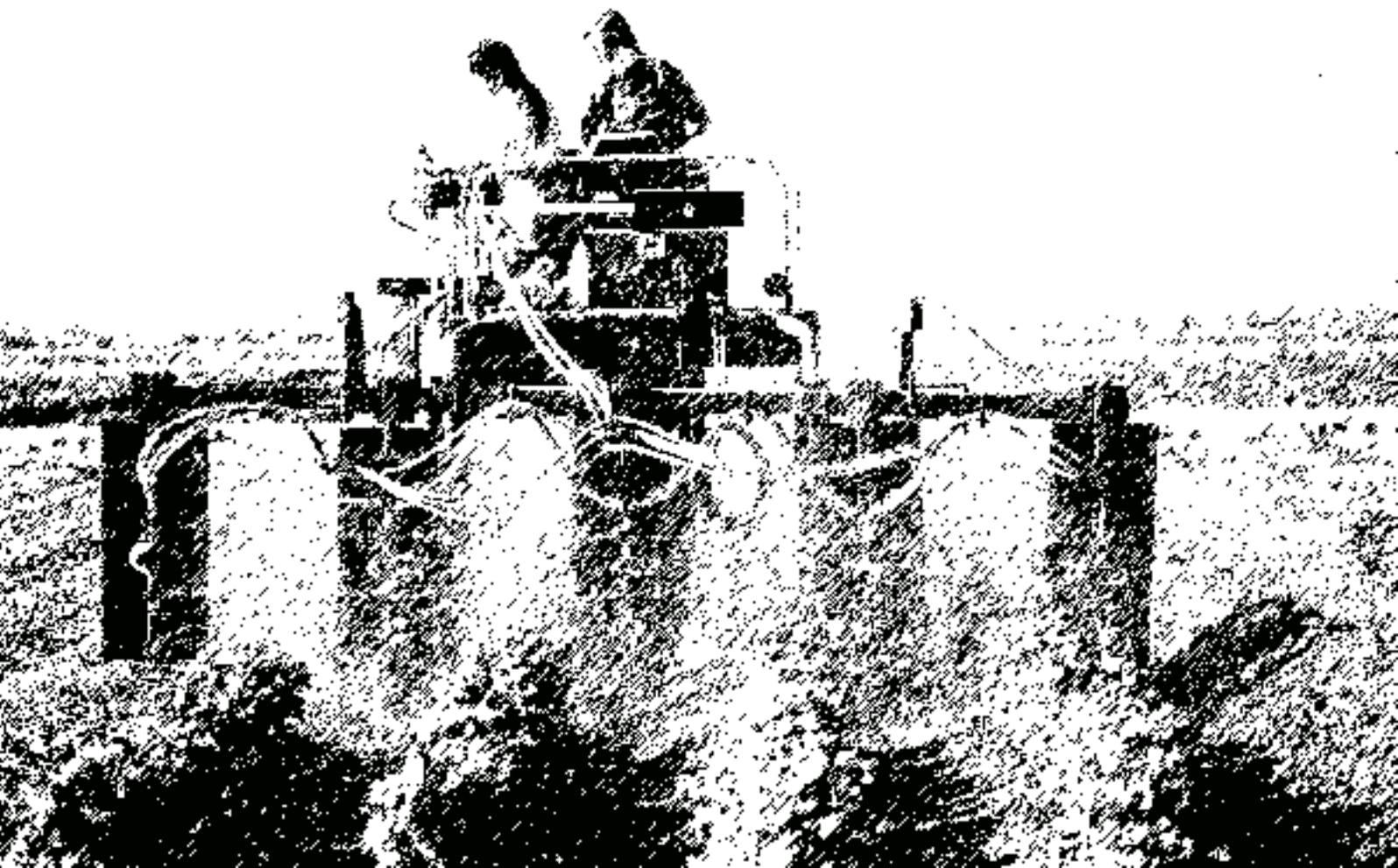


Farming in the

A modern business



21st century in a modern world

by Arlene Dohm

In the 21st century, farmers and ranchers are likely to know as much, or more, about world events as they do about the pests or bacteria that are eating their crops or affecting their cattle. Moreover, today's farmers often incorporate the latest breakthroughs in science and technology into their farming practices. Modern farmers also are more likely than farmers in the past to be female, Hispanic, and older than the average worker. (See the box on page 22.)

But in many ways, 21st-century farmers are not so different from the farmers who preceded them. They are hardworking, independent caretakers of land and animals—and jacks-of-all-trades. And most are still at the mercy of the weather. “Your livelihood is in the hands of Mother Nature, and at times, it can make you unsure of the future,” says Steve Anderegg, a farmer in Mason City, Iowa. “This is not an occupation for those who like security.” Despite this, he says, “it is the ultimate lifestyle.” Farmers enjoy having variety in their work, providing the world with food and fiber, and being their own bosses.

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Successful farming in the 21st century requires knowledge not only of the latest techniques for raising crops and farm animals but also of how to operate a successful business. This article describes modern-day farmers and ranchers, those who own or lease their own farms and who grow crops and raise animals for a variety of purposes. It also examines how the occupation as a whole is changing and how farmers and other agricultural workers can prepare for the future. Sources of more information are provided at the end of the article.

Farming today

Farmers of the 21st century are, first and foremost, entrepreneurs. The success of their farms rests squarely on their shoulders—or on those of the workers they hire.

And more and more, success is measured in terms of profit and loss.

Today, most farms and ranches in the United States are small. But farms are getting larger and more concentrated. Increasingly, farmers contract with large business operations, called agribusinesses. These businesses purchase the farmers' crops or animals and produce the food that we recognize on grocery store shelves. Farmers who do business in this way say that they reduce their risk of losing money because they are guaranteed a buyer that will offer them a known price for their crops or animals.

Other farmers sell their products themselves elsewhere, such as on commodities exchanges—trading centers, similar to stock markets—where prices often are determined by worldwide supply and demand for the

What are farmers producing?

Commodity group	Number of farms producing (thousands)	Market value, 2002 (in millions of dollars)
Crops		
Grains, oilseeds, dry beans, and dry peas	485	\$39,957
Fruits, tree nuts, and berries	108	13,771
Vegetables, melons, potatoes, and sweet potatoes	59	12,786
Tobacco	57	1,617
Nursery and greenhouse products, flowering and ornamental plants, and sod	56	14,686
Cotton and cottonseed	25	4,005
Christmas trees and short-rotation woody crops	15	400
Other crops and hay	359	7,930
Animals and animal products		
Cattle and calves	852	\$45,115
Horses, ponies, mules, burros, and donkeys	128	1,329
Sheep, goats, and their products	96	542
Poultry and eggs	83	23,972
Hogs and pigs	82	12,401
Milk and other dairy products from cows	79	20,281
Aquaculture (fish farms)	7	1,133
Other animals and other animal products	29	722

Source: 2002 Census of Agriculture (U.S. Department of Agriculture, National Agricultural Statistics Service)

products. A variety of factors, such as worldwide market conditions, may lower or raise the prices that these farmers receive. Because these farmers have little control over pricing, keeping down the costs of production is especially important.

Modern farmers use a wide range of techniques to maximize production and reduce costs. Even something as common as the cell phone, for example, has improved farmworkers' ability to coordinate their efforts over thousands of acres and speed up their work. Whether raising crops or livestock, farmers are finding ways to apply modern techniques and increase efficiency. The table on the facing page shows the major crops and animals that farmers raised in 2002.

Growing crops

In many ways, the business of raising crops today is distinctly modern. For example, many farmers use integrated pest management techniques to control pests without pesticides. To eradicate a pest, they might introduce another type of insect that feeds on it or use a substance that interferes with the pest's reproductive cycle.

Among the more contemporary methods of raising crops are precision farming, bioengineering, and organic farming.

Precision farming. Precision farming involves using technology and data to make efficient decisions about raising crops. Two methods of precision farming include the making of detailed maps of the land and the use of electronic yield monitoring.

Farmers use detailed maps of the land that are created from satellite and aerial photographs. Added to these maps are data from sensing devices in the ground that measure the amounts of water, weeds, and nutrients in the soil. Today's Global Positioning Systems (GPS) allow exact locations of the land and nutrients to be pinpointed. Farmers use this information to decide where to add fertilizer, herbicides, and water. In this way, farmers reduce their costs by cutting down on unnecessary applications.

GPS also helps farmers and farmworkers navigate equipment accurately through the fields. "GPS guidance for tractors allows us to have zero overlap, which has increased efficiency tenfold," says Anderegg. "It cuts costs, cuts herbicide use, decreases fuel use, and increases time efficiency so we can work more acres." (For more information about careers involving GPS and electronic sensing devices, see "Geography jobs," elsewhere in this



issue of the *Quarterly*.)

Precision farming also includes yield monitoring. During harvesting, yield monitors are attached to farm equipment, such as combines (power-operated machines that cut, thresh, and clean grain), to track how much is produced in an exact location. Together with GPS maps, yield monitors help farmers determine which sites on the farm may need extra nutrients to boost production.

Bioengineering. Another technology used by many 21st-century farmers is bioengineering. Bioengineered crops are grown from seeds that have been genetically modified to yield plants that are altered in some way—for example, to resist certain pests, to tolerate drought, or to contain additional nutrients, such as rice with extra vitamin A.

Although many farmers raise bioengineered crops, some consumers are leery of genetically modified foods and refuse to purchase them. Farmers must decide whether the higher production yields and lower production costs of a bioengineered crop outweigh the risk that the crop will not sell at a price that covers the additional cost of the seeds.

Organic farming. A growing number of farmers avoid bioengineered crops altogether, along with the use of synthetic pesticides and herbicides. These farmers take advantage of the higher prices that they can charge for organic grains, fruits, and vegetables. Since 1990, according to the U.S. Department of Agriculture, sales of organic products have grown 20 percent per year, and they are expected to continue climbing. For small farmers, growing organic products allows them to remain in farming and still make a profit.

In using more natural methods of production, organic farmers do not dismiss science and technology in growing their crops. In fact, they might need to know more than other farmers about how plants grow and what helps them to thrive. Most organic crop farmers, and some conventional farmers, adopt techniques that raise soil quality to naturally resist diseases, weeds, and insects. They might increase soil quality by planting high-nutrient crops in the off-season, for example, or by using conservation tillage practices, such as leaving remnants of their crop to decompose in the soil after harvesting.

Raising animals

Farmers and ranchers who raise livestock and other animals are following many of the same trends as those who grow crops. Technology is changing their work, too. For example, manure disposal is an issue on farms that have many animals. Converting manure to methane, or biogas, to produce electricity is a growing and economical use of the waste product.

Other modern practices on farms and ranches include mechanization, breeding, and organic farming.

Mechanization. An increasing number of animals are being housed and fed in large, highly mechanized feedlots, until they reach a desired weight for sale. In these feedlots, computers measure an exact amount of scientifically formulated feed for each animal, which is then delivered mechanically. These animals may be fed growth hormones and antibiotics to help them avoid disease and increase their weight quickly. Such technology makes it possible for farmers today to get cattle to a desired weight in 13 to 16 months, a period much shorter than the 2 to 3 years required in the 1950s. And sensors embedded

FARM FACTS, 2002

Top five States for agricultural production: California, Texas, Iowa, Nebraska, and Kansas

Total number of farms: 2,128,982

Farms with sales of less than \$2,500: 39 percent

Farms with sales of \$100,000 or more: 15 percent

Average farm size: 441 acres

Farms owned by either families or individuals: 90 percent

Farm operators who are women: 27 percent
(women as principal operators: 11 percent)

Growth in the number of farms and ranches with principal operators who are Hispanic: 51 percent (1997-2002)

Average age of farmers: 55 years

Source: 2002 Census of Agriculture (U.S. Department of Agriculture, National Agricultural Statistics Service)

in animals detect health problems and make it possible to easily trace contaminated meat to a particular animal.

The most modern dairy farms are as highly mechanized as modern factories. On these farms, robots do most of the work. Cows are trained to walk up to milking stations, where lasers guide a machine to their udders. Robots automatically perform the milking duties that farmers once did.

Breeding. Genetics and breeding also play a role on today's farms and ranches. Animals are increasingly bred for certain characteristics that are in demand: chickens that produce more eggs or hogs that are leaner than average, for example. Many large farms and ranches have reproductive specialists onsite to oversee animal breeding.

Organic farming. In contrast to large feedlots are smaller farms and ranches that raise animals on grass or organically grown feed and generally do not use hormones or antibiotics. Animals raised on these farms are allowed to graze in fields or to roam freely in designated areas on the farm. The cost of raising animals in this way is higher. But, as with organic produce, the higher prices brought by meat and poultry products from these animals can make the farms profitable.

Getting started in farming

Most farmers got into farming because their parents and grandparents farmed, and they simply entered the family business. Most enjoy the rural lifestyle, the independence, and working outdoors and would not trade their job for any other.

However, many of today's farmers and ranchers work part time, so they often train for another occupation. Whether they are full-time or part-time farmers, however, people wishing to farm must gain knowledge and experience in agriculture and its changing practices.

Acquiring land—or not

For many people, one of the main obstacles to becoming a farmer is the difficulty in acquiring the land needed to farm. The lack of available land and the increasing cost of it, especially in expanding urban areas, prohibit many from getting into the occupation. There are, however, several options available to people who are determined to become 21st-century farmers but who do not own and will not inherit land.

Saving money and buying land a little at a time is

still the foremost method of acquiring property. Another method is to get loans from a financial institution, such as a bank, with which the prospective landowner has established a good relationship. Loans also are available from Federal organizations; the U.S. Department of Agriculture's Farm Service Agency, for example, specifically earmarks funds for beginning farmers and ranchers.

Some farmers prefer not to own the land they farm. Instead, they lease land from absentee or older farm owners. The farming of land by someone other than the owner has become increasingly common as the children of farmers inherit farmland—but not the desire to work on it.

Education and training

Education is critical to becoming a 21st-century farmer and may be the difference between success and failure. Farmers today not only have to be experts on plants and animals, they must also be computer literate, mechanically inclined, savvy in business, legal minded, and knowledgeable about world events. They must also be politically astute because much of their farm income and operations are tied to governmental policies and regulations.

Increasingly, educating oneself about farming and agriculture requires a lifelong commitment. The 21st-century farmer must stay informed about technological developments to remain competitive both locally and globally. Beginning in the middle school years, students in farming communities can enroll in agricultural education classes at their schools. In addition, students aged 12 to 21 can join their local chapter of the National FFA Organization, an agricultural education association. And State or county Cooperative Extension offices have information about 4-H clubs, which provide youths with opportunities to engage in a variety of farming-related projects.

With so much to learn, obtaining a bachelor's degree is often recommended for aspiring farmers. In fact, 19 percent of farmers have a bachelor's or higher degree, and another 7 percent have an associate degree.

Earning a degree is more important than the area of study chosen; a degree in business or political science, for example, may be as useful as one in agricultural science to a prospective farmer, especially one who was raised on a farm.

Most farmers do not have a bachelor's degree. These

farmers are encouraged to get some postsecondary training in subjects such as farm management, fertilizers and pesticides, and marketing. Classes usually are offered at community colleges or other adult education centers.

Marketing and developing a marketing strategy are becoming essential tools for farmers and ranchers. Marketing involves determining what products to grow and whom to sell them to. It also involves knowing how to price a product to cover costs and understanding strategies that minimize the risk of fluctuating prices.

A marketing strategy helps farmers decide how to distribute their products. Small farmers may find that marketing directly to consumers, whether at farmers' markets or over the Internet, is more profitable than selling to large businesses. Others may contract their produce to area restaurants or grocery stores. Some small farmers do limited processing of their own products to make them more marketable and profitable—for example, creating specialty cheeses from milk or selling hay for household decorations instead of for feed.

Other routes to agricultural work

Farmers and ranchers are not the only workers in occupations devoted to agricultural pursuits. Some people might enjoy working on or around farms or agriculture but do not like the uncertainty of life on a farm. Other people might want to get experience as they save money to buy land of their own to farm. There is work in agriculture for these enthusiasts. (See, for example, "Careers in the green industry: Jobs for people with green thumbs," elsewhere in this issue of the *Quarterly*.)

Agricultural scientist. Agricultural scientists may advise farmers and farm managers about the best ways to control weeds, apply pesticides, conserve water, or prevent soil erosion. They might also help farmers and ranchers determine the quantity and mix of nutrients needed in animal feed to produce healthier cattle and leaner meat, for example.

Although many agricultural scientists work in laboratories, a growing number work with farmers and farm managers to improve the quantity and quality of their crops and animals. According to the U.S. Bureau of Labor Statistics (BLS), the employment of these scientists is projected to grow 9 percent between 2002 and 2012.

Most agricultural scientists have at least a bachelor's degree, and many have a graduate degree. A bachelor's degree can prepare people to work in applied science or as assistants in laboratories. Scientists who do basic research almost always have a master's or doctoral degree.

Farm managers. Farm managers perform many of the same functions as farmers, but instead of owning or leasing a farm, they manage one for somebody else. Their job is mainly supervisory. Farm managers hire the farmworkers, contract for the services of specialists in weed control or pesticide application, perform payroll duties, and ensure that the farm runs efficiently. They may decide what to plant and negotiate prices with buyers.

BLS projects that employment of farm managers will grow 5 percent between 2002 and 2012. Growth in the numbers of absentee landowners and of farms owned by institutions and corporations will re-



quire operation of farms by professional farm managers.

The education of agricultural managers is similar to that of farmers and ranchers because they do similar work. Many have a bachelor's degree in business or marketing to help them manage a farm; or they have a degree in agronomy, agricultural production, animal science, or some other subject related to farming. Nearly all agricultural managers have experience working on a farm or ranch.

Other occupations. Other related occupations with job potential are in agricultural sales and custom harvesting. Agricultural sales, which involves selling farm-related products, requires knowledge of agriculture, farming, and ranching practices. Custom harvesting is a service offered by companies to farmers who either cannot afford or choose not to buy expensive harvesting equipment, such as a combine.

Farming outlook

There is more than one direction in which 21st-century farmers can go. They can own or manage a large, capital-intensive farm. Or, they can find an agricultural niche and provide a specialty product that is in high demand. In either case, 21st-century farmers must have good business sense and the ability to make money in an industry that is expensive to enter and that entails considerable risk.

The outlook for becoming a self-employed farmer or rancher is not favorable. BLS projects a 21-percent decline in the number of self-employed farmers and ranchers. Many farmers and ranchers who are expected to leave this occupation include those who will retire, work part time, or lack the means or desire to invest in equipment and modernize their farms to generate a profit.

Still, farming in the 21st century is one of the most productive occupations in the country. According to BLS, the number of self-employed farmers and ranchers whose primary job was farming decreased from nearly 1.1 million in 1992 to about 900,000 in 2002. Despite this decline in employment, the market value of all agricultural products sold during that decade grew noticeably, from \$162 billion in 1992 to \$200 billion in 2002. And according to the American Farm Bureau Federation, one farmer in 1990 could feed 129 people. Today, that number is 144.

Farmers and ranchers may be decreasing in number, but their productivity continues to improve. And that gives business-savvy farmers a green light to the future.

For more information

To learn more about farmers and ranchers, visit a public library. Look for sources of information about occupations and issues, such as biotechnology and global marketing, that are associated with farming. BLS resources about agriculture-related careers, available in many libraries, include the 2004-05 editions of the *Occupational Outlook Handbook* and *Career Guide to Industries*. Both are also available online, at www.bls.gov/oco and www.bls.gov/oco/cg, respectively.

Other career information is available from associations, including the following:

American Society of Farm Managers and
Rural Appraisers
950 S. Cherry St., Suite 508
Denver, CO 80246-2664
(303) 758-3513
www.asfmra.org

National FFA Organization
Attention: Career Information Requests
P.O. Box 68960, 6060 FFA Dr.
Indianapolis, IN 46268-0960
(317) 802-6060
www.ffa.org

American Farm Bureau Federation
Young Farmer & Rancher Program
600 Maryland Ave. SW., Suite 800
Washington, DC 20024
(202) 406-3600
www.fb.org/programs/yfr

Information about obtaining loans for starting or operating a farm or ranch or for students who are starting a small agricultural business is available from:

U.S. Department of Agriculture
Farm Service Agency
1400 Independence Ave. SW., Stop 0522
Washington, DC 20250-0522
(202) 720-1632
www.fsa.usda.gov

To locate State Farm Service Agency offices, call toll-free, 1 (800) 880-4183.

Information about the business of farming is also available online from the U.S. Department of Agriculture's Small Farm Program at www.usda.gov/occe/smallfarm.

