Median annual earnings of natural sciences managers were $75,880 in 2000. The middle 50 percent earned between $56,320 and $100,760. The lowest 10 percent earned less than $43,110, and the highest 10 percent earned more than $128,090. Median annual earnings in the industries employing the largest numbers of natural sciences managers in 2000 were:

Research and testing services .............................................. $87,070
Federal government ......................................................... 74,780

A survey of manufacturing firms, conducted by Abbot, Langer & Associates, found that engineering department managers and superintendents earned a median annual income of $85,154 in 1999, while research and development managers earned $84,382.

In addition, engineering and natural sciences managers, especially those at higher levels, often receive more benefits—such as expense accounts, stock option plans, and bonuses—than do non-managerial workers in their organizations.

Related Occupations
The work of engineering and natural sciences managers is closely related to that of engineers; mathematicians; and physical and life scientists, including agricultural and food scientists, biological and medical scientists, conservation scientists and foresters, atmospheric scientists, chemists and materials scientists, environmental scientists and geoscientists, and physicists and astronomers. It also is related to the work of other managers, especially top executives.

Sources of Additional Information
For information about a career as an engineering and natural sciences manager, contact the sources of additional information for engineers, life scientists, and physical scientists that are listed in statements on these occupations elsewhere in the Handbook.

Farmer, Rancher, Agricultural Managers
(O*NET 11-9011.01, 11-9011.02, 11-9011.03, 11-9012.00)

Significant Points
- Modern farming requires college training in agriculture and work experience acquired through growing up on a farm or through a small number of internships now available.
- Overall employment is projected to decline because of increasing productivity and consolidation of farms.
- Aquaculture should provide some new employment opportunities; in addition, developments in value-added marketing and organic farming are making small-scale farming economically viable again.
- Self-employed farmers’ and ranchers’ incomes vary greatly from year to year.

Nature of the Work
American farmers, ranchers, and agricultural managers direct the activities of one of the world’s largest and most productive agricultural sectors. They produce enough food and fiber to meet the needs of the United States and produce a surplus for export.

Farmers and ranchers may be owners or tenants who rent the use of land. The type of farm they operate determines their specific tasks. On crop farms—farms growing grain, cotton, and other fibers, fruit, and vegetables—farmers are responsible for planning, tilling, planting, fertilizing, cultivating, spraying, and harvesting. After the harvest, they make sure the crops are properly packaged, stored, or marketed. Livestock, dairy, and poultry farmers must feed, plan, and care for the animals and keep barns, pens, coops, and other farm buildings clean and in good condition. They also oversee breeding and marketing activities. Horticultural specialty farmers oversee the production of ornamental plants, nursery products—such as flowers, bulbs, shrubbery, and sod—and fruits and vegetables grown in greenhouses. Aquaculture farmers raise fish and shellfish in marine, brackish, or fresh water, usually in ponds, floating net pens, raceways, or recirculating systems. They stock, feed, protect, and otherwise manage aquatic life sold for consumption or used for recreational fishing.

Farmers and ranchers make many managerial decisions. Their farm output is strongly influenced by the weather, disease, fluctuations in prices of domestic and foreign farm products, and Federal farm programs. In a crop operation, farmers usually determine the best time to plant seed, apply fertilizer and chemicals, harvest, and market. They use different strategies to protect themselves from unpredictable changes in the markets for agricultural products. Many farmers carefully plan the combination of crops they grow so that if the price of one crop drops, they will have sufficient income from another to make up for the loss. Others, particularly operators of smaller farms, may choose to sell their goods directly through farmers’ markets, or use cooperatives to reduce their financial risk and to gain a larger share of consumers’ expenditures on food. For example, in Community Supported Agriculture (CSA), cooperatives sell to consumers shares of a harvest prior to the planting season, thus freeing the farmer from having to bear all the financial risks and ensuring the farmer a market for the produce of the coming season.

Farmer and ranchers who plan ahead may be able to store their crops or keep their livestock to take advantage of better prices later in the year. Those who participate in the risky futures market—in which contracts and options on futures contracts on commodities are traded through stockbrokers—try to anticipate or track changes in the supply of and demand for agricultural commodities, and thus changes in the prices of farm products. By buying or selling futures contracts, or by pricing their products in advance of future sales, they attempt to either limit their risk or reap greater profits than would normally be realized. They may have to secure loans from credit agencies to finance the purchase of machinery, fertilizer, livestock, and feed. Like other businesses, farming operations have become more complex in recent years, so many farmers use computers to keep financial and inventory records. They also use computer databases and spreadsheets to manage breeding, dairy, and other farm operations.

Responsibilities of farmers and ranchers range from caring for livestock, to operating machinery, to maintaining equipment and facilities. The size of the farm or ranch often determines which of these tasks farmers and ranchers will handle themselves. Operators of small farms usually perform all tasks, physical and administrative. They keep records for tax purposes, service machinery, maintain buildings, and grow vegetables and raise animals. Operators of large farms, on the other hand, have employees who help with the physical work that small-farm operators do themselves. Although employment on most farms is limited to the farmer and one or two family workers or hired employees, some large farms have 100 or more full-time and seasonal workers. Some of these employees are in nonfarm occupations, working as truck drivers, sales representatives, bookkeepers, and computer specialists.

Agricultural managers guide and assist farmers and ranchers in maximizing the financial returns to their land by managing the day-
to-day activities. Their duties and responsibilities vary widely. For example, the owner of a very large livestock farm may employ a manager to oversee a single activity, such as feeding the livestock. On the other hand, when managing a small crop farm for an absentee owner, a manager may assume responsibility for all functions, from selecting the crops to participating in planting and harvesting. Farm management firms and corporations involved in agriculture employ highly trained professional farm managers who may manage farm operations or oversee tenant operators of several farms. In these cases, managers may establish output goals; determine financial constraints; monitor production and marketing; hire, assign, and supervise workers; determine crop transportation and storage requirements; and oversee maintenance of the property and equipment.

There are several types of agricultural managers. Nursery and greenhouse managers make decisions about the type and quality of horticultural plants—trees, shrubs, flowers, or mushrooms, for example—to be grown. They also select and purchase seed, fertilizers, and chemicals used for disease control. Crop farm managers and fish hatchery managers direct farmworkers involved in crop and fish hatchery production. (Farmworkers are discussed in the Handbook statement on agricultural workers.)

**Working Conditions**

The work of farmers, ranchers, and agricultural managers is often strenuous; work hours are frequently long; and they rarely have days off during the planting, growing, and harvesting seasons. Nevertheless, for those who enter farming or ranching, these disadvantages are outweighed by the quality of life in a rural area, working outdoors, being self-employed, and making a living working the land. Farmers and farm managers on crop farms usually work from sunrise to sunset during the planting and harvesting seasons. During the rest of the year they plan next season’s crops, market their output, and repair machinery; some may earn additional income by working a second job off the farm.

On livestock producing farms and ranches, work goes on throughout the year. Animals, unless they are grazing, must be fed and watered every day, and dairy cows must be milked two or three times a day. Many livestock and dairy farmers monitor and attend to the health of their herds, which may include assisting in the birthing of animals. Such farmers rarely get the chance to get away unless they hire an assistant or arrange for a temporary substitute.

Farmers who grow produce and perishables have different demands on their time. For example, organic farmers must maintain cover crops during the cold months, which keeps them occupied with farming beyond the typical growing season.

Farm work also can be hazardous. Tractors and other farm machinery can cause serious injury, and workers must be constantly alert on the job. The proper operation of equipment and handling of chemicals is necessary to avoid accidents and protect the environment.

On very large farms, farmers spend substantial time meeting with farm managers or farm supervisors in charge of various activities. Professional farm managers overseeing several farms may divide their time between traveling to meet farmers or landowners and planning the farm operations in their offices. As farming practices and agricultural technology become more sophisticated, farmers and farm managers are spending more time in offices and at computers, where they electronically manage many aspects of their businesses. Some farmers also spend time at conferences, particularly during the winter months, exchanging information.

**Employment**

Farmers, ranchers, and agricultural managers held nearly 1.5 million jobs in 2000. About 86 percent were self-employed farmers and ranchers. Most farmers, ranchers, and agricultural managers oversee crop production activities, while others manage livestock and dairy production. A smaller number are involved in agricultural services, such as contract harvesting and farm labor contracting.

The soil, topography of the land, and the climate of an area generally determine the type of farming and ranching done. For example, California, Wisconsin, New York, and Pennsylvania lead the country in milk production, while Ohio, California, Pennsylvania, and Indiana lead in egg production. Texas, California, Georgia, and Mississippi are the biggest cotton producers, and Kansas, North Dakota, Montana, and Washington are the biggest wheat producers.

**Training, Other Qualifications, and Advancement**

Growing up on a family farm and participating in agricultural programs for young people (sponsored by the National FFA Organization, formerly known as the Future Farmers of America, or the 4-H youth educational programs) are important sources of training for those interested in pursuing agriculture as a career. However, modern farming requires increasingly complex scientific, business, and financial decisions. Therefore, even people who were raised on farms must acquire the appropriate education.

Not all agricultural managers grew up on farms or ranches. For these people, a bachelor’s degree in business with a concentration in agriculture is important. In addition to formal education, they need several years of work experience in the different aspects of farm and ranch operations in order to qualify for an agricultural manager position.

Students should select the college most appropriate to their specific interests and location. In the United States, all State universities have one land-grant university with a school of agriculture. Common programs of study include agronomy, dairy science, agricultural economics and business, horticulture, crop and fruit science, and animal science. For students interested in aquaculture, formal programs are available, and include coursework in fisheries biology, fish culture, hatchery management and maintenance, and hydrology. Whatever one’s interest, the college curriculum should include courses in agricultural production, marketing, and economics.

Professional status can be enhanced through voluntary certification as an Accredited Farm Manager (AFM) by the American Society of Farm Managers and Rural Appraisers. Certification requires several years of farm management experience, the appropriate academic background—a bachelor’s degree or, preferably, a master’s
degree in a field of agricultural science—and the passing of courses and examinations relating to business, financial, and legal aspects of farm and ranch management.

Farmers, ranchers, and agricultural managers need to keep abreast of continuing advances in agricultural methods both in the United States and abroad, as well as changes in governmental regulations that may impact methods or markets for particular crops. Besides print journals that inform the agricultural community, the spread of the Internet allows quick access to the latest developments in areas such as agricultural marketing, legal arrangements, or growing crops, vegetables, and livestock. Electronic mail, on-line journals, and newsletters from agricultural organizations also speed the exchange of information directly between farming associations and individual farmers.

Farmers, ranchers, and agricultural managers also must have enough technical knowledge of crops, growing conditions, and plant diseases to make decisions ensuring the successful operation of their farms. A rudimentary knowledge of veterinary science, as well as animal husbandry, is important for livestock and dairy farmers. Knowledge of the relationship between farm operations—for example, the use of pesticides—and environmental conditions is essential. Mechanical aptitude and the ability to work with tools of all kinds are also valuable skills for the operator of a small farm, who often maintains and repairs machinery or farm structures.

Farmers, ranchers, and agricultural managers need the managerial skills necessary to organize and operate a business. A basic knowledge of accounting and bookkeeping is essential in keeping financial records, while a knowledge of credit sources is vital for buying seed, fertilizer, and other inputs necessary for planting. It is also necessary to be familiar with complex safety regulations and requirements of governmental agricultural support programs. Computer skills are increasingly important, especially on large farms, where computers are widely used for recordkeeping and business analysis. For example, some farmers, ranchers, and agricultural managers use personal computers to access the Internet to get the latest information on prices of farm products and other agricultural news.

High school training should include courses in mathematics and in biology and other life sciences. Completion of a 2-year degree, and preferably a 4-year bachelor’s degree program in a college of agriculture, is becoming increasingly important. But even after obtaining formal education, novices may need to spend time working under an experienced farmer to learn how to put into practice the skills learned through academic training. A small number of farms offer, on a formal basis, apprenticeships to help young people acquire such practical skills.

Job Outlook
Demand for food and fiber will increase due to growth in world population and in demand for U.S. agricultural exports as developing nations improve their economies and personal incomes. However, increasing productivity in the U.S. agricultural production industry is expected to meet domestic consumption needs and export requirements with fewer workers. Employment of farmers and ranchers, is expected to continue to decline through 2010, while employment for farm, ranch, and agricultural managers is expected to grow slower than average. The overwhelming majority of job openings for self-employed farmers and ranchers will result from the need to replace farmers who retire or leave the occupation for economic or other reasons.

Market pressures will continue the long-term trend toward consolidation into fewer and larger farms over the 2000-10 period, further reducing the number of jobs for farmers and ranchers, but increasing employment of agricultural managers. Some farmers acquire farms by inheritance; however, purchasing a farm or additional land is expensive and requires substantial capital. In addition, sufficient funds are required to withstand the adverse effects of climate and price fluctuations upon farm output and income and to cover operating costs—livestock, feed, seed, and fuel. Also, the complexity of modern farming and keen competition among farmers leaves little room for the marginally successful farmer.

Despite the expected continued consolidation of farm land and the projected decline in overall employment of farmers, ranchers, and agricultural managers, an increasing number of small-scale farmers have developed successful market niches that involve personalization, direct contact with their customers. Many are finding opportunities in organic food production, as more consumers demand food grown without pesticides or chemicals. Others use farmers’ markets that cater directly to urban and suburban consumers, allowing the farmers to capture a greater share of consumers’ food dollars. Some small-scale farmers, such as some dairy farmers, belong to collectively owned marketing cooperatives that process and sell their product. Other farmers participate in community-supported agriculture cooperatives that allow consumers to directly buy a share of the farmer’s harvest.

Aquaculture also should continue to provide some new employment opportunities over the 2000-10 period. Overfishing has resulted in declining ocean catches, and the growing demand for certain seafood items—such as shrimp, salmon, and catfish—has spurred the growth of aquaculture farms. Aquaculture output increased strongly between the early 1980s and mid-1990s, and continued growth is expected.

Earnings
Incomes of farmers and ranchers vary greatly from year to year because prices of farm products fluctuate depending upon weather conditions and other factors that influence the quantity and quality of farm output and the demand for those products. A farm that shows a large profit in one year may show a loss in the following year. Under the 1996 Farm Act, Federal Government subsidy payments, which have traditionally shielded some grain producers from the ups and downs of the market, were set at fixed levels regardless of yields or prices. Consequently, these farmers may experience more income variability from year to year than in the past. The Act also phases out price supports for dairy farmers, and may result in lower incomes for dairy producers. Many farmers—primarily operators of small farms—have income from off-farm business activities, often greater than that of their farm income.

Full-time, salaried farm managers, with the exception of horticultural managers, had median weekly earnings of $542 in 2000. The middle half earned between $221 and $655. The highest paid 10 percent earned more than $756, and the lowest paid 10 percent earned less than $187. Horticultural specialty farm managers generally earn considerably more.

Farmers and self-employed farm managers make their own provisions for benefits. As members of farm organizations, they may derive benefits such as group discounts on health and life insurance premiums.

Related Occupations
Farmers, ranchers, and agricultural managers strive to improve the quality of agricultural products and the efficiency of farms. Others whose work is related to agricultural products include agricultural engineers, agricultural and food scientists, agricultural workers, and purchasing agents and buyers of farm products.

Sources of Additional Information
For general information about farming and agricultural occupations, contact:
Financial Analysts and Personal Financial Advisors

(O*NET 13-2051.00, 13-2052.00)

Significant Points

- A college degree and good interpersonal skills are among the most important qualifications for these workers.
- Although both occupations will benefit from an increase in investing by individuals, personal financial advisors will benefit more.
- Financial analysts may face keen competition for jobs, especially at top securities firms, where pay can be lucrative.

Nature of the Work

Financial analysts and personal financial advisors provide investment analysis and guidance to businesses and individuals to help them with their investment decisions. They gather financial information, analyze it, and make recommendations. However, their job duties differ because of the type of investment information they provide and the clients they work for. Financial analysts assess the economic performance of companies and industries for firms and institutions with money to invest. Personal financial advisors generally assess the financial needs of individuals, providing them a wide range of options.

Financial analysts, also called security analysts and investment analysts, work for banks, insurance companies, mutual and pension funds, securities firms, and other businesses helping the company or their clients make investment decisions. They read company financial statements and analyze commodity prices, sales, costs, expenses, and tax rates in order to determine a company’s value and project future earnings. They often meet with company officials to get better insight into a company and determine managerial effectiveness. Usually financial analysts study an entire industry, assessing current trends in business practices, products, and industry competition. They must keep abreast of new regulations or policies that may affect the industry, as well as monitor the economy to determine its effect on earnings.

Financial analysts use spreadsheet and statistical software packages to analyze financial data, spot trends, and develop forecasts. Based on their results, they write reports and make presentations, usually making recommendations to buy or sell a particular investment or security. Senior analysts may actually make the decision to buy or sell for the company or client if they are the ones responsible for managing the assets. Other analysts use the data to measure the financial risks associated with making a particular investment decision.

Financial analysts in investment banking departments of securities or banking firms often work in teams analyzing the future prospects of companies that want to sell shares to the public for the first time. They also ensure that the forms and written materials necessary for compliance with Securities and Exchange Commission regulations are accurate and complete. They may make presentations to prospective investors about the merits of investing in the new company. Financial analysts also work in mergers and acquisitions departments, preparing analyses on the costs and benefits of a proposed merger or takeover.

Some financial analysts, called ratings analysts, evaluate the ability of companies or governments issuing bonds to repay their debt. Based on their evaluation, a management team assigns a rating to a company’s or government’s bonds. Other financial analysts perform budget, cost, and credit analysis as part of their responsibilities.

Personal financial advisors, also called financial planners or financial consultants, use their knowledge of investments, tax laws, insurance, and real estate to recommend financial options to individuals based on their short-term and long-term goals. Some of the issues they address are retirement planning, estate planning, tax issues, funding for college, and general investment options. While most planners offer advice on a wide range of topics, some specialize in areas such as estate planning or risk management.

An advisor’s work begins with a consultation with the client, where the advisor obtains information on the client’s finances and financial goals. The advisor then develops a comprehensive financial plan that identifies problem areas, makes recommendations for improvement, and selects appropriate investments based on their goals, attitude toward risk, and expectations or needs for a return on the investment. Often, this plan is written, but it can be in the form of verbal advice. Financial advisors usually meet with established clients at least once a year to update them on potential investments.