

Food and Agricultural Policy

Taking Stock for
the New Century



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Preface

Our Nation's farm and food system serves the population exceedingly well. Today, American consumers enjoy abundant and safe food presented in a wide variety of choices. Our affordable food has enabled consumer spending on many other goods and services that contribute to our unrivaled standard of living.


The outstanding performance of our food system has not come about by happenstance. Rather, it has been the result of far-sighted planning and investment decisions that long ago put policies and procedures in place to support it. But, in recent years the pace of change has been unparalleled.

Our producers now operate in a global, technologically advanced, rapidly diversifying, highly competitive business environment that is relentlessly driven by increasingly sophisticated consumers.

Our challenge today is twofold: to confront and manage the change immediately before us while at the same time modernizing our farm and food system infrastructure to ensure continued growth and development for the 21st century.

The stocktaking exercise described in this report is an effort to that end. Its purpose is to formulate a longer term view of the Nation's agriculture and food system, and to offer constructive ideas and suggestions to help guide the necessary efforts and investments to meet future needs. That is a tall order and involves a wide range of considerations.

The changes are so sweeping that we must pause to take stock of the new operating environment, with a view to ensuring that our system continues to have the foundation it needs to serve us as well in the future as it has in the past.



Ann M. Veneman
Secretary



Executive Summary

Our system has served this nation exceedingly well in the past, the result of far-sighted planning and investment—and it is our current responsibility to reappraise and further develop that foundation to meet the needs of the future.

The dynamism that characterizes today's food system began to develop more than two centuries ago, at the advent of the Industrial Revolution, and continues relentlessly today. It reflects changes in our society—globalization of markets and culture, advances in information and biological (and other) technologies, fundamental changes in our family structure and workforce—and extends throughout the network of food marketing, distribution, trade, and consumption. These trends are positive and unstoppable. They reflect today's realities and are leading to a fundamental restructuring of the food system and a much different business environment for food and agriculture in the future.

The implications of these trends and the changes they imply are enormous. Our national institutions, policies, regulations, indeed the entire infrastructure built to support agriculture and the food system, as well as the underlying resource base upon which it depends, are increasingly stressed as the system attempts to deal with this new environment. Modernizing our institutions and policies to deal with these new realities is a constant challenge.

Our system has served this nation exceedingly well in the past, the result of far-sighted planning and investment—and it is our current responsibility to reappraise and further develop that foundation to meet the needs of the future. That is the purpose of this stocktaking exercise—the development of important principles that stakeholders can use to help guide our strategic thinking about food and agriculture in this new century.

Entering a New Era

It has not been so long ago in America's history that food was viewed strictly in terms of commodities produced in bulk and meant to be plentiful and affordable. But, in the last half century's prosperity, our concept of and expectations from food have changed, and taken on a new significance. American consumers today expect a great deal more from our food system. And, there is no doubt that it delivers—more nutritious food with wider variety, improved safety, with less environmental impacts, and greater convenience than at any time in the Nation's history.

Consumer-Driven Agriculture

Increasingly, U.S. consumers insist on defining what is produced, how food production takes place, and with what effects. With more secure supplies of food, consumer interest has shifted to the forms in which foods are available and the services these products include. This consumer driven focus became increasingly important as population growth slowed and prosperity grew, changing the nature of demand for food. Today, domestic food needs grow only at the same slow pace as the population expands. As the U.S. food market has matured, consumption growth for one food product increasingly comes at the expense of another.

As well, Americans consider environmental quality as a kind of “non-market” good that is extremely important in consumer choices. The close interactions between farming practices and natural resources, always important, have been in the spotlight since the 1960s. Whether preserving wetlands, improving wildlife habitat, or maintaining water quality in rivers, streams, and lakes, American farmers' stewardship of the environment has shown

steady improvement. However, these issues remain a matter of both public and private concern and can impact consumer decision making.

A Global Economy

Political boundaries no longer constrain the conduct of good business, and this includes agribusiness. Better, faster, more reliable communications and transportation systems facilitate businesses' abilities to produce, source, and sell in the locations that give them best advantage, even if that means operating in multiple locations around the world. This globalization of markets pressures firms to be more competitive and to "shorten the supply chain" (reducing the number of business transactions and their associated costs) in order to meet rapidly changing consumer demand.

Businesses in the food system around the world compete against each other to provide high-quality products at the best price. Globalization makes it imperative for companies to diversify their sources of raw materials and buy from the farmer, wholesaler, or food processor that provides the best product for the lowest price at any given time. Thus, we can no longer think of our agriculture as being confined to what takes place within our borders. We are part of a larger, world-wide interconnected system.

Technological Innovation

Not only has technology facilitated the growth of global markets by reducing the constraint of geography, so too have new technological innovations spurred remarkable adaptation of the U.S. food and agricultural system to new global conditions and demands. Agricultural technology has traditionally focused on tools and techniques to lower farmers' costs and increase yields. In today's agricultural economy, new biological and information technologies actually expand markets for farmers and assure better communi-

cation between producers and consumers, further increasing market opportunities.

Biologically based technology is a particularly promising source for new products and new uses for farmers. For example, agriculture is the source of clean-burning fuel and industrial ethanol, a variety of specialty chemicals derived from plants rather than from mined stock, soy-based inks and diesel fuel, industrial adhesives, biopolymers, and films. Scientists recently announced that soybean oil can replace a significant share of petroleum-based resin used in manufacturing auto parts. The possibilities are far ranging, important, and growing. They include "pharmacological" products (agriculturally grown pharmaceuticals) and crops or livestock that embody specific traits demanded broadly by consumers (like leaner meat) or by niche markets (such as organic foods).

Information technology and computer-based marketing promise, via "e-commerce," far broader access to markets than has ever been the case before. This access extends to consumers seeking direct buying opportunities, and producers seeking buyers of all sizes and types for niche as well as bulk products. The consequence is that size and distance are diminishing in importance for successful marketing.

The combined effect of biological and information technologies is potentially staggering. At the same time that consumer demands and producer opportunities are more rapidly and accurately signaled through e-commerce transactions, advances in biotechnology permit more rapid transformation of such demands into new products than ever possible before.

Technical advances are also addressing environmental issues. The tools of precision agriculture permit fertilizers and other agricultural chemicals to be used in quantities that exactly meet crop nutrition

Today, domestic food needs grow only at the same slow pace as the population expands. As the U.S. food market has matured, consumption growth for one food product increasingly comes at the expense of another.





or protection needs, reducing the chance of exceeding environmental capacity. Adaptations from space, energy, and manufacturing sectors, such as satellite monitoring and robotics, offer remarkable new opportunities for agri-environmental improvement as well as continued increases in production efficiency.

Agricultural Diversity

The explosion of productivity sparked by technological advance has meant big changes for the farming sector. A concentration of resources into fewer and larger farms occurred throughout the 20th century. While production doubled over the last 50 years, farm numbers dropped by more than two-thirds. Today, about 150,000 American farmers produce most of our food and fiber. While among the world's most competitive farms, these operations make up just one segment of U.S. agriculture. USDA counts another 2 million farmers who meet the criterion of selling at least \$1,000 worth of product annually, many of whom have other occupations but enjoy rural lifestyles.

A vast diversity of farms emerges out of this multitude: niche farms, hobby farms, hunting preserves, dude ranches, you-pick operations,

farms that sell directly to consumers through farmer's markets, bed and breakfasts, and more.

Farmers produce scores of different raw commodities every year and countless varieties of products, even though bulk commodities—such as cotton, corn, wheat, and other food and feed grains that are the focus of government programs—symbolize agriculture for many. These program crops, grown on almost every farm in the 1930s, are produced today on perhaps only 30 percent of all farms and account for just 20 percent of the total value of agricultural sales.

In the 1930s, when price and income support programs first were developed, there was little need to distinguish among farms, farmers, or farm households. In fact, farms and households (and farming communities, in many cases) were closely intertwined as a way of life and were considered inseparable. Today, fewer farmers are full time, choosing to merge farm and nonfarm employment opportunities. While income from farming, as measured by net farm cash income, was \$55.7 billion in 1999, off-farm sources contributed \$124 billion.

The Implications of Change

We see in 2001 a highly diverse set of farms, responding with alacrity to apply unique technological possibilities to a new array of increasingly well articulated consumer demands in a globalized food system. The role of government will also continue to change, particularly as it relates to trade, farm policy, infrastructure demands, conservation and the environment, rural communities, and nutrition and food assistance. How we approach these issues will set the course for the future of American agriculture.

Trade Expansion Is Critical

Trade is critically important to the long-term economic health and prosperity of our food and agricultural sector. We have far more capacity than needed to meet domestic food market requirements. To avoid excess capacity throughout the system—our farmland, transportation, processing, financing, and other ancillary services—we must maintain and expand our sales to customers outside this country. Steadily expanding foreign demand—brought on by income gains, trade liberalization, and changes in global market structures—has helped U.S. exports steadily increase over time from \$7.3 billion in 1970 to \$53.5 billion for the current fiscal year. Clearly, without the salutary effects of an expanding export market, farm

prices and net cash incomes would be significantly lower today.

Over 96 percent of the world's population lives outside the United States. Most future growth in food demand will be in developing and middle-income countries, where both population and income are growing relatively rapidly. While we continue to see growth in exports of traditional commodities, exports of consumer-oriented, high-value products (meats, poultry, fruits and vegetables, and processed grocery products) are growing even more rapidly. High-value products now account for two-thirds of total sales, compared with only half in 1990.

Working to “level the playing field” through worldwide reductions in tariffs and other barriers to trade is fundamental to expanding exports. The average food and agricultural tariff in world trade is much higher than tariffs on manufactured items. The United States already has

one of the lowest food and agricultural tariffs (12 percent compared to a global average of 62 percent), and thus stands to gain immensely from ambitious efforts to cut tariffs where they are high.

Clearly, without the salutary effects of an expanding export market, farm prices and net cash incomes would be significantly lower today.

Principles for Expanding Trade

- **Recognize the critical importance of the global marketplace.** More than 96 percent of all consumers live outside the United States. Failing to reach the newly emerging middle-class consumers (where demand growth will be most rapid) will stifle expansion of market share.
- **Expand markets through new trade agreements.** Greater access to foreign markets requires aggressive trade policy to lower tariffs and eliminate distorting subsidies. Failure to provide strong leadership in global trade liberalization will result in our producers and exporters being left behind. Other nations are aggressively pursuing agreements, many right in this hemisphere which

are markets where we should have transportation and other advantages.

- **Ensure that farm and trade policies are fully compatible.** Domestic farm support and international trade policies must be consistent and mutually reinforcing. It makes no sense to have trade policies and programs promoting farm exports at the same time domestic support programs inadvertently reduce competitiveness. Our domestic and export policy must support our existing international obligations and at the same time give us ample latitude in pursuing ambitious goals in ongoing and future negotiations.
- **Enforce existing trade agreements.** Once new trade agree-

ments have been concluded, the Government must ensure that our trading partners meet their obligations. This includes ensuring that our trading partners use accepted scientific principles in enacting their regulations. The growing number of sanitary/phytosanitary-related trade issues also requires an enhanced regulatory infrastructure.

- **Sharpen marketing efforts.** Programs to expand exports—export credit guarantees and market development—have served our food and agriculture sector well. Continual review and modification of these programs are required to ensure they are cost-effective and target high-impact growth markets and high-value products.

Farm Sector Policy

More than seven decades of farm policy have provided a rich, full experience upon which to draw as we contemplate appropriate 21st century policies for our industry. Our experience with policies and programs across this span of time has proved very instructive, providing invaluable lessons which at a very minimum can help us avoid the obvious mistakes of the past. History also shows that growth in farm household income has been due largely to rapid improvements in productivity supported by a strong research base along with better opportunities to market products—including export markets and off-farm employment opportunities.

Many of the program approaches since the 1930s proved not to work well or not at all, produced unexpected and unwanted consequences, became far costlier than expected, and have been continually modified in our long succession of farm laws. The Federal Agriculture Improve-

ment and Reform (FAIR) Act of 1996 removed much of the decades-old program structure, provided unparalleled farmer decision-making flexibility through “decoupled” benefits, and set a new example throughout the world for providing domestic farm sector support. While that approach still is arguably the least market- and resource-use-distorting approach available, its direct payments do share some unintended effects with price support programs, namely, the artificial inflation of farm land prices. The effect clearly has been exacerbated by the size of payments in recent years, some \$28 billion in the last 4 years above the amount provided in the 1996 law.

Because of their historical evolution, current program benefits still are largely directed to specific commodity producers reaching only about 40 percent of our farms. And, there still is no direct relationship between benefits received and financial status of the farm.

Our current broad-scale, commodity-oriented approach to farm support does not recognize existing

wide differences in production costs, marketing approaches, or overall management capabilities that delineate competitive and noncompetitive operations. For example, highly efficient commercial farms benefit enormously from price supports, enabling them to expand their operations and lower costs even more. Other farms have not received enough benefits to remain viable and have been absorbed along the way.

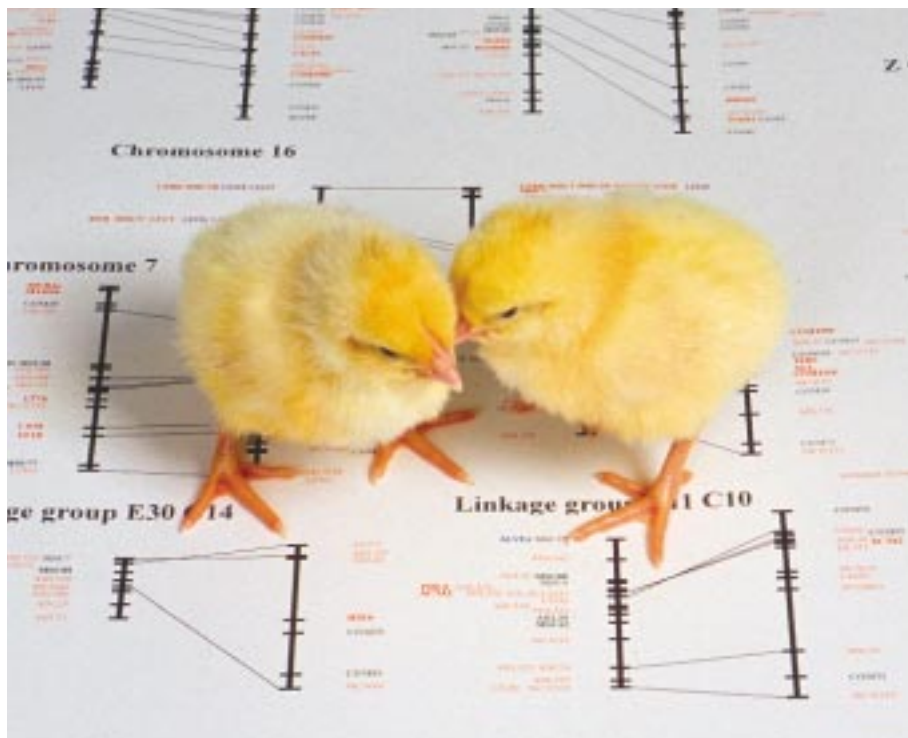
Another unintended consequence of current programs stems from the increasing disconnect between land ownership and farm operation. While program benefits were intended to help farm operators, most support eventually accrues to landowners, in the short run through rising rental rates and in the longer term through capitalization into land values. For many farm operators, renting land is a key strategy to expand the size of the business and capture the size economies, as evidenced by 42 percent of farmers renting land in 1999. Clearly, operators farming mostly rented acreage may receive little benefit from the programs.

While the current policy made large strides towards greater market orientation, a careful evaluation in the context of today's diverse farm structure and increasingly consumer-driven marketplace still reveals severe misalignment among policy goals, program mechanisms, and outcome. Improvements could support more sustainable prosperity for farmers and agriculture and rural communities without engendering long-term dependence on direct government support.



Principles for Farm Policy

- **Pay heed to lessons learned.** Above all, effective farm policies for the new century must build upon the lessons learned from over seven decades of rich experience with the farm programs. Even the most carefully designed government intervention distorts markets and resource allocation, produces unintended consequences, and spreads benefits unevenly. We cannot afford to keep relearning the lessons of the past.
- **Recognize our new operating environment.** Our farm sector and food system operate today in a new and evolving business and social environment. It is a competitive, consumer-driven environment, global and rapidly changing with enormous implications for the place and role of the farm sector in the overall food system. It is highly interdependent, blending the efforts of many industries to add value to farm sector products.
- **Continually expand our commitment to open markets.** The United States is thoroughly committed to market-oriented policies, well understood to serve the best long-term interests of all stakeholders in the food system and society at large. Markets have continually demonstrated their superiority to other alternatives in guiding allocation of resources, investment, and production in patterns that are most beneficial to society at large. Still, this commitment needs to be renewed and expanded.
- **Commit even more fully to future growth of the farm and food system.** There is a long-standing, national economic commitment to open markets in support of the Nation's market-oriented policies. For the agriculture industry, development of foreign markets is essential to support future investment, growth, and the long-term health of the sector. Our agricultural production capacity today not only exceeds domestic demand but is growing faster as well. Thus, future asset values, incomes, growth, and general prosperity depend upon gaining greater access to the global growth markets. New and expanded trade agreements hold the best promise for our competitive producers to expand sales and gain market share and generate economic activity across rural America.
- **Ensure that farm and trade policies are fully compatible.** Domestic farm support and international trade policies must be consistent and mutually reinforcing. It makes no sense to have trade policies and programs promoting farm exports at the same time domestic support programs inadvertently reduce competitiveness. Our domestic and export policy must support our existing international obligations and at the same time give us ample latitude in pursuing ambitious goals in ongoing and future negotiations.
- **Strengthen U.S. global leadership.** The world looks to U.S. leadership in policy formulation and program design for both domestic agriculture support and international trade. U.S. policymakers must be cognizant that our actions set examples and help persuade others to our positions.
- **Accommodate and build on the farm sector's wide diversity.** Effective agricultural policies must recognize the wide diversity in the farm sector itself, in terms of size, location, financial status, crop and livestock products produced, managerial abilities, income sources, and goals and aspirations. The problems faced by these groups are widely different and require solutions tailored effectively to address particular needs. Failure to do so only exacerbates the problems and postpones the day of reckoning.
- **Provide a market-oriented economic safety net for farmers.** The national recognition that the farm sector is both unique and essential is long standing and widely held. The result is a parallel commitment to policies that support open markets and those that prevent precipitate downturns in the farm sector. Thus, these programs must conform to basic public policy principles including effectiveness, transparency, equity, consistency, and comprehensiveness. Current policies now take several forms, including countercyclical loans, crop and revenue insurance, and direct payments, but they could be constructed with other programs (such as tax-deferred income accounts) that fully comply with such principles.
- **Focus on a broader infrastructure.** Provide a longer term view of the requirements for a healthy and prosperous farm and food system to ensure that it continues to enjoy widespread consumer confidence and support. This entails refocusing institutions and continuing judicious investment for the entire system, including refurbishing and modernizing the infrastructure that underpins the farm, food, and trading system.



Enhancing the Infrastructure

U.S. agriculture successfully delivers abundant, affordable, safe, and nutritious food to markets worldwide. Nothing has been more important to this success than an extensive physical and institutional infrastructure—in effect, the backbone of the food and agricultural system. The recent outbreak of foot-and-mouth disease in Europe served to heighten our awareness of the infrastructure that protects the integrity of the food and agricultural system. Science, technology, and intergovernmental cooperation are key to keeping crop and animal pests and diseases out of the United States, and to managing the pest and disease challenges we face inside our borders.

America's familiarity with health risks from foodborne microbial hazards has increased in recent years. Widely publicized outbreaks of foodborne illness—traceable to such sources as *E.coli* 0157:H7 in ham-

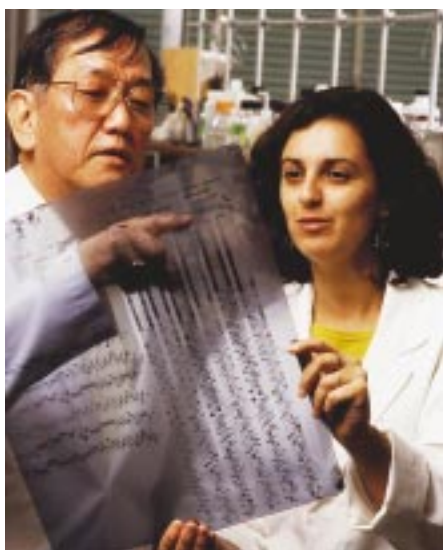
burger, *Listeria monocytogenes* in hot dogs, and *Salmonella* in poultry and eggs—have raised the public's concern. Although preliminary evidence suggests the number of illnesses caused by some pathogens (notably *Salmonella*) may be decreasing, food safety systems are confronting an array of emerging pathogens such as *Cyclospora*, *Cryptosporidium*, and new strains of *Salmonella*.

The agricultural infrastructure includes all of the basic services, facilities, equipment, and institutions needed for the economic growth and efficient functioning of the food and fiber markets. This requires investment in services to protect farmers, ranchers, and consumers from the threats of crop and animal pests and foodborne diseases. It demands a strong commitment to research and the cooperative extension system that undergird production, marketing, food safety, nutrition, natural resource conservation, and all other functions of USDA agencies.

This structure now is being challenged in radically changed market and institutional contexts, calling for very different approaches than in the past. First, the various sectors of the food economy—from producers to processors to retailers—are more interconnected than ever before, and grow more so every day. For any new policy to succeed, it must have input and cooperation from every link in the food chain. Second, crop or animal diseases are increasingly global and require coordinated solutions. Third, recent increases in intellectual property protections and advances in biological science have prompted the private sector to more actively invest in the knowledge base and technological underpinnings of the food system. Stronger private sector incentives imply more opportunities for effective partnerships between the public sector and industry in solving problems.

Principles for Infrastructure Policy

- **Focus on a broader infrastructure.** Provide a longer term view of the requirements for a healthy and prosperous farm and food system to ensure that it continues to enjoy widespread consumer confidence and support. This entails refocusing institutions and continuing judicious investment for the entire system, including refurbishing and modernizing the infrastructure that underpins the farm, food, and trading system.
- **Recognize our new operating environment.** Our farm sector and food system operate today in a new and evolving business and social environment. It is a competitive, consumer-driven environment, global and rapidly changing with enormous implications for the place and role of the farm sector in the overall food system. It is highly interdependent, blending the efforts of many industries to add value to farm sector products.
- **Enhance pest and disease prevention for plants and animals.** From farmers to consumers, our food system depends on strong pest and disease prevention and eradication programs.
- **Build on current success in providing safe food for all Americans.** Emerging pathogens mean that our food safety systems must be continually assessed and updated in order to maintain consumer confidence in our food supply.
- **Anticipate future infrastructure needs.** Building new and different capacities for accomplishing priorities requires a long-term view with a process for anticipating change.
- **Base decisions on science.** Regardless of good intentions, no authorized program, no mandate, no request or emergency need can be carried out unless the appropriate research base, scientists, laboratories, methods, data and information, institutions, and technologies are available. New science is needed to ensure that any new regulations, in food safety, animal and plant health, environment, or other areas, are sound and cost-effective.
- **Capitalize on the unique public sector role in agricultural research and extension.** The private sector is playing an ever-larger role in agricultural research and information provision. Limited public sector research funding thus needs to be devoted to fundamental scientific discovery and questions that the private sector has no incentive to pursue, but that could lead to the betterment of society.
- **Recognize the importance of competition in the market for research.** Maintaining competitive research funding increases the likelihood that the best minds of the country will be applying themselves to important public sector research issues.
- **Recognize the importance of collaboration.** Collaborations involving public agencies, private companies, universities, and consumers are an important means for meeting the interests of various groups while advancing the public good.





Conservation and Environment

Farmers, ranchers, and private forest landowners own and manage two-thirds of the Nation's land and are the primary stewards of our soil, air, and water. While the cost of stewardship on that land is borne by land managers, the benefits accrue to society at large. Meeting society's demands for improved environmental quality requires a broader definition of "output" to include environmental amenities—such as rural landscape amenities, wildlife habitat, wetlands, and improved water and air quality—along with food, fiber, and timber production.

Conservation policy evolved from a primary focus on keeping productive topsoil in place. Reducing soil erosion once was an overriding concern, and a primary accomplishment. We now realize that the off-farm costs of farming include a wide variety of environmental quality measures. Conservation policy thus has come to include broader measures of water quality, as well as protection of wildlife habitat and wetlands. Moreover, emerging issues gaining public attention include

nutrient runoff from livestock production, water conservation, energy production, and reduced greenhouse gas emissions.

As the scope of environmental concerns has expanded, a wider range of conservation policy instruments now are needed to address them. Traditional land retirement (the Conservation Reserve Program) has dominated Federal spending on conservation since 1985; 92 cents of every dollar spent on direct conservation payments to farmers pays for rental and easement payments for idling environmentally sensitive cropland and cost sharing for management practices that enhance the environmental benefits from retired lands. However, considerable conservation activities are carried out on vast stretches of working lands due to voluntary actions and to comply with conservation compliance and other regulatory requirements.

The current imbalance favoring land retirement suggests an untapped potential for achieving cost-effective environmental benefits from conservation spending on working lands. Further, many emerging agri-environmental problems can be addressed only by changing management practices on working land. Similarly, improved private forest management practices can better protect watersheds, provide improved habitat for threatened and endangered species, and guard against non-native invasive species.

Conservation policy must continually balance competing concerns and a "portfolio" approach is essential—employing coordinated land retirement, stewardship incentives, conservation compliance requirements, and regulatory assistance. Use of each where most appropriate can accomplish agri-environmental protection most efficiently. In addition, increased cooperation with local and State governments and others in implementing conservation programs will ensure funds are spent effectively and leveraged.

Principles for Conservation

- **Sustain past environmental gains.** Improvements in losses from soil erosion and wetlands benefit farmers and all Americans. These and other gains resulting from existing conservation programs should be maintained.
- **Accommodate new and emerging environmental concerns.** The need for sources of renewable energy and the potential for reducing greenhouse gas emission are emerging environmental issues. In addition, reducing nutrient runoff from livestock production, addressing conflicts over scarce water supplies, and protecting open space have gained momentum as issues to be addressed. Conservation policy should adapt to emerging environmental and community needs and incorporate the latest science.
- **Design and adopt a portfolio approach to conservation policies.** Targeted technical assistance, incentives for improved practices on working farm and forest lands, compensation for environmental achievements, and limited dedication of farmland and private forest lands to environmental use will provide a coordinated and flexible portfolio approach to agri-environmental goals.
- **Reaffirm market-oriented policies.** Competition in the supply of environmental goods and services and targeted incentives ensure the maximum environmental benefits for each public dollar spent. In addition, permitting the private sector to invest in the provision of environmental goods and services leverages Federal resources and facilitates a transition to a fully functioning private market.
- **Ensure compatibility of conservation and trade policies.** Producer compensation for conservation practices and environmental achievements should be consistent with “green box” criteria under WTO obligations.
- **Coordinate conservation and farm policies.** Conflicts may exist between farm program incentives to increase production and conservation programs seeking to reduce environmental problems from expanded production. Extending conservation compliance will help coordinate environmental objectives and Federal programs.
- **Recognize the importance of collaboration.** Non-Federal governmental agencies, including State, local, and Tribal governments, as well as private for-profit and not-for-profit organizations, are playing an ever-increasing role in the delivery of technical assistance and in incentive programs for conservation. Encouraging these efforts and developing public-private partnerships and joint programs leverage Federal resources and improves program access and implementation.





Rural Communities

Farming no longer anchors most rural economies as it did in the early 20th century. Seven out of eight rural counties are now dominated by varying mixes of manufacturing, services, and other nonfarming activities, and commodity-based farm policies do not address the complexities of rural economies and populations. Rural America is diverse, and the challenges facing rural communities are wide-ranging, varied, and defy homogeneous solutions. This diversity presents opportunities for the creative application of programs and policies, and calls for unique partnerships across the spectrum of institutions serving rural America.

Jobs and incomes are declining in many areas dependent on natural resource-based industries, but other places, often associated with rural amenities, are thriving. Creating an environment that will attract and sustain private investment, job growth, and income generation activities in rural America, including regional development initiatives and creative pilot programs, is an important goal. Policies that find alternative methods to increase rural income from the natural resource base, such as energy production, are also important.

Rural areas are well situated as sites for the development of renewable energy as well as for more traditional fossil-fuel production. Wind and solar energy are most economically generated in rural areas due to the openness of rural spaces. Dedicated crops and agricultural residues can be used to produce fuels, such as ethanol and biodiesel, and to power turbines to produce electricity. While ethanol output is growing rapidly, biodiesel and biomass electricity generation could benefit from research and development efforts and pilot projects to overcome barriers to expanded commercialization.

Both urban and rural youth need unprecedented education and technical skills to compete in the increasingly high-skill “new economy” of the future. In the past, many rural areas hosted industries that required a reliable pool of low-skilled, low-cost workers. Employers are now more attracted to concentrations of well-educated and skilled workers. Education and worker training are essential in helping rural communities cultivate high-performance, knowledge-based companies, while human capital and earnings potential are improved by strengthening classroom instructional quality and facilitating school-to-work transitions.

Telecommunications, electricity, water and waste disposal systems, and transportation infrastructure are essential for rural development, but many rural communities face financial challenges because of a limited tax base and high cost associated with their small size. Information and communication technology – abetted by financial and technical assistance – can help smaller com-

munities enjoy the same benefits that at one time accrued solely to cities, such as higher standards of health care and virtually unlimited educational opportunities. Options include Federal financial assistance for deploying broadband access or incentives for State, private, and public partnerships to develop fiber optic or wireless capabilities.

Principles for Rural Communities

- **Recognize the diversity of rural America.** The opportunities and challenges facing rural America are as diverse as rural America itself, and there is no single recipe for prosperity.
- **Recognize that rural development policy is not synonymous with agricultural policy.** Traditional commodity support and farming-oriented development programs play an increasingly limited role in the improved well-being of rural Americans.
- **Understand the importance of the nonfarm economy in rural policy.** Farming no longer anchors most rural communities and economies. Instead, the nonfarm economy anchors much of agriculture, and rural policy for the 21st century must recognize the increased importance of nonfarm jobs and income as the drivers of rural economic activity.
- **Create an environment that will attract private investment.** Rural communities must adopt creative strategies to diversify the economy, attract new businesses, and sustain their successes.
- **Emphasize the need for greater education and technical skills.** Today's youth, regardless of where they ultimately live and work, will need an unprecedented level of education and technical skills to compete and succeed in the increasingly high-skill "new economy."
- **Capitalize on the natural resource base.** Rural areas are well suited as sites for the development of renewable energy as well as for more traditional fossil-fuel energy production.
- **Protect lives and property in the wildland-urban interface.** Rural citizens in rural communities near large areas of forested land need assurance that their lives and property are safe from wildfires. Innovative, coordinated, and aggressive approaches to the reduction of fuels in forests and rangelands are needed to extend protection across the greatest possible area.
- **Expand infrastructure, community facilities, and technology.** Such improvements will help rural communities connect with the "new economy" and realize an enhanced quality of life. New information and communication technologies can help smaller communities enjoy the same benefits that at one time accrued solely to cities.
- **Coordinate involvement of all stakeholders.** Rural community issues are often most effectively addressed at the local and State levels, but the Federal Government can provide an important coordinating role. A new look at the Federal role in rural development activities, with the goal of streamlining programs, targeting resources, and improving program coordination, is needed.



Nutrition and Food Assistance

Food and agricultural policy long has sought to ensure that all Americans have access to a healthy and nutritious food supply, regardless of income. This policy has encompassed a wide array of food assistance and nutrition programs that have humanitarian, investment, and agricultural support goals. These programs provide aid to the needy, helping alleviate short-term hunger and hardship; represent pragmatic investments in human capital that yield a better educated, stronger, and healthier workforce and families; and support the agricultural sector.

Core efforts include the Food Stamp Program, child nutrition programs, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and commodity distribution programs.

Today, these programs serve one in every six Americans at some point during the year. In addition to ensuring access to adequate food, the programs promote healthy diets for all Americans.

Our Nation's food assistance programs have been successful, but the environment in which they operate is changing. Most of these programs were started in response to problems of underconsumption and undernutrition among the low-income population in the 1960s and early 1970s. While these problems remain significant, important new challenges are emerging related to diet quality—the proper variety and quantities of foods and nutrients in an individual's diet to promote health and well-being.

Principles for Nutrition and Food Assistance

- **Continue commitment to a national nutrition safety net.** A well-nourished population is healthier, more productive, and better able to learn. No child or needy family should be left behind for want of food.
- **Guarantee stable funding of the nutrition safety net.** The national nutrition safety net, including WIC, should be supported and targeted to those most in need.
- **Simplify program rules.** Program rules must strike a balance between targeting, client access, supporting work, and administrative burden.
- **Support modern technologies.** Electronic Benefit Transfer (EBT) and other technologies are crucial to the improved delivery of benefits, client access, administrative efficiency, and program integrity.
- **Ensure a commitment to outcome-based performance measures.** Outcome-based performance measures will be crucial to deciding the future direction of the nutrition assistance programs.
- **Encourage healthy and nutritious diets.** American consumers must be made aware of the link between diets, health, and physical activity, and motivated to make appropriate changes.

Importance of Integrated Programs

Changing circumstances strongly suggest the need for contemporary reflection on the program delivery needs of the future. USDA remains organized as a traditional hierarchy, with authority and responsibility flowing directly through each agency, from the Secretary to administrators to State and regional levels and to field operations, where they exist.

The issues facing the modern food and farm system today are so multifaceted and complex that they cannot be solved by any one program or approach. Protecting against plant and animal pests and diseases, or eliminating emerging foodborne pathogens, or overcoming the barriers to producing bioenergy efficiency, or ensuring nutritious food for low-income households, or encouraging cost-effective carbon sequestration on farms and in forests – none of these can be accomplished by any single agency.

Increasingly, the technology available to solve many program and policy problems also requires resources from multiple agencies. While the multidimensional nature of the issues, and the technologies needed to address them, cry out for more integrated program delivery, customers also are demanding more comprehensive service. A customer today often has an interest in more than one USDA or other Federal program, and can be thwarted in obtaining efficient service if the organization is inflexible.

A number of approaches can be taken to substantially improve service, even without major, additional restructuring. These include: one-

stop shopping for delivery of services; sharing data, information, and computation environments across agencies and programs; and new flexibility for increased coordination of resources. Advances in information technology may allow agencies, at very low cost, to share key data so that customers can be spared the burden of providing the same information to multiple Federal offices.

Assurance that data being collected meet contemporary decision-making needs *across* the many functions of the Department can only come from a review that crosses all lines of the organization. This supports a comprehensive effort to inventory current data collection efforts and to align them with an assessment of future data requirements. Integration of databases across agencies and programs then would be easier.



Principles for Program Integration

- **Support collaboration to solve problems.** Recognize that the complexities of many contemporary agricultural issues cross the bounds of traditional program areas.
- **Encourage a coordinated view of functions and services.** Institute a range of practices, including “one-stop shopping” for USDA services, common electronic work environments, consistent data convention across agencies, data sharing, and increased resource flexibility among agencies, that encourage a “corporate” rather than a fragmented view toward program implementation.
- **Pursue partnership opportunities.** Continued and increased cooperation and partnership opportunities need to be sought with program beneficiaries, Congress, consumers, industry, NGOs, Federal and non-Federal government agencies, universities, and others.
- **Sustain capacity for integrated responsiveness.** The latest technologies are needed to support integrated programs and “corporate” systems. A cadre of highly trained and actively practicing scientists, economists, and other analysts provides a necessary foundation for rapid response across subject areas and programs.

I. The Evolving Food and Agriculture System

Once food was viewed strictly in terms of commodities produced in bulk and meant to be plentiful and affordable. But, in the decades of prosperity in the last half century, the concept of food and our expectations have changed and taken on a new significance.

American consumers today have come to expect a great deal more of the food system, as well. And, there is no doubt that it delivers—more nutritious food with wider variety; improved safety, with less environmental impacts; and greater convenience than at any time in the Nation’s history. The drivers of change in society at large—fundamental changes in our family structure and workforce, globalization of markets and culture, booms in information and biological and other technologies—are at work in agriculture and food markets and throughout the value chain, as well.

As food and fiber have changed, so have farmers and their farms. Postwar economic prosperity drew people off farms into jobs providing a growing array of goods and services. At the same time, agriculture experienced an explosion in its productivity. Today, the approximately 150,000 farmers produce most of our food and fiber are among the world’s most competitive, able to fully meet domestic needs and also supply large quantities to foreign markets. These farmers are the foundation of

the Nation’s food security and underpin the agricultural economy.

But, these operations make up just one segment of U.S. agriculture. USDA counts another 2 million farmers who meet the criterion of selling at least \$1,000 worth of product annually, many of whom have other occupations but enjoy rural lifestyles. A vast diversity of farms emerges out of this multitude: niche farms, hobby farms, hunting preserves, dude ranches, you-pick operations, farms that sell directly to consumers through farmer’s markets, bed and breakfasts, and more.

While the American landscape is dominated largely by agriculture, these operations vary widely to cope with different soils, water conditions, and markedly distinct weather patterns. The close interactions between farming practices and natural resources, always important, have been in the spotlight since the 1960s.

Environmental quality matters a great deal to Americans today, whether preserving wetlands, improving wildlife habitat, or maintaining water quality in rivers, streams, and lakes. Agriculture, vast as it is, holds a special responsibility for resource stewardship. How farmers address this environmental responsibility, whether on a large commercial corn and soybean farm or a part-time cattle operation, has





shown steady improvement, but remains a matter of both public and private concern.

It is a particularly challenging task to ensure that this complex and diverse farm and food system works to most Americans' satisfaction. Although farming itself employs only about 1 percent of the workforce and accounts for less than 1 percent of the Nation's gross domestic product (GDP), it is the critical component of the entire food and fiber system—spanning farm inputs, processing, manufacturing, exporting, and a wide range of ancillary services—that contributes \$1.5 trillion (16 percent of GDP) and employs 17 percent of the labor force. Helping this system remain efficient and competitive globally, especially as markets shift from commodities to high-value products, is not only critical to the financial well-being of farmers but also very important to the U.S. economy.

When the Federal Government first considered its responsibilities with respect to agriculture, George Washington suggested Congress establish a National Board of Agriculture. Around the mid-1800s, the enduring importance of a strong science base for farming was recog-

nized in the creation of the U.S. Department of Agriculture and the federally supported State agricultural research and extension at land-grant universities.

In the 19th and 20th centuries, as our great urban centers came to dominate our economy, the smooth functioning of markets was essential to ensure the flow of food and fiber from farm to city. The New Deal supported farmers who produced basic commodities, and thereby helped to ensure plentiful food supplies. Attention was paid to how well markets worked, and the Federal Government helped level the playing field by bolstering the flow of information between buyers and sellers and also monitored their commercial transactions.

Ensuring food safety, promoting nutritious and convenient foods and products, delivering food assistance to low-income consumers, protecting environmental quality, and keeping markets functioning efficiently are all added service requirements of the last century. Today, a new challenge is before us: the ongoing transformation of U.S. agriculture into the still-emerging, global, consumer-driven food system. How do we make the enormous shift from the largely

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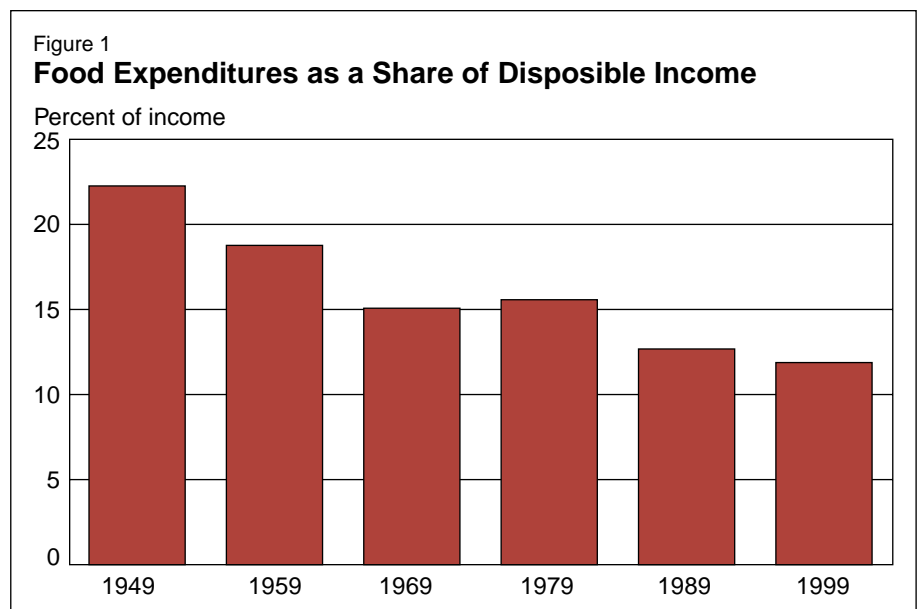
commodity-oriented focus of the past 75 years to the much different products and function focus required for the new century? What is the appropriate Federal role in this task and, if one, how extensive should it be?

Consumer-Driven Agriculture

Historically, farmers' main objective was to keep up with the food demand generated by a growing population. Over time, people wanted not only to ensure that their basic energy requirements were met, but also to eat better through access to a wider variety of nutritious foods. Economic progress depended on the physical well-being of a nation's people, and much of the success of the Industrial Revolution turned on having a well-fed workforce. The Industrial Revolution also made agriculture much more efficient as it changed production processes, tools used, and resources needed. For example, the switch from horses to tractors early in the

20th century, followed by the adoption of a succession of new technological practices, helped assure Americans an adequate food supply. At the same time, it dramatically changed the farmers' way of life.

With more secure supplies of food, the consumer focus shifted to which foods were available and the services these products included. This became increasingly important as population growth slowed and Americans prospered, changing the nature of the demand for food. Today, domestic food needs grow only when the population expands, and it is growing slowly by historical standards. The share of income spent on food has fallen steadily over time (figure 1), with proportionally more now spent on housing, automobiles, education, and other goods and services. As the U.S. food market has matured, consumption growth for one food product increasingly comes at the expense of another. Aging baby boomers may be more inclined to substitute decaffeinated coffee for regular coffee, but such shifts in preferences alter total coffee consumption very little. The number of foods labeled "low-fat" or "health food"



shows how the food system has evolved to address consumer demand.

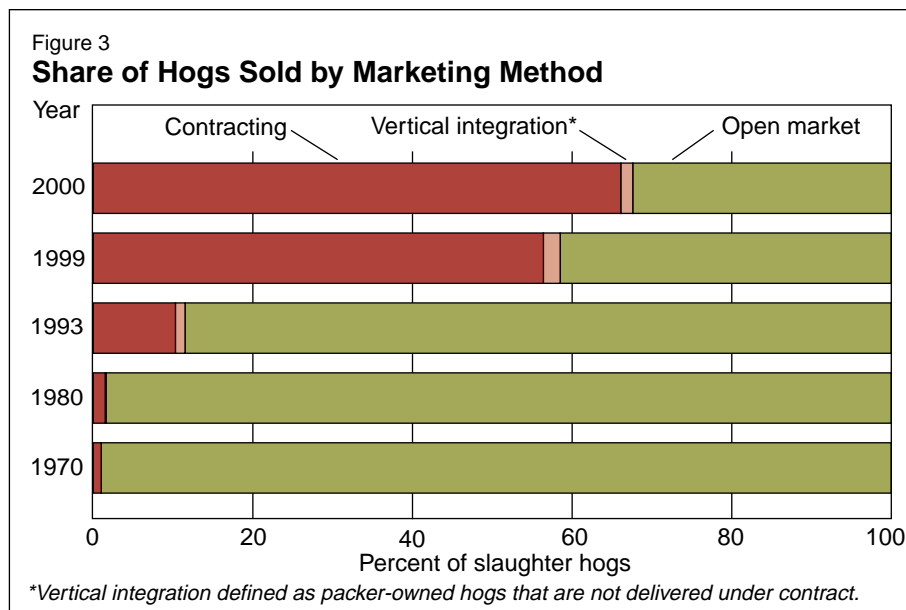
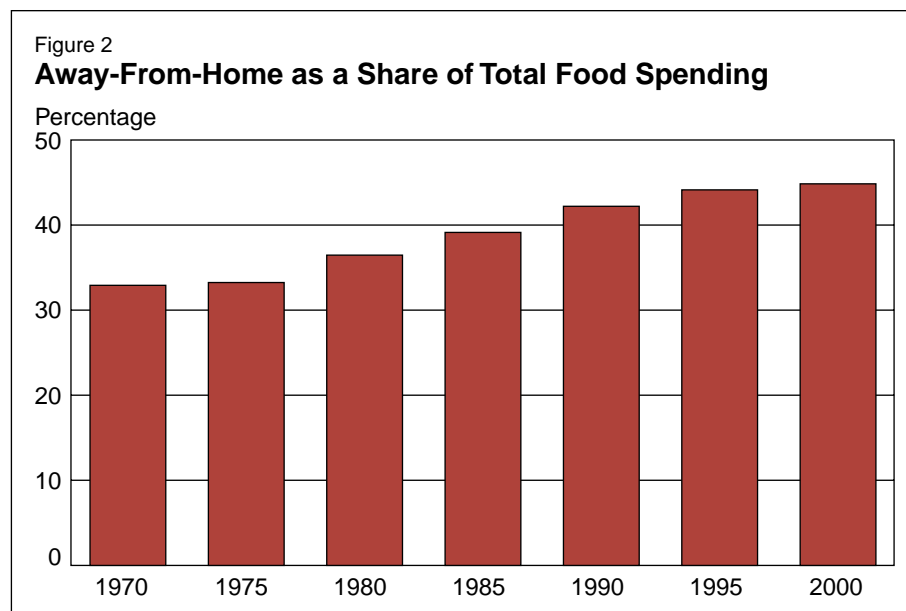
As our markets mature, we have seen an explosion in new product introductions. Over 12,000 new food products have been introduced annually across 14 major food categories (ranging from baby food to soup). Retail food stores offer choices that provide novelty, variety, and convenience—from organic produce, exotic fruits, and marinated meat to bottled water.

Food marketing also is changing in other ways. Mass merchandisers, warehouse club stores, specialty stores, and restaurants are becoming increasingly favored over traditional supermarkets. The supermarket share of grocery food sales that was 78 percent in 1992 had fallen to 70 percent by 1997 as mass merchandisers and warehouse club operators increased their market share from 6 to 12 percent.

Meanwhile, Americans continue to eat away from home, reflecting the premium on convenience (figure 2). Some retailers have responded with strategies emphasizing greater variety, quality, and service, while others are offering lower prices on more limited lines of products and services.

The farm and food industry, of course, is enormously affected by the changing profile of this mature market. It is responding by better coordinating the supply chain so consumer signals are translated swiftly and effectively. By establishing direct ties to growers through contracts, food retailers can ensure that they provide specific product qualities tailored to consumer demand. For example, the introduction of convenience pork products, such as pretrimmed and marinated tenderloins of uniform size and quality, has emerged as the pork industry attempts to interpret and respond to consumer signals (figure 3).

Another response may focus on niche markets, which frequently



exist side by side with mass retailing. For example, premium vintners thrive alongside large-volume distributors in the wine industry. And, expanding numbers of more affluent foreign food consumers are more important in a mature market.

New Business Relationships Between Farmers and Companies Benefit All

General Mills, a leading producer of breakfast cereals, is using a specific variety of wheat to make its popular “Wheaties” brand of cereal. The types of wheat used to produce flakes can respond differently to milk and General Mills wanted one that would make flakes that curl, reducing sogginess in the consumer’s breakfast bowl. General Mills forged new business arrangements with farmers to get a specific wheat type that both curls and retains crispness.

General Mills contracted with farmers to produce the specific

type of grain best suited to its needs. This created new value for farmers who receive premium prices for grains with desired characteristics. Farmers also benefit by having an assured buyer. General Mills, in turn, benefits from increased efficiency by using a precise variety in manufacturing. New business relationships between farmers and food companies mean higher revenues for farmers, increased efficiency for processors, and consistent product quality for consumers.

concerns about diet and health. This is the promise of “second generation” biotechnology products, following the “first generation” innovations that reduced farmers’ production costs or boosted yields but did not otherwise change the commodity. Designing, creating, and monitoring these second generation products are prominent opportunities for biotechnology research, and increasingly offer the promise of new and larger markets for the sector.

Larger farm size; specialized, more efficient production methods; and greater coordination characterize the structural change well underway in commercial agriculture. For these farms, a decided change in their role in the overall food system is occurring. Farmers once purchased inputs and sold products in arms-length transactions and largely were price takers in both markets. But, those lines are fast blurring, with differentiated products, bundled systems, and greater system coordination. Buyers and sellers of agricultural commodities and producers rely less on cash markets and more on dozens of kinds of contractual arrangements (see box). New production, a variety of joint venture/marketing arrangements, and information technology are lowering

Biotechnology is another tool that promises to help meet consumers’ demand for services, illustrating how demand and technology interact to create new markets. The food sector will further capitalize on the growing interest in “functional foods,” products differentiated by nutritional (and perhaps medicinal) content and appeal to consumers’

Biotechnology is another tool that promises to help meet consumers’ demand for services, illustrating how demand and technology interact to create new markets.





the total costs of doing business by introducing size economies and reducing transaction costs.

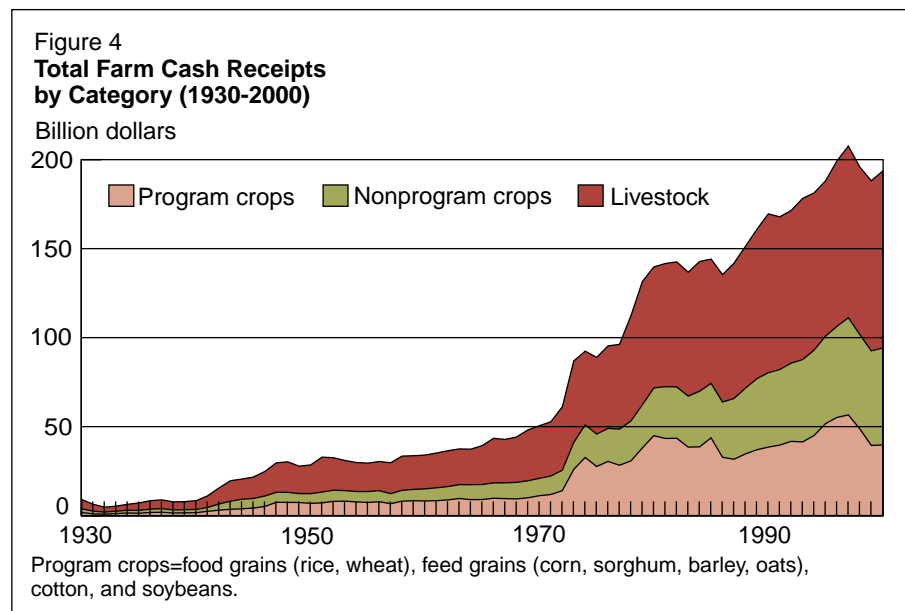
While this structural change clearly is advantageous for some, it also prompts concerns about competition, market access, and the use of market power by some participants to the disadvantage of others. Moreover, reduced competition could limit society's gain from structural change by stifling innovation or tilting the market's results in favor of those with the greatest market power.

Agricultural Diversity

Farming today consists of enormously different farms growing numerous crop and livestock products for sale in markets that range from their immediate neighbors to consumers worldwide. Farms differ in size, type and value of commodities produced, technology used, resource endowment, financial status, and many other attributes. Farmers differ in commitments of time, management abilities, business goals, and financial resources. The result is a sector that cannot be accurately characterized by any single measure or characteristic. Even the notion of a "family farm" applies to an increasingly broad range of structural configurations. However, it is essential to recognize and under-

stand this diversity that makes up today's agriculture if we are to adequately prepare for its future.

The concentration of resources into fewer and larger farms occurred throughout the 20th century. While production doubled over the last 50 years, farm numbers dropped by more than two-thirds. Farmers produce scores of raw commodities every year and countless varieties of products even though bulk commodities—such as cotton, corn, wheat, and other food and feed grains that are the focus of government programs—are taken by many to symbolize agriculture. These pro-



gram crops, which were grown on almost every farm in the 1930s, are produced today on about 30 percent of all farms, and they account for a small fraction (20 percent) of the total value of all agricultural sales today (figure 4).

In the 1930s, when price and income support programs first were developed, there was little need to distinguish among farms, farmers, or farm households. In fact, farms and households (and farming communities, in many cases) were closely intertwined as a way of life and were considered inseparable. Farm fami-

lies were fully engaged in the production of commodities and the relatively simple process required few input purchases from other sectors. The industrial revolution on the farm, of course, has changed this enormously, with most commercial farms now operated as sophisticated businesses like any other. Most hire labor and use custom services to per-



form specialized tasks. Most inputs are purchased off-farm and financing is a standard part of their business plans. These businesses plan rigorously, manage meticulously, and invest carefully, with full expectations of profitable returns. Even so, fewer farmers are full time; instead, most choose to merge farm and non-farm employment opportunities. Fewer households earn all of their income from farming or devote all of their financial resources to the farm business.

A place can meet the official definition of a “farm” simply by generating agricultural product sales of \$1,000 or having the potential to do so, and some 2.2 million places are classified as farms. They range from places with two cows or a little more than 500 bushels of corn to multimillion-dollar operations. A

simple examination of farm sector groups with common characteristics provides a new perspective with significant implications for policy design.

Economic sales classes are one way to distinguish farms, with sales measured as the gross value of agricultural commodity and product sales, landlord share of commodity sales, the value of products removed under contract, and all government payments. Three common size groups of farms are \$250,000 or more, \$100,000-\$249,999, and less than \$100,000. There are 146,000 farms with sales over \$250,000, 199,000 farms with sales between \$100,000 and \$249,000, and 1.8 million farms with sales of less than \$100,000. (See table A-2 in appendix 1 for more information by sales class.)

While sales classifications are useful for communicating general points, they mask diversity within each group that is important to policy decisionmaking. Farmers and farm households have different goals and are at different stages of business development and household life. For example, in the smallest economic sales class a relatively small proportion (27 percent) view farming as their primary occupation, and the rest are either retired or consider farming a secondary occupation.

Grouping farms into three types—commercial, rural residence, and intermediate—based on both



their sales size and primary occupation reveals key differences in income sources, commodity specialization, use of government programs, and other characteristics (see appendix 1).

Today, there are 175,000 commercial farms. This group consists of large family farms with sales above \$250,000 and farms that are not organized as sole proprietorships. This small proportion of farms (8 percent) accounts for 68 percent of total output. These farms have business goals that include containing costs and increasing sales, and they are profitable.

A second group of farms, nearly 1.4 million (62 percent of all farms, 8 percent of total output), combines nonfarm jobs with farming or are retired people or those who view farming as an investment opportunity and a way to enjoy rural amenities. The result is a group of households with a rich mix of vocation and career choices, much like their urban and suburban counterparts, and little dependence on the farm economy for their income. Even though most of these farms are not profitable as stand-alone farm businesses, these rural-residence farms typically have incomes comparable to those of nonfarm households.

A third group of about 650,000 farmers consider farming their primary occupation and share goals with both commercial farms and rural-residence farms. Some emphasize economic and financial objectives much like the larger, more commercial farms and are attempting to compete for resources with their commercial competitors. Others have goals that align more closely with smaller, less commercial operations. Those without substantial off-farm earnings rely on alternative uses of agricultural resources to generate income. Many use their farm equipment to provide custom work to other farms, some rent land to other farmers, and some provide hunting and other outdoor recre-

Figure 5

Commercial Farms Are Small in Number, Own Less Than 1/3 of the Land, But Produce Most of the Output (1999)

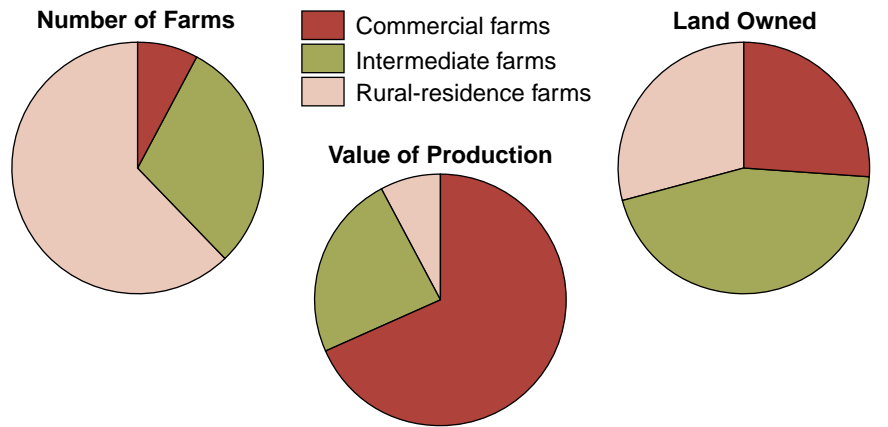
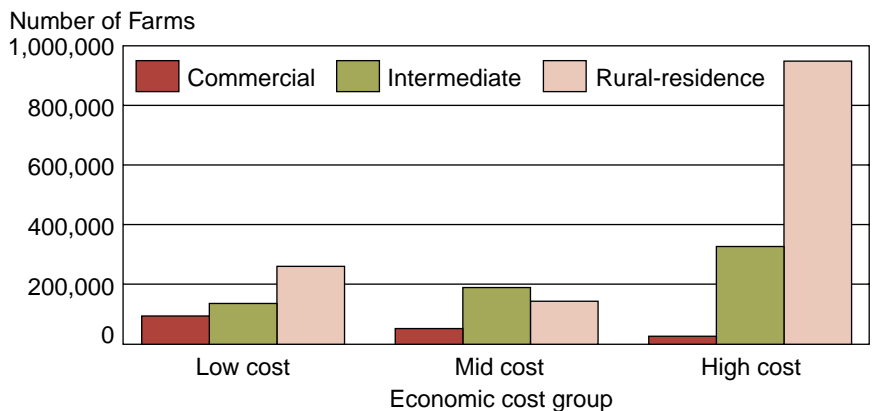


Figure 6

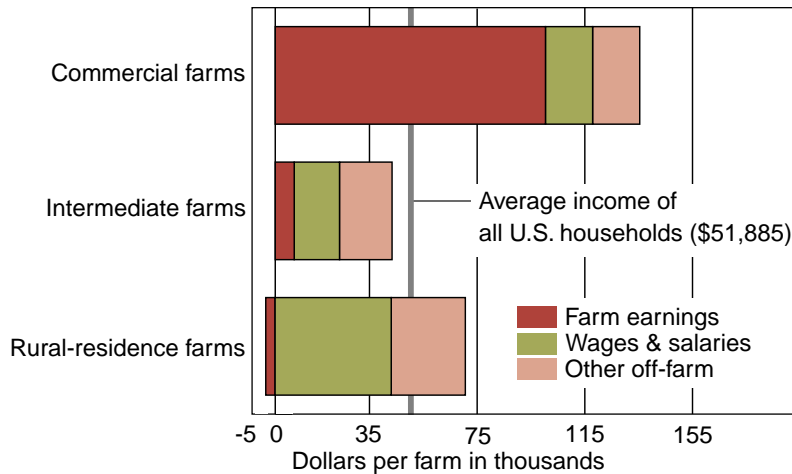
Low-Cost Farms Can Be Any Size, But Most Rural-Residence and Intermediate Farms Do Not Cover Production Costs with Farm Income (1999)



ation as a way of generating additional income. The intermediate farms in this situation typically are not large enough to support the farm household yet require a substantial labor commitment from the operator.

Stark contrasts emerge among the three groups in terms of their numbers, shares of production, and land holdings (figure 5). Commercial farms, only 8 percent of the total, accounted for 68 percent of production and 29 percent of land use. Most farms fall in the rural-residence and

Figure 7
Sources of Operator Household Income (1999)



In contrast with the long-term trend of declining farm numbers, the 1990s saw relative stability in the number of farms and even modest increases since 1996.

intermediate categories and occupy 71 percent of the land owned by farmers.

The competitiveness of farms also varies systematically across the groups (figure 6). Some low-cost farms are found in all three categories, but commercial farms tend to be low-cost producers. Economies of size enable these commercial farms to have low unit costs. By contrast, most intermediate and rural-residence farms do not cover production costs from farm income. Most rural-residence farms fall into the high-cost category.

Off-farm income is important for most farmers, but particularly so for rural-residence farms, whose household income is above the national average (figure 7). While income from farming, as measured by farm sector net cash income, was \$55.7 billion in 1999, earnings from off-farm sources were \$124 billion. Not surprisingly, most rural-residence farms subsidize their farming activities as part of a rural lifestyle. Off-farm income also is critical for intermediate farms, but contributes only a small share to commercial farm households. Even on many larger,

more commercial farms, family members frequently work off-farm at a variety of jobs, ranging from self-employment in nonfarm businesses to positions in government and private companies.

The widespread importance of off-farm income illustrates that for the majority of farm households, the health of the general economy is far more important to their well-being than the level of commodity prices. In contrast with the long-term trend of declining farm numbers, the 1990s saw relative stability in the number of farms and even modest increases since 1996. Recent prosperity in the general economy likely boosted farm numbers, particularly rural-residence farm numbers.

Today, almost one-half of the total acreage in production is rented, reflecting the fact that many landlords are not farm operators, an important consideration in policy formulation. The farm operator's ownership of the land utilized ranges from complete owners (owns all the land they operate) to tenants who rent all of the land farmed, with various combinations in between. The largest number of farms is operated by full owners but these tend to be small, contributing only a third of farm output. By contrast, only 8 percent of farms were tenant-run, but they accounted for 14 percent of output.

In many ways, diversity in the farm sector is driven by diversity in resources and climate. Weather conditions, soil types, water availability, and access to markets vary across the country and affect the types of commodities produced. For example, along southern coastal areas, the most common crops that farms grow are fruit, vegetable, nursery, and other high-value crops, while in the Upper Midwest the primary crops are wheat and other cash grains.

The concentration of farms and production likewise varies across the



country. The highest concentration of farms is in the middle of the country, contributing one-quarter of output. Farm financial circumstances also vary a great deal from one region to the next (see appendix 2 for more detail on regional characteristics of farms).

These circumstances clearly reveal a wide divergence in the realities of farming across the country, and just as clearly illustrate the shortcomings of “one size fits all” agriculture policy. The needs, concerns, and opportunities of larger, commercially oriented farms differ from those of smaller, intermediate farms, regardless of location. Moreover, the requirements of commercial farms in one region may be vastly different from those in another. Farms in the Corn Belt, for example, may be most concerned about eroding competitiveness from rising land prices directly related to farm programs, and about gaining greater access to global grain markets. In contrast, the more diversified farms in southern coastal areas producing many high-value crops may be most concerned about environmental constraints, water supplies, and continued access to specific pesticides. High land

prices are also a concern in this region, but more likely reflect urban development pressures and farmland preservation issues.

Farms in the Upper Midwest tend to be more highly leveraged than those in other regions, which increases their concern over input costs, commodity prices, and other factors that affect operating margins and their ability to repay loans. A High Plains cotton farmer may be worried about water availability, energy costs, and the lack of alternative enterprises. In yet another example, more than half of all farmers in regions spanning the southern and eastern reaches of the country specialize in livestock production. Those farmers are facing new pressures for protecting water quality from animal waste. Recognizing the different realities faced by a diverse farm sector sets the stage for a new generation of policy approaches. As the old saying goes, “a problem well defined is a problem half solved.”

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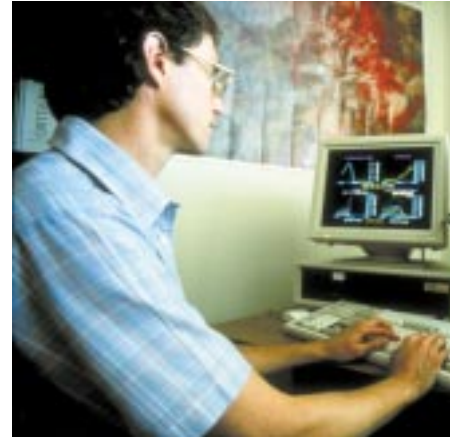
Forces Driving Change

Today, a small number of very powerful forces are propelling the fast-paced change occurring in every single component of the food system. Globalization, the growing competitive pressure from closer integration of business all around the world, along with a broad range of new technologies, from information advances to biotechnology, are converging to fundamentally alter the farm and food system as we know it. Understanding the nature of these “drivers” helps define the needs for agriculture and the food system, and—consequently—the needed investments and policies to support the system.



Globalization

Globalization of markets allows somebody somewhere around the globe to profit by finding and meeting consumer demand. Information about trends and tastes spreads almost instantly and effortlessly now. Accounts of next-generation biotechnology products can be found on countless Web sites, often



only one click away from real-time prices of commodities and products and other information needed for business decisions.

Today, with capital markets that operate 24 hours a day and without borders, existing food companies and entrepreneurs anywhere in the world can develop a new product or an innovative process for almost any application. And, while experience shows that most of those new products or businesses fail, their cumulative impact makes the marketplace highly competitive.

The “openness” of the world economy resulting from economic and political reforms has contributed importantly to globalization. In the past, much of global trade and investment was strongly influenced by government policies and actions rather than by economic decisions driven by the marketplace. Today, much more agricultural trade is market driven because of the collapse of the Soviet Union, the end of the U.S.-European Union (EU) subsidy wars, and China’s shift to more market-oriented agricultural policies. International trade agreements, reforms in domestic agricultural policies, financial market liberalization, and a constellation of other policy changes that boost competition have further hastened globalization.

Growth in international trade and investment illustrates the impact of globalization on the food system.

From 1991 to 1998, the volume of trade for all industries tripled and foreign direct investment (FDI) quintupled. A similar trend is observed for agriculture-related industries. Sales by affiliates of multinational companies show the broad influence of this investment. For example, sales by U.S. affiliates of foreign firms in the food sector increased threefold between 1987 and 1998, reaching \$64 billion, far outpacing U.S. imports of \$32 billion. Sales in 1998 by foreign affiliates of U.S. multinationals were even larger at \$133 billion.

All parts of the food system participate in trade, foreign direct investment, and other global business relationships such as licensing or franchising. For both global trade and U.S. exports, consumer-oriented, high-value products (meats, poultry, fruits and vegetables, and processed grocery products) have been the fastest growing and largest export sector, accounting for over two-thirds of total sales and performing much more reliably in recent years than have markets for commodities.

Tremendous investment growth also has occurred in the retail food industry (supermarkets). U.S. food-service firms, including restaurants and fast-food outlets, had foreign affiliate sales of \$14.5 billion in 1996. Sales by U.S. affiliates of foreign firms in retail trade nearly tripled from 1987 to 1998 and U.S. companies also have invested overseas.



FDI and the U.S. Wine Industry

The world wine industry has undergone major demand-driven changes in the last decade. Preferences have shifted toward high-quality wines, with consumers more attuned to brand name than to country of origin. And, wine retailers in developed markets have a growing influence on distribution and sales. They prefer dealing with a few consistent suppliers that offer a broad portfolio of wines, thus increasing the importance of a wine producer's ability to provide a steady supply of consistent quality. Some U.S. wineries with limited vineyards found they were unable to maintain supplies of wine grapes

or ship consistently, thus forfeiting retail shelf space to foreign competitors. To remedy this, some purchased vineyards and wineries abroad to gain access to additional supplies and varieties. Through such foreign investment, U.S. wine producers have increased domestic market share at the expense of traditional European suppliers. Moreover, U.S. wine exports have grown over 20 percent annually since 1995. Countries receiving foreign direct investment have benefited as well, gaining access to new production technologies and increased demand for their grape and wine production.

Foreign-owned firms had foodservice sales in the United States of \$6.4 billion in 1998. McDonald's has become the largest overseas foodservice operator, with more than 28,000 restaurants in 121 countries.

Globalization of markets pressures firms to be more competitive, to "shorten the supply chain," streamlining the system (eliminating transactions and their associated costs) to efficiently meet rapidly changing consumer demand. Businesses in the food system around the world compete against each other to provide high-quality products at the best price. Globalization makes it imperative for companies to diversify their sources of raw materials and buy from the farmer, wholesaler, or food processing company that provides the best product for the lowest price at any given time.

All of our experience and evidence points to increasingly fierce competition in the agricultural system, suggesting that the innovative, cost-effective producers will prosper. Mergers, acquisitions, and further

Today, much more agricultural trade is market driven because of the collapse of the Soviet Union, the end of the U.S.-European Union (EU) subsidy wars, and China's shift to more market-oriented agricultural policies.

globalization of the food system can be expected to continue. Helping consumers eventually get what they want can be good business, and businesses that can do this quickly and efficiently tend to succeed while those who are slow to understand key trends face rapid erosion of competitive position.

Globalization of markets clearly underscores the need for policies that support growth in competitiveness in the world's inter-related food system. These include policies that support effective trade negotiations and market expansion, as well as expanded monitoring of competition and investment to ensure the efficiency of global markets. Globalization further calls attention to ensuring adequate investment in our infrastructure to accommodate the changing environment—from stronger food safety monitoring and inspection to new research underpinning sanitary and phytosanitary regulations to new competitiveness measures.

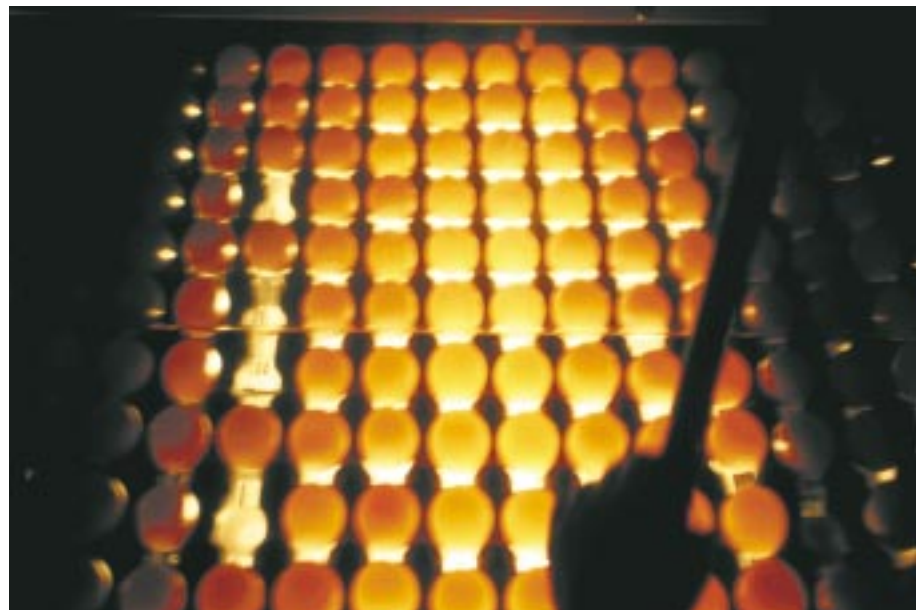
Technology

Americans have come to rely on the producers of persistent technological innovation in every aspect of

our lives, importantly including food, agriculture, and natural resources. Technological change in agriculture focused traditionally on tools and techniques to lower farmer production costs and increase yields. Such technologies, which have added greatly to production efficiency, increased profit margins of early adopters, and ultimately lower consumer prices, still have a role in today's agricultural economy (see box).

Increasingly, though, the market today is pushing technological progress in new directions, for new purposes, using new tools—all with different implications for business and policy decisionmaking. Biobased technologies promise opportunities never before imagined. Production and processing technologies are opening entirely new energy, industrial, and pharmaceutical markets for the Nation's farmers. Technology is shifting at every level in the production and marketing chain toward satisfying consumer demand for quality, safety, nutrition, and choice.

Production Technology. Recent advances in agricultural production technology have both reduced pro-



Productivity Growth Drives Competitiveness

Technology has driven the tremendous growth in American agriculture's productivity. The more than threefold increase in corn yields and more than doubling of wheat yields in the past 50 years is indicative of the ability of our farmers to produce more with the same or fewer resources (figure 8). Agricultural sector productivity grew approximately 2 percent annually, reflecting technological advances in plant and animal breeding, mechanization and chemical inputs, and an overall efficient use of resources. These substantial productivity gains have kept U.S. agriculture highly competitive in world markets for many products and commodities.

Yields have grown across all farms but have increased the most on commercial farms (figure 9). Higher yields help explain why most commercial farms are profitable, i.e., they produce more with fewer inputs, which reduces their unit costs. However, farms can be profitable with lower yields, but with increased emphasis on cutting costs or producing value-enhanced or niche products that improve revenues.

Figure 8
Growth in Yields Reflects Technological Progress

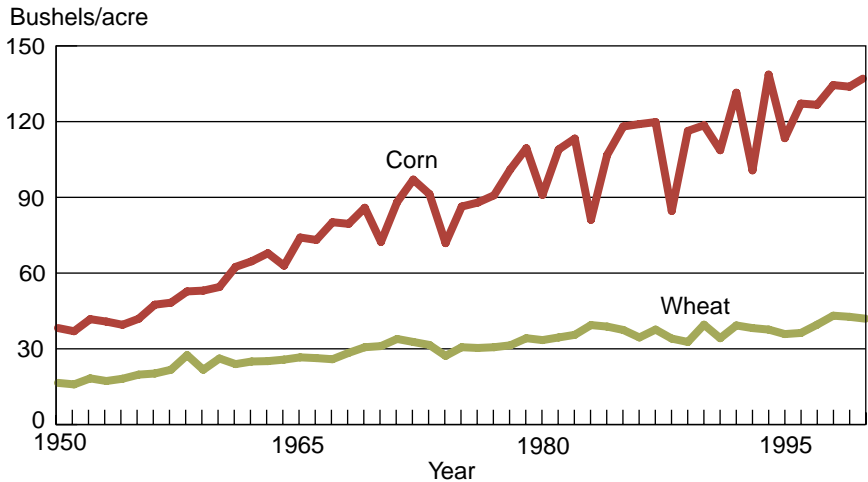
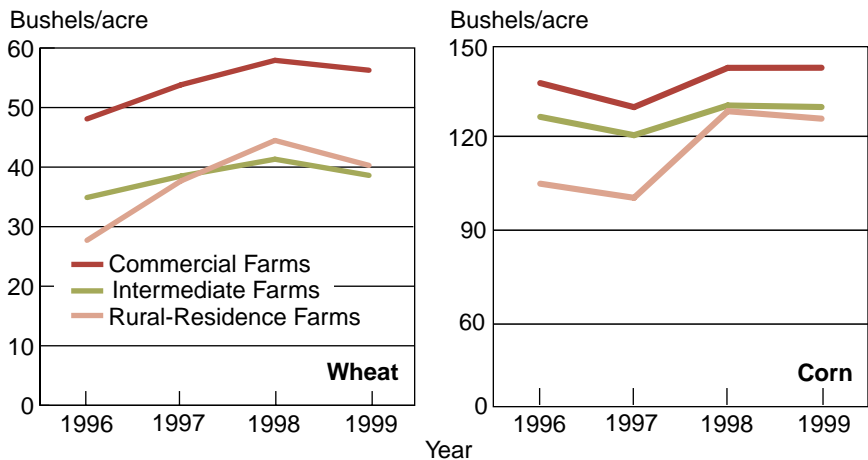


Figure 9
Highest Yields Found on Commercial Farms



ducer costs and conserved natural resources. An example is a drip-irrigation technology that has reduced water needs to support crop growth by 20 percent, a response to competition in water-scarce, densely inhabited areas of the country. Technical advances are also addressing environmental problems arising from the concentration of animal waste in large, confined animal operations. But, more generally, “preci-



sion agriculture” promises both greater production efficiency and coordination of input application with environmental considerations. The prospect is for an agriculture that uses sensors, automated responses to monitored variables, robotics, and other high-tech means to optimize both production efficiency and environmental quality (see box, page 33).

In a sense, the past success of agricultural technology presented a policy dilemma. Fewer farms or farmers were needed to produce the growing output, giving rise to both winning and losing producers as yield-enhancing or cost-reducing technologies were widely adopted. Those less able to quickly adopt newer technologies often were surprised by those who were. Future technological advances may offset losses by opening up new markets for standard commodities (see box).

Biologically based technologies are particularly promising as the source of new products and new product uses for farmers. For example, agriculture is the source of clean-burning fuel and industrial ethanol, a variety of specialty chemicals derived from plants rather than from mined stock, soy-based inks and diesel fuel, industrial adhesives, biopolymers, and films. Agricultural scientists recently announced that soybean oil can replace a significant share of petroleum-based resin used in manufacturing auto parts. The possibilities are far reaching, important, and growing. Not only do biobased advances promise to save nonrenewable resources, but they now replace options lost to many farmers as a result of technological advances in food production.

Agricultural biotechnology (see box) permits the rapid development and production of new specialty chemicals, pharmacological products, and commodities with consumer-friendly traits such as higher nutritional content, low fat, or better flavor. This consumer-driven

Cost-Reducing vs. Revenue-Enhancing Technology

Farm profit margins can be increased in only two ways, by lowering unit costs or raising revenues. Today’s technology, however, enables farmers to affect margins both ways for the first time in history. Technology can reduce costs by lowering the per unit cost and increasing yields. It also can enhance revenue by enabling value-added products. Past production technologies have been heavily geared toward lowering unit costs. While beneficial to society, the profit-enhancing aspect of this approach fades as the adoption becomes widespread among most farmers and is manifested in lower prices.

Today, promising opportunities are offered by biotechnology and

information technologies that may allow expanding revenues by opening new markets. Such markets include biobased energy, “farmacological” products (agriculturally grown pharmaceuticals), crops for industrial uses, and crops or livestock that embody specific traits demanded in niche markets (such as organic foods). Accompanying these developments, computer-based marketing provides access to niche markets for an array of producers, including those that cannot achieve the size economies required for efficient bulk commodity production. The significance of these technological developments is that they are overturning the old dictum of “get big or get out.”

Agricultural Biotechnology

Biotechnology is a collection of powerful tools that can be used to increase production or cut costs, develop product attributes desired by consumers, or enhance environmental quality. It is a production, processing, consumer-oriented, and information technology that has application in not just one, but every segment of the food supply chain.

Agricultural biotechnology brings new products, markets, and opportunities to the food and agriculture sector. New crops are being developed to mitigate pest and disease problems, resist drought, tolerate salt, increase photosynthesis, improve nutritional characteristics of food and feed, enhance processing characteristics, and produce new specialty chemicals and human biologics. Biotechnology has introduced new options to farmers, increased profits, and

made farming more environmentally friendly. It promises advances in combating hunger and malnutrition, while helping to treat and prevent some of the most debilitating diseases affecting much of the world.

Not all biotechnology applications involve the development of new transgenic organisms. Increasingly, applications in the area of genomics will enable the selection of genetically controlled activities within the genetic makeup of a given plant or animal species, enabling more rapid expression of traits now obtained through conventional breeding. Bioinformatics, the creation of data bases from which genetic clues can be culled, will foster such advances.

Additionally, the tools of biotechnology can address environmental challenges. Prospects

include pollution remediation, increased bioenergy availability, enhanced carbon sequestration, and reduced fertilizer runoff. For example, biotechnology has been used to develop strains of corn that resist corn rootworm. Farmers who plant these new strains could then use less pesticides, thereby reducing environmental hazards that may be associated with pesticide use.

Capitalizing on agricultural biotechnology requires ongoing oversight to ensure the safety of an expanding repertoire of new products and assistance in helping the marketplace adjust to this increased diversity of agriculturally based products.





Consumers' demands for food safety, freshness, quality, convenience, and even attractiveness have spawned whole new industries, each relying on new and unique avenues of technological advance.

product diversification and differentiation multiply opportunities for farmers.

A diversifying agricultural system, based more on end products and less on raw commodities, brings new challenges along with broad benefits. The Nation's agricultural infrastructure is built primarily around the commodity-based system. Storage, distribution, and transportation systems can be strained by the need for different products' physical segregation or identity preservation. Government can help by setting standards, monitoring compliance, or certifying agents to define the characteristics that differentiate one commodity-based product from another.

Standard price signals also become harder to read as specialty products become more important. The price of No. 2 yellow corn, for example, could fail as a bellwether if identity-preserved corn products entering different market channels for different end uses become more important. As a result, price-influenced policy decisions will need to be sensitive to a far more comprehensive set of price signals than those from spot markets.

Consumer-Oriented Technology.

Consumers' demands for food safety, freshness, quality, convenience, and even attractiveness have spawned brand new industries, each relying on new and unique avenues of technological advance. Examples include food safety research focused on reducing the threat of foodborne disease before an animal even becomes food. Scientists are working on feed additives to eliminate pathogens like *Salmonella* and *E. coli* from hogs' and cows' intestinal tracts before slaughter. Research is developing antimicrobial food packaging materials that would kill microorganisms in food. Rapid tests for microbial pathogens or labels that change color if pathogens are present also will help contribute to food safety.

Packaging technology is revolutionizing ways in which foods can be marketed. An example is the development of "breathable" bags that preserve washed and mixed, ready-to-eat salad greens that gave rise to an entirely new value-added segment of the food industry. Another is edible food wrap—wrap in sheet form made from 100-percent pureed fruits and vegetables—that not only

extends fresh food shelf life but also improves overall nutritional value. This is an example of “active packaging,” in which the packaging material in some way interacts with the product it contains to improve its quality, safety, shelf-life, and utility.

Technical innovation in shipping and transportation has allowed U.S. agriculture to deliver food products around the globe with no substantial loss in freshness and quality. Perishable agricultural products, many of which were implausible as overseas sales just a decade ago, now account for more than one-fifth of U.S. food and agricultural exports, due in large part to new transportation technologies.

The technologically based proliferation of new products and new market possibilities is a boon to American consumers and producers

alike. Nevertheless, these trends magnify business decisions about what to produce and where to market it. Competition intensifies when new products must compete with existing ones for grocery shelf space, and transportation technology allows American producers to sell in markets where others formerly dominated. Government must support the creativity, foresight, and entrepreneurship in America’s farmers and agribusinesses as they respond to new opportunities created by new technologies.

Information Technology.

Information technology (IT) contributes to the faster flow of information among potential buyers and sellers of food and agricultural products. It thus affects the speed at which markets operate, and it shortens the timeframe in which pur-

New Technologies Can Increase Yields, Reduce Costs

The advent of the “information age” brings new possibilities and opportunities to farmers that can significantly increase farms’ economic performance. A host of new technologies are available that provide timely, site-specific information to farmers that can help increase yields, and reduce unit costs. The Global Positioning Systems (GPS) that use satellites to provide precise location information can be used by farmers to guide farm machinery. Precise navigation of farm vehicles ensures that the machine moves exactly as directed, thereby reducing overlap and increasing efficiency. GPS systems can also be linked with systems that gather information on crop yield and soil conditions, allowing farmers to determine which parts of their farm are most productive, and to take steps to improve low-yielding acreage. Since GPS systems can operate at

any time, farmers can operate machinery 24 hours a day, increasing the utilization of equipment.

Digital imagery offers another tool for high-tech agriculture. Digital images of farmers’ fields allow them to precisely monitor field conditions, detect plant stress, and link to mapping software to assist in field measurement and pest scouting. Early detection of pests, nutrient deficiencies, or water stress can result in reduced input and application costs or increased yields. Such site-specific information may lead to greater emphasis on management of zones within fields rather than whole fields. Conserving resources, reducing agrichemical applications, or efficiently managing nutrients from livestock waste through the application of such technology will provide enormous environmental and economic benefits.

Farmers have demonstrated a willingness to adopt this type of technology. USDA surveys indicate that 30 percent of the corn and 25 percent of the soybean acreage was harvested last year with combines having a yield monitor. In addition, farmers intend to produce yield maps for as much as 10 percent of all corn and soybean acres.

Research continues on adapting information technologies for a variety of new uses. Several new sensing devices, made for use on combines along with yield monitors, have the potential to increase food quality and enhance crop value by detecting specific crop traits during harvest, such as increased protein or oil content, thus making it possible to preserve identity traits during marketing, processing, and distribution.

The food system has entered a consumer-driven era and diversity within our farm sector is enormous. New waves of new technology are sweeping through the entire food system. And, business must now operate in a global economic environment.

chase, inventory, and pricing decisions must be made. Adoption of information technology by farmers, particularly the Internet, has occurred at the same or greater rate than in the general population or among small businesses. Growth in access to and use of computers and the Internet, as well as growth in the range of farm-specific applications, has been robust. In 2000, nearly 60 percent of all farm households had access to a computer, and nearly half of these used the Internet as part of their business.

Farmers reported over \$375 million in online business purchases in 2000, and sold nearly \$300 million worth of harvested crops and livestock online. Farmers are increasingly using the Internet to add value to traditional commodities through niche marketing and “branded” commodities. Identity preservation of commodities is another IT-dependent use; the characteristics of crop and livestock products and their production processes can be efficiently documented and quickly verified online.

Where Are the Drivers Taking Us?

The food system has entered a consumer-driven era and diversity within our farm sector is enormous. New waves of technology are sweeping through the entire food system. And, business must now operate in a global economic environment. This combination of forces is resulting in an increasingly product-based rather than commodity-based system—in the addition of entirely new markets for agricultural output and continued structural adjustment in every segment of the food system.

Producer responsiveness to clear consumer signals, the inducement of structural change and technological advance by market forces, and diversification and location of production to meet market demands are all essential signs of a well-functioning market. All of these rapidly emerging developments indicate that the institutions, policies, and programs that underpin our food and agriculture systems must be adapted to





meet the new challenges.

Because the new environment promises to be so different from the relatively insular, commodity-based system of the not-so-distant past, old institutions must adapt to meet the changing needs, or new ones be formed to provide the appropriate functions. The heterogeneous product markets of the 21st century require different information to function well, and the most useful information will be “real-time” and amenable to customization by its users. Heterogeneity in markets (importing and exporting) also suggests the need for different facilitating services to test, monitor, certify, or otherwise assist branding and identity preservation processes, and for the maintenance and advancement of sanitary and phytosanitary standards.

The application of new technologies and increased investment to achieve natural resource conservation and environmental goals should be encouraged. Environmental enhancement can be consistent with a consumer-driven agriculture, since this is a “good” which consumers demand, and for which market-oriented approaches can be found.

While consumer requirements now must factor greatly in agricultural policy, so must recognition of the wide diversity among producers. Particular attention must be paid to groups that would be unable—without technical, educational, information, or infrastructure assistance—to meet the challenges and take advantage of new opportunities provided by globalization and technological advance.

II. Trade Expansion Is Critical

...steadily expanding foreign demand—brought on by income gains, trade liberalization, and changes in global market structures—has helped U.S. exports steadily increase over time from \$7.3 billion in 1970 to \$53.5 billion for the current fiscal year.

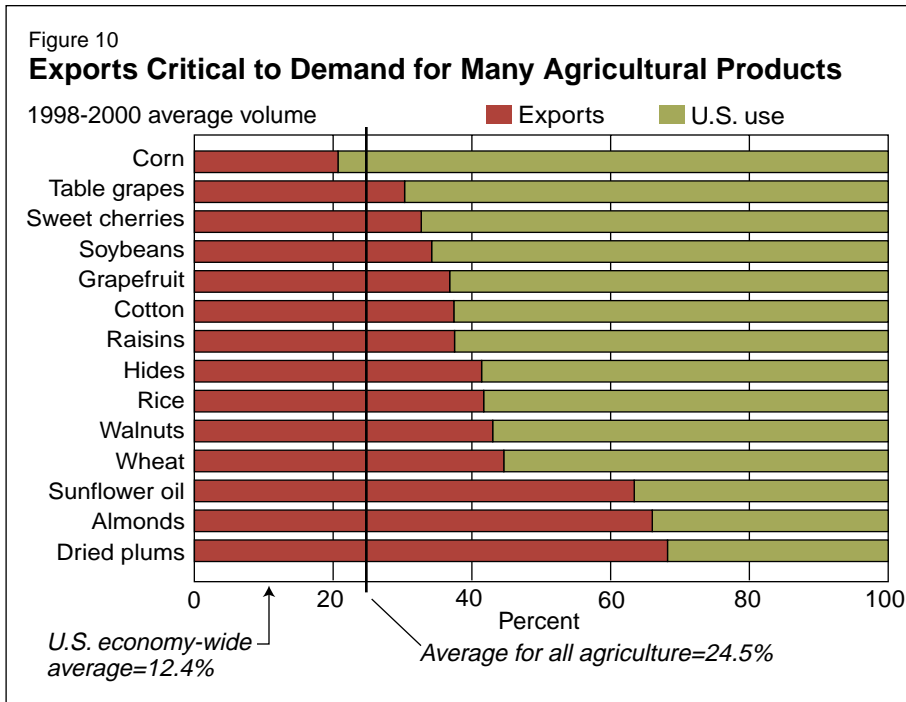
Trade continues to be critically important to the long-term economic health and prosperity of our food and agricultural sector. We have far more capacity than needed to meet domestic food market requirements. To avoid excess capacity throughout the system—our farmland, transportation, processing, financing, and other ancillary services—we must maintain and expand our sales to customers outside this country. In fact, our system's capacity grows faster than the domestic market alone can absorb. Given the maturity of our own food market, aggregate domestic demand has grown more slowly than the

farm sector's rate of productivity growth. However, steadily expanding foreign demand—brought on by income gains, trade liberalization, and changes in global market structures—has helped U.S. exports steadily increase over time from \$7.3 billion in 1970 to \$53.5 billion for the current fiscal year. Clearly, without the salutary effects of an expanding export market, farm prices and net cash incomes would be significantly lower today.

The farm sector's reliance on exports can be further appreciated by observing the share of production of individual commodities exported each year. International markets take a large share of basic commodities such as wheat (45 percent) and soybeans (34 percent) as well as high-value processed products. Some high-value products, including almonds (66 percent) and sunflower oil (63 percent), rely on exports for well over half of sales. Overall, exports account for 25 percent of total farm sales (figure 10), double the percentage for the economy as a whole.

Agricultural exports also play an important role in the larger U.S. economy. Every dollar of direct export sales generates another \$1.39





in supporting economic activity. Processed products have even more extensive economic impacts than bulk commodities—\$1.56 in supporting activity compared to \$1.11. Exports also are not only important in providing jobs on farms, but also in food processing and in the transportation and trade sectors. Some 790,000 jobs were generated in 2000—318,000 on farms and 472,000 in assembling, processing, and distributing products for export. Overall, exports support jobs paying above-average wages.

Trade provides U.S. consumers with access to a wider variety of foods at reasonable prices, including those not produced domestically. Trade brings tropical fruits, coffee, and exotic French cheeses to American consumers. Imports make fresh fruits and vegetables, such as asparagus and grapes, available at affordable prices during winter months. U.S. food processors rely on global markets for many intermediate inputs, such as cocoa (combined with domestic sugar and dairy products) for chocolate.

Increasingly, as the food industry becomes globalized, it uses not just trade, but a variety of innovative business arrangements to access products from global markets and to sell services and products. Capital and technology now flow freely across national borders. U.S. producers move abroad to serve foreign markets and, increasingly, to sell those products here. Foreign firms are major players in our food markets, while U.S. firms sell widely abroad. By removing trade barriers, goods produced in the United States can be sold in foreign markets. But, if trade barriers remain, U.S. capital and technology will relocate to produce and gain access to these markets.



Developing and Middle-Income Markets

Over 96 percent of the world's population lives outside the United States—and that obviously is where food consumption growth will take place. Food demand in the United States and other developed countries—the mature markets—can be expected to increase only slowly, no faster than the rate of population growth. Most future growth in food demand will be in developing and middle-income countries, where both population and income are growing relatively rapidly. Almost all of the world's projected increase of 1.2 billion people by 2020 will be in these countries. As

incomes rise, these consumers spend a far greater proportion of the extra money on food than do high-income consumers, who spend little.

Expenditures on food in developing countries still require a very large proportion of available incomes—47 percent on average compared to 13 percent for developed countries (and only 11 percent for the United States). This relationship that transforms income growth into large increases in food demand also makes the poor in developing countries vulnerable to food shortages from poor weather or economic crises and suggests a role for food aid (see box).

At very low incomes, cereals or grain make up most of consumers' calorie consumption, but as incomes rise above subsistence levels, consumers diversify their diets and

Food Aid

Food aid over the years has been used for a wide variety of reasons ranging from emergency situations to alleviate food shortages to promoting economic development. At any given time, short-term shortages, weather-related and/or human-made disasters (such as civil strife) create a need for food aid. Food emergencies such as assistance for refugees and displaced persons also are growing.

The United States is pivotal in the international food aid system, providing a significant share of all food assistance, and its actions have a major influence on other donors and the system as a whole. U.S. international food assistance is provided through a variety of programs, including PL-480, Section 416(b), and Food for Progress administered by USDA and USAID. The United States also provides food aid through the United Nations World Food

Program, and through international non-governmental organizations (NGOs).

Management of food aid has become complicated because of the wide range of objectives. While all international donors cite humanitarian relief as the basic motivation, economic and political considerations also influence allocation. The mix of food aid usually reflects the export profile of the donor country and tends to vary with yearly fluctuations. Hence, while food aid clearly helped save lives during food emergencies in many countries such as Sudan, Ethiopia, Somalia, Rwanda, and Haiti, current patterns of supply and distribution are sometimes suboptimal in timing and benefits.

Several factors suggest this is an opportune time to review our food aid programs. Five years have passed since the World Food

Summit in 1996 when the United States and developed countries pledged to reduce the number of hungry people by half by 2015. Some progress has been made, but the current pace will not meet the goal. Criticisms of food aid as interfering with the functioning of markets and reducing the incentive to local producers have been raised. New global trade negotiations and formulation of new domestic farm policies in several countries could be important venues for this review. In addition, all countries' food aid programs have also faced criticism that they interfere with the functioning of markets, reducing the incentive to producers.

purchase more meat and dairy products along with processed products. The growth in demand and diversification in diets by developing countries will have a dramatic impact on food markets in the next 20 years. The International Food Policy Research Institute (IFPRI) suggests that by 2020, 85 percent of the increase in the global demand for cereals and meat will occur in developing countries and that the demand for meat in the developing world could potentially double.

Across developing countries the “middle class,” whose incomes have reached the level where consumers diversify diets by including livestock and processed products, is growing rapidly. Research in the mid-1990s indicated that there were some 900 million middle-class consumers in 19 key developing countries (figure 11). By 2006, that number is estimated to reach 1.5 billion, an increase of 68 percent and equal to the current combined population of Japan and the European Union. Much of that increase will be in China, India, and Southeast Asia but there will also be sizeable gains across Latin America.

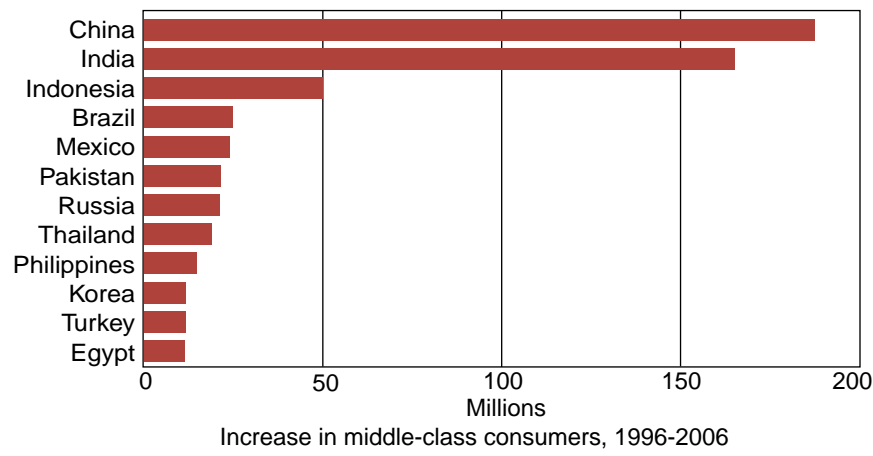
Growth in High-Value Exports

While we see growth in exports of basic commodities, exports of consumer-oriented, high-value products (meats, poultry, fruits and vegetables, and processed products) are growing even more rapidly (figure 12). High-value products now account for two-thirds of total sales, compared with only half in 1990.

Of the 20 fastest growing agricultural exports during the past decade, 15 were consumer-oriented, high-value products, with pet food leading the way. Pet food sales have grown almost 14 percent annually for a decade and this year are projected to reach a record 1 million tons valued at \$1 billion. Continued

Figure 11
Middle Classes in Key Emerging Markets To Grow by 600 Million

Transition from subsistence existence to “middle class” creates increased demand for quantity, quality, and diversity of food.

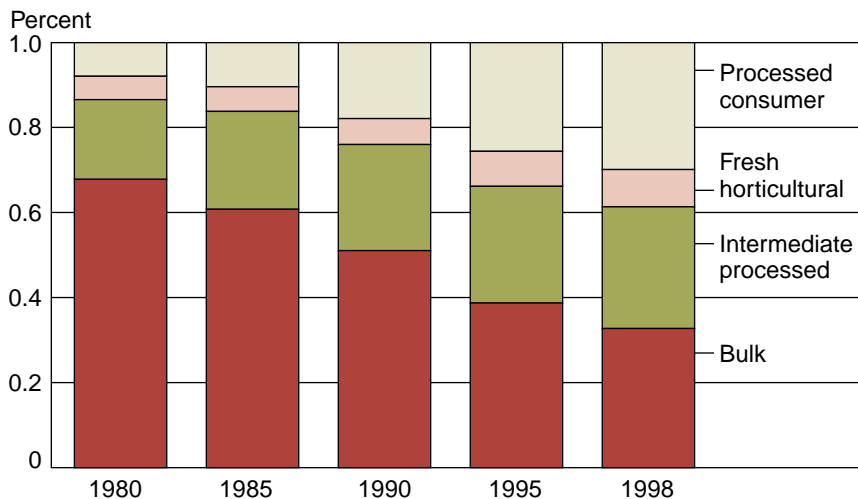


expansion in these markets will require greater cooperation across the value chain—among farmers, ranchers, food processors, and others—to offer high-quality products at prices competitive with farmers and processors in other countries.

The positive outlook for high-value-product exports clearly benefits the Nation’s bulk commodity producers. The sharp expansion in exports of red meats and poultry, especially relative to domestic sales,

has increased the use of grain and soybeans to feed livestock (see box, page 40). We are exporting more corn and soybeans, but in the form of meat and poultry. In 1990, only 1.4 percent of the total value of our grain output and 1.8 percent of the value of our soybean output was exported as livestock products. In 2000, those numbers had grown to 4.3 percent for grains and 5.4 percent for soybeans.

Figure 12
Share of High-Value Products in U.S. Exports Growing Rapidly



Trade Expands Demand for Meat

In the last 15 years, U.S. export sales of the three major meats—beef, pork, and poultry meat—have grown faster than our competitors’ meat exports, and the U.S. has evolved from primarily a meat importer to a large exporter. United States exports totaled \$6.2 billion in 2000, compared with \$3.7 billion in imports. Export quantity also exceeded imports (10 billion versus 4 billion pounds). On a value basis, the United States has become a net exporter of beef, pork, and poultry, with the value of beef exceeding \$3 billion and pork and poultry each exceeding \$1 billion. At the same time, we are the world’s largest beef importer and a major pork importer. Expanding high-value meat export sales in the future benefits both processors and livestock producers, expands economic activity, and expands the demand base for both grains and oilseeds.

Barriers to Expanding Trade

Although trade has become increasingly important for many products, U.S. exports have not kept pace with those of our competitors and, as a result, our market share has steadily eroded. Twenty years ago, the United States led exporters with a 24 percent share of global agricultural markets. That share has fallen to 18 percent and the European Union, with over 17 percent market share, has almost surpassed the United States. Some factors, such as a strong dollar that increases the relative price of U.S. exports, are beyond the scope of agricultural policy. But, U.S. exporters can benefit from international trade agreements to remove trade barriers and strengthened export promotion programs to keep pace with other countries’ foreign market development initiatives (see box, page 41).

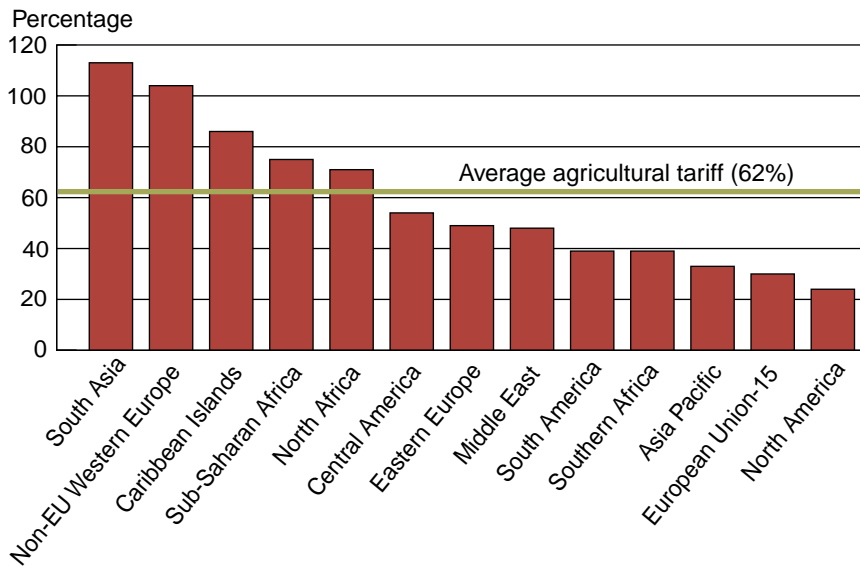
Lowering tariffs and other barriers to trade is fundamental to expanding exports. The average food and agricultural tariff is 62 percent, much higher than tariffs on manu-

factured items. Both developed and developing countries have high tariffs. Exports to the large potential markets in South Asia (including India) and to South America must overcome tariffs of 113 and 40 percent, respectively. The United States has one of the lowest food and agricultural tariffs, at 12 percent (figure 13), and thus stands to gain immensely from ambitious tariff cuts. However, the United States still maintains some high tariffs that protect specific commodities.

In addition to tariffs, high levels of domestic support for agriculture and export subsidies distort agricultural markets. In contrast to tariffs that are applied by almost all countries, developed countries account for virtually all domestic support and export subsidies. The Organization for Economic Cooperation and Development estimates that in 2000, developed countries’ total support for agriculture was \$327 billion. In that same year, total production supports by the European Union were \$90.2 billion, compared to \$49 billion by the United States. The European Union dominates use of export subsidies, accounting for approximately 90 percent of total annual spending since the Uruguay Round Agreement on Agriculture (URAA) took effect.

USDA research shows that removing all forms of agricultural protection and support could raise world prices 12 percent, over half of this from removing tariffs alone. Our producers and the industries they support could see the value of U.S. agricultural exports grow 19 percent. Global economic welfare would increase by \$56 billion annually by removing existing distortions.

Figure 13
World Agricultural Tariff Averages, by Region¹



¹Tariffs are bound MFN rates based on final URAA implementation.

U.S. Falling Behind on International Market Promotion Spending

Since the URAA, our competitors, notably the EU and the Cairns Group, have increased their market development investments by 50 percent to \$1 billion annually. In sharp contrast, our market development spending has been virtually flat at about \$250 million. This is a sharp reduction from the early 1990s when Market Access Program funding fell from \$200 million to the current \$90 million.



A Trade Agenda for the 21st Century

America should continue to be a global agricultural leader in the 21st century. Our farmers and food companies benefit from a wealth of natural resources, cutting-edge technology, and a supporting infrastructure. With these assets, we can compete with anybody in the world—provided markets are open, trade is not distorted by subsidies, and our own domestic support programs do not inadvertently reduce our competitiveness. We also can and should employ America’s agricultural bounty to meet the world’s growing food aid needs.

Enhancing the competitiveness of U.S. food and agriculture in the global marketplace should be one of the primary objectives of our farm policy. To achieve this goal, we need to focus on four strategies:

- Continuing the liberalization of trade in agriculture
- Enhancing the competitiveness of our food and agricultural exports
- Ensuring we have the proper tools
- Pursuing an ambitious and focused global marketing strategy.

Continuing Trade Liberalization

Agricultural trade liberalization will expand access for U.S. food and agricultural products in overseas markets and reduce unfair competition in those markets from other countries. It would also promote economic growth globally, and particularly in developing countries where the demand for U.S. food and agricultural products has the greatest potential to grow.

A new round of World Trade Organization (WTO) negotiations would advance the process of trade liberalization. A new WTO agreement on agriculture is needed to continue the process of agricultural trade liberalization that was begun with the URAA. Signed in 1994, the URAA marked the first time that agriculture was subject to effective international trade rules. It establishes disciplines for the three major types of trade-distorting agricultural policies, frequently referred to as the three pillars of the URAA—market access (tariffs, quotas, and other trade barriers), domestic support, and export subsidies.

The URAA made substantial progress in liberalizing agricultural trade. However, much work remains to be done. Further progress in reducing and eliminating export

America should continue to be a global agricultural leader in the 21st century.



subsidies, market access barriers, and trade-distorting domestic support measures requires a comprehensive approach—all countries have to put all products and all policies on the table. There can be no exceptions.

Regional and bilateral trade agreements create export opportunities. They can be important building blocks for trade liberalization. The North American Free Trade Agreement (NAFTA), the United States' largest effort to date to completely eliminate trade barriers, has had promising results. Since the implementation of NAFTA, U.S. food and agricultural exports to Canada and Mexico have expanded by 59 percent, while corresponding exports to the rest of the world grew by only 10 percent. The Administration has committed to negotiating free trade agreements with Singapore and Chile, and eventually a Free Trade Area of the Americas encompassing virtually the entire Western Hemisphere.

Unfortunately, we have fallen behind some of our competitors. Today, there are more than 130 preferential trade agreements throughout the world—and the United States is party to only 2 of them (NAFTA and the U.S.-Israel Free Trade Area Agreement). The European Union has 27 preferential agreements with other countries and is negotiating 15 more. Both the EU and Japan are negotiating or exploring preferential trade deals with our Latin American neighbors, natural markets for U.S. food and agricultural products.

Free trade agreements should supplement, not substitute for, global trade liberalization. They can accelerate the pace of liberalization and provide momentum for global reform, but they also have limitations. Trade distortions caused by export subsidies and domestic supports cannot be effectively addressed in free trade agreements. Nor should the basic rules governing global agricultural trade established in the

WTO be altered in free trade agreements.

Enforcement will help to maximize the benefits from trade agreements. As part of the Uruguay Round, WTO members agreed to a strong dispute settlement process. The United States has been involved in nine agriculture-related cases brought to dispute settlement panels and has prevailed in seven. Nevertheless, the number of disputes in the WTO continues to grow, creating demands on resources for both the government and industry. The prospective entry into the WTO of China and Russia—countries without strong market systems in place—will present even greater enforcement challenges.

While the dispute settlement process has been an important tool, intervention to prevent trade disputes before they reach the WTO will be critical to protecting U.S. agricultural trade interests in the future. Effective prevention requires constant monitoring of U.S. export markets. The U.S. agricultural attaché network, working closely with U.S. exporters, can serve as an early warning system for potential trade problems.

A critical success of the Uruguay Round was the establishment of effective rules to prevent domestic regulations to protect food safety and plant/animal health from being used as disguised trade barriers. Under the Sanitary and Phytosanitary (SPS) Agreement, countries committed to using science as the basis of domestic regulations and to subjecting their regulations to scrutiny through the WTO dispute settlement process.

The United States is as rigorous as any country in basing its regulatory decisions on sound science. However, our regulatory infrastructure is struggling to keep pace with the increase in the number of technical barriers to trade. The growing number of SPS regulations around the world related to biotechnology



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present a particular challenge, both for our infrastructure and for our food and agricultural exports. To meet these growing challenges we will need more resources in our regulatory agencies; more research and technology development for disease and pathogen control; and, just as importantly, resources to train regulatory officials in other countries to help ensure that their regulations are based on sound science.

Enhancing Export Competitiveness

As agricultural trade is liberalized, the competition in the global marketplace will become increasingly fierce. Trade liberalization alone will not guarantee success in export markets. We will have to sell what our customers are demanding and on better terms than our competitors.

The United States has abundant natural advantages in agriculture that will allow us to continue to be an agricultural superpower. However, to remain competitive, our domestic farm programs must be complementary with our international trade objectives. Producers need flexibility to adapt rapidly to the changing demands of the marketplace. Our support policies should provide an economic safety net without distorting market signals. Given the rapid growth in high-value-product exports, food processors and manufacturers need access to their raw materials at world market prices. In short, we have to expand our vision from supporting farm prices to participating in the global marketplace.

Providing the Proper Tools

We must ensure that our exporters have the necessary tools to capture a greater share of the benefits that are flowing from trade reform and the resulting global market expansion. USDA provides support for overseas market expansion through both infrastructure, such as the agricul-

tural attachés overseas, and assistance programs, such as export credit and credit guarantee programs.

Exporters receive assistance from a trade infrastructure that includes agricultural offices in 63 posts covering 130 countries. Agricultural attachés serve on the front line of U.S. food and agricultural trade, working with foreign governments to eliminate unfair trade barriers, responding quickly to market access problems, and monitoring compliance with trade agreements. The attachés overseas and the staff in Washington help exporters expand current markets and break into new markets through continuous reporting of trade information and by assisting with trade promotion activities. They also help to overcome barriers posed by different cultures, languages, and preferences for food.

Export promotion assistance allows firms to establish footholds in profitable markets that otherwise might have been inaccessible. With the Market Access Program (MAP), USDA targets consumer-promotion and trade-servicing activities toward markets for value-added and processed products. Commodity and agricultural trade associations can use the Foreign Market Development (FMD) program to acquire market research and surmount long-term impediments to trade.

USDA programs to guarantee financing for trade have expanded exports by providing developing and middle-income countries with access to credit. Recent success in using export credits to finance food imports by countries during the Asian financial crisis demonstrates the ability of these programs to maintain demand for U.S. products. However, these programs have been sharply criticized by some countries as unfair subsidy practices, although the United States is not alone in maintaining export credit programs. As we look to the future, we will

have to consider the feasibility of developing international disciplines on the use of government-supported export credits.

Focusing Our Marketing Strategy

USDA's export assistance activities should be focused on those markets with the greatest growth potential. While we cannot afford to ignore any market, neither can we provide the same level of assistance and attention to all markets.

Principles for Expanding Trade

- **Recognize the critical importance of the global marketplace.** More than 96 percent of all consumers live outside the United States. Failing to reach the newly emerging middle-class consumers (where demand growth will be most rapid) will stifle expansion of market share.
- **Expand markets through new trade agreements.** Greater access to foreign markets requires aggressive trade policy to lower tariffs and eliminate distorting subsidies. Failure to provide strong leadership in global trade liberalization will result in our producers and exporters being left behind. Other nations are aggressively pursuing agreements, many right in this hemisphere which are markets where we should have transportation and other advantages.
- **Ensure that farm and trade policies are fully compatible.** Domestic farm support and international trade policies must be consistent and mutually reinforcing. It makes no sense to have trade policies and programs promoting farm exports at the same time domestic support programs inadvertently reduce competitive-



- ness. Our domestic and export policy must support our existing international obligations and at the same time give us ample latitude in pursuing ambitious goals in ongoing and future negotiations.
- **Enforce existing trade agreements.** Once new trade agreements have been concluded, the Government must ensure that our trading partners meet their obligations. This includes ensuring that our trading partners use accepted scientific principles in enacting their regulations. The growing number of sanitary/phytosanitary-related trade issues also requires an enhanced regulatory infrastructure.
- **Sharpen marketing efforts.** Programs to expand exports—export credit guarantees and market development—have served our food and agriculture sector well. Continual review and modification of these programs are required to ensure they are cost-effective and target high-impact growth markets and high-value products.

III. Farm Sector Policy

The farm sector and all of agriculture are vastly different today, as is much of rural America. Yet, our farm policy retains vestiges of the New Deal programs and reflects a time of greater homogeneity across American farms and farm households.

If farmers and farm families all across the country shared the same goals and faced the same challenges and opportunities, fashioning farm policy today would be straightforward. And, indeed, that's the way it must have seemed in the 1930s, when farm families depended mainly on farm earnings and grew crops and livestock on much the same acreage as their neighbors. Then, policy had a more focused objective—helping to reduce the wide income disparity between farm families and their urban counterparts—and a “one size fits all” approach was more appropriate. Supporting field crop prices provided widespread assistance, since most farmers grew some field crops, and helped stabilize the entire sector. The farm sector and all of agriculture are vastly different today, as is much of rural America. Yet, our farm policy retains vestiges of the New Deal programs and reflects a time of greater homogeneity across American farms and farm households.

Today, the farm sector is diverse beyond the imagination of those who framed the New Deal legislation. On average, farm family incomes no longer lag, but rather surpass those of other U.S. households. Most farms are run by people whose principal occupation is not farming. Markets have changed, too. Domestic demand alone is no longer

sufficient to absorb what American farmers can produce. Demand by well-fed Americans grows slowly, with population growth. The promise of new, much faster growing markets lies overseas, in countries where economic prosperity is emerging for larger numbers of people.

As a result, the United States must consider its farm policy in an international setting, helping farmers stay competitive while pressing for unfettered access to global markets. At the same time, Americans' expectations with respect to food have moved well beyond assurance of adequate quantities to include quality, safety, convenience, and many more attributes. And, expectations now extend to environmental preservation and enhancement.

More than seven decades of farm policy have provided a rich, full experience upon which to draw as we contemplate appropriate 21st century policies for our industry. The view of policies and programs across their history has proved very instructive, providing invaluable lessons which at a very minimum can help us avoid the obvious mistakes of the past. History also shows that growth in farm household income was largely due to rapid improvements in productivity supported by a strong research base along with better opportunities to market products, including export markets and off-farm employment opportunities.





Many of the program approaches since the 1930s proved not to work well or not at all, produced unexpected and unwanted consequences, became far costlier than expected, and have been continually modified over time in the long succession of farm laws. Some major, and still highly relevant, lessons learned include:

- **History has shown that supporting prices is self-defeating.** Government attempts to hold prices above those determined by commercial markets have simply made matters worse time after time. Artificially higher prices encouraged even more unneeded output from the most efficient producers at the same time they discouraged utilization, consequently pushing surpluses higher and prices lower. Costs to taxpayers grew until the point was reached where something more had to be done. All too often, that turned out to be finding ways to restrict output.
- **Supply controls proved unworkable too.** These usually involved restricting the amount of land farmed in attempts to reduce output. But, the remaining land was farmed more intensively, and supply rarely was cut enough to boost prices to politically satisfactory levels. The programs were costly to taxpayers and consumers and the unused resources were a drag on overall economic performance. But, perhaps most important of all, limiting our acreage was a signal to our competitors in other countries to expand theirs, and we lost market share that is always difficult to recapture.
- **Stockholding and reserve plans distort markets enormously.** Isolating commodity stocks from the market when supplies are abundant is attractive for its short-term price stimulus. But, because such stocks eventually must be returned to the market, they limit the recovery of prices in the future. Moreover, time after time, stocks have proved costly to



Since the land charge is such an important component of farmers' total cost, sustained increases in land prices and rents have a decidedly adverse effect on the competitiveness of our farmers in the marketplace compared with those in other exporting countries, a cause of growing concern in recent years.

maintain, distorted normal marketing patterns, ceded advantage to competitors, and proved tempting targets for political tampering.

- **Program benefits invariably prove to be disparate, providing unintended (and unwanted) consequences.** The rapidly changing farm sector structure produced a wide array of farm sizes and efficiencies. Many farms were low cost and the programs were of enormous benefit, enabling them to expand their operations. Others did not receive enough benefits to remain viable and thus were absorbed along the way. That situation still remains to some extent today, even though we now have far fewer farms.

The clarity of these lessons provided several emphatic turning points in national policy. The 1985 farm law proved to be one such point when, after long debate on fundamental philosophy, a more market-oriented approach was adopted. That market orientation was extended in the 1990 farm law, making a less intrusive and expensive role for government in farmer

decisionmaking and in the operation of the markets.

The Federal Agriculture Improvement and Reform (FAIR) Act of 1996 proved to be historic in that it removed much of the decades-old program structure, provided unparalleled farmer decisionmaking flexibility through “decoupled” benefits, and set a new example throughout the world for providing domestic farm sector support. While that approach still is arguably the least distorting of markets and resource use, its direct payments do share some unintended effects with price support programs, namely the artificial inflation of farmland prices. The effect clearly has been exacerbated by the size of payments in recent years, some \$28 billion in the last 4 years above the amount provided in the 1996 law.

While the rise in land prices creates wealth for some, it works to the disadvantage of others. Direct government transfers distort real estate markets, keeping land prices artificially high when commodity prices are low, as we are seeing today. Higher land prices from consecutive years of large program support make it more difficult for beginning farmers by increasing capital requirements. This inflation also makes it more costly for existing farms to expand to achieve size economies, either by purchasing or renting additional acreage (since land rents move in tandem with prices). Higher land values do benefit local tax authorities and the collateral base of farm lenders, but add directly to production expenses through higher interest and rental costs. Since the land charge is such an important component of farmers' total cost, sustained increases in land prices and rents have a decidedly adverse effect on the competitiveness of our farmers in the marketplace compared with those in other exporting countries, a cause of growing concern in recent years.

Squaring Today's Realities With Policies

Because of their historical evolution, current program benefits still are largely directed to specific commodity producers, resulting in only 40 percent of farms being recipients. And, there still is no direct relationship between receiving benefits and financial status of the farm. The most financially disadvantaged segment of farmers today is the low-income, low-wealth group (see appendix 1). This limited-resource group comprised about 6 percent of farms, had average household income of \$9,500, but received less than 1 percent of direct government payments in 1999. In contrast, 47 percent of payments went to large commercial farms, which contributed nearly half of program commodity production and had average household income of \$135,000 (figure 14).

Our current broad-scale, commodity-oriented approach to farm support does not recognize existing wide differences in production costs, marketing approaches, or overall management capabilities that delineate competitive and noncompetitive operations. It thus is impossible to provide enough income support for intermediate farms without overly stimulating production by lower cost, large-scale commercial producers (figure 15). Even though many intermediate farms and rural-residence farms receive some program benefits, only one in four generated enough revenue to cover economic costs. Even more problematic is the inability of these farms to improve their cost efficiency at the same pace as larger commercial operations, whose investment in new technologies and ability to expand are aided by program benefits.

Figure 14

Large Farms Receive the Biggest Share of Direct Government Payments (1999)

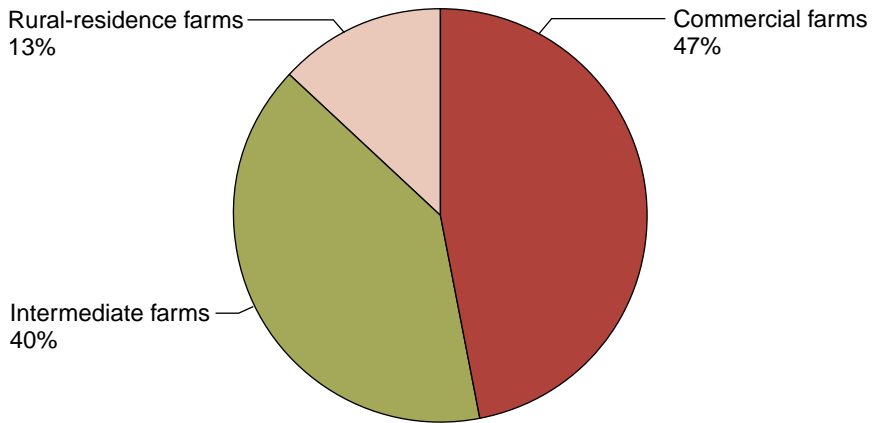
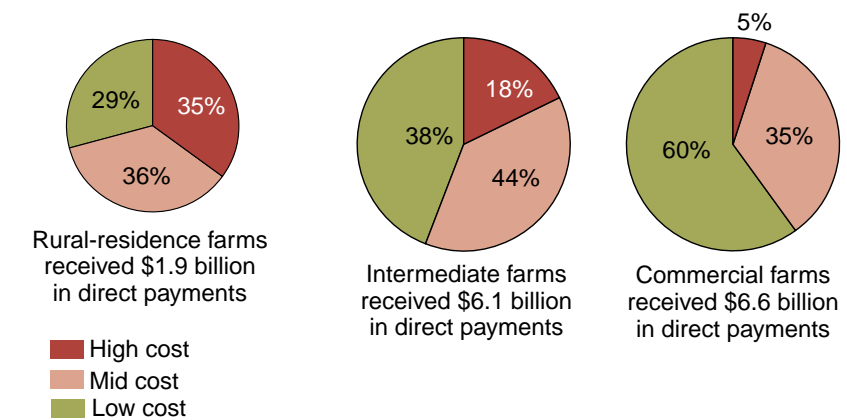


Figure 15

Distribution of Direct Payments by Farm Size and Cost Structure (1999)



Another unintended consequence of current programs stems from the increasing disconnect between land ownership and farm operation. While program benefits were intended to help farm operators, most support eventually accrues mainly to landowners, in the short run through rising rental rates and in the longer term through capitalization into land values. Land prices in recent years have been relatively robust—especially in areas producing program commodities—despite concerns about low commodity prices and the future direction of farm programs. For many farm operators, renting land is a key strategy to expand the size of the business in order to capture the size economies, as evidenced by 42 percent of farmers renting land in 1999. Clearly, operators farming mostly rented acreage may receive little benefit from the programs.

The impact of income from any source (including program benefits) on land values depends on whether that income is viewed as permanent or transitory—the degree of certainty that the income will continue in the future. Even though production flexibility contract payments

were intended as transitory when authorized by the 1996 Farm Bill, subsequent emergency assistance and a 70-year history of government involvement in agriculture have reaffirmed the expectation that support will continue in the future.

The 1996 FAIR Act also continued the marketing loan program, another evolution of the old price support idea, but importantly modified to avoid government stockholding which proved so burdensome in times past. Marketing loan payments effectively provide a large countercyclical component to farm income, but distort markets by limiting the production response to falling market prices. The program guarantees a price for traditional program commodities (food grains, feed grains, and cotton) and oilseeds. As market prices have fallen below this guaranteed price, total marketing loan benefits have risen from less than \$200 million for the 1997 crop to \$8 billion for the 1999 and \$7.3 billion to date for the 2000 crops. Since 1996, countercyclical marketing loan benefits have totaled about \$20 billion.

While the current policy made large strides toward greater market orientation, a careful evaluation in



the context of today's diverse farm structure and increasingly consumer-driven marketplace still reveals severe misalignment among policy goals, program mechanisms, and outcome. Improvements could support more sustainable prosperity for farmers, agriculture, and rural communities without engendering long-term dependence on direct government support.

The Economic “Safety Net”

While strong arguments can be made for solutions for specific problems, common principles apply to all programs that support the diversity of American farms. Foremost, our strongly held view is that agricultural policy must recognize that the marketplace is the best guide for allocating resources and provides the most objective reward for efficiency and good management. But, that does not rule out helping farmers and ranchers when unexpected events beyond their control occur and cause output or income to plummet. The challenge, of course, is to provide an adequate safety net without encouraging sustained dependence on government. Safety net interventions should not obscure needed adjustments in outputs and markets that inevitably must occur, nor should they fail to reflect that the functioning of competitive markets must cover the entire food system in today's dynamic, consumer-driven agriculture.

The idea of a “safety net” is becoming much more encompassing than the traditional price and income support. This modern view has been dramatically emphasized in recent years, when we have seen the entire agriculture infrastructure placed under great stress from food safety



concerns and the potentially devastating losses to producers (foot-and-mouth disease and BSE in Europe, for example). These and other events have underscored the need for protection from plant and animal diseases and pests, new research on testing, more widespread monitoring, research to maintain and improve competitiveness in world markets, buttressing the foundation for sanitary and phytosanitary measures in trade agreements, and generating more attention to food safety and the integrity of the entire food system. Arguably, the policy focus of the past 4 years has distracted us from focusing on these fundamental aspects of a safety net for the entire food system for the benefit of not only the farmer but the consuming public as well.

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Diverse Farm Structure and the Government's Role

The highly diverse, consumer-driven food system makes flexibility imperative in matching government program design and intent with farm circumstances that vary with size, organization, and geographic location. In short, the solution should fit the problem, and benefits for one group should not disadvantage other groups. For example, highly competitive commercial farms may benefit most from trade negotiations that expand markets for their products while intermediate



farms also may take advantage of newly developed market opportunities. Alternatively, investment in rural infrastructure that helps attract more and better jobs may be crucial to intermediate farms and other rural inhabitants.

Past attempts at tailoring or directing benefits to particular groups have not proved very successful where the basic economic

realities of farming were misunderstood. For example, legislative efforts to ensure that farm operators rather than landlords got the benefit of government payments were easily circumvented, while payment limits to individual farmers have not proved effective. Nevertheless, developing policy improvements requires a better understanding of how the farm sector is structured and operated and the implications for a government role in the sector.

Government's Role in Assisting Commercial Farms

Commercial farms in the United States are among the most highly efficient producers of food and fiber anywhere. Their cost advantage over other farms derives largely from size economies. The bulk of their income is derived from farming and related activities and their well-being depends on the success of the farm business—on production efficiency and the managerial ability to respond to weather, pests, disease, and changes in farm input and marketing costs, as well as on prices. Federal programs that expand market opportunities, help reduce production and marketing costs, and assist with risk management are most beneficial to commercial producers.

Expand markets. In the long run, commercial farmers need new and expanded markets in which to sell their growing output to avoid suffering price declines. Government leadership in negotiating new and expanded international trade agreements and resolving trade disputes provides access to overseas customers. Support for research into alternative product uses such as renewable energy also will expand markets.

Risk management. Commercial farms, like other successful businesses, use a variety of tools to manage risks, including insurance, diversification of markets, contracting inputs and outputs to establish



prices, and using futures and options markets. Frequent exposure to natural disasters (hail, flood, drought, frost, and wind) sets agriculture apart. The potential for natural disasters to affect wide areas at the same time, as well as other factors, makes it difficult for private insurance markets for agriculture to be viable.

Insurance provides farmers with a range of choices to reduce risk, given their individual circumstances. In contrast to other payments where farmers respond to Government-determined prices and payments, insurance can be more market oriented. Market orientation extends to the provision of insurance where private companies and agents sell and service policies and the Government provides financial incentives to companies and subsidies that lower premiums paid by farmers. While insurance programs do not directly interfere with market prices, they must be expanded and managed carefully to avoid distorting markets through excessive subsidies for risk or through providing guarantees that are out of line with market conditions.

Federal involvement in agricultural insurance has grown steadily since the 1980s, in parallel with the increasing market orientation of farm policy. About three-quarters of the acreage planted to major crops (corn, wheat, soybeans, and cotton)

is at least minimally insured, and insurance is available for more than 100 crops. Coverage has been expanding through the provision of coverage for more crops and through the development of new types of insurance, such as revenue coverage, which provides more risk management choices to farmers.

Concerns that farmers were purchasing too little insurance motivated reforms by Congress in the Agricultural Risk Protection Act (ARPA) of 2000. High premiums were cited as a primary cause for low participation, and the ARPA increased premium subsidies, lowering farmers' premium costs for higher coverage levels. The ARPA also increased incentives for extending coverage by increasing the role of the private sector in the development of new risk management tools. ARPA provides \$8.2 billion over 5 years to lower premiums and extend coverage.

Managing conservation. Farmers and ranchers are very aware of the impact of their operations on the environment. Compliance with regulations that protect resources and the environment is consistent with farms' own objectives, but entails added cost, while competitiveness hinges on cost control. Meeting water and air quality standards, for example, can increase costs when production practices are altered to reduce nutrient loss or control erosion, just as protecting endangered species may require costly adjustments. Regulations that recognize the realities of farming operations can help minimize the costs of adopting environmentally friendly practices, and assistance in meeting additional costs also can help protect U.S. producers' competitive edge in international markets.

The highly diverse, consumer-driven food system makes flexibility imperative in matching government program design and intent with farm circumstances that vary with size, organization, and geographic location. In short, the solution should fit the problem and benefits for one group should not disadvantage other groups.

Needs of the Intermediate Farms

The intermediate category of farms perhaps is best characterized as businesses in transition. They may be beginning farmers or farmers nearing retirement, but a common characteristic is that keeping the farm going generally requires off-farm income sources. The path to profitability for most lies in lowering production costs—often available only by expanding their farming operations, especially if their focus is crop commodities. However, these farms increasingly have new opportunities on the demand side of the market, by increasing their revenues through direct marketing and by producing value-enhanced products. Direct markets often are specialty markets, appropriate for farmers able to move small amounts of product. Creating “virtual” economies of size through joint ventures and other value-added business enterprises also may enhance the long-term viability of these operations. Moreover, the importance of off-farm earnings clearly suggests that large benefits accrue to these farmers from efforts to expand off-farm employment opportunities and strengthen rural communities.

Strengthening competitiveness. The long-term viability of intermediate farms depends on developing strategies to access new markets and effectively manage costs. Earning profits provides the resources to adapt to all types of change, including short-term weather shocks or continual technological advances. Commercial farms have been able to do this while intermediate farms still struggle, and assistance in becoming more astute managers of their marketing and financial operations likely is critical.

Even so, intermediate farms’ revenue arguably now is depressed because of the policies that encourage overproduction. These farms currently bear the unintended consequences of payments based on output, which encourage more production, primarily by commercial farms. This pushes market prices lower and makes it more difficult for intermediate farms to break even. While reducing or eliminating this market distortion would benefit these farms, it would not be sufficient to ensure their survival. That would require greater efficiency for those on the verge of becoming competitive, while recognizing the diversity of local conditions facing these farmers. A national program focusing on intermediate farms may not address all farmers’ needs. For example, educational resources (to improve management), information about new markets, and natural resource conditions all vary significantly by region. This diversity has prompted discussion of new, innovative approaches such as block grants to States for programs that tailor cost efficiency to specific farms.

Risk management. Improved management extends to the sophistication with which farmers choose and employ risk management tools. Commercial farms typically use a broad range of approaches to manage adverse effects of market, financial, and natural disaster risks. Intermediate and rural-residence farms may have more limited experience. The ARPA also includes funding for partnerships with private and public entities to educate producers about risk management activities and risk reduction strategies. Federal and State Governments, often through land-grant universities, provide training to help farmers acquire or enhance risk management skills needed to thrive in today’s marketplace.



Stewards of the land. Intermediate farms also must meet environmental mandates, and their smaller size may mean that they face different requirements and costs of compliance. Moreover, this group of farms controls a significant portion of the farmland (45 percent), and supporting their compliance with environmental regulations is important to the quality of the Nation's resources.

Assisting Rural-Residence Farms

Most rural-residence farms lose money on farming, subsidizing these activities with nonfarm earnings or retirement income. Objectives other than farm profitability, such as enjoyment of a rural lifestyle and farm work, keep them in agriculture. Their off-farm income, aided by favorable tax policies, permits them to subsidize farming. Also, many small farm owners may view farmland as a long-term investment that diversifies their financial portfolios.

Not surprisingly, traditional agricultural policy has very little influence on the financial well-being of these households. They are very little connected to commodity prices but

much more so to wage rates, interest rates, employment levels, and tax policies. Their needs obviously are more effectively addressed by rural development and other policies that most affect them. These farms are small individually, and they account for only a small proportion of total output, but collectively they control a large proportion (29 percent) of the farmland, suggesting that their participation in appropriately designed conservation and environmental programs potentially could make important contributions to national objectives in those areas.

Other Policy Areas Increasingly Important

While policy discussion still is dominated by commodities, other areas are increasingly important for farmers of all groups. One such area is tax policy. The President's tax reform legislation eliminated the estate tax that was a longtime and growing concern to family farmers and small business owners who make up a large part of the food system. Estate tax elimination allows family farms and businesses to be passed to the next generation without dissolution of the entity or the need to sell assets in order to pay Federal taxes. Over the long haul, tax relief will encourage work and innovation and also allow farmers to save more in their pension plans or individual retirement accounts.



Tax-deferred Farm and Ranch Risk Management (FARRM) accounts, as variously have been proposed, would allow farmers to reserve a substantial percentage of their net farm income in a tax-deferred account, which could be drawn on during downturns. These funds could be held in the account for several years to help farmers in times of reduced income to offset operating expenses and purchase inputs for the next production cycle. Such accounts, appropriately designed to be countercyclical, could be an important part of the economic safety net.

Farm Policy and International Trade

It has been clear for some time that the long-term economic health and prosperity of the farm sector, and indeed of the entire food system, depend upon the ability to gain greater access to customers in foreign markets. The reasons are obvious. We have far more capacity, in our natural resources and infrastructure investments, than needed to meet domestic food needs and our market is now mature. In fact, new technology expands this capacity faster than the growth in domestic demand, which is at the slow pace of our Nation's population growth. Assets increasingly out of place, underutilized, and declining in value would result without growing access to the 96 percent of the world's consumers who are outside the United States.

This increased reliance on foreign markets and trade now means that we must pay greater attention to the compatible development of domestic farm support policy and our international undertakings and activities. Today, choices made in our domestic policy have a direct bearing upon

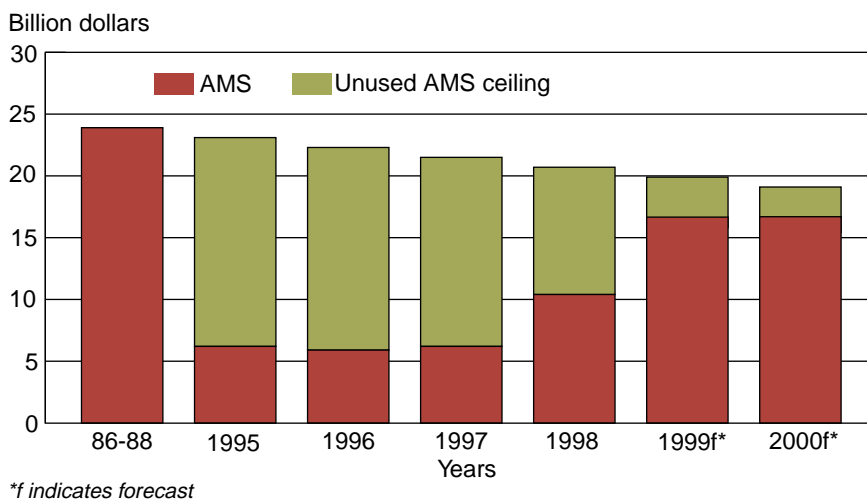
international agreements already in force as well as upon the latitude we have in negotiating new agreements to bring even more benefits.

We must ensure that we fulfill our existing WTO commitment on domestic support while providing room for negotiations. The “three pillars” of the Uruguay Round Agreement on Agriculture (URAA)—market access, domestic support, and export subsidies—recognize the interdependence between domestic and trade policies. Reaching a consensus among WTO members on further trade liberalization will require reductions across all three pillars.

Current policies, particularly spending for marketing loan payments, approach WTO limits and leave little room for negotiating further reductions (figure 16). Amber box spending rose from \$6.2 billion in 1997 to \$10.4 billion in 1998, largely from increased marketing loan payments. Payments in 1999 and 2000 brought the United States closer to its limits. Other large expenditures in the amber box are market price supports for dairy, sugar, and peanuts valued at \$5.8 billion in 1998 and subsidies for crop insurance at \$747 million.

Noncommodity-specific payments also have increased and potentially could exceed the ceiling of 5 percent of the value of domestic production. If this happens, the full value of the expenditures then must be included in the Aggregate Measure of Support (AMS) and would push us well above our WTO commitments. Market loss assistance payments (MLAs) of \$2.9 billion, combined with other expenditures, used about one-half of the available 1998 “de minimus” exemption. Increased crop insurance subsidies in 1999 and 2000, combined with MLAs of \$5.5 billion, will push our total much closer to the “de minimus” ceiling.

Figure 16
U.S. Aggregate Measure of Support (AMS) Approaches WTO Ceiling



WTO Domestic Support Categories

The URAA differentiates domestic support policies according to their effects on production and trade. “Amber box” policies that directly subsidize production and influence the decision to produce are included in the calculation of an Aggregate Measure of Support (AMS) and made subject to reductions. Amber box policies are further divided according to whether they provide commodity-specific or noncommodity-specific support. “Green box” policies, those that cause only minimal trade distortions, are exempt from any expenditure limits. “Blue box” policies are distorting farm subsidies that are linked with supply limitations.

WTO members agreed to reduce commodity-specific, trade-distorting domestic support by 20 percent (13 percent for developing countries). Noncommodity-specific support is not included when calculating the AMS as long as it does not exceed 5 percent of the value of agricultural production (developing countries have a 10 percent ceiling). These amber box payments are referred to as “de minimus.” Our limit on spending on amber box policies is \$19.1 billion. “Blue box” policies are exempt from reductions because the supply limits partially offset the subsidies’ incentives to overproduce and thus disrupt global trade.

Principles for Farm Policy

- **Pay heed to lessons learned.** Above all, effective farm policies for the new century must build upon the lessons learned from over seven decades of rich experience with the farm programs. Even the most carefully designed government intervention distorts markets and resource allocation, produces unintended consequences, and spreads benefits unevenly. We cannot afford to keep relearning the lessons of the past.



- **Recognize our new operating environment.** Our farm sector and food system operate today in a new and evolving business and social environment. It is a competitive, consumer-driven environment, global and rapidly changing with enormous implications for the place and role of the farm sector in the overall food system. It is highly inter-dependent, blending the efforts of many industries to add value to farm sector products.
- **Continually expand our commitment to open markets.** The United States is thoroughly committed to market-oriented policies, well understood to serve the best long-term interests of all stakeholders in the food system and society at large. Markets have continually demonstrated their superiority to other alternatives in guiding allocation of resources, investment, and production in patterns that are most beneficial to society at large. Still, this commitment needs to be renewed and expanded.
- **Commit even more fully to future growth of the farm and food system.** There is a long-standing, national economic commitment to open markets in support of the Nation's market-oriented policies. For the agriculture industry, development of foreign markets is essential to support future investment, growth, and the long-term health of the sector. Our agricultural production capacity today not only exceeds domestic demand but is growing faster as well. Thus, future asset values, incomes, growth, and general prosperity depend upon gaining greater access to the global

growth markets. New and expanded trade agreements hold the best promise for our competitive producers to expand sales and gain market share and generate economic activity across rural America.

- **Ensure that farm and trade policies are fully compatible.** Domestic farm support and international trade policies must be consistent and mutually reinforcing. It makes no sense to have trade policies and programs promoting farm exports at the same time domestic support programs inadvertently reduce competitiveness. Our domestic and export policy must support our existing international obligations and at the same time give us ample latitude in pursuing ambitious goals in ongoing and future negotiations.
- **Strengthen U.S. global leadership.** The world looks to U.S. leadership in policy formulation and program design for both domestic agriculture support and international trade. U.S. policymakers must be cognizant that our actions set examples and help persuade others to our positions.
- **Accommodate and build on the farm sector's wide diversity.** Effective agricultural policies must recognize the wide diversity in the farm sector itself, in terms of size, location, financial status, crop and livestock products produced, managerial abilities, income sources, and goals and aspirations. The problems faced by these groups are widely different and require solutions tailored effectively to address particular needs. Failure to do so only exacerbates the problems and postpones the day of reckoning.

- **Provide a market-oriented economic safety net for farmers.** The national recognition that the farm sector is both unique and essential is long standing and widely held. The result is a parallel commitment to policies that support open markets and those that prevent precipitate downturns in the farm sector. Thus, these programs must conform to basic public policy principles including effectiveness, transparency, equity, consistency, and comprehensiveness. Current policies now take several forms, including countercyclical loans, crop and revenue insurance, and direct payments, but they could be constructed with other programs (such as tax-deferred income accounts) that fully comply with such principles.
- **Focus on a broader infrastructure.** Provide a longer term view of the requirements for a healthy and prosperous farm and food system to ensure that it continues to enjoy widespread consumer confidence and support. This entails refocusing institutions and continuing judicious investment for the entire system, including refurbishing and modernizing the infrastructure that underpins the farm, food, and trading system.

IV. Enhancing the Infrastructure

The recent outbreak of foot-and-mouth disease in Europe has heightened U.S. awareness of the infrastructure that protects the integrity of the food and agricultural system.

U.S. agriculture is hugely successful at delivering abundant, affordable, safe, and nutritious food. Nothing has been more important to this success than an extensive physical and institutional infrastructure—in effect, the backbone of the food and agricultural system.

The agricultural infrastructure includes all of the basic services, facilities, equipment, and institutions needed for the economic growth and efficient functioning of the food and fiber markets. This requires investment in services to protect farmers, ranchers, and consumers from the threats of crop and animal pests and foodborne diseases. It demands a strong commitment to the research and cooperative extension system that undergirds production, marketing, food safety, nutrition, natural resource conservation, and all other functions of USDA agencies.

Like every infrastructure, that of the agriculture and food system requires periodic review, ongoing reinforcement, and appropriate modernization just to keep pace with continuously emerging and often unique challenges, and rapidly changing conditions. The system must be prepared to meet our future needs, which may be strikingly different than those we see today.

A responsive infrastructure requires adequate resources in place ahead of time, and access to cutting-

edge science, technology, and information. The infrastructure cannot function at its best if it must always play catch-up. At the same time, funds are not limitless. To make the best use of our resources, we must inventory current services and facilities and prioritize what needs to be upgraded and enhanced.

USDA and its cooperators have historically invested in the “bricks and mortar” needs of the infrastructure. Maintenance and renovation of scientific facilities, farm service centers, and testing laboratory and inspection facilities, for example, are ongoing needs. They are necessary but not sufficient to face the future and adapt to changing circumstances.

The existing infrastructure is now being challenged in radically changed market and institutional contexts, calling for very different approaches than in the past. First, the various sectors of the food economy—from producers to processors to retailers—are more interconnected than ever before, and grow more so every day. For any new policy to succeed, it must have input and cooperation from every link in the food chain. Second, crop or animal diseases that demand infrastructural support are increasingly global and require coordinated solutions. Third, recent increases in intellectual property protections and advances in biological science have prompted the private sector to more actively invest in the knowledge base and technological underpinnings of the food system. Stronger private sector incentives imply more opportunities for effective partnerships between the public sector and industry in solving problems.

These contextual changes mean the United States must think differently about the agricultural and food system infrastructure. The Federal Government must partner with other participants in the food chain, including private companies and consumers; public, university, and

private scientists; State governments; and international bodies that promote effective forums for global cooperation. A cooperative approach requires new ways of doing business, new approaches to problem solving, and new institutional arrangements that meet the interests of various groups while advancing the public good.

Major areas in which innovative thinking about the food and agricultural infrastructure needs to take place are: our responsiveness to pest and disease threats; assurance of food safety; sustaining and building the data, information, and scientific bases on which good decisionmaking relies; and delivering services to rural America.

Responding to Pest and Disease Threats

The recent outbreak of foot-and-mouth disease in Europe has heightened U.S. awareness of the infrastructure that protects the integrity of the food and agricultural system. Science, technology, and intergovernmental cooperation are key to keeping crop and animal pests and diseases out of the United States, and to managing the pest and disease challenges we face inside our borders.

Crop Pests and Diseases

Crop yield losses caused by insects, weeds, and diseases are U.S. farmers' oldest challenge, but these take new forms all too often. The prevention and control of crop pest and disease outbreaks present many special challenges to the agricultural infrastructure. Uncertainties about the establishment, spread, damage, and movement of pests and diseases and commodities across State and international boundaries create the need for a flexible and responsive, area-based infrastructure.

Invasive crop insects, weeds, and diseases are particularly elusive in this age of extensive international trade. Of recent concern are Karnal bunt wheat fungus, the glassy-winged sharpshooter that transmits Pierce's disease to grapes, plum pox, citrus canker, Mediterranean and Mexican fruit flies, and leafy spurge on grazing land. Each of these invasions has consequences for acreage, yield, prices, trade flows, and costs of government compensation programs.

The scientific and regulatory infrastructure are essential to ensure the prevention or exclusion of invasive pests and diseases, early detection of pests and diseases that have entered, and rapid control or eradication measures for pests and diseases that have become established. International cooperation must also be heightened to control or prevent the spread of invasive pests and globally spreading diseases. New bio-science and information technologies must be enlisted to increase the efficiency and cost-effectiveness of these programs.



Federal and State Governments have a major role in preventing and controlling invasive crop pests and diseases, and Federal and State agencies work closely to support research and technical assistance. A number of Federal laws govern policies and actions. The Plant Protection Act, passed by Congress in 2000, provides one clear statute for plant health activities, from regulating imports to certifying exports, and includes emergency authority to deal with plant pest and disease outbreaks. It provides a model for the type of modernized, flexible authorities that are needed in the animal disease area as well.

Plant pest and disease issues also call for innovative approaches to industry, government, and university collaboration. One such approach pertains to Pierce's disease, fatal to grapes, for which there is no effective treatment. Pierce's disease poses an increasingly serious threat to the table, wine, and raisin grape industries, but an impressive research and education effort is underway in California, enlisting the California Department of Food and Agriculture, the University of California, USDA, and industry groups. The Pierce's Disease Control Program relies on a task force which,

through its research subcommittee, coordinates research priorities, raises research funds, and fosters collaborations among researchers on both understanding and treating the disease and controlling its insect hosts.

Despite good models and spectacular successes in defending America's borders from invasive pests, we must maintain vigilance in surveillance systems.

Livestock Pests and Diseases

The outbreak of foot-and-mouth disease (FMD) in Europe drove home the global nature of livestock disease. In addition to strengthening border controls, USDA has sent dozens of veterinarians to Europe to study and help contain the disease. While FMD is not a human health risk, it is difficult to overstate its potential harm to the U.S. livestock sector should an outbreak occur after a 72-year absence.

The emergence in Europe of Bovine Spongiform Encephalopathy, or BSE, has disrupted markets in the European Union. Although there have been no U.S. cases, BSE has become the business of government science and regulatory systems. The agricultural research system is working hard to determine the nature and transmission of BSE and to improve



detection and diagnostic tools. Early detection is essential, not only to eradicate a disease disastrous for the animals afflicted and ruinous to their producers, but also to prevent hazardous products from entering the food chain. Thus, our research on BSE benefits both animal health and food safety.

FMD and BSE, while much in the news, are not the only or even biggest threats to U.S. livestock production and exports. Other potentially costly livestock diseases include Newcastle's disease (avian), cattle tick fever, and hog cholera. To guard against animal disease outbreaks, we must invest in new tests, devise new diagnostics and systems of detection, and better ascertain pathways of disease transmission. Projects that modernize animal health diagnostic, surveillance, and research facilities must be prioritized and, if crucial, receive adequate funding and construction authority.

Further investigation is needed of methods that prevent rather than merely detect and contain animal pest problems, animal disease, and animals acting as carriers of human pathogens. Among those approaches warranting closer examination are good animal husbandry to improve the health and sanitary conditions of animals, and the use of vaccination, antibiotics, or other medicines. Hazard Analysis and Critical Control Points (HACCP) might also assume a stronger role to control disease at major checkpoints and pathways.

The international nature of animal disease—including more than 50 diseases not known to exist in the United States—clearly calls for vigilance in border protection and quarantine systems. An integrated, cooperative approach to addressing emerging animal disease issues worldwide is needed. This means working with other countries to use sound science and to recognize economics as the basis for prioritizing emerging disease issues, identifying disease pathways, monitoring dis-



ease outbreaks, harmonizing inspections and regulations at ports before diseases break out, and evaluating economic and trade implications of alternative approaches to animal disease management in a global context. The ongoing activities of the Codex Alimentarius Commission and the International Office of Epizootics are good models for concerted effort.



Ensuring Food Safety

The past decade has seen many efforts by the Federal Government, State partners, and the private sector to promote safer food—implementation of HACCP inspection systems for meat, poultry, seafood, and juices; public and private partnerships to improve food safety education and knowledge among consumers; increased efforts to promote good manufacturing practices for fresh produce; and increased monitoring of the safety of imported foods. HACCP is clearly working, reducing the incidence of *Salmonella* on raw meat and poultry—by as much as half on raw chicken. Federal agencies are coordinating to increase basic research on food safety, and to intensify surveillance of foodborne illness outbreaks. Improved animal production systems, better pathogen control during processing and distribution, and increased education on food safety issues and on food handling and preparation practices for consumers and food retailers all help to strengthen the food safety system.

Nonetheless, America's familiarity with health risks from foodborne microbial hazards has increased in recent years. Widely publicized outbreaks of foodborne illness—traceable to such sources as *E. coli* O157:H7 in hamburger, *Listeria monocytogenes* in hot dogs, and *Salmonella* in poultry and eggs—have raised the public's concerns about risks from microbial pathogens in food. Although preliminary evidence suggests the number of illnesses caused by some pathogens (notably *Salmonella*) may be decreasing, food safety systems are confronting an array of emerging pathogens such as *Cyclospora*, *Cryptosporidium*, and new strains of *Salmonella*. Emerging pathogens mean that food safety and animal health systems to protect the food supply must be continually reassessed and updated. New science is needed to ensure that any new regulations are sound, and alternatives warrant scrutiny, as well, for their cost-effectiveness.

Continued basic research is needed to evaluate the incidence of current and emerging hazards, identify and quantify the chronic compli-



cations that these acute foodborne illnesses can cause, and identify which foods are causing the illnesses. Over two-thirds of foodborne disease-related deaths are caused by pathogens of unknown origin, or by human exposure through unknown food sources. Better understanding of the basic science of food safety is therefore needed to help design appropriate interventions and to set priorities for further risk reduction.

Proper design and implementation of new food safety policies must be based on the best available science. This is especially important in an international context. Risk assessment and risk management approaches to define appropriate interventions to prevent contamination require state-of-the-art science to ensure that our risk reduction efforts are both effective and cost-efficient.

While the objective of food safety policy remains safeguarding public health, we can never completely eliminate foodborne health risks. Resources devoted to improving food safety are not unlimited and must compete with other pressing public health needs. More effort is

needed to rank the relative food-safety risks from multiple sources, including microbial, chemical, and other food- and water-related hazards. Science-based risk assessments can help set priorities for further risk reductions. Economic analysis of the benefits and costs of risk reduction can enable the maximum net benefit to society while minimizing the regulatory burden on the private sector.

Where possible, Federal policies and programs must be coordinated and integrated to reduce duplication of effort, regulatory burden, and program cost. This is especially important in food safety, where regulatory responsibility is divided among several Federal agencies (USDA, FDA, EPA) and where many actors play a role in research, development, and implementation of food safety policies. The Federal Government already facilitates this coordination through such structures as the President's Food Safety Council, the Joint Institute for Food Safety Research, and the Joint Institute for Food Safety and Nutrition. Close coordination across agencies must continue.



More attention needs to be given to identifying appropriate roles for government, industry, and consumers. Where, when, and how to intervene in private markets to promote social goals such as improved food safety are crucial decisions. Simply put, we cannot just regulate our way out of problems. Private firms, responding to consumer demands for safe food, can voluntarily adopt management procedures to control pathogens all along the food chain, exert control at a key stage, or invest in research and development for new equipment or management systems. Dissemination of publicly funded research results to private stakeholders and partners hastens the diffusion of new food safety technologies (such as rapid tests for microbial contamination).

Policies that promote innovations in new technologies and food pro-

duction systems can help minimize the regulatory burden of food safety regulations. Public education has a key role, too. While the public cannot be expected to become food safety experts, they should understand the basic issues and food safety rules. Public information campaigns can play an important role in educating foodservice workers and consumers about safe food handling.

In several States, quality assurance plans illustrate government, industry, scientists, and consumers coming together to develop voluntary agreements on guidelines for safe food production and sound environmental practices. In California, plans were developed for strawberries, eggs, produce, and dairy—without additional government regulation.



Building the Knowledge Base

Every aspect of the infrastructure and the food system it supports is fed, fundamentally, with new knowledge, through research and development, data collection, and information dissemination.

Scientific Research and Development

Investments in agricultural research and technology development (R&D) have driven remarkable rates of agricultural productivity over the last 50 years. U.S. agricultural productivity has outdistanced most other industrial sectors of the economy, with an estimated 40- to 60-percent return on public sector investment. We must now ensure that the research infrastructure is appropriately oriented to confront new challenges to the food system with equal success. Determining how public agricultural research fulfills its longstanding role as producer of knowledge for the public good requires more complex and strategic decisionmaking than just a decade ago. The science base also depends increasingly on the effectiveness with which public, private, and university partners collaborate, creating synergies and mutual benefits by combining the relative strengths and interests of each.

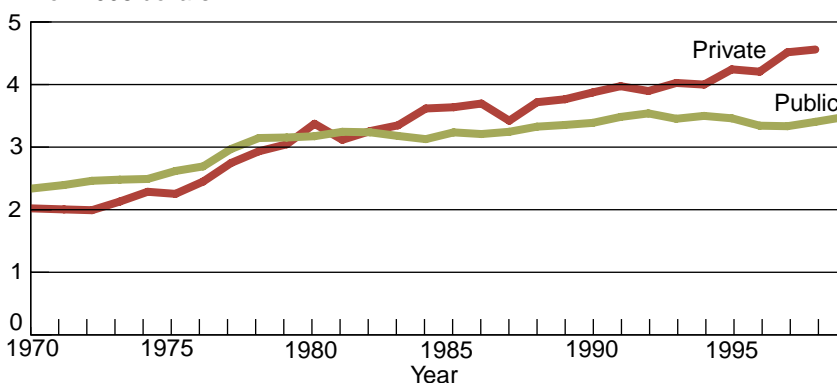
Since the mid-1980s, the level of public funding for agricultural R&D has leveled off in real (inflation-adjusted) terms (figure 17). This trend calls out for a review in light of the changing conditions and emerging problems that have pressing needs for new and improved knowledge—areas including environmental quality, food safety, diets and health, and pest and disease management. Any review should consider other government funding for health and environmental research that also supports agriculture. The



Figure 17

Agricultural Research Funding in the Public and Private Sectors

Billion 1998 dollars



Public numbers based on USDA Current Research Information System, Inventory of Agricultural Research, various years.

potential for accomplishing public research goals has never been greater because of developments in genomics and gene mapping, computational and information technologies, and better understanding of environmental systems. But misplaced priorities may undermine this potential.

It is also important to note changing incentives for private sector research and what they imply for the public sector role and for public-

private partnerships. In contrast to the leveling-off in public R&D funding, research expenditures by the private food and agricultural industry tripled in real terms between 1960 and 1996, from about \$1.3 billion to \$4 billion. This trend follows from the expansion of laws providing intellectual property protections, which enhanced the ability of private firms to profit from agricultural research. At the same time, advances in biotechnology—for example, fast and accurate “DNA fingerprinting” to identify patented DNA sequences—have strengthened companies’ ability to protect their intellectual property. In the last 10 years especially, the rate of patent application and patent granting for biological inventions has exploded, particularly for genetically engineered plants and animals as well as for individual genes with specific uses or “utilities.”

The expansion of private research incentives allows public research to

refocus on areas of benefit to society that in and of themselves are unlikely to be a focus for private endeavors. These needs include fundamental science and applied work in environmental quality (such as managing livestock waste, enhancing water quality, and mitigating soil degradation), food safety, plant and animal disease, and nutrition and health. These orientations are especially needed to support the new challenges to the regulatory systems of USDA and other Federal environmental, health, and safety agencies.

Carving out distinctly public sector research for the public good is now difficult because some knowledge or biological tools necessary to the task are increasingly patented by private firms. Public sector and university projects are often complicated by the need for researchers to negotiate licensing agreements with private firms. Such situations can be mitigated through new and creative institutional arrangements. The



Environmental Quality Research

The successful use of buffers to protect environmental quality is based on an extensive history of research and cooperation between scientists and farmers. Buffers restore land closest to streams, rivers, and other vulnerable waterways with plantings of native vegetation. These natural buffers protect stream water by capturing much of the sediment, nitrogen, phosphorus, and other agricultural chemicals borne in runoff or ground water. As a result of research at USDA’s Agricultural Research Service (ARS) and other institutions, the National Conservation Buffer Initiative program was established by the Natural Resources Conservation Service in 1997. The National Conservation Buffer Team has representatives from Federal and State

Governments, farming groups, environmental groups, and industry.

ARS research continues to seek ways for farmers to maximize the returns from the investment in buffers, whether grass hedges, filter strips, or forest buffers. Such research includes determining the best grasses for use in grass hedges, measuring sediment loss and buffer use under different tillage systems, and helping farmers adapt buffer conservation strategies to their regions’ specific soils, climate, topography, and hydrological patterns. Scientists can even simulate the movement of water, nutrients, sediment, and carbon in runoff or ground water passing through a buffer, using software called REMM—Riparian Ecosystem Management Model.

focus of any new form of collaboration, however, must increasingly facilitate cooperative research projects with multiple, complementary outcomes for public and private participants.

Strengthening research partnerships also requires ongoing review of the research portfolio in terms of the complement of funding vehicles to support extramural (primarily university) research. Universities in the land-grant system have also historically provided the State-based partnership for the Federal agricultural research effort because of their connections to State and local issues and constituent needs, and their provision of a geographic base for disseminating research findings to States' farmers, communities, households, and consumers.

A balanced portfolio for supporting university research, including competitive grants and formula funds, sustains the dual university role: conducting much-needed basic research to support the agricultural and food system and partnering with Federal scientists. Competitive grants, which have been much slower to emerge in food and agriculture than in other areas of science such as medicine, should increase, but without sacrificing the partnership support that formula funds provide. Whereas formula funds encourage recipient institutions to undertake major mission-oriented applied research and relieve scientists of the burden of seeking grants, competitive grants are the best means USDA now has to expand the pool of topnotch scientists conducting basic research relevant to the agricultural and food system. Our failure to fully exploit opportunities through competitive grants—used widely throughout the rest of the science community—jeopardizes our continuing ability to bring the best and newest science to meet agriculture's challenges and advance its future.

Data and Information Needs

Associated with, but distinct from scientific R&D, is the continued need for public sector provision of objective, consistent data and information to level the basis for decisionmaking among participants in the food and agricultural system.



The Department of Agriculture spends about \$550 million each fiscal year on statistical programs, half of which represents the costs of direct data collection. The Natural Resources Conservation Service (soil, snow, and watershed surveys) and the National Agricultural Statistics Service (crop and farm surveys) collect most USDA data. Over and above the \$550 million inventoried in major statistical programs, the Agricultural Marketing Service is involved in collecting market data. The Grain Inspection, Packers and Stockyards Administration also collects data to investigate allegations of potential violations of the Packers and Stockyards Act of 1921 in the livestock, meatpacking, and poultry industries and, on a more limited



An Agriculture Infrastructure Investment Fund

Innovative investment strategies will be necessary to assure adequate and timely response to needed changes in the infrastructure undergirding a rapidly evolving food and agricultural system. One possibility would be the creation of an “Agriculture Infrastructure Investment Fund,” which could be empowered to accept contributions from other governmental and private sources to projects of mutual interest. The Fund could also be empowered to retain receipts gained from the disposition of unneeded property in order to finance future infrastructure investments.

basis, to assess structural change in these industries. It is important to ensure that these historical programs are aligned with future data and information needs.

Structural changes in the food system suggest that new and different types and sources of data may be needed. For example, as less and less data on livestock prices were obtained through the “spot” market (because of the prevalence of contracting), there was a move to mandatory livestock price reporting. Mandatory reporting calls for a large quantity of meat product retail prices, data that are not currently collected by USDA or any other Federal agency.

Concentration and vertical integration in other agricultural sectors raises questions about the utility and validity of traditional spot-market price data, and may make it increasingly difficult to collect adequate information on such variables as production costs and farm income. There is a growing need to collect data and conduct research and analysis that will help market participants adjust to market changes and to contribute to more informed public policy deliberations relating to structural change. This

will require knowing more about supply chain linkages. However, less public information is available about increasingly private market transactions. This dilemma may suggest the need for new authorities for data collection and research to identify appropriate government roles for monitoring and oversight.

Finally, as the nature of government services adapts to accommodate changes in the food and agricultural system, the standards for previously collected information may be inadequate for future decisionmaking. This could be the case, especially, in using “representative” or aggregate information when examining policies that need to be tailored to different types of producers or environmentally specific characteristics. Data linking environmental and natural resource quality to information on farm practices are becoming especially critical, though such data remain scarce.

Principles for Infrastructure Policy

- **Focus on a broader infrastructure.** Provide a longer term view of the requirements for a healthy and prosperous farm and food system to ensure that it continues to enjoy widespread consumer confidence and support. This entails refocusing institutions and continuing judicious investment for the entire system, including refurbishing and modernizing the infrastructure that underpins the farm, food, and trading system.
- **Recognize our new operating environment.** Our farm sector and food system operate today in a new and evolving business and social environment. It is a competitive, consumer-driven environment, global and rapidly changing with enormous implications for the place and role of the farm sector in the overall food system. It is highly interdependent, blending the efforts of many industries to add value to farm sector products.
- **Enhance pest and disease prevention for plants and animals.** From farmers to consumers, our food system depends on strong pest and disease prevention and eradication programs.
- **Build on current success in providing safe food for all Americans.** Emerging pathogens mean that our food safety systems must be continually assessed and updated in order to maintain consumer confidence in our food supply.
- **Anticipate future infrastructure needs.** Building new and different capacities for accomplishing priorities requires a long-term view with a process for anticipating change.
- **Base decisions on science.** Regardless of good intentions, no authorized program, no mandate, no request or emergency need can be carried out unless the appropriate research base, scientists, laboratories, methods, data and information, institutions, and technologies are available. New science is needed to ensure that any new regulations, in food safety, animal and plant health, environment, or other areas, are sound and cost-effective.
- **Capitalize on the unique public sector role in agricultural research and extension.** The private sector is playing an ever-larger role in agricultural research and information provision. Limited public sector research funding thus needs to be devoted to fundamental scientific discovery and questions that the private sector has no incentive to pursue, but that could lead to the betterment of society.
- **Recognize the importance of competition in the market for research.** Maintaining competitive research funding increases the likelihood that the best minds of the country will be applying themselves to important public sector research issues.
- **Recognize the importance of collaboration.** Collaborations involving public agencies, private companies, universities, and consumers are an important means for meeting the interests of various groups while advancing the public good.

V. Conservation and the Environment

With images of the Dust Bowl seared in the collective mindset, reducing wind- and waterborne soil erosion became an overriding concern, and a primary accomplishment. Soil losses have declined dramatically in response to conservation policies, and productivity gains have been equally dramatic, thanks to technological advances.

Farmers, ranchers, and private forest landowners own and manage two-thirds of the Nation's land and are the primary stewards of our soil, air, and water. While the cost of stewardship on that land is borne by land managers, the benefits serve society at large. Meeting society's demands for improved environmental quality requires that we broaden our definition of "output" to include environmental amenities—such as rural landscape amenities, wildlife habitat, wetlands, and improved water and air quality—along with food, fiber, and timber production.

Conservation programs have been part of farm policy since the 1930s. Historically, those programs focused largely on maintaining the produc-

tivity of food-producing natural resources. Today, environmental concerns extend well beyond the farmgate and have become key considerations in policy formulation.

Right Track, New Directions

Conservation programs can help reduce the gap between the level of environmental quality the public demands and the level of environmental quality that farmers and forest landowners would otherwise provide. Because environmental amenities typically are not sold on a market, managers of farm and forest land have limited marketplace incentives for providing them. Conservation programs can provide that incentive and compensate land managers for the amenities they produce.

Conservation policy evolved from a primary focus on keeping productive topsoil in place. With images of the Dust Bowl seared in the collective mindset, reducing wind- and waterborne soil erosion became an overriding concern, and a primary accomplishment. Soil losses have declined dramatically in response to conservation policies, and productiv-





ity gains have been equally dramatic, thanks to technological advances. We now realize that the off-farm costs of soil erosion far exceed on-farm costs, and that off-farm costs of agricultural production extend beyond those associated primarily with soil erosion.

As the scope of environmental concerns has expanded, a wider range of conservation policy instruments are now needed to address them. Traditional land retirement (the Conservation Reserve Program) has dominated Federal spending on conservation since 1985; 92 cents of every dollar now spent on direct conservation payments to farmers pays for rental and easement payments for idling environmentally sensitive cropland and cost sharing for management practices that enhance the environmental benefits from retired lands. But direct outlays for conservation are only part of the picture. While land retirement programs involve less than 10 percent of total cropland, considerable conservation activities are carried out on vast stretches of working lands, both voluntarily and to comply with regulatory requirements.

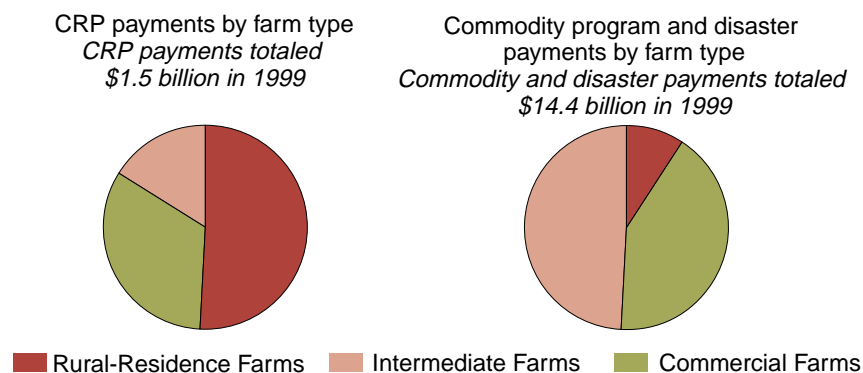
Nevertheless, the current imbalance favoring land retirement suggests an untapped potential for achieving cost-effective environmental benefits from conservation spending on working lands. Further, many

emerging agri-environmental problems can be addressed only by changing management practices on working land. In particular, reducing nutrient runoff from fertilizer and animal waste may require widespread changes in the management of nutrients, as well as strategically placed conservation buffers. Similarly, improved private forest management practices can better protect watersheds, provide improved habitat for threatened and endangered species, and guard against non-native invasive species.

The changes in agriculture also provide new perspectives. Increasingly diverse farms—rural-residence farms, intermediate farms, and commercial farms, including those farms that have not been served by traditional agricultural programs—all play a role in conservation efforts. Most farms are small (intermediate or rural residence), and small farms continue to control the majority of farmland (figure 5, page 23). These farms account for nearly 85 percent of all land retired for conservation purposes, and conservation programs are an important income source for them (figure 18). The success of new conservation

Figure 18

Rural-Residence Farms Get Most of the Payments From the Conservation Reserve Program, But a Small Portion of Other Farm Program Payments



tools will depend on ensuring that intermediate and rural-residence farms and nonindustrial private forest landowners will have continued access to them.

Some environmental problems are associated primarily with large, commercial farms. For example, confined animal operations are getting larger and more concentrated and contribute disproportionately to nutrient-based water quality problems; just 5 percent of farms with confined livestock account for more than 60 percent of the excess nitrogen and phosphorus from manure produced nationwide. These structural changes suggest a changing and varied relationship between

farming and the environment, with implications for policy design.

Programs Score Environmental Gains

Since 1985, significant gains have been made in addressing major environmental concerns (see box, page 75). In response to conservation programs and requirements, soil erosion has declined (figure 19), wetlands losses have declined (figure 20), and other wetlands have been restored. As a result, water quality has improved, and fish and wildlife populations are improved.

Figure 19

The Decline in Soil Erosion Is Widespread

Change in average annual soil erosion by wind and water on cropland and CRP land 1982-1997

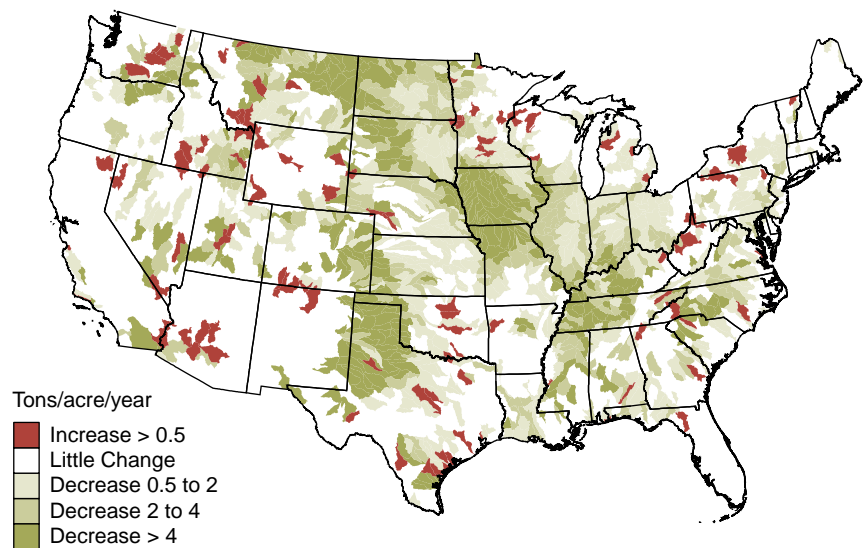
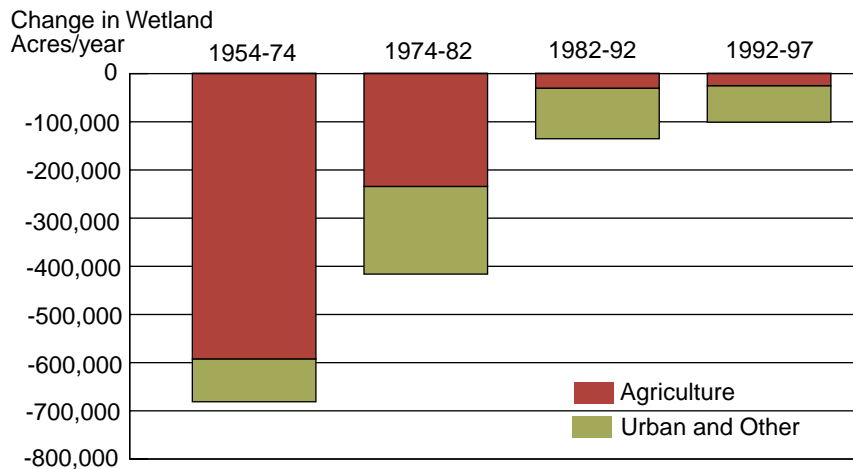


Figure 20

Annual Wetland Losses From Agriculture Slowed Dramatically Through 1982, and Continue To Decline



Environmental Gains From Major Conservation Programs

- Soil erosion on cropland and pasture declined by 1.2 billion tons (40 percent) from 1982 to 1997, and those gains are spread widely across all major farming regions (figure 19). The benefits of erosion reduction due to conservation compliance and the Conservation Reserve Program (CRP) are estimated to exceed \$2 billion per year.
- Wetland losses from agriculture were down to 27,000 acres per year in 1992-97, from 593,000 acres per year during 1954-74 (figure 20). The swampbuster requirements are effective in discouraging conversion of as much as 3.3 million acres of agricultural wetlands.
- Agriculture has become a major engine of wetland restoration. More than 990,000 acres of wetlands have been restored through the Wetlands Reserve Program (WRP) since 1991.
- Wildlife habitat has been restored and improved. The hunting and recreation benefits associated with the CRP are estimated at over \$700 million per year.
- Land retirement and other conservation programs are increasing the amount of carbon sequestered in the soil and mitigating greenhouse gas buildup.

Emerging Environmental Challenges

Building on past environmental gains will require renewed effort. Although soil erosion has declined by 40 percent over the past 15 years, farms are still losing 1.9 billion tons of soil every year, which impairs water quality and fish habitat, reduces water storage capacity in reservoirs, imposes costs on municipal and industrial water users, and reduces future soil productivity. The

Wetlands Reserve Program (WRP) is an important tool for reducing the Nation's net loss of wetlands. Without conservation compliance, soil erosion and wetland losses would both increase because, depending on crop prices, farmers could find it profitable to farm up to nearly 15 million acres of the highly erodible lands and wetlands that are currently protected by sodbuster and swampbuster provisions.

The array of conservation issues has grown with changes in the structure of agriculture and in farm and forest management practices, and with greater public concern about a

Emerging Challenge Water and Agriculture: Inextricably Linked

Nationwide, agriculture accounts for nearly 80 percent of all water consumption. That figure is even higher west of the Mississippi. Three-quarters of all cropland in the Western United States is irrigated. The 16 percent of harvested cropland that is irrigated accounts for nearly half of the value of all crops sold. Nationwide, nearly 100 percent of all orchard sales and more than 80 percent of the sales of vegetables and potatoes are produced on irrigated cropland.

Increasingly, in all regions of the country, demand for water is growing faster than supply. Increasing demands—for urban, environmental, and Native American uses and for the production of hydroelectric power—and declining supplies—arising in part from land use changes including urbanization,

deforestation, and fewer wetlands—create conflicts over water allocations. Conflicts arising over scarce water supplies in river basins throughout the West may foreshadow emerging conflicts in Eastern States. Because it accounts for such a large percentage of total water use, agriculture is uniquely positioned to be a part of the solution.

Incentives and technical support for improved on-farm water management encourage farmers to do more with less and provide some regulatory and drought relief for farmers who have to cut back. Conservation programs can also play an important role in helping to solve water management issues on the watershed scale. Voluntary conservation programs and risk management programs could be

parlayed, in conjunction with other Tribal, State, and Federal agencies, to develop market-based water banks to help mitigate the high cost to all water users of drought-induced water supply reductions. Water banks could consist of producers who would voluntarily idle production on irrigated lands in drought years in return for payment. Such a program would minimize the cost of disruptions associated with droughts while keeping resources (water, land, and labor) in production in non-drought years. Encouraging development of more on-farm water storage facilities (such as reservoirs and storm water ponds) can help alleviate local shortages.

wider range of issues. These issues include: diminishing open space; nutrient management; pesticide use and runoff; greenhouse gas emissions and carbon sequestration; water conservation and flood mitigation; air quality; energy production and conservation; non-nutrient animal waste concerns, such as water-borne pathogens and antibiotic-resistant bacteria; and lack of access to natural forestland (see boxes). Progress has already been made in each of these areas, but more can be done.

Two particularly timely issues—energy efficiency in agriculture and

conflicts over irrigation water supplies—can be addressed to some extent by conservation efforts. Given appropriate economic incentives, much of the vast landscape managed by farmers and forest landowners could be managed to store additional carbon or to produce biomass and biofuels to replace fossil fuels, and onfarm energy use can be reduced. Similarly, improved management of irrigation water and innovative approaches to addressing shortages can help mitigate, and possibly avoid, conflicts over increasingly scarce water resources.

Emerging Challenge **Energy: Agriculture as User and Supplier**

The recent increases in energy prices faced by producers throughout the country emphasize the need to find new ways to improve the energy efficiency of U.S. agriculture. While agricultural production accounts for about 1 percent of the Nation's annual Gross Domestic Product, it accounts for some 2 percent of total energy consumed in the United States, in both direct form, such as diesel fuel, and indirect forms, such as fertilizers.

Adoption of energy-saving equipment, the shift to diesel power, and conservation practices such as conservation tillage have resulted in significant improvements in the energy efficiency of agriculture during the past several decades.

In the future, the challenge will be to improve energy efficiency in

ways that maintain the productive capacity of farms while benefiting the environment. One avenue is the adoption of advanced farming practices, such as precision farming, which can optimize the use of equipment, chemicals, and fertilizers, lowering production costs and reducing chemical and fertilizer runoff. Development of more efficient machinery and new seed varieties can improve energy efficiency.

Air quality concerns, increased oil imports, imbalances in U.S. energy supply and demand, and new opportunities for farmers have combined to intensify interest in the production of renewable energy. Crops, crop residues, and forest residues could be converted to various forms of energy. Farms could be sites for wind and geo-

thermal power production where conditions are favorable. Products from livestock and poultry operations, including animal fats, manure, and methane, could be harnessed to produce various forms of energy.

While bioenergy and bioproducts can improve air quality and reduce greenhouse gas emissions compared with the use of fossil fuels, the challenge is to overcome the barriers to economic feasibility and ensure that the production of energy raw materials is environmentally beneficial at the farm level.

Emerging Challenge **Climate Change and Agriculture: Risks and Opportunities**

While significant uncertainties remain over the timing and extent of future changes in climate, there is good evidence that warming is occurring and that it is due in large part to human activity. Over the next 100 years, the implications of these changes for U.S. agriculture are potentially significant. Agricultural systems are vulnerable to changes in growing season, precipitation, and water availability. Some of these effects are likely to benefit agricultural productivity. Higher concentrations of carbon dioxide in the atmosphere will likely result in higher photosynthesis rates and potentially increase yields. While overall changes in climate are not expected to imperil the ability of the United States to feed its population and to export foodstuffs, impacts within U.S. regions are expected to vary widely.

Agricultural activities contribute about 9 percent of overall U.S. greenhouse gas emissions. Emissions are caused by activities

such as the use of nitrogen fertilizers, animal waste management, and onfarm fuel use. Tillage practices can turn agricultural soils into a source or a sink of carbon. During the first half of the last century, carbon in Corn Belt soils declined by almost 50 percent, but subsequent adoption of reduced tillage and reversion of marginal lands from agriculture to native vegetation began to improve soil carbon levels. Today, agricultural soils are offsetting almost 2 percent of U.S. greenhouse gas emissions.

The challenge is to identify and implement low-cost opportunities to reduce emissions from agricultural sources and increase carbon storage in soils. Many of these actions provide broader conservation and environmental benefits. Increasing the organic content of soils can improve the soils' water-holding capacity, reduce erosion, and improve fertility. Improving animal waste handling techniques can reduce water and air pollution as well as lowering emissions of

methane, a potent greenhouse gas. Opportunities exist to improve the management of the Nation's forests for carbon sequestration and bioenergy. U.S. forests are sequestering a significant quantity of carbon each year, equivalent to roughly 15 percent of overall U.S. emissions.

Realizing these opportunities will take a number of efforts, including an adequate system for measuring the carbon storage and greenhouse gas emissions from agriculture and forests. In addition to building carbon storage and reductions in greenhouse gas emissions into conservation programs, other potentially useful efforts include improving technical assistance given to farmers, disseminating information on the nature of potential changes in climate, identifying potential vulnerabilities and adaptation strategies for agriculture, and devising techniques and practices that can offset greenhouse gas emissions.



Emerging Challenge **Soil: Managing a National Strategic Asset**

High-quality soils can help ensure efficient and sustained agricultural productivity, mitigate adverse effects of drought and flooding, and promote clean water by buffering against pollutants such as excess nutrients and pesticides. High-quality soils resist degradation when beset by natural disasters such as flooding and drought, quickly recovering their beneficial functions. They respond efficiently and quickly to agronomic and energy inputs, achieve maximum yields with improved crop varieties, and

require less energy to work and manage. More than 129 million acres of U.S. cropland, about 34 percent of total U.S. cropland as of 1997, are in need of improved soil quality.

While excess erosion has been reduced, in part through conservation assistance, persistent and new soil resource concerns require new conservation efforts. The biological, chemical, and physical processes that occur in soils are important drivers of agriculture's productivity. These processes cannot be simply bypassed with other inputs.

Soil degradation is not just the loss of soil through soil erosion. Processes can be interrupted even while the soil stays in place, as through compaction, crusting, salinization, or loss of organic matter.

The challenge is to develop strategies to maintain the Nation's soils as a means to achieve multiple benefits, including reduced runoff and erosion, increased carbon sequestration, and improved productivity and sustainability.

Emerging Challenge **Wildlife: Broadening the Support System**

A healthy rural landscape provides critical habitat, food, and safety to a diversity of wildlife. About 80 percent of the wildlife species in the West use agricultural land. Improvements to the landscape—including wetlands, grasslands, flood plains, and certain types of forests—can provide ecosystems to help support wildlife and aquatic species and provide benefits in the form of recreation, hunting, and other forms of agrotourism. Habitat

restoration can also help threatened and endangered species recover. Pursuing environmental quality across a diverse landscape mosaic will better safeguard wildlife populations and healthy ecosystems than limiting conservation to small, specialized, and isolated tracts.

Wildlife habitat restoration has helped significantly in the past several years, and has yielded substantial benefits. Because wildlife species move freely across both

public and private lands, new approaches should cover both public and private lands, farm and nonfarm lands, and will require cooperation among agencies, multiple levels of government, and the public.

Emerging Challenge Managing the Urban/Rural Interface

Large and growing areas of U.S. agriculture and forestry are influenced by proximity to urban areas and spreading concentrations of population brought about by urban development and large-lot housing. Development at the urban fringe, in small towns and scattered across the rural countryside, removes land from agriculture and forest production and changes the nature of open space. This development can increase costs for infrastructure like roads and sewers; increase traffic congestion and energy used for transportation; impose higher costs

on local communities for services; heighten controversy about farming and forestry activities; increase risk of wildfire in the wildland-urban interface; cause forest fragmentation; and erode the sense of community in formerly rural areas.

Farms in metro areas are an increasingly important segment of agriculture, comprising one-third of all farms, nearly one-fifth of farmland, and one-third of the value of U.S. agricultural output. However, as farmers adapt to rising land values and increasing contact with new residents, new challenges

arise. Strategies to help metro-area farmers adapt may include emphasizing new and higher value products, conserving resources, and using marketing techniques for a more urban environment. Wildfire protection and preventative action are most needed in the urban wildland interface—often located in municipal watersheds—to protect homes, lives, and property. A challenge is to coordinate effectively with State and local governments and communities.

A Portfolio of Policy Tools

The greatest challenge in designing the next generation of conservation programs is to simultaneously address multiple environmental problems, support rural communities, make efficient use of Federal funds, and comply with international trade agreements. The challenge is made more difficult by the diversity in agricultural resources, crops, and farm and forest types.

Conservation policy needs to balance competing concerns. Voluntary measures must be weighed against compulsory actions for improving the environmental performance of agriculture. The benefits and costs of removing land from crop production must be balanced with improved conservation and environmental performance on land that remains in production. A carefully designed “portfolio” approach—employing coordinated land retirement, stewardship incentives, conservation compliance, and regulatory assistance, each where most

appropriate—can enhance agri-environmental protection most efficiently. A third dimension will be striking the appropriate balance among the roles of Federal, State, and local governments in implementing conservation programs.

Incentives for Stewardship on Working Farmlands

The sheer vastness of land remaining in production suggests that substantial improvements in water and air quality and wildlife habitat may be possible only with conserving activities on working lands. Conservation incentive programs for working lands, in combination with technical assistance, are also a means of reducing the regulatory burden on farmers faced with air and water quality restrictions.

Two approaches, one existing and one suggested, form the centerpiece of public dialogue on conservation incentive options for working farmland. Both approaches provide incentives to encourage private land and wildlife conservation. The existing program is the Environmental Quality Incentives Program (EQIP),

created in 1996 to combine and refocus a number of longstanding conservation cost-share/incentive payment programs.

By most measures, EQIP is a successful program. It is targeted; statutory language requires that the program be implemented in a manner that maximizes the environmental benefits per dollar expended. To achieve that goal, the environmental concerns addressed by the program vary across the country, reflecting the high degree of regional diversity in priorities, resource conditions, and opportunities for conservation. Practices associated with management of livestock waste obtain the lion's share of funds in the Northern, Eastern, and Southern States, where these issues are an overriding concern. In the western half of the United States, where water is scarce, the majority of funds are allocated to improving water management practices. In the Midwest, a large share of the funds are used to prevent soil erosion.

EQIP is also in high demand by farmers. Currently, EQIP has the largest unmet demand of all conservation programs, with a backlog of about 197,000 applications to improve the environmental performance on 67 million acres of agricultural land. In comparison, current enrollment levels include 80,000 contracts covering 34 million acres. Expanded funding could help alleviate this backlog.

The new approach is a broader, market-based incentive program for providing payments to farmers who use or adopt practices that enhance the environment. It may be the best option for compensating farmers for the environmental amenities they provide, as well as recognizing the past efforts of "good actors" who already practice enhanced stewardship. Each approach has unique features and several in common, and use of both would require careful coordination.

In addition, a number of smaller initiatives or programs can be used to promote specific activities or to capitalize on unique opportunities to address more specialized problems. However, coordination among program efforts and levels of government is essential to ensure that they are accessible to farmers and not duplicative with other agencies. Protection of farmland and preservation of open space, for example, are currently being coordinated among USDA and State and local governments through the Farmland Protection Program.



Incentives for Land Retirement

Land retirement is generally a long-term (10 years or more) dedication of land to a specific environmental or resource-conserving use. As such, it is well suited for providing environmental benefits that increase with the length of time land is removed from crop production. For example, many wetland services (wildlife habitat, filtering runoff, and floodwater retention) and other wildlife habitat arise only when the ecosystem is fully established, a process that may take years. By removing land from crop production, these programs also affect com-

modity supply, whether intentionally or not. Land retirement can be achieved using long-term contracts or permanent or term-specific easements.

The Conservation Reserve Program (CRP) is the primary example of a land retirement program. In effect since 1985, it provides annual rental payments and cost-sharing for establishing a permanent cover on environmentally sensitive land. Acres are selected through a competitive process. Use of an Environmental Benefits Index to select land parcels, beginning in 1991, substantially increased environmental benefits relative to costs. Currently, 34 million acres are enrolled, just under the statutory limit of 36 million acres.

Alternative enrollment programs, which emphasize local environmental problems and partial-field enrollment, have the greatest untapped potential for yielding benefits from land retirement. For example, buffer practices (riparian buffer and filter strips) and other partial-field enrollments can be targeted. Buffers are extremely effective in addressing water quality problems from sediment, nutrients, and pesticides, with 50- to 90-percent removal efficiencies. By focusing funds on only that portion of fields that can best provide environmental benefits, results per program dollar increase, with minimal land retirement.

Programs such as the Conservation Reserve Enhancement Program, that partner Federal, State, tribal, and private organizations to combat priority problems in water quality, soil erosion, and wildlife habitat, help leverage Federal funds and further target local environmental priorities. These partnerships provide additional resources, greater community buy-in, and improved program implementation.

An alternative to long-term contracts for land retirement is purchasing permanent (or very long term) easements, as is done in the

Wetlands Reserve Program. Similar to the CRP, WRP focuses exclusively on restoring wetlands that had been converted to cropland. With slightly more than 1 million acres enrolled in WRP, the program is a strong tool for mitigating the loss of wetlands.

Resources not previously eligible for land retirement programs, such as grasslands, could also be targeted. The Nation's grassland and pastureland declined by 23 million acres from 1982 to 1997. Some of these areas offer significant environmental benefits to the public. If land retirement is carefully used, areas of native prairie and improved biodiversity could be established. A new grazing land reserve program could provide a needed economic incentive for many producers to conserve the agricultural productive capacities of grasslands while providing environmental benefits for the public. Local nonprofit organizations and grassbanks are also improving land stewardship on public grazing lands.

Education and Technical Assistance

Farmers and forest landowners need information to facilitate the adoption or use of more environmentally sound practices. Educational and technical assistance entail providing data on soil quality, water quality, and wildlife habitat, as well as disseminating information on ways to use that data and how to





apply sustainable production techniques and new technologies.

Demand for education and technical assistance could increase substantially as land managers grapple with regulatory or program participation requirements, such as the development of conservation or nutrient management plans. Targeted Federal programs may play a critical role in helping to mitigate the costs of such requirements. Both for-profit and not-for-profit groups, including agricultural extension programs, may satisfy a portion of that demand. Training and certification programs for extension agents and technical consultants could help build that capability and provide quality assurance. The role of State and local government partners must also be encouraged.

Incentives for Stewardship on Non-Federal Forests

The Nation's capacity to produce healthy, sustainable forest resources, while maintaining favorable watershed and habitat conditions, increasingly depends on nonindustrial private forests. Owners of these lands control nearly 60 percent of the Nation's forests and supply nearly half of its forest products, but fall far

short of their potential for producing wood, other forest products, or environmental benefits.

A forest stewardship incentives program could provide non-Federal forest land managers with technical assistance and financial help to improve forest conditions and help ensure that environmentally important forest tracts are conserved. Education and technical assistance will be an important component of such a program. On small owner-ships, a timber sale is an unusual event in the owner's life, and often is a response to a personal situation, such as retirement. The vast majority of timber sales occur without the benefit of professional advice and with no plan for maintaining or regenerating a sustainable forest on the site following the harvest. Landowners who receive technical assistance are more likely to manage their forests for timber, wildlife, and water quality.

Also key to forest stewardship are State/Federal partnerships providing economic incentives for increased provision of environmental amenities, reduced fire hazards and protection of rural communities from wildfires, and improved defense against invasive species.

As with farmlands and grasslands, in some cases, purchasing conservation easements may be the most efficient and effective means for helping to address social goals for maintaining forest landscapes, reducing fragmentation, and slowing urban sprawl.

Farmer and Forester Responsibility and Regulatory Requirements

While incentive-based policies can play an important role in encouraging improved environmental performance on farms and forests, land managers also have a responsibility to limit environmental damages from their activities.

Conservation compliance. Compliance provisions, first introduced in the 1985 Food Security Act, require certain resource conservation activities for farmers to remain eligible for benefits from selected Federal agricultural programs. Specifically, farmers can lose program benefits if they produce crops on highly erodible land without applying an approved conservation system or if they convert wetlands for agricultural production.

Compliance provisions redressed a longstanding inconsistency between price and income support programs, which encouraged farmers to expand production (sometimes on environmentally sensitive land), and conservation programs that sought to mitigate the adverse effects of agricultural production. The need for compliance requirements has not been lessened by the changing nature of farm price and income supports. Some environmentally sensitive land is still vulnerable to conversion for crop production because commodity and crop insurance programs can reduce the risk of converting this land for crops. Applying conservation compliance requirements to crop insurance programs would help ensure that those programs do not encourage farmers to bring marginal land into production.

Animal feeding operations. The concentration of livestock production into fewer, larger confined animal feeding operations (CAFOs) has raised public concern over the impact of this trend on air and water quality. Manure nutrients can run off to surface water and/or leach into ground water due to accumulation in open and unpaved feedlots, storage in holding ponds and lagoons, uncovered stockpiles, or when excess manure and wastewater are applied to land.

Forthcoming Federal and State regulations on animal waste will increase the demand for educational, technical, and financial assistance for waste management practices, and for development of alternative uses of waste, new storage and management technologies, and improved feed management strategies. Demand for technical assistance to produce farm-level nutrient management plans will also increase. Longer term research needs include technological advances in the treatment and storage of, and alternative uses for, manure.



Total maximum daily loads. A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and allocates pollutant loading among point and non-point sources. Across the country, States have committed to developing TMDLs for nearly 22,000 impaired water bodies by 2015, under authority provided by the Clean Water Act. Three leading pollutants identified by States in their 1998 water quality assessments were sediments, nutrients, and harmful micro-organisms. Depending on the levels of pollutants found in impaired waters and the designated uses of the waters, some TMDLs will indicate that certain pollutants should be significantly reduced. Such reductions could dramatically affect U.S. agriculture and the forest products industry.

Endangered species. Farmers and forest landowners whose lands include habitat for species listed as threatened or endangered under the Federal Endangered Species Act may find their activities restricted. Attempts to protect the northern spotted owl on public and private forests throughout the Pacific Northwest led to reduced timber harvests, perhaps the most well-known example of the impact of such restrictions. Similarly, efforts to protect threatened and endangered fish species have led to reduced access to irrigation water for farmers in many Western States. Forest and farmland stewardship programs and safe harbor provisions can help land managers implement the types of conservation practices necessary to avoid the need for such drastic tradeoffs in the future.

Next Generation in Conservation Incentives

As we look to the next generation of conservation programs, the current portfolio of land retirement and stewardship incentives could be retained. Or the array of current cost-share and rental payment programs could be augmented by, or even replaced with, a single, comprehensive system of financial incentives, supported by appropriate research and technical and educational assistance. This new approach could be developed using the market-based tools that already have been proven to work (see box, page 86). It could be structured to encourage the production of environmental goods and services in a more cost-effective way. Actions that improve environmental performance on working land could even be considered side-by-side with land retirement, eliminating the bias in current conservation programs toward idling productive farmland.



...Encourage the production of environmental goods and services in the most cost-effective way.

Designing a Market-Based Stewardship Program

Environmental performance—the level of environmental gain per dollar of cost—is determined largely by program design. Two mechanisms have already been proven to work—environmental targeting and competitive bids. Targeting environmental objectives through the use of a comprehensive benefits index, and minimizing costs through the use of competitive bids, can increase overall efficiency and provide greater environmental benefits.

Benefits index: A comprehensive conservation benefits index could be used to assess the relative value of all proposed conservation and environmental projects. The index would provide ratings for improvements in a set of environmental, conservation, and rural community elements, with scores based on the expected benefits during the time of enrollment. The scores would then be compared with the proposed bids to determine acceptability. By allowing all activities, including those proposed for producing lands, to compete for conservation resources, the current bias toward setting lands aside from production could be eliminated. The index could capture such benefits as wildlife, water quality, soil erosion, soil quality, control of invasive species, local and regional air quality, greenhouse gas reductions and carbon sequestration, innovative biomass energy and biobased feedstocks, rural/community enhancements, and State and regional priorities.

Bid system: As part of each proposal, an owner/operator would propose a payment per acre for implementing a set of practices or management systems. Competitive bids would improve the effectiveness of efforts, given limited Federal resources. The bid would reflect the owner/operator's costs and forgone opportunities. For example, converting land from conventional tillage to

conservation tillage would have lower opportunity costs than retiring the land, so it should generate a lower bid. At the same time, conservation tillage would likely receive a lower benefits score than land retirement.

Contracts would be awarded to owner/operators with the greatest benefit index score relative to the bid. All land in farm production or enrolled in a land retirement program could be eligible, including land devoted to animal agriculture and to forests. Myriad conservation and environmental practices and activities could also be eligible, provided they can be objectively scored. This bid system adopts and enhances the bid process already proven to increase benefits to the CRP. However, it differs from CRP in that it would accept practices on lands that remain in production. A separate program could be developed for range, pasture lands, and forest lands.

In selecting contracts for enrollment, the duration of the contract would be taken into account. Producers could propose single-year or multiyear activities, with priority given to offers with multiyear benefits. This flexibility would allow land owners to specify the contract length that works best for them. Once enrolled, compliance could be enforced as under existing conservation programs.

Two key features suggest this program would be categorized as a “green box” conservation program for purposes of meeting WTO obligations. First, the payments to producers would be determined on a bid basis. Competition in bids is likely to result in payment rates reflecting costs of implementing the practices, a WTO requirement for “green box” programs. Second, the index would favor neither commodity production nor land retirement,

so the program should not be viewed as production distorting.

This program could supplement existing programs. Moving to a single, new comprehensive program would require a multiyear phase-in schedule to accommodate existing contracts and the time required to develop the new benefits index. But careful coordination would be necessary to minimize landowner confusion and administrative burdens, and to ensure that the programs complement each other. Because of the complexity in designing a new conservation benefits index and consolidating farm programs, it would be appropriate to initiate such an approach with a pilot program.

In some instances, private markets for environmental goods and services do not develop due to a lack of uniform standards or other mechanisms that bring buyers and sellers together and/or assure buyers of product quality. The comprehensive system of incentives could facilitate and accommodate emerging private markets for farm- and forest-based environmental goods and services. Since the benefits index could be disaggregated, the proportion of the overall incentive attributable to a particular element could be separated. Separating out these benefits and providing uniform standards and assurances in quality could remove barriers to private financing for certain environmental goods.

One option would allow private companies to enter into separate contracts with landowners to support the production of certain environmental benefits—based on the benefits index. Or, a fund could be established to support one component of the overall program. The fund could accept private sector resources in return for attribution of certain environmental services, such as water quality improvements and carbon sequestration.

Principles for Conservation

- **Sustain past environmental gains.** Improvements in losses from soil erosion and wetlands benefit farmers and all Americans. These and other gains resulting from existing conservation programs should be maintained.
- **Accommodate new and emerging environmental concerns.** The need for sources of renewable energy and the potential for reducing greenhouse gas emission are emerging environmental issues. In addition, reducing nutrient runoff from livestock production, addressing conflicts over scarce water supplies, and protecting open space have gained momentum as issues to be addressed. Conservation policy should adapt to emerging environmental and community needs and incorporate the latest science.
- **Design and adopt a portfolio approach to conservation policies.** Targeted technical assistance, incentives for improved practices on working farm and forest lands, compensation for environmental achievements, and limited dedication of farmland and private forest lands to environmental use will provide a coordinated and flexible portfolio approach to agri-environmental goals.
- **Reaffirm market-oriented policies.** Competition in the supply of environmental goods and services and targeted incentives ensure the maximum environmental benefits for each public dollar spent. In addition, permitting the private sector to invest in the provision of environmental goods and services leverages Federal resources and facilitates a transition to a fully functioning private market.
- **Ensure compatibility of conservation and trade policies.** Producer compensation for conservation practices and environmental achievements should be consistent with “green box” criteria under WTO obligations.
- **Coordinate conservation and farm policies.** Conflicts may exist between farm program incentives to increase production and conservation programs seeking to reduce environmental problems from expanded production. Extending conservation compliance will help coordinate environmental objectives and Federal programs.
- **Recognize the importance of collaboration.** Non-Federal governmental agencies, including State, local, and Tribal governments, as well as private for-profit and not-for-profit organizations, are playing an ever-increasing role in the delivery of technical assistance and in incentive programs for conservation. Encouraging these efforts and developing public-private partnerships and joint programs leverage Federal resources and improves program access and implementation.

VI. Rural Communities

Rural America is home to one-fifth of the Nation's people, keeper of natural amenities and national treasures, and safeguard of a unique part of American culture, tradition, and history. Rural America is a collage of people and places—an incredible diversity of races, ethnic groups, terrain, climate, amenities, businesses, and institutions. Rural residents and policy-makers, indeed all of America, face many decisions that will affect, if not determine, rural America's future. Rural development policy is no longer synonymous with agricultural policy, and it is time for a new

national discussion of policy for rural communities.

Farming no longer anchors most rural communities and economies as it did through the mid-20th century (figure 21). Seven out of eight rural counties are now dominated by varying mixes of manufacturing, services, and other nonfarming activities. This trend has sharply altered the relationship between farming and local economies, and today most small family farms are closely associated with diversified rural economies that offer off-farm income opportunities. Large farms still enhance some local economies, but developments in long-distance purchasing of inputs and marketing of products reduce the contribution. Consequently, traditional commodity support and farming-oriented development programs play an increasingly limited role in improving the prosperity of rural Americans.

Jobs and incomes are decreasing in many areas that are dependent on natural resource-based industries such as agriculture, mining, and forestry, but other places, often associated with rural amenities, are thriving. Declining areas must diversify

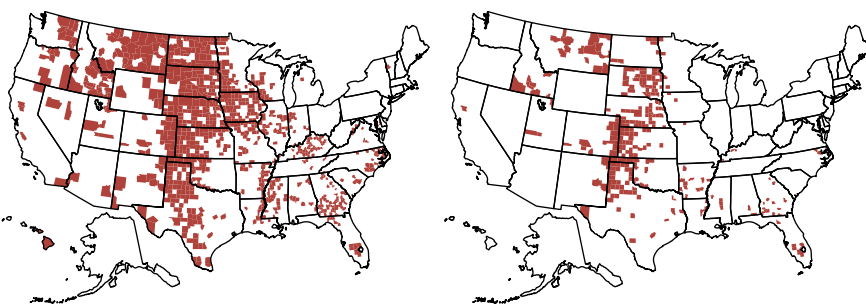


Figure 21

Farm Earnings Less Important in Local Economies Now Than 30 Years Ago

Farming accounted for 20 percent or more of earnings in 877 nonmetro counties in 1969.

By 1999, farming accounted for 20 percent or more of earnings in only 258 nonmetro counties.



and attract new businesses, while growth areas must develop strategies to sustain their success. A prosperous rural America depends upon many of the same things as urban areas—good-paying jobs; access to critical services such as education, health care, technology, transportation, and communication; strong and safe communities; and a sustainable natural environment.

The challenges facing rural communities are wide-ranging and varied, and they defy homogeneous solutions. Farming communities in the Great Plains face different problems—with different solutions—than do poor areas of the Mississippi Delta or counties in California's Central Valley. At the same time, rural areas offer many advantages, including lower costs of living,

abundant scenic amenities, less congestion, and a slower paced lifestyle.

Rural America—its conditions and its future—is a local, State, and national concern. Its diversity presents opportunities for the creative application of programs and policies, and calls for unique partnerships among the spectrum of American institutions—different levels of government, the business community, public advocacy groups, and local organizations. New and innovative Federal approaches to sustainable community development are required, and improved program targeting, streamlining of programs, and program coordination are needed now more than ever.

A prosperous rural America depends upon many of the same things as urban areas—good-paying jobs; access to critical services such as education, health care, technology, transportation, and communication; strong and safe communities; and a sustainable natural environment.

Rural America Today

At the dawn of the 21st century, no one industry dominates the rural landscape, no single pattern of population decline or growth exists for all rural areas, and no statement about improvements and gaps in well-being applies to all rural people. Many rural areas are thriving, and during the 1990s, almost 8 percent of rural counties grew in population at more than twice the national average. Colorado was the epicenter of this high growth, but other clusters were found throughout the Rocky Mountain West, with smaller pockets in the Texas Hill Country, the Ozarks, the Atlantic and Gulf coasts, and northern Georgia (figure 22).

However, these favorable trends were not universal, and many areas of the Great Plains and western Corn Belt experienced significant population loss as they wrestled with declining agricultural employment and the lack of replacement jobs in other industries. Population loss was

also found in some low-income areas such as the Appalachian coal fields and the lower Mississippi Valley.

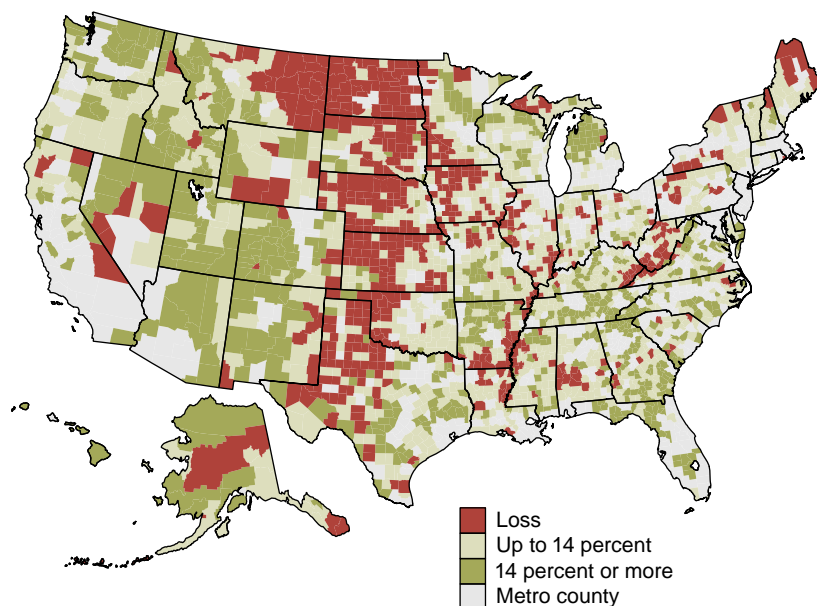
Poverty also has a regional flavor (figure 23). More than one-fifth of rural America had persistently high poverty rates (above 20 percent) in each of the last four decades. These chronically poor areas are heavily concentrated in the South, Appalachia, the Ozarks, the Mississippi Delta, the Rio Grande Valley, and the Native American reservations of the Southwest and Northern Plains. A disproportionate number of economically at-risk people—including racial/ethnic minorities and high school dropouts—characterize these areas, and, at the same time, the local economies of these areas often lag other rural places. However, these persistently poor counties are not synonymous with population-loss counties, and they experience different stresses.

Opportunities in Rural America

The opportunities and challenges facing rural America are as varied as rural America itself, and local areas differ by needs and resources. Current commodity-based farm policies do not fully address the complexities of rural economies and populations. Federal economic development programs can acknowledge rural diversity by targeting program benefits to rural areas with high poverty rates and/or substantial declines in population and employment. These programs can provide needed infrastructure for economic development, provide employee training for the “new economy,” emphasize training in entrepreneurial and leadership skills, and encourage both business and tourism development. Federal efforts to encourage regional development initiatives, develop creative pilot programs, and provide incen-

Figure 22
Nonmetro Population Change, 1990-2000

U.S. average growth was 14 percent for this period.



tives for areawide development strategies would be consistent with a comprehensive approach to rural policy.

The efforts of rural communities and counties to build longer term regional economic development plans are the first steps toward viable economic growth. These plans help local governments understand the benefits of reallocating scarce human and financial resources, while simultaneously trying to make the best use of available government programs and expertise. Modifying existing Empowerment Zones/Enterprise Communities programs to foster more effective regional-Federal efforts would enable limited government resources to be used over a broader range of rural areas.

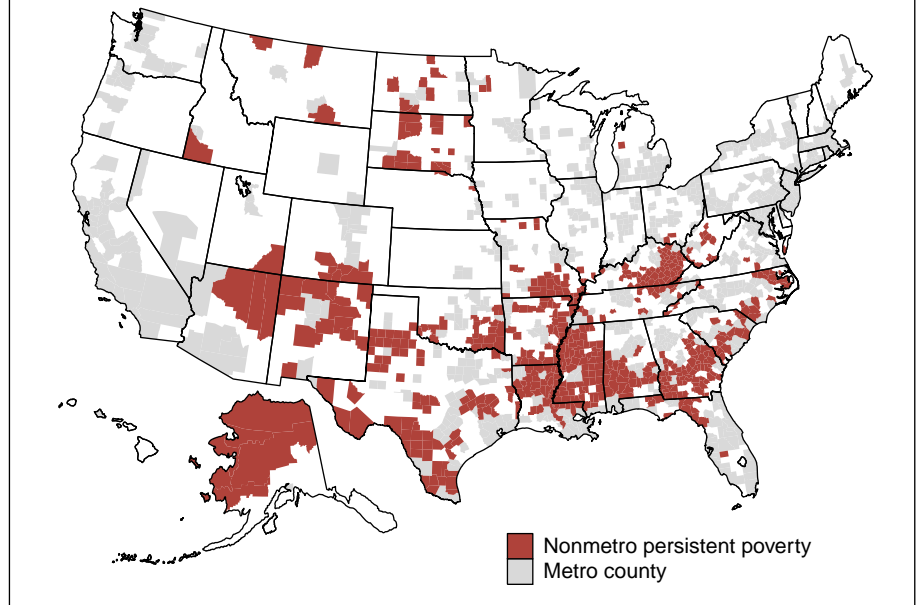
Although these programs are currently of a limited scope, there is a significant need to assist rural areas in developing and executing plans and strategies for new development initiatives. Achieving economic diversification and reducing dependence on traditional rural economic activities will require training, support, and education. Community leadership, traditional local governance, infrastructure analysis, and community planning will likely require new thinking, as old and new institutions blend to accommodate the needs of a changing rural America.

Historically, State and local governments have had the primary responsibility for formulating policy responses to rural economic shortcomings. Recently, regional initiatives have achieved some level of success. In either case, the Federal Government will continue to support these efforts by encouraging communication among Federal, State, and local agencies, all working together to encourage and assist the private sector in the rural regions of our country.

Figure 23

Nonmetro Persistent-Poverty Counties

These counties had 20 percent or more persons in poverty in 1960, 1970, 1980, and 1990.



Several forces are converging to make investments in energy-related industries profitable for rural areas.

Innovation, Investment, and Income Generation

An environment should be created that will attract private investment to rural America. Three areas are targets of new policy initiatives: expanding value-added agricultural production, finding alternative methods to increase rural income from the natural resource asset base, and providing leadership in education, specifically entrepreneurial skills.

Value-Added Agriculture

Many programs exist to promote value-added agricultural development, including cooperative programs, business and industry loans, Rural Business Enterprise and Opportunity Grants, and others. It is a priority to creatively integrate into these programs biobased and renewable energy production and distribution; livestock operations and value-added products, including methane utilization and odor control; environmental beautification; and other

innovative development opportunities.

Natural Resource Base

Capitalizing on new uses of the Nation's natural resource base is essential. This resource base can provide water filtration systems, carbon sequestration, recreation, tourism, nontraditional energy sources, and other activities. In addition, new farm services, such as carbon stored in plants and the soil through carbon sequestration activities, can create new income opportunities while simultaneously addressing the public concern over greenhouse gas concentration in the atmosphere.

Energy-Related industries

Several forces are converging to make investments in energy-related industries profitable for rural areas. First, domestic energy production has not kept pace with domestic energy use, resulting in energy price increases over the past 2 years. Second, rural areas are well suited as sites for the development of renewable energy as well as more traditional fossil-fuel energy production. Wind and solar energy are most economically generated in rural areas due to the openness of rural spaces and the need for large land areas for production.

Energy production from biomass offers enormous potential. Dedicated crops and agricultural residues can be used to produce transportation fuels, such as ethanol and biodiesel, and to power turbines to produce electricity. While ethanol production is growing rapidly, biodiesel and biomass electricity generation would benefit from research and development efforts and pilot projects to overcome barriers to expanded commercialization.

On another front, slow Federal review and approval processes have often thwarted energy production in rural areas. USDA is working with other agencies to speed this process



and accelerate development of energy projects. Another major barrier to siting new fossil fuel plants in the last 10 years has been proximity to objecting communities, and rural areas are potential candidates for new plants because of their lower population densities.

Access to Capital

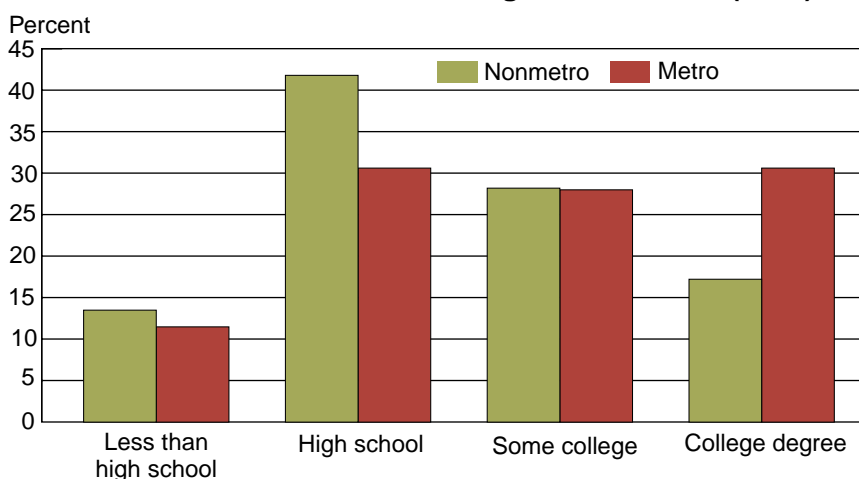
Equity capital is often in short supply in rural areas, and rural entrepreneurs must compete with urban businesspeople for scarce investment funds. However, some rural residents lack the skills to develop effective business plans and other ingredients of a successful business venture. Rural access to startup capital is also hampered by the inability of some rural residents to develop and sell proposals. Rural residents would benefit from assistance in developing strong business acumen as well as business communications skills.

Education and Skills To Succeed

The wage gap between urban and rural workers reflects a rural workforce with less education and training on average than urban workers (figure 24). In the past, many rural areas hosted industries that required a reliable pool of low-cost workers. Today, a labor force with low education levels poses a challenge for many rural counties seeking economic development. Many rural jobs historically held by workers with limited education have been lost to changes in production technology or changing consumer demand. Employers are now more attracted to rural areas offering concentrations of well-educated and skilled workers.

Moreover, today's youth, regardless of where they ultimately live and work, will need an unprecedented level of education and technical skills to compete in the

Figure 24
Educational Attainment of Adults Age 25 and Older (1999)



increasingly high-skill “new economy.” Programs such as 4-H clubs are needed more than ever, particularly in areas where rural schools are underfunded and plagued by dropouts. Rural employers complain less about the basic skills of local workers than about their reliability, interpersonal skills, and problem-solving abilities. These skills are not generally taught in schools but are basic to many youth programs. These programs, adapted to fit local needs and integrated with schools and other training programs, may be key to upgrading the workforce in traditionally low-skill, high-poverty areas. They may also help serve another need—to alert rural youth

to further education and training programs available to them.

Education and worker training will be essential in helping rural communities cultivate high-performance, knowledge-based companies. Rural human capital would be improved by strengthening classroom instructional quality. Technical assistance could ensure that best-practice models of distance learning are available to remote schools where the benefits from such technologies are greatest. Instructional quality could also be improved by promoting teacher recruitment and retention efforts in remote and poor rural areas. Efforts to facilitate school-to-work transition of youth are particularly important in isolated and distressed rural communities. The benefits of these strategies will be greatest in rural communities where existing workforce development programs (especially the Workforce Investment Act) face special challenges due to high rates of high school dropout or limited demand for youth labor.

Protecting Rural Communities From Wildfire

One of the most significant conservation issues facing America today is the need to protect lives and property in communities near large areas of forested land, the so-called wildland-urban interface. Rural and volunteer fire departments provide the front line of defense on up to 90 percent of these high-risk and costly fires. While they have a good record in rapidly suppressing traditional wildland fires, these local resources often struggle to meet the complex demands of fighting fire in the wildland-urban interface. Safe and effective protection in these areas demands close coordination among local, State, and Federal firefighting resources.

The Federal Government, in cooperation with landowners and State, tribal, and local governments, can take action to reduce the risk to





communities and resources. Indeed, Federal funding for wildfire preparedness, suppression, and mitigation has dramatically increased in the last few years. A concentrated effort will assure these resources are used effectively. A top priority for minimizing risk is the reduction of fuels in forests and rangelands adjacent to and within communities. Particular emphasis should be placed on projects where fuel reduction can occur on adjoining State, private, or other non-Federal land to extend protection across the greatest possible area. Incentives and technical assistance to communities and private landowners to help minimize hazardous fuels on property can extend protection and enhance the safety and increase the effectiveness of firefighters.

The risk of rural fires can also be reduced by ensuring that personnel at the State and local level are prepared to fight wildland-urban interface fires. The USDA Forest Service's State and Volunteer Fire Assistance programs provide technical and financial assistance to local firefighting resources. In addition, Federal agencies must back up local firefighters by conferring incident manage-

ment skills and leadership. Finally, fire education programs geared toward homeowners and communities should emphasize planning and zoning requirements for fire-safe building materials, and landscaping to reduce the loss of lives and property.

Maintaining existing markets and creating new markets for better use of the small wood that is removed from wildlands as part of the fuels management program is essential. Programs to more effectively use small wood include technical assistance, training, seed funds for selected capital investments, identification of value-added income-producing opportunities, and applied research on additional uses for small wood. Small wood can be an ideal source of fuel for rural cogeneration plants and will increase energy production while stimulating rural economic growth.



Infrastructure, Public Services, and Business Assistance

Telecommunications, electricity, water and waste disposal systems, and transportation infrastructure (such as highways and airports) are essential for rural development. But many rural communities face financial challenges because of a limited tax base, high costs associated with diseconomies of size, and difficulties adjusting to population growth or decline. Investments in needed infrastructure have increased in recent years, but they are costly and face challenges such as deregulation.

Many communities continue to lack infrastructure and public services, such as advanced telecommunications and air transportation services. Other public services (schools, hospitals, police and fire, libraries, and community centers, for example) are important for community as well as economic development, particularly in areas experiencing recent prosperity and growth. The Rural Housing Service provides assistance to communities for such facilities, but more can be done to ensure that the efforts of USDA, other Federal agencies, and State and local governments are addressing the needs of rural communities. Only through a coordinated effort by all stakeholders can the limited resources available for infrastructure and community facilities be put to best use.

Growth in high-paying jobs is needed to improve incomes and education in rural areas. However, the traditional approach for attracting firms into a region by offering tax breaks may no longer be sufficient. New approaches, such as efforts to provide training and tech-

nical assistance to clusters of firms and the provision of startup and equity capital to help new and existing firms grow, offer more potential for success. Continued assistance to help support rural businesses, infrastructure, and community facilities can help rural communities connect with the new economy and realize an enhanced quality of life.

Information and communications technology—aided by financial and technical assistance—can help smaller communities enjoy the same benefits that at one time accrued solely to cities, such as higher standards of health care and virtually unlimited educational opportunities. Options include Federal financial assistance for deploying broadband access or incentives for State, private, and public partnerships to develop fiber optic or wireless capabilities.

Rural America Tomorrow

The diversity of rural America and the diminished role of farming heighten the role of institutions in helping to create vibrant, innovative market solutions to challenges facing rural communities. The Federal Government can provide a coordinating hand, but State and local problems are often most efficiently and effectively addressed by State and local residents. A reexamination of the Federal role in rural development activities is needed with the goals of streamlining programs, targeting resources to their most effective use, and improving program coordination at the Federal, State, and local level.



Principles for Rural Communities

- **Recognize the diversity of rural America.** The opportunities and challenges facing rural America are as diverse as rural America itself, and there is no single recipe for prosperity.
- **Recognize that rural development policy is not synonymous with agricultural policy.** Traditional commodity support and farming-oriented development programs play an increasingly limited role in the improved well-being of rural Americans.
- **Understand the importance of the nonfarm economy in rural policy.** Farming no longer anchors most rural communities and economies. Instead, the non-farm economy anchors much of agriculture, and rural policy for the 21st century must recognize the increased importance of non-farm jobs and income as the drivers of rural economic activity.
- **Create an environment that will attract private investment.** Rural communities must adopt creative strategies to diversify the economy, attract new businesses, and sustain their successes.
- **Emphasize the need for greater education and technical skills.** Today's youth, regardless of where they ultimately live and work, will need an unprecedented level of education and technical skills to compete and succeed in the increasingly high-skill "new economy."
- **Capitalize on the natural resource base.** Rural areas are well suited as sites for the development of renewable energy as well as for more traditional fossil-fuel energy production.
- **Protect lives and property in the wildland-urban interface.** Rural citizens in rural communities near large areas of forested land need assurance that their lives and property are safe from wildfires. Innovative, coordinated, and aggressive approaches to the reduction of fuels in forests and rangelands are needed to extend protection across the greatest possible area.
- **Expand infrastructure, community facilities, and technology.** Such improvements will help rural communities connect with the "new economy" and realize an enhanced quality of life. New information and communication technologies can help smaller communities enjoy the same benefits that at one time accrued solely to cities.
- **Coordinate involvement of all stakeholders.** Rural community issues are often most effectively addressed at the local and State levels, but the Federal Government can provide an important coordinating role. A new look at the Federal role in rural development activities, with the goal of streamlining programs, targeting resources, and improving program coordination, is needed.

VII. Nutrition and Food Assistance

The core programs include the Food Stamp Program, the child nutrition programs, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and commodity distribution programs. Today, these programs serve one in every six Americans at some point during the year. In addition to providing a nutrition safety net, the programs promote healthy diets for all Americans.

Ensuring Access to Nutritious Food

Our Nation's food assistance programs have been a success, but the environment in which they operate is changing. Most of these programs were started in response to documented problems of underconsumption and undernutrition among the low-income population in the United States in the 1960s and early 1970s. Since then, the gap between the diets of low-income and other families has narrowed. Today, in both higher and lower income groups, median nutrient intakes are well above the Recommended Dietary Allowances (RDAs) for most vitamins and minerals. Moreover, available informa-

Food and agriculture policy has long sought to ensure that all Americans have access to a healthy and nutritious food supply, regardless of income. This policy has encompassed, and USDA has administered, an array of food assistance and nutrition programs that operate with humanitarian, investment, and agricultural support goals. More specifically, the goals include aid to the needy that helps alleviate short-term hunger and hardship; pragmatic investments in human capital that yield long-term returns in a better educated, stronger, and healthier workforce and families; and support for the agricultural sector.

While some nutrient deficiencies remain, the most pressing dietary problem today is overconsumption of fat, sodium, refined carbohydrates, and calories.





tion indicates that food stamp recipients have a better nutrient profile than nonrecipients with comparable incomes.

While some nutrient deficiencies remain, the most pressing dietary problem today is overconsumption of fat, sodium, refined carbohydrates, and calories. Important new challenges are emerging related to diet quality—the proper variety and quantities of foods and nutrients in an individual’s diet to promote their health and well-being. In their current form, each of the core food assistance programs contains a direct link to nutrition and health. Food stamp benefits are tied to the cost of a modestly priced nutritious diet sufficient to sustain an active, healthy life. The key components of WIC include food packages tailored to specific nutrition requirements, nutrition education, and health care referrals. The child nutrition programs are based on standards that ensure school meals served to children meet certain nutritional requirements.

Food and nutrition assistance programs have contributed to significant improvements in the nutritional status of low-income and vulnerable groups, as measured by growth, low birthweight, and hema-

tological status (anemia). In perhaps the most striking example, nutrition surveillance data for 1974-76 indicated that 22.8 percent of preschool-aged children were stunted (having low height for their age); by 1992, the prevalence of stunting in low-income children had dropped to 8 percent.

Changes in the program environment, nutrition issues, and caseload composition make this an opportune time to modernize the food and nutrition assistance programs. Of particular urgency are ensuring dependable funding for WIC, modernizing the national nutrition safety net, and improving support for agricultural producers.



Ensuring Funding for WIC

WIC helps safeguard the health of low-income women, infants, and children (up to age 5) who are at nutritional risk. WIC achieves this by providing nutritious foods to supplement diets, information on healthy eating, and referrals to health care. WIC provides early intervention during critical times of growth and development that can help prevent future medical and developmental problems.

Established in 1972 as a pilot program, WIC has grown rapidly and matured into a core component of the Nation's nutrition safety net (figure 25). In fiscal year (FY) 2000, WIC served an average of 7.2 million participants per month. Almost half of all infants and about one-quarter of all children age 1-4 participate. Federal program costs totaled almost \$4 billion in FY 2000, making WIC the country's third largest food assistance program, behind the Food Stamp Program (\$17.0 billion) and the National School Lunch Program (\$6.1 billion).

Over a decade ago, when decisions were made categorizing programs into mandatory and discretionary spending categories, WIC was a much smaller program. At that time, WIC became discre-

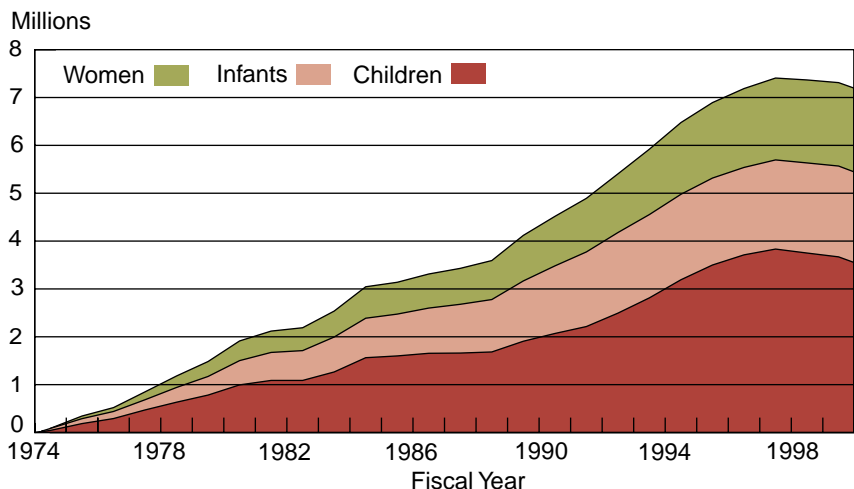
tionary. Now a large and popular program, it is a core component of the national nutrition safety net. However, since WIC has remained classified as discretionary, adequate year-to-year funding to support this popular program is not guaranteed. Although WIC has received ample funding to serve all eligible applicants for the last several years, now is the time to rethink the funding approach used to sustain this vital program.

Modernizing the National Nutrition Safety Net

The Food Stamp Program (FSP) has been the foundation of the Nation's food assistance safety net, providing benefits to qualifying families while supporting the markets for agricultural products. Using normal retail marketing channels, the FSP empowers needy households with increased food purchasing power to acquire affordable and nutritious foods. The FSP has been a pioneer in the innovative delivery of benefits to clients through the use of Electronic Benefit Transfer (EBT). This system not only increases program efficiency, but reduces client stigma in grocery store checkout lines and better enables program



Figure 25
Average Number of WIC Participants per Month, FY 1974-2000





administrators to detect and deter waste, fraud, and abuse.

Although the current FSP provides a strong foundation upon which to build, much has changed since Congress last reauthorized this vital program. Welfare reform transformed social policy for low-income families, replacing an entitlement to cash assistance with a system that requires work in exchange for time-limited assistance. Since welfare reform was enacted in 1996, welfare rolls—and the proportion of food stamp households on welfare—have fallen sharply, while the percentage of food stamp households with earnings has grown. Today, more working families than welfare families use food stamps. Now, more than ever, the Food Stamp Program plays a critical role in facilitating the transition from welfare to work.

The national eligibility and benefit rules of the Food Stamp Program form a minimum public safety net across all States. As States continue to explore innovative welfare policies, food stamps have provided a steady base that serves the basic nutrition needs of low-income households wherever they live. Yet, there are opportunities to better support work, simplify program rules,

increase emphasis on outcome-based performance measures, serve currently unmet needs, bolster public confidence in the program's integrity, and improve support for agriculture.

- **Enhancing Work Support and Simplifying Program Rules.** Food stamps can be a bridge from government dependence to work and self-sufficiency. But working families often have circumstances that make complying with the program's procedural requirements more difficult. Concerns have grown that the program's administrative burden and complexity are hampering its performance in the post-welfare reform environment. The complexity of program requirements—often the result of desires to target benefits more precisely—may cause errors and deter participation among those eligible. These burdens are particularly significant for the working families that comprise an increasing portion of the food stamp caseload.

We should pursue opportunities to improve the program for working families, facilitating their access to benefits while minimizing burdens for State agencies. These may include revisiting the treatment of assets, income, and deductions in

determining benefits for working families and others.

- **Emphasizing Outcome-Based Performance Measures.** Because food stamp benefits are entirely federally funded (unlike the other major State-administered assistance programs for low-income families), the FSP has maintained a rigorous payment accuracy measurement system. The system determines fiscal sanctions and enhanced funding based on error rates computed from annual samples of quality control (QC) case-record reviews. State and local administrators believe that the QC error rate is a poor measure of overall program performance. When used as such, administrators are tempted to impose more burdensome reporting and verification requirements for working households whose fluctuating earnings have historically made them more error-prone. This is counterproductive to the FSP's new need to support work and personal responsibility. We need to examine how the food stamp program recognizes and rewards performance that serves its multiple goals.

Currently, there is no adequate system in place to monitor and assess the nutrition performance of the food stamp and child nutrition programs. With increased emphasis on outcome-based performance measures, there is a need to consider implementing annual monitoring on a national scale. An expanded collection system for program management not only would improve assessment of program performance, but also would provide agricultural producers and food processors with timely information on food choices, food prices, and dietary practices of Americans.

- **Serving Unmet Needs.** Despite the general effectiveness of the program's current national standards, significant needs remain. The number of citizen children born in the

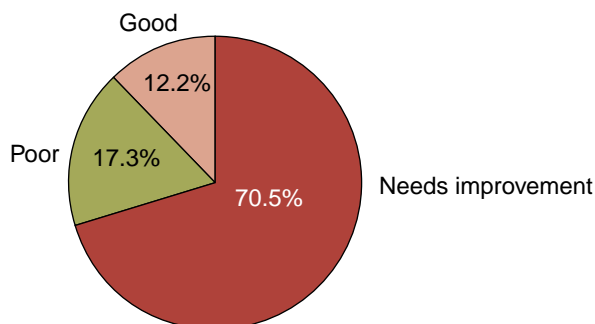
United States to immigrants who are participating in the program has dropped dramatically in recent years. Fewer than half of eligible elderly persons participate in the program. Program changes and simplifications could help ensure that all those at risk of hunger have better access to the benefits they need.

- **Improving Accountability.** Waste, fraud, and abuse divert resources from their intended use and undermine public confidence and support for programs. Food stamps are intended for food. When individuals sell their benefits for cash, it violates the spirit and intent of the Food Stamp Program as well as the law. FNS estimates food stamp trafficking—the exchange of benefits for cash by authorized retailers—at about \$660 million per year. The expansion of Electronic Benefit Transfer (EBT)—which is now in place in 41 States, Washington, DC, and Puerto Rico—makes certain forms of trafficking harder to conduct and large-scale trafficking easier to detect.

Some States with low coupon issuance costs have delayed implementing an EBT system due to a cap on Federal support for expenses above the cost of coupon issuance. The current cap is based on obsolete estimates of these costs. Facilitating prompt and full implementation of EBT and expanding support for increased use of EBT systems to detect fraud would improve FSP administration.

- **Improving Support for Agriculture.** The commodity distribution programs traditionally support agriculture by distributing products that are in ample supply. The Department will continue to ensure the safety and wholesomeness of the donated products. In general, these programs would benefit from changes to improve their effectiveness.

Figure 26
Healthy Eating Index (HEI)*, U.S. Population (1996)



**The HEI is a dietary assessment tool that measures adherence to 10 components of the U.S. Dietary Guidelines. An HEI score greater than 80 (out of 100 maximum) implies a "good" diet; an HEI score between 51 and 80 implies a diet that "needs improvement"; and an HEI score of less than 51 implies a "poor" diet.*

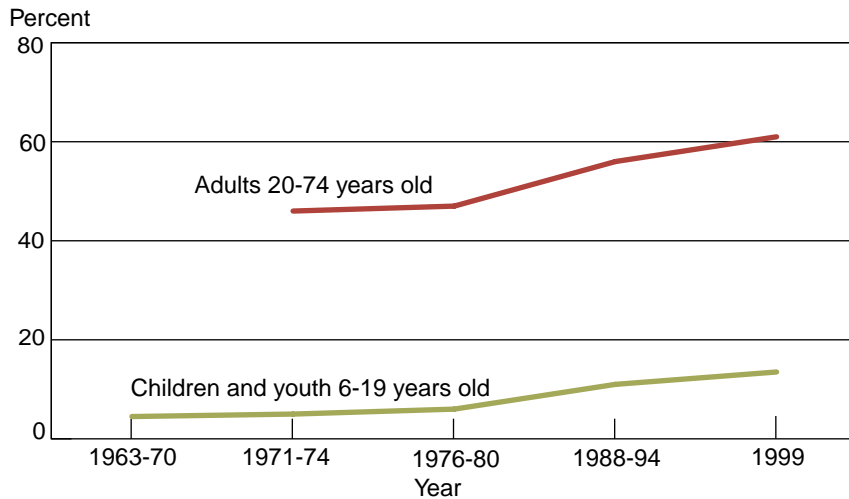
The emergency food assistance system (EFAS) is a relatively small, but vital component of the food assistance safety net, as well as an important outlet for surplus commodities. Comprised largely of private, nonprofit food banks, pantries, emergency kitchens, and food rescue organizations, EFAS helps ensure adequate nutrition for low-income people who may not be eligible for, or who may find it difficult to participate in, other food assistance programs. While only about one-eighth the size of USDA's programs, EFAS's community-based structure and flexibility allow it to efficiently fill critical gaps in the food assistance safety net. Policy options should seek to improve the administration and effectiveness of USDA support for the EFAS.

Healthy Food Choices

USDA food and nutrition assistance programs have made great strides in reducing nutritional deficiencies among the low-income population. However, nutritional deficiencies have been supplanted by poor diets of a different hue and with different implications: excessive and unbalanced consumption patterns that result in obesity and increased risk of major chronic health problems such as cardiovascular disease and diabetes. Poor diets are widespread. According to USDA's Healthy Eating Index (HEI), nearly seven out of every eight Americans (all but about 12 percent) have poor diets or are in need of improving the nutritional quality of their diet (figure 26).

As a direct consequence of poor diets and physical inactivity, the number of overweight individuals continues to increase. The implications are tremendous for future health, health care costs, and quality

Figure 27
Proportion of Overweight Population Has Risen



of life of Americans (figure 27). There is also concern that as more children and adolescents become overweight, the chronic diseases that have typically been associated with people in their fifties may begin to appear earlier.

Although these problems affect individuals at all income levels, they are more prevalent among low-income groups. And, specific population subgroups continue to face specific nutrition problems. For example, iron and calcium intakes of children and women continue to need improvement. Also, breastfeeding initiation and duration rates continue to fall far short of national objectives; meeting these objectives can result in savings of \$3.6 billion in direct and indirect costs associated with three childhood conditions—otitis media, gastroenteritis, and necrotizing enterocolitis.

The challenge is how to motivate consumers to change their dietary

patterns and physical activity levels so as to improve the chance for a healthier life. People choose the foods they eat to meet a variety of needs, and nutrition is just one factor. Income and time constraints, cultural habits, and individual tastes and preferences play an important role. Improving the healthfulness of diets requires changing attitudes, behavior, and eating practices—as well as a long-term commitment to those changes. This is increasingly difficult to accomplish, as consumers are bombarded by sophisticated food advertising that often emphasizes other food characteristics that appeal to them. In 1997, food manufacturers spent over \$7 billion in advertising. In contrast, USDA spent over \$300 million on nutrition education, evaluation, and demonstrations—mostly through WIC and FSP.

The need for healthier eating patterns will require a concentrated research effort to develop new approaches, tools, and technologies to motivate consumers. Potential research advances include effective nutrition education messages and materials, dissemination models to effectively and efficiently reach target audiences, and standardized, cost-effective methods for evaluating nutrition information outcomes. One institutional approach that has proven successful for conducting human nutrition research is to provide support for a university-based nutrition information research center that would focus on these issues. Such a center could provide a critical mass of resources to conduct research for use by programs, States, and local agencies. Likewise, efficiencies could be gained from pooling some nutrition education funds and activities across program lines.



Principles for Nutrition and Food Assistance

- **Continue commitment to a national nutrition safety net.** A well-nourished population is healthier, more productive, and better able to learn. No child or needy family should be left behind for want of food.
- **Guarantee stable funding of the nutrition safety net.** The national nutrition safety net, including WIC, should be supported and targeted to those most in need.
- **Simplify program rules.** Program rules must strike a balance between targeting, client access, supporting work, and administrative burden.
- **Support modern technologies.** Electronic Benefit Transfer (EBT) and other technologies are crucial to the improved delivery of benefits, client access, administrative efficiency, and program integrity.
- **Ensure a commitment to outcome-based performance measures.** Outcome-based performance measures will be crucial to deciding the future direction of the nutrition assistance programs.
- **Encourage healthy and nutritious diets.** American consumers must be made aware of the link between diets, health, and physical activity, and motivated to make appropriate changes.

VIII. Importance of Integrated Programs

All of the major agencies of today's USDA were in existence by the 1930s. For example, the Department's field operations, a national network of county offices, arose out of the New Deal imperative to establish a Federal presence in local areas, as a matter of politics but also to facilitate program delivery for farm, conservation, and rural infrastructure services. Some of the research, economic, and statistical agencies trace their roots to the 1800s.

Just because agencies are old doesn't mean they have outlived their original purposes. Indeed, the missions of these agencies—to secure the well-being of American consumers, farmers, and rural resi-

dents—are as meaningful today as in 1930. But changing circumstances strongly suggest the need for contemporary reflection on the program delivery needs of the future.

USDA remains organized as a traditional hierarchy, with authority and responsibility flowing directly through each agency, from the Secretary to administrators to State and regional levels and to field operations, where they exist. This configuration creates “stovepipes,” in which all goals, policies, resources, and administrative functions are contained within the confines of individual parallel organizational structures. As PricewaterhouseCoopers observed in a recent report to the Department, “...the stovepipe structure poses problems for contemporary management approaches because it runs counter to an organization's core business processes, which are usually aligned horizontally and cross-functionally. In a traditional hierarchy, processes and people are trapped inside their functional stovepipes—those tall, thin structures with physical or theoretical walls that prevent full cooperation and communication.” These stovepipes can be a big impediment to better integration of program management and improved service delivery.

The issues facing the modern food and farm system today are so multifaceted and complex that they cannot be solved by any one program or approach. Protecting against plant and animal pests and diseases, or eliminating emerging foodborne pathogens, or overcoming the barriers to producing bioenergy efficiency, or ensuring nutritious food for low-income households, or encouraging cost-effective carbon sequestration on farms and in forests—none of these can be accomplished by any single agency. Solutions require many agencies working together, sharing their diverse human and physical resources.



Emerging Technologies: Geographic Information Systems (GIS): Better integration for better decisions

From firefighting to farm program compliance to food safety, the use of GIS technology has dramatically improved the ability of program staff to make good decisions and provide better customer service. In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e., data identified according to their locations.

Images produced with a GIS—including maps and animations—allow policymakers, land managers and others to view their subjects in ways that literally never have been possible before. GIS technology can be used for scientific investigations, resource management, and development planning. For example, a GIS might allow emergency planners to calculate emergency response times in the event of a natural disaster, or a GIS might be used to find wetlands that need protection from pollution. The changes in crop growth through a growing season can be animated to determine when drought was most extensive in a particular region. Working with two factors that vary by location and over time allows researchers to detect regional differences in the lag between a decline in rainfall and its effect on vegetation. These analyses are made possible both by GIS technology and by the availability of digital data on local, regional, and global scales. The volume of data with spatial associations has expanded dramatically over the

past decade, and more will follow, generating ever greater amounts of data. GIS and related technology will help greatly in the management and analysis of these large volumes of data, allowing for better understanding of climatic, terrestrial, and aquatic processes, and the linkages in those processes.

The use of GIS can be an important tool in efforts to:

- Improve agricultural productivity. Precision agriculture and crop anomaly detection depend critically on field-level information. The usefulness of information on agricultural status and trends is enhanced with spatial variation.
- Improve environmental stewardship. Environmental analysis, pattern and population density analysis, natural resource management, ecosystem restoration (especially for migratory species), resource inventory and assessment, watershed and water quality assessment, conservation planning, recreation planning and management, and compliance implementation all benefit from the use of spatially referenced data and the use of a GIS to illuminate relationships between environmental quality and resource conditions and the management practices that affect them.
- Protect food safety and reduce animal diseases. For example, surveillance of spatially based diseases, regionally based health surveys, epidemiological surveillance of foodborne diseases and microbial risk assessment support for food safety are all enhanced with the use of a GIS.
- Improve rural community planning. Community planning and development are enhanced with the use of spatial information on changes in demographics and infrastructure.
- Improve emergency response. Improved fire response and recovery, protection of firefighters, natural disaster response and recovery, disaster assessment, risk assessment, and risk education are among the early uses of GIS and have tremendous potential for further advances. Early warning systems can reduce damages from disasters and improve agricultural disaster response programs.
- Improve record keeping for improved program implementation. Geographic/demographic allocation of resources and program and policy evaluation depend critically on good records and can be enhanced with a better integrated and spatially explicit data set including information such as land ownership surveys, recordation and administration, and land and farm practice records management.

As this cooperation continues to improve, we must also ensure that resources are coordinated to enhance the technology and technical knowledge of agency personnel. The information technology revolution has created possibilities that we have only begun to imagine. One example involves geographic information systems (GIS), which have tremendous potential to improve the quality of information available to guide decision making by farm and forest managers, agency personnel, and policymakers, and to improve public health and safety and protect the environment (see box).

Increasingly, the technology available to solve many program and policy problems also requires resources from multiple agencies. To use GIS to its best advantage requires the systems to be constructed with many diverse data sets—or data layers—which are maintained by a variety of agencies. Unfortunately, agencies often develop and maintain these data sets using their own definitions and conventions, which can make them inconsistent with one another and costly, or even impossible, to use in GIS. For example, trying to merge data sets on soil characteristics, farm program participants, crop insurance participation, and crop production levels, runs afoul of different farm and field definitions and boundaries.

While the multidimensional nature of the issues, and the technologies needed to address them, cry out for more integrated program delivery, customers also are demanding more comprehensive service. A customer today often has an interest in more than one USDA or other Federal program, and can be thwarted in obtaining efficient service if the “stovepipes” of the organization are inflexible. Fortunately, a number of approaches can be taken to substantially reduce the negative effects of a stovepipe organization, even without major, additional restructuring. These include: one-stop shopping for delivery of serv-

ices to rural America; sharing and integration of data bases and information, and computation environments across agencies and programs; and new flexibility for increased coordination of resources.

Delivering Services

Attention must be paid to the overall structure used by USDA and its Federal and State partners to deliver services to its customers, particularly in rural America. In recent years, USDA has made progress in streamlining its rural office structure while maintaining or improving customer service. Field offices of the Farm Service Agency, Natural Resources Conservation Service, and Rural Development mission area have been colocated. Staffing levels have been reduced, over 1,000 offices have been closed, and investments in new technology have improved local office efficiency.

Further actions are necessary to ensure that the USDA farm service structure is appropriately sized, configured, and located for efficient provision of the new services demanded by a rapidly evolving food and agriculture system. Interagency cooperation will be especially critical in moving from simple collocation of agency personnel to actual “one-stop shopping” for rural American customers of the Federal Government. And there is still much to be done to advance the information technologies that link service operations among agencies.

The concept of “one-stop shopping” has arisen as a notion that is applicable to the farmer seeking information on farm loans and on conservation practice cost-shares as it is to the single mother inquiring about her eligibility for food stamps and for income support. Advances in information technology may allow agencies to break through stovepipes at a very low cost, sharing key data so that customers are spared the bur-

Further actions are necessary to ensure that the USDA farm service structure is appropriately sized, configured, and located for efficient provision of the new services demanded by a rapidly evolving food and agriculture system.

den of providing the same information to multiple Federal offices. Notwithstanding any other organizational reforms, these information-sharing initiatives should accelerate the integration of program management and delivery.

Taking Advantage of Information Technology

Key to the success of service center modernization is the replacement of the aging business and technology systems of partner agencies with a common computing environment that will allow sharing of data and implementation of streamlined business processes. Information shared among agencies will reduce the redundant requests made of customers participating in multiple programs, as well as customer office visits and paperwork burden, and allow agencies to operate efficiently at lower staffing levels. This effort will provide the infrastructure needed to meet the legislative requirement in the Freedom to E-File Act that customers be able to do business electronically with the service center agencies by June 2002.

Innovation in electronic government can improve the quality of service provided directly to citizens, and it can also support improvements in agency planning and decisionmaking. Gains may arise when agencies are able to acquire data relevant to policy formulation and program delivery. However, the need for the Nation's food and fiber system to respond to the new consumer demands—ranging from environmental quality to food safety to energy—raises questions, not just about the relevance of the data to public and private sector decisionmakers, but also about whether information technologies are able to manipulate data from diverse

sources into useful formats that can be shared across agencies.

The new information needs that are arising with change in the food sector clearly call for better integration of data collection, storage, and use. For example, advances in molecular biology have created the need for data bases to store sequencing, mapping, and functional genomics data for plants, animals, and microbes. Public research agencies can help make "bio-information" available broadly, but doing so requires a new effort in data base and information analysis tools.

Assurance that data being collected by USDA meet contemporary decisionmaking needs *across* the many functions of the Department can only come from a review that crosses all lines of the Department's organization. USDA needs to commission a comprehensive effort to inventory current data collection efforts and to align them with an assessment of future data requirements. Integration of data bases across agencies and programs would then be easier.

Recently, seven USDA agencies (the World Agricultural Outlook Board, Economic Research Service, Agricultural Marketing Service, Farm Service Agency, Foreign Agricultural Service, National Agricultural Statistics Service, and Cooperative State Research, Education, and Extension Service) engaged an outside consultant to help streamline the interagency collaboration that produces monthly estimates and forecasts of key commodity market prices, production, stocks, and use. The review prompted a commitment to boost agency analysts' problem solving abilities through capturing knowledge in systems and software. Electronic discussion forums, data bases, and document management systems can improve access to information across agencies.

Commensurate opportunities likely exist in other parts of the



The new information needs that are arising with change in the food sector clearly call for better integration of data collection, storage, and use.

Department, and need to be identified. Although the payoff to such efforts is potentially very large, agency funds for supporting such studies are scarce. It might be appropriate to provide the authority to pool funds across agencies for the express purpose of conducting such studies and implementing recommendations.

Increasingly, regulatory agencies, working with business firms, other countries, and government colleagues, require the use and knowledge of advanced technologies and new science. For assistance, they must draw on the expertise of researchers in USDA science agencies and also at federally supported land-grant universities. Better understanding of the science of food safety, of environmental protection,

and of human nutrition, to name but a few areas of advance, can be applied directly to the management and delivery of key Federal services. Increasingly, researchers are called upon to ensure that sound science undergirds the decisions of public officials, a departure perhaps from the days when the main role of science in agriculture was to underpin advances in farm productivity. Clearly, that contribution is as important as ever, but the expanded use of science in farm and food policy and program management multiplies the demands on researchers.

In business parlance, research would be called a "back room" function, one that supports the delivery of many services and activities. A major factor in the success of Walmart was the integration of such functions for its stores across the country. Instead of each store having its own separate accounting system, for example, all use one central accounting resource, thereby saving money but also allowing a better flow of financial information through the store network. In the same way, a single focus for research in the Department can effectively serve multiple agency needs. The 1994 reorganization recognized the value of this approach in creating the Research, Education, and Economics mission area (comprised of the Agricultural Research Service; Cooperative State Research, Education, and Extension Service; Economic Research Service; and National Agricultural Statistics Service).



Principles for Program Integration

- **Support collaboration to solve problems.** Recognize that the complexities of many contemporary agricultural issues cross the bounds of traditional program areas.
- **Encourage a coordinated view of functions and services.** Institute a range of practices, including “one-stop shopping” for USDA services, common electronic work environments, consistent data convention across agencies, data sharing, and increased resource flexibility among agencies, that encourage a “corporate” rather than a fragmented view toward program implementation.
- **Pursue partnership opportunities.** Continued and increased cooperation and partnership opportunities need to be sought with program beneficiaries, Congress, consumers, industry, NGOs, Federal and non-Federal government agencies, universities, and others.
- **Sustain capacity for integrated responsiveness.** The latest technologies are needed to support integrated programs and “corporate” systems. A cadre of highly trained and actively practicing scientists, economists, and other analysts provides a necessary foundation for rapid response across subject areas and programs.

Appendix 1— America’s Diverse Farms: More Detailed Information¹

Farms vary widely in size and other characteristics, ranging from very small retirement and residential farms to businesses with sales in the millions. Three distinct groups of farms have been identified—commercial, rural residence, and intermediate—to demonstrate the wide range of characteristics and financial circumstances that exist today. Even within these groups, there are important differences that further demonstrate the diversity of America’s farms.

Commercial farms consist of large family farms with sales above \$250,000 and some nonfamily enterprises that are organized as cooperatives or nonfamily corporations or have a hired manager. A large share (44 percent) of commercial farms are considered large family farms with gross sales between \$250,000 and \$500,000. Another 33 percent are very large family farms, with gross sales exceeding \$500,000, while the remaining 23 percent are nonfamily farms.

- Large family farms are most likely to specialize in cash grains, with 39 percent obtaining over 50 percent of revenue from those crops. In addition, other farms produce grain without specializing in it. Since cash grains have traditionally been supported by commodity programs,² large family farms receive a large share of government payments from commodity programs (22 percent),

and 80 percent of large family farms receive payments from government programs.

- Households operating large family farms depend on the farm for about 60 percent of their total income, and about two-thirds of these households rely on farming for at least half of their income. Nevertheless, these households receive an average of \$35,000 from off-farm sources, largely from earned sources. Average household income in 1999 was \$77,300, or 56 percent higher than the average for all U.S. households.

- Very large family farms specialize in a broader array of commodities than large family farms. About 23 percent of very large family farms specialize in poultry, compared with only 8 percent of large farms and 2 percent for all U.S. farms. Very large farms account for high shares of the production of poultry (68 percent), hogs (60 percent), high-value crops (48 percent), and milk (45 percent). The share of very large farms receiv-

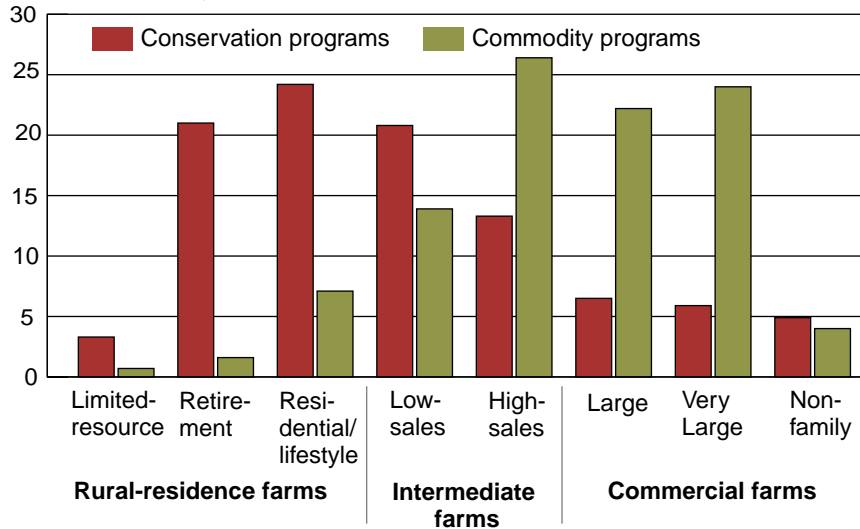
¹ Data are from the Agricultural Resource Management Study (ARMS) an annual survey conducted by USDA’s Economic Research Service and National Agricultural Statistics Service.

² Commodity programs include transition payments, loan deficiency payments, and agricultural disaster payments. Conservation programs include the Conservation Reserve Program, the Wetlands Reserve Program, and the Environmental Quality Incentive Program.

Figure A-1

Distribution of Government Payments by Typology Group (1999)

Percent of total payments



Conservation programs are the Conservation Reserve Program, the Wetlands Reserve Program, and the Environmental Quality Incentive Program. Other programs include agricultural disaster payments, loan deficiency payments, and transition payments.

ing commodity program payments is 67 percent, much lower than the 80 percent estimate for large family farms. Nevertheless, in 1999 large and very large farms received similar shares of all commodity program payments.

- Average household income for households with very large farms is \$201,200, or about four times the average for all U.S. households and substantially higher than the average for any other group of farm households. Most (83 percent) of the income of these farm households comes from farming.

- Nonfamily farms are a diverse group including large corporate farms as well as sole proprietorships with a hired manager. About 24 percent of nonfamily farms specialize in high-value crops, about three times the comparable percentage for all U.S. farms. Nonfamily farms produce about 25 percent of fruits, vegetables, and nursery crops.

Intermediate farms have sales below \$250,000 and the operator reports farming as his or her major occupation. Intermediate farms can be divided into two groups: those with sales under \$100,000 (73 percent of intermediate farms) and those with high sales between \$100,000 and \$250,000 (27 percent).

- Operators of low-sales intermediate farms have a fairly high average age—59 years—and 39 percent of them are at least 65 years old. Some of them have already scaled back their operations in preparation for retirement. Most of their income comes from off-farm, about half earned and half unearned. Their most common specialization is beef (40 percent of low-sales farms). Average household income is just under \$40,000, or three-fourths of the average for all U.S. households. Low-sales farms receive about 21 percent of conservation program payments.

- The most important specializations for high-sales intermediate farms are cash grains (38 percent of the group) and dairy (22 percent). About 81 percent of farms in the group receive commodity program payments, and high-sales farms receive about 26 percent of the payments from these programs, the largest percentage received by any group. Unlike other small farms, high-sales farms receive a substantial share (50 percent) of their income from farming, and 58 percent receive at least half of their income from farming. In 1999 average household income was \$53,300, about the same as the average for all U.S. households. With respect to their specialization, program participation, and reliance on farming for income, high-sales farms are more like large family farms than low-sales intermediate farms.

Rural-residence farms have gross sales below \$250,000 where farming is considered a secondary activity both in terms of resources invested in the farm and the amount of income it contributes to the farm household. Rural-residence farms can be divided into three groups. The first is limited-resource farms (10 percent of total rural-residence farms), with sales less than \$100,000, farm assets less than \$150,000, and total household income less than \$20,000. The second group is made up of farms whose operators report that they are retired (20 percent of the total), and the third group is made up of residential/lifestyle farms whose operators report a non-farm occupation (70 percent of the total).

Two characteristics that these groups share is reliance on off-farm income and heavy specialization in beef cattle. At least 40 percent of each of these groups specializes in beef cattle. Beef production, particularly cow-calf enterprises, has relatively flexible and low labor requirements that mesh well with off-farm work or retirement.

- Operators of limited-resource farms, as a group, are fairly old. Their average age is 59 and 47 percent are at least 65 years old. This group also has the highest percentage of operators with less than a high school education. Average household income for the group (\$9,500) is 17 percent of the average for all U.S. households. Considering their needs, limited resources, education levels, and age, operators in this group are the most difficult for the USDA and other agencies to serve.

- As one would expect, operators of retirement farms have the highest average age (69 years) and 71 percent were at least 65 years old. Average household income was \$40,600, about the same as for low-sales households. Most of their income came from off-farm, largely from unearned sources, such as Social Security and investments. Not only have these farmers retired, but so has some of their land. Retirement farms receive about 21 percent of their payments from conservation programs, made up largely of the Conservation Reserve Program.

- Households operating residential/lifestyle farms participate more heavily in the off-farm labor market than households operating other types of farms. In addition to the operators working off farm, 63 percent of households also had a spouse working off-farm. Households operating residential/lifestyle farms had an average household income of \$83,800. They were the only small farm households to earn an income above the average for all U.S. households.

Table A-1

Farm and Household Characteristics by 3 Farm Groups, 1999

<i>Item</i>	<i>Farm typology grouping</i>			<i>48-State total</i>
	<i>Rural-residence farms</i>	<i>Intermediate farms</i>	<i>Commercial farms</i>	
Number of farms	1,356,047	655,812	175,091	2,186,950
Share of farms (percent)	62.01	29.99	8.01	100.00
Total value of production (\$ billion)	13.7	42.0	120.3	176.0
Average value of production (\$)	10,074	64,117	687,065	80,481
Share of value of production (percent)	7.76	23.89	68.35	100.00
Total number of acres owned (million)	149	230	134	513
Average number of acres owned	110	351	767	235
Share of acres owned (percent)	28.98	44.86	26.16	100.00
Total number of acres operated (million)	204	390	277	871
Average number of acres operated	150	595	1,581	398
Share of acres operated (percent)	23.39	44.82	31.78	100.00
Gross cash farm income (\$/farm)	11,718	68,044	589,470	74,865
Gross farm income (\$/farm)	17,952	76,237	609,810	82,815
Net farm income (\$/farm)	2,310	12,998	115,832	14,603
Government payments (\$/farm)	1,437	9,254	41,218	6,966
Share of government payments (percent)	12.79	39.84	47.37	100.00
Household earnings (\$/household) ¹	67,371	43,390	135,397	64,347
Farm earnings (\$/household) ¹	-3,384	7,046	100,380	6,359
Off-farm earnings (\$/household) ¹	70,754	36,343	35,017	57,988
Wages and salaries (\$/household) ¹	43,229	16,825	17,513	33,541
Other off-farm earnings (\$/household) ¹	27,526	19,518	17,504	24,447
Distribution of farms by size				
Less than \$100,000	98.66	73.26	13.44	84.22
\$100,000-\$250,000	1.34	26.74	*3.24	9.11
\$250,000 or more	na	na	83.32	6.67
Distribution of farms by cost				
Low cost (percent)	19.28	20.91	54.29	22.58
Mid cost (percent)	10.66	29.05	30.22	17.74
High cost (percent)	70.06	50.04	15.49	59.68

¹ Excludes nonfamily farms

*The relative standard error exceeds 25 percent but is no more than 50 percent.

Table A-2

Farm and Household Characteristics by Sales Class, 1999

<i>Item</i>	<i>Sales class</i>			<i>48-State total</i>
	<i>Less than \$100,000</i>	<i>\$100,000 - \$250,000</i>	<i>\$250,000 or more</i>	
Number of farms	1,841,901	199,163	145,886	2,186,950
Share of farms (percent)	84.22	9.11	6.67	100.00
Total value of production (\$ billion)	26.1	31.0	118.9	176.0
Average value of production (\$)	14,184	155,668	814,878	80,481
Share of value of production (percent)	14.84	17.61	67.54	100.00
Total number of acres owned (million)	289	105	119	513
Average number of acres owned	157	529	815	235
Share of acres owned (percent)	56.33	20.51	23.15	100.00
Total number of acres operated (million)	408	203	259	871
Average number of acres operated	221	1,021	1,779	398
Share of acres operated (percent)	46.85	23.35	29.80	100.00
Distribution of farms by type				
Rural residence farms (percent)	72.64	9.10	na	62.01
Intermediate farms (percent)	26.08	88.05	na	29.99
Commercial farms (percent)	1.28	*2.85	100.00	8.01

*The relative standard error exceeds 25 percent but is no more than 50 percent.

Table A-3
Characteristics of Farms, by Farm Typology Group, 1999

Item	Rural-residence farms			Intermediate farms		Commercial farms			All U.S. farms
	Limited-resource	Retirement	Residential/lifestyle	Farming Low-sales	Farming High sales	Large family farms	Very large family farms	Nonfamily farms	
Farms	126,920	297,566	931,561	480,441	175,370	77,314	58,403	39,374	2,186,950
Land operated per farm	128	145	155	435	1,033	1,444	2,093	1,089	398
Sales less than \$10,000	78.7	80.8	74.3	36.6	0.0	0.0	0.0	33.1	55.9
Mean gross cash farm income	7,838	9,456	12,969	34,252	160,621	321,084	989,377	523,292	74,865
Farms by specialization:									
Cash grain	7.6	6.0	9.3	20.8	37.8	36.9	17.8	20.0	14.9
Other field crops	22.2	30.4	22.0	16.5	11.3	13.1	12.3	22.6	20.5
High value crops ¹	*8.8	6.5	5.8	7.6	7.1	7.1	12.3	24.4	7.1
Beef	41.1	45.1	41.4	40.5	12.2	9.2	9.9	16.0	36.9
Hogs	d	d	d	d	2.3	5.7	9.1	d	1.4
Dairy	d	d	d	5.3	22.4	16.7	14.3	*2.1	4.2
Other livestock	17.1	11.6	20.2	8.5	6.8	11.3	24.4	12.9	14.9

d = Data suppressed due to insufficient observations. *The relative standard error exceeds 25 percent but is no more than 50 percent.

¹Vegetables, fruits, tree nuts, and horticultural specialties.

Appendix 2— Farm Resource Regions

Groupings that follow political boundaries, primarily State or multi-State areas, are typically used to capture regional variation in production and other farm characteristics. Such groupings, while convenient, provide little insight into the inherent physical and environmental production capability of different land areas. A more effective grouping merges information about characteristics of land areas with information about types of commodities produced. This results in geographic areas that, while cutting across State boundaries, are more homogeneous with regard to both resource and production activities. These regions provide a snapshot of the regional diversity in farms, farmers, and farm households by combining “like” counties, based on commodities produced and

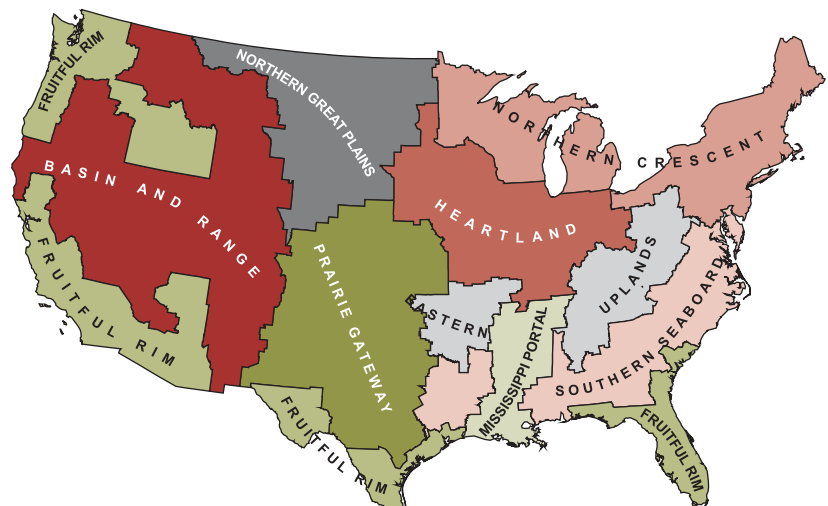
underlying climate, soil, water, and topography (table A-4). Several variables—including the proportion of farms and the value of production, farm income and the portion of that income derived from farming, and a rough cataloging of the types of farms in terms of size, income source, and type of farming activity—illustrate the variation in economic factors across regions (figure A-2).

One in five U.S. farms is located in the **Heartland** region, which accounts for one-quarter of cropland and a similar share of total production. This region, which has a mix of commercial farms, rural-residence farms, and intermediate farms, has the highest concentration of corn and soybean production. Hog farm operations are also more common in this region than elsewhere in the country.

The **Eastern Uplands** contains 16 percent of farms—mostly rural-residence farms—contributing only 7 percent of total farm output. Beef cattle, tobacco, and other field crops are the major commodities. This region had the highest percentage of farm households with incomes below the U.S. average for all households, at 68 percent.

Figure A-2

Geographic Areas Based on Land Resources and Commodity Concentration



The **Fruitful Rim** has 12 percent of farms, but contains a large proportion of commercial farms. The topography and climate are extremely diverse in this region, but are generally favorable to the production of fruits, vegetables, and other high-value crops. In many areas of the West and Southwest, production is possible only with irrigation. Freeze-free growing seasons are long, ranging generally from 200 to 365 days, and more than 60 percent of cropland is irrigated. Household incomes in the Fruitful Rim are the highest of any region.

The **Northern Great Plains** region of the country is characterized by the Nation's largest farms, as measured by the number of acres operated per farm. Almost half the farms in this region are considered intermediate farms, with the remaining farms predominantly commercial operations. Farmers in this region reported working about 500 hours more per year than the average. Operator household incomes were well below the national average and the lowest of any region. Farmers here are most dependent of any region on farm earnings, which make up 26 percent of total earnings. Wheat, oats, and barley are the most common crops.

The **Northern Crescent** accounts for 14 percent of farms and a similar share of farm output. The region has a high share of rural-residence and intermediate farms. Dairy farms represent 17 percent of the region's farms, compared with 4 percent nationally. Other major farm types include general field crop (24 percent) and high-value crop (13 percent) farms. Reflecting the region's focus on dairy and specialty crop production, farmers reported working an average of 1,710 hours on their farms, the second highest among regions and more than 200 hours above the national average. This region is also the most urbanized and, along with portions of the other coastal regions (Southern Seaboard and Fruitful Rim), faces the greatest

pressures from urban sprawl and, conversely, the greatest demand for farmland preservation.

The **Southern Seaboard** accounts for 11 percent of farms, but only 9 percent of farm output. This region has a dichotomy of farms, with a large concentration of rural-residence farms and a similarly large occurrence of commercial farms. More than two-thirds of farms in this region specialize in livestock production (beef cattle, poultry, and hogs).

The **Prairie Gateway's** mix of commercial farms, rural-residence farms, and intermediate farms mirrors the Nation's. Although this region accounts for the second largest share of cropland, beef cattle and other types of livestock are the primary farm commodities.

The **Mississippi Portal** is comprised largely of the flood plains and low terraces of the Mississippi River south of its confluence with the Ohio River. The climate and soils are favorable for crop production, although many soils require drainage for successful crop production. Much like the Southern Seaboard region, there is a dichotomy of farms between rural-residence farms and those that are more commercially engaged. This region has a large concentration of commercial cotton, rice, soybean, and poultry operations. Most of the rural-residence farms raise beef cattle.

Rugged mountain ranges, high valleys, plateaus, plains, and large basins characterize the **Basin and Range** region. In terms of land in farms, operations here are the second largest on average. Beef cattle and other livestock farms are prevalent, accounting for 63 percent of farms. Farms producing field crops are the second most common type (24 percent). This region contains only 5 percent of total cropland and includes large areas of Federal land holdings.

Table A-4

Farm and Household Characteristics, 1999, by ERS Land Resource Regions

Item	ERS Land Resource Regions										48-State total
	Heartland	Northern Crescent	Northern Great Plains	Prairie Gateway	Eastern Uplands	Southern Seaboard	Fruitful Rim	Basin and Range	Mississippi Portal		
Total farms (% of total)	21	14	4	14	16	11	12	4	4	4	100
Value of production (% of total)	24	13	5	14	7	9	21	5	3	3	100
Household earnings (\$/household)	62,743	55,962	58,707	67,148	59,174	59,446	90,936	59,345	59,874	64,347	
Farm earnings (% of total)	17	10	26	9	1	1	13	9	8	8	10
Households with lower than US average income (% of total)	57	62	63	62	68	61	57	61	64	64	61
Typology											
Rural-residence farms	54	57	38	65	72	70	61	62	72	72	62
Intermediate farms	35	35	52	28	24	23	29	30	18	18	30
Commercial farms	11	8	10	7	4	7	10	8	10	10	8
Specialization											
Cash grains	42	11	29	14	na	4	2	6	13	13	15
Other field crops	17	24	25	18	22	21	17	24	25	25	21
High-value crops	2	13	na	2	3	6	28	7	na	na	7
Livestock	40	52	46	67	74	68	53	63	60	60	57

Note: U.S. average income in 1999 was \$54,842 as measured by the CPS.