

## The Future of Animal Agriculture in North America

Animal agriculture in North America constantly adapts to change. New products are developed to meet changing consumer preferences. New production systems reduce costs. Contracts increasingly replace open markets and redefine the relationships among the stakeholders in the system. Technological developments increase productivity and efficiency at the farm-level, in processing, distribution systems and marketing. Every facet of the animal food chain—from genetics to retail and food service outlets—is adjusting to the rapid pace of change. But with change and opportunities come controversy and challenges.

Exploring opportunities and challenges requires going beyond matters of supply and demand, cost of production and transportation to examine basic institutions, customs of trade, law and social factors that underlie the production, distribution, transformation, sale and consumption of animal products. We look at shifting forces of change, try to anticipate their direction and impacts, and provide information that will allow farmers and ranchers, agribusiness, food retailers, taxpayers, policymakers and consumers to make more informed decisions about their future.

This is a North American report. It examines the animal agriculture industry in all three NAFTA countries—Canada, Mexico and the United States. It identifies issues that are common to all three countries and areas where there are different concerns and approaches. It explores the integration of the industry across borders since the implementation of NAFTA and the issues that continue to disrupt or impede trade. However, this study does not recommend specific solutions to border issues.

This report examines the major animal segments of the North American food system—beef, pork, dairy and poultry. The emphasis is on domesticated animals in the food system, not companion animals or minor species raised for recreation or public display.

This project was a partnership between Farm Foundation, government agencies, industry groups, other nonprofit organizations and foundations, and the academic community. A diverse Steering Committee provided guidance and direction. Seven working groups headed by academic experts and composed of industry, government and nonprofit leaders did

the bulk of the analysis and writing. More than 150 individuals from Canada, Mexico and the United States actively participated in the development of this report.

Animal agriculture in North America faces opportunities and challenges in seven basic areas:

- Economics of production, processing and marketing
- Consumer demand
- Global competitiveness and trade
- Food safety and animal health
- Environmental issues
- Community and labor issues
- Animal welfare

This summary gives a brief overview of animal agriculture in North America, summarizes the seven basic challenges, explores options for the future, identifies key take-home messages, and ends with an agenda for future research and analysis.

### The Industry Today

*Beef*—The North American beef cow herd was estimated at 49.2 million head in 2004. North American beef cows account for 21 percent of the world total. U.S. beef cattle are two-thirds of the North American herd, while Mexico accounts for 23 percent and Canada 10 percent. The most significant trend during the past 25 years is the growth in both the Canadian and Mexican beef cow herd and calf crop relative to those of the United States. North American beef production in 2004 of 14.9 million metric tons (mmt) on a carcass weight equivalent (cwe) basis accounted for a quarter of world beef production. The United States produces about 80 percent of North American beef, while Mexico averages about 12 percent of production and Canada about 8 percent.

*Swine*—The number of North American breeding sows has declined during the last two decades, but, due to improvements in reproductive efficiency, pig numbers have not. Sow numbers were estimated at 8.5 million head in 2004, compared with 11.7 million head in 1980. The North American pig crop has been greater than 10 percent of the world total since the early 1990s. The United States accounts for approximately 70 percent

of the North American pig crop, with Canada producing 20 percent and Mexico about 10 percent. The most significant trend during the past 25 years is the growth in the number of Canadian sows and pigs relative to that of the United States. In 2004, North American pork production was 12.4 mmt, or 10 percent of total world pork production. While world pork production increased to 100.9 mmt in 2004 from 69.9 mmt in 1990, North America has averaged 12 mmt production during the last five years and is behind only China at 47 mmt and the European Union (EU) at 21 mmt. Pork production in North America and the EU has remained relatively stable since 1999, while China's production has more than doubled.

*Poultry* – U.S. poultry production has increased threefold during the past two decades. The majority of this expansion was in fresh/frozen broiler and turkey meats. Production growth was spurred by the availability of low-cost feed grains, capital and technology for expansion, and a well-integrated, efficient production and marketing system. Poultry meat production in North America was 21.2 mmt in 2004, about 88 percent of which was broiler meat. The United States has seen a steady increase in poultry meat production to 17.8 mmt in 2004 from 6.3 mmt in 1980. The United States accounts for 84 percent of North American poultry production, while Mexico accounts for 11 percent and Canada the remaining 5 percent.

The three North American countries accounted for 35 percent of world poultry meat production in 2004, down from a high of 39 percent in 1993. The main reason for the decline in North American world share was a 300 percent increase in Chinese production and a 257 percent increase in Brazilian production.

*Dairy* – Cow's milk production in North America was estimated to total 95.4 mmt in 2004, or 15.6 percent of the world's milk output. U.S. production represented 81 percent of North American milk output, Mexico approximately 10 percent and Canada about 8 percent. The North American dairy herd totaled 16.9 million head in 2004—9.01 million head in the United States, 6.80 million head in Mexico and 1.08 million head in Canada. India is the world's largest producer of milk (87.2 mmt), but almost 60 percent of this total consists of buffalo milk. North America trails the 25 EU countries that combine to produce 131.1 mmt of cow's milk. During the past two decades, Mexican milk production increased by one-third, while the United States and Canada saw output grow 19 percent and 6 percent, respectively. In the United States and Canada, the increases in output have come from fewer cows and sharp improvements in milk productivity per cow, primarily from enhanced genetics. Mexico's dairy herd has increased in number.

### Economics of Production, Processing and Marketing

The trend to fewer and larger livestock and poultry operations is expected to continue. The economies of scale in production and processing are significant and will drive the optimal size of

facilities, as well as the firm. Firm-level economies will be captured through effective supply-chain management that improves cost efficiency and control, food safety and quality, and the ability to respond to consumer demands. Quality concerns will also drive more systemized, micro-managed production and distribution processes to reduce product variability and improve conformance with quality standards and consumer expectations about uniform product attributes. Technology will provide new efficiencies and information to better manage the system. Concerns about food safety and a drive to qualified suppliers and traceback will increase pressures for and payoffs from tighter coordination along the production and distribution chain.

Small and mid-size producers face serious survival challenges in determining how they can successfully fit into integrated supply-chain structures. Higher revenue may be possible in value-added niche markets where consumers pay high enough premiums for differentiated products to offset the increased cost of producing, processing and distributing in small quantities. Small and mid-size producers may be able to capture the market access and cost advantages of larger producers by joining a network or alliance that acts like a large producer. Both these options require a high level of cooperation and interdependence among producers.

Optimal processing plant capacity can be very large, requiring significant capital outlays and adequate supplies of live animals for efficient operations. Producers are not expected to invest in production capacity if access is not assured to processing plants that can pay competitively for products. This interdependence will result in the development of production-processing centers and supporting infrastructure as the optimal strategy for growth and expansion in the industry.

Livestock and poultry production and processing are increasingly mobile. Capital and technology can move anywhere in the world. North American firms can and have invested in production-processing centers in regions with a comparative advantage. Likewise, such production-processing centers in North America may have foreign ownership. The livestock production/distribution industries are clearly becoming global in their production and trade activities. In the future, it is likely that a few global livestock firms will dominate world production and processing and will source and sell products globally.

#### *Options for the Future*

*Regulatory reform:* Regulations can create benefits as well as costs for the industry. Environmental regulations, labor laws and tax rules are all costs of doing business. Inspections and animal identification systems may increase costs from producers to retailers, but may be critical to doing business in some markets. In general, more regulation increases private-sector costs, while less regulation reduces costs. But in most cases, the specific magnitude of those costs is not known. What is known in principle—if not in specifics or details—is that regulatory

reform that limits economic activity and/or increases private-sector costs is disadvantageous to small-scale firms; decreases the innovation and adaptability of an industry to a changing business climate; discourages the private sector from investing and expanding; and undermines an industry's global competitiveness unless other countries or locales adopt similar regulations.

*Differentiated product focus:* Consumers have diverse preferences. Many consumers, particularly the more affluent, are demanding food attributes above and beyond food safety or quality standards. These attributes include animal welfare, organic, social responsibility, environmental responsibility, free-range production, locally produced, and no use of antibiotics, synthetic growth hormones, or genetically modified organisms. Some of these differentiated production practices increase production costs relative to traditional commercial methods.

Many process attributes cannot be verified from the product itself. There are essentially two ways to ensure strict production practices that cannot be verified post-harvest: vertical production and marketing arrangements audited to ensure that practices are being met, or vertical ownership of production, processing and marketing. Where demand for such product differentiation originates (local markets or national food retailers) will largely determine whether it is scale neutral or favors large or small production, processing and/or marketing firms.

*Maintaining open markets and industry diversity:* There are concerns that marketing agreements, contracts and similar business arrangements are more conducive to larger operations; reduce spot market liquidity; reduce the availability of market information needed for efficient price discovery; and adversely affect smaller operations. The substantial horizontal contracting growth in hog production, for example, suggests contracts enable large production operations to become larger. However, numerous other factors contribute to horizontal integration in livestock production, including profits that attract external capital, and advances in genetics, health, nutrition and production management that increase economies of scale.

Contracting with integrators who provide services, capital and risk management has enabled many smaller operations to remain in livestock production and focus on production. Public-sector interventions that limit business arrangements or size would make it difficult to capture the efficiency and other benefits of these business strategies.

A key argument for public-sector intervention is concern about monopoly or monopsony power in the livestock industry value chains. However, assessing the competitive conduct or behavior of firms in value chain relationships—where risks as well as rewards are shared—requires more complex measures and metrics than the traditional focus on prices and margins currently used in anti-trust and market power assessments. Public-sector interventions must carefully weigh costs and benefits throughout the food chain. Interventions designed to

help one segment of the industry may not work and may have unintended consequences for others in the system.

### Consumer Demand

Income, population growth and demographic changes are the key determinants of demand for animal products. Per-capita meat consumption in the United States and Canada is near 200 pounds per year, while in Mexico it is 165 pounds per year.

Rising levels of income, changing lifestyles, urbanization and other demographic changes have contributed to increased consumption of animal products, increased consumption of prepared foods and increased consumption of food away from home. More attention is being given to the problem of obesity, and how to integrate dietary guidance and science into recommendations and policies that work to improve the quality of diets consistent with the changes in income, demographics and the market for foods.

Income is projected to continue to rise in all three North American countries. The faster growth of income in developing countries worldwide will lead to continued growth in demand for animal source foods. Slowing population growth and an older population mean that expansion in demand for total food calories will slow.

Food safety will continue to be a paramount consumer expectation. While being relatively uninformed about the level of safety in food supplies, consumers will become increasingly intolerant of food safety failures. Regulation and product processing and packaging will continue to evolve to provide more guarantees of food safety. For some consumers, information on and the ability to trace product and process attributes will be key factors in product selection.

As North American incomes continue to increase, consumers will choose products on the basis of varied attributes, including taste, variety and convenience. Animal-sourced food product and process attributes have become very important for North American consumers. Though consumers may not be familiar with production methods, higher income consumers may choose products on the basis of attributes related to production process—such as natural, organic, “family farm” or “animal-friendly”—associating that process with a measure of product quality.

Labeling is an important tool to communicate product attributes, including food safety. To some extent, the increased use of labels reflects the public's interest in informed choice regarding complex and sometimes controversial new agricultural technologies, and the growing market for imported foods. The U.S. country-of-origin labels might require onerous recordkeeping and operating procedures, and imply agreement with food safety concerns. Labels may provide large amounts of product information, but when the information is complex or requires understanding of nutritional relationships, consumers may not be fully informed.

Continued concentration of large-scale processing, food distribution and retailing may reduce consumer choice in markets. Large retailers will offer a variety of foods although their market power presents the potential to restrict consumer choices and increase prices. Some newer retailers, such as Whole Foods and Wild Oats, have increased market share by offering alternative products to some—often high-end—consumer segments. It is important to recognize that not all stores will be larger stores; small producers and retailers may serve specific markets, especially in urban areas. Internet shopping may allow consumers access to specialty markets and products, but, to date, many consumers prefer to shop in-store locations.

#### *Options for the Future*

*Make product standard and certification programs more uniform across North America:* Food safety is a public good across national borders. Harmonization of food standards and processes across North America would enable firms within the three nations to operate on a level playing field with greater market transparency and maintain credibility within the integrated food systems. While governmental regulation may be costly, allowing firms the flexibility to develop their own food safety processes may reduce the economic impact of such regulations.

It is important to recognize consumer preferences for food products differ in the three countries. Trade that takes advantage of differences in consumer preferences is likely to benefit consumers in all three countries.

*Enhance consumers' ability to obtain information on products and make use of labeling information:* There is increased competition in providing various food product and process attributes, but consumers may not understand the attributes. Lack of information leads to markets that do not work well, as well as consumers who may lose confidence and trust in the quality of the food system. A challenge is to present a large amount of information, both in quantity and variety, to consumers in forms they can understand. This includes information on health and nutrition attributes, food handling and warnings. Although much of the information is regulated through federal agencies, private companies and brands also have incentives to promote desired food attributes through labels and advertisement.

*Educate consumers about production agriculture and food:* Consumers have become distant from production agriculture. Lack of information can lead to consumer misconceptions about production methods and techniques. At the same time, production agriculture is under increasing scrutiny from consumer groups. These two factors may threaten continued growth in animal product consumption and perpetuate a lack of understanding about issues surrounding production agriculture. Educating consumers about commercial agriculture and enhancing the public's knowledge and awareness of food production methods may have long-term benefits in maintaining consumer confidence and growth in the demand for animal food products. Food companies, public officials and educators

will be challenged to effectively communicate to consumers about food and production issues.

*Promote a competitive retail and distribution environment:* Different food retailing environments exist within the North American market. The dominance of four or five large firms characterizes the markets in both Canada and the United States. Wal-Mart and other very large, nontraditional retailers are having a significant effect on retailing. This type of environment provides increased consumer product choice at low prices; however, it may reduce consumer access to other products that may serve smaller consumer segments. In some markets, the presence of large merchandisers coexists with smaller, niche segments. In other cases, the presence of larger firms may limit the ability of smaller market segments to survive. Some suggest that governments be more aggressive in preventing concentration in food retailing to preserve consumer choice. However, given rapid change in the industry, it is not clear that government action would actually result in more choice than is produced by an industry in rapid transition.

### Global Competitiveness and Trade

Economic forces driving increased market integration and trade are complex and interrelated. Prices and trade flows are increasingly impacted by events, policies and forces outside of North America. Global animal product markets are consumer driven, with product safety, wholesomeness, quality and price being key determinants of international competitiveness. Processors, retailers and food service corporations are expanding and integrating this global market, bringing efficiency and affordable food to both developed and developing countries around the world.

North America is both a leading exporter and importer of animal products. The EU is often a larger exporter, but the bulk of that trade is within the EU. While Canada and the United States are essential markets for each other, they also compete for export customers. Brazil is a rapidly growing competitor, particularly in poultry exports, but continues to be limited in pork and beef exports by the presence in that country of foot-and-mouth disease (FMD). China and Russia have significant potential as export customers, but have challenges that may slow the development of these markets.

Two primary factors will shape the future of North American exports of animal products: income of developing economies and trade agreements. The growth of consumer income in the United States and Canada has slowed, as has the growth rate for animal product consumption. However, there is a successful track record of increasing demand for animal proteins as economies grow and consumer spending increases.

The livestock, meat and poultry markets in North America are increasingly integrated. Live hog trade between Canada and the



United States is a good example. Canadian producers have increased farrowing and pig exports to the Midwest region of the United States. U.S. producers have invested in finishing facilities, have lower feed costs and are in close proximity to several large, efficient pork packers. The recent closure of the U.S.-Canadian border to live cattle due to *bovine spongiform encephalopathy* (BSE) encouraged Canada to invest more heavily in slaughter facilities. Coupled with cyclically low U.S. cow slaughter, this has resulted in closure of some U.S. slaughter plants. Animal health and food safety considerations will continue to impact border decisions, even within the NAFTA trade agreement.

Worldwide, demand for North American-produced animal products is likely to continue to grow. Meanwhile, both governments and the private sector are facing greater requirements and responsibilities for assuring consumers about product safety and quality. In the future, private-sector decisions will play an increasing role if other countries follow China's decision to approve individual plants for import rather than approve systems of entire countries. Market institutions that help to harmonize agricultural programs and Sanitary and Phytosanitary Standards (SPS) may lessen the confusion about trading rules and facilitate more trade opportunities.

### *Options for the Future*

*Policies that promote growth in developing countries:* Consumer income growth in developing countries, such as India and China, may be the single most important factor in increasing North American meat exports during the next decade. The long-term payoff to policies aimed at growing the economies of developing countries is likely to be quite high. Such policies will be highly controversial. They go beyond potential concessions in the World Trade Organization (WTO), Free Trade Agreement of the Americas (FTAA) and/or the Central America-Dominican Republic Free Trade Agreement (CAFTA-DR), to renewal of food aid, and to economic and technical development through organizations like the United Nations and World Bank. Most controversial, some of these programs may be aimed at improving agriculture in the developing world as a first step in raising income levels. This strategy worked with three large customers for North American animal products—Japan, Korea and Taiwan. However, improving agriculture in developing countries will be viewed by some industry participants as creating competitors. Economic logic, however, suggests that the long-term impact is to create better customers and more stable markets.

*Engage Brazil:* Brazil is already a major force in world animal product markets. Brazil is likely to increase market share during the next decade. This has several implications. First, if Brazil's per-capita income grows fast enough, a large proportion of its increasing production will be absorbed internally rather than abroad. Second, pursuit of FTAA will give the NAFTA countries opportunity to integrate their markets with Brazil and the

MERCOSUR trading bloc. As has been learned from NAFTA, it is easier to deal with issues of competition within an established framework. Hemispheric market integration may be achieved.

*Harmonization of trade and regulatory policies within NAFTA:* If improving the efficiency of the North American animal industry is a goal, greater harmonization of policies, programs and regulations is required. This may include, but is not limited to, farm programs, environmental regulations, product safety and animal identification rules. Regular meetings of NAFTA and legislative policymakers to discuss regulations and rule making might help improve transnational harmonization, but the outcome is uncertain.

*Focus on value added:* Future growth potential for North American animal product exports in value-added, branded, packaged products is important. To enhance the competitiveness of the products, government regulators and trade negotiators need to work closely with the food manufacturing and food service industries to assure a sound policy and regulatory framework to support future trade growth.

### Environmental Issues

Despite improvements in technologies, manure management and new regulations, byproducts from animal agriculture production and processing can still result in negative impacts on the environment. Increasingly, questions arise about air emissions from livestock operations that may contribute to greenhouse gas (GHG) and potentially have human health implications. While new technologies to improve environmental performance and monitor progress will be developed, constraints on resources may limit implementation.

Farms, regions or countries that import significant amounts of feed may contribute to surplus nutrients locally increasing the risk of water quality degradation if the nutrients cannot be effectively utilized. In the United States, the revised Concentrated Animal Feeding Operations (CAFO) regulations require phosphorous-based nutrient plans to address this concern. Innovative technologies, such as producing energy from manure, may be needed to economically manage the nutrients in operations with limited land application potential.

As rural communities and agriculture change, animal production and other land uses will conflict over water, odor and related off-site impacts of animal production. The public's perception of farmers is changing, and the public may be less tolerant of environmental and nuisance impacts of animal agriculture. The disputes are often complex and closely inter-related with other issues, such as traffic, noise, insects and property values. In the United States, litigation has an increasing role in air and water quality disputes and increases business uncertainty. Litigation is costly, time consuming and creates uncertainty about issues, potential solutions, policies and regulations. Failure to find a

workable solution will delay investment and agricultural economic development.

Environmental regulations differ across the three North American countries and, to some degree, across states and provinces within countries. State and local governments have become key players in environmental regulation in the United States. Regulatory differences across states may increase, creating additional uncertainty for producers and agribusinesses. Such changes may increase product prices and may adversely affect the competitiveness of the animal agricultural sector where these disputes occur. These implications appear to be the greatest for the U.S. industry due, in particular, to the prevalence of litigation.

Finally, while there is diversity, there are many existing and developing similarities in the structure of the livestock and poultry production sectors in Mexico, Canada and the United States. Across the countries, there are different environmental and economic priorities, regulatory strategies and resources, and legal frameworks. Public policies and business strategies to address environmental issues of animal agriculture must be in the context of the country and industry in question, but diversity should not be an excuse for inaction.

#### *Options for the Future*

*Strengthen the public-sector role:* Establishing stronger federal, state or provincial policies to encourage responsible growth of the animal industry in locations with less environmental risk is one option. These policies could also create a uniform regulatory playing field across countries, states and provinces that could reduce overall environmental risk. The policy would allow industry to work more easily nationally or across North America. This option could include increasing commitment to implement regulatory and incentive programs, including adequate funding for staff.

*Expand systems research by the public and private sector:* There is a need for more systems-oriented research on the environmental impacts of agriculture. Increased public funding for this type of research would give public- and private-sector leaders better information about the inter-relationships of environmental/health, social, economic and legal/policy implications of the interface between animal agriculture and the environment. Results could identify solutions for different scales of farming and regional environments that take social/behavioral factors into consideration. There should be an emphasis on performance-based solutions to assure accountability. This research should be regional, national and global in scope, future-oriented and anticipatory of emerging challenges, multidisciplinary, including agricultural universities and medical schools, and involve public and private partnerships.

*Target implementation of best management practices to the highest priority water quality concerns:* Past technical, cost-sharing and educational work on nutrient management planning had significant shortcomings in implementation and accountability. Existing programs may not be focused on the most important environmental problems. In addition, small and mid-size farms appear to be important contributors to water quality problems, at least in the United States. Existing programs may not reach these producers because their size exempts them from current regulatory programs.

Central elements of this approach are to target efforts to areas and farms with the greatest problems to achieve the most environmental bang-for-the-buck. This would possibly include a multi-faceted approach to integrate ecological goods and services into agri-environmental policy to reach broader environmental outcomes. Because the focus is on implementation, it would use existing social and economic research knowledge on implementation and adoption, including incentive-based tools. It would require improved coordination among agencies and possibly other water or air quality monitoring groups, and development of information systems to assure cross-compliance with existing farm programs and resulting benefits. Work would be needed to improve understanding and build trust within and among suppliers of information and services, and with stakeholders.

*Use market-like mechanisms to “get the prices right”:* This option involves public and private cooperation to explore and foster promising innovative arrangements that internalize external costs of the firm, i.e., off-farm impacts on neighbors, communities and the environment. Such arrangements could more accurately reflect the societal costs of animal production in prices, providing incentives to firms to better manage manure and animal byproducts. Reflecting the true cost and value of manure and byproducts in prices of products or services might provide an incentive for producers and processors to adopt systems that maximize profits while being environmentally friendly. This option recognizes that environmental stewardship does not depend on technology alone; incentives must exist for producers to adopt practices that protect the environment. The type of incentive program will depend on implicit or explicit property rights in current government approaches.

*Legal reform:* In the United States, environmental litigation continues to create uncertainty for animal agriculture. This risk is difficult to manage with traditional risk management tools. Many legal reform proposals have been put forward designed to provide the industry with some certainty or a “safe harbor.” But, generally, these reform efforts fail because they are perceived as taking rights from one group and giving them to another without compensation or required action by the industry.

The crux of this policy approach is the need for multiple parties—industry, scientists and the public (through government)—to act together. In exchange for the industry's obtaining some protection against complex and costly litigation, the industry supply chain would take specific responsibility for the handling of animal manure and other environmental impacts using recognized science-based methods. The agricultural scientific and research community must be a part of this effort by continuing to advance our knowledge of the human and environmental effects of animal agriculture, and exploring new and innovative ways in which to manage the handling of animal manure and other environmental impacts of animal agriculture. The mutual goal would be to balance society's goals for environmental quality with economic goals, such as jobs and income growth and industry health, in North America.

### Community and Labor Issues

One significant outcome of the changes in animal agriculture is a change in the relationship between farms and rural communities. Production units have become larger and more technologically advanced, using supply chains and marketing channels to link to the economy at large. Much production has shifted from independent operators to vertically coordinated operations that largely bypass community linkages. New operations may bring new resources, opportunities and economic growth to local economies. Large production or processing operations require a concentration of workers, who may not be highly paid and may have to be recruited from other locales. All this challenges the socioeconomic milieu of communities where these enterprises are located. New economic opportunities may impact the community's autonomy, norms, traditions, pace, culture and control.

The community and labor impacts associated with livestock and poultry production and processing are significant, but very diverse. Labor is more mobile than is industry infrastructure and inputs that give a particular region a comparative advantage in animal agriculture. Livestock and poultry production is a value-added enterprise that creates jobs directly and indirectly as producers and workers purchase goods and services. The local economic impact of this industry will depend in part on the community's ability to meet the needs of producers or processors. In some rural communities where animal production and processing have expanded, there are more jobs than available local workers; immigrants increasingly fill these generally unskilled jobs. Regions of the United States and Canada are sometimes challenged to integrate new people and new cultures into existing communities. Mexico, whose rural communities often supply the immigrant workers to U.S. and Canadian companies, benefit from the remittances sent to families. However, the out migration to urban cities in Mexico and north of the border is creating challenges in rural Mexico.

Meat packing and processing are more dangerous and lower paying than other manufacturing jobs. In the United States, many of the workers are undocumented immigrant workers and may not have health insurance. A large number of immigrant workers in a community often stretch thin such local resources as health care and public schools' English as a Second Language programs. Mexican workers send a significant amount of money back to their families in Mexico. The average income for rural Mexican households receiving remittances in 2000 was 3,250 pesos per month, compared with 1,662 pesos/month for those not receiving money from the United States. Some estimate that remittances reduce the number of people in poverty in Mexico by 1 percent to 2 percent annually. This cash flow from North to South provides income in rural areas of Mexico, where some small communities average 83 dependents per 100 working-aged individuals.

#### *Options for the Future*

*Economic development:* Rural communities in North America compete in a global environment. Provinces, states, regions and communities seeking investment need to assess how their location will potentially make animal agriculture operations globally competitive. This is challenging in a world of varied wage and regulatory conditions.

Industry has a responsibility to the community in which it does business. Industry needs to be proactive and act as a responsible citizen, providing leadership in creating positive experiences for communities. If they are unable to create these positive community experiences, there will be an increasing inability to site or expand. Some communities will always oppose the industry, but many would welcome a partner to help them develop socially and economically.

Potential strategies include: 1) Government bodies should consider comprehensive industrial policies, so animal agriculture is not singled out. Effective development and community impact policies are needed. 2) Streamline regulatory processes. 3) Develop industry strategies to create positive community impacts. 4) Focus on rural economic development, not just animal agriculture development. 5) Make use of provincial, state or regional economic development resources.

*Labor:* Reducing labor turnover has benefits for employers, as well as the communities in which they operate. Options for strengthening human capital include using the workplace as a location for classes to strengthen English language, finance and banking skills, or to provide health services. Partnerships with local high schools or community colleges are one alternative for implementation.

Governments might consider maintaining immigrant worker programs that ensure adequate labor supply to the animal agriculture industry. Helping immigrant workers adjust to a new location and culture and helping communities adjust to

new immigrant populations can be advantageous to employers. Fostering integration may help immigrants be more productive workers, help immigrants advance in their workplace, help workers' families and reduce opposition to newcomers. These actions can provide a more stable work force and community.

There are increasing needs for the animal agriculture industry to engage in private and public-private partnership programs to enhance labor and community relationships. Potential benefits include enhancing human capital, improving the well-being of employees, reducing turnover and fostering good relations with the community at large, which has become a strategic stakeholder. As the firm grows, it places demands on the community. Proactive labor policies can be an important signal of a firm's commitment to its community.

Agriculture can pose threats to worker health and safety. Government agencies are challenged by the dimensions of regulation enforcement regarding worker safety and immigration. Areas for potential improvement include engineering, training and education, health service, surveillance, safety, and understanding culture differences. Particularly in animal production facilities, improvements can be made in surveillance of non-fatal injuries and illnesses, controls to decrease organic dusts and manure-generated gases, improvements in the functionality and comfort of personal respiratory protective devices, and strategies to provide affordable workers' compensation programs for agricultural employers.

### Food Safety and Animal Health

Protecting the safety of the food supply is essential to all countries, and Canada, Mexico and the United States spend significant resources to assure that food is safe to eat and wholesome. While consumers do not always understand the science behind industry practices and government policies, North American consumers have a high degree of confidence in the safety of their food. Technological developments to enhance production efficiency and/or protect animal health often raise concerns among consumers despite the rigorous product approval process and ongoing testing and surveillance programs. Globalization of food trade provides greater food choices, and potentially confusion, if there are not consistent standards for safety and labeling. Increased consumer sophistication and advanced information technology pose both a challenge and an opportunity for firms and the government to inform consumers and address their concerns. Advanced supply-chain management systems allow for tracing food products that result in faster, more targeted recalls when needed. Private-sector efforts to minimize risks of recalls and protect brand equity are part of an effective food safety strategy.

Animal health is closely linked to food safety and consumer confidence and is also central to the profitability of the livestock and poultry production sectors. Increased production costs,

lower revenues for farms with disease and trade restrictions due to the presence of particular diseases have economic impacts on all producers in the industry. To protect animal industries and consumers from imported diseases or food safety problems, SPS regulations have become part of most trade agreements. However, these standards can also be trade distorting and protectionist, and accentuate the need for harmonization of standards and enforcement within NAFTA.

The North American live animal market is increasingly linked, and companies within countries are ever more interdependent. Once implemented across North America, animal identification and tracking systems could allow restricted animal movement within or across countries while still controlling disease. Farm-level biosecurity measures to reduce disease risk and developments in vaccine research are providing new tools to lessen the threat and impact of animal diseases to farmers.

#### *Options for the Future*

Animal health and food safety are for the public good and important elements of national security in all North American countries. The challenge is to develop and implement policies that most effectively achieve a safe and secure food supply and competitive livestock and poultry sectors in North America. The options discussed below offer a range of public-sector involvement and discretion on how to utilize scarce government resources.

*Public programs and policies:* Recent BSE cases in the United States and Canada have crystallized concerns that consumers, livestock producers and allied industries share about the economic impacts of animal disease and the complexity of estimating the size of such impacts. Public agencies have responded with resources and more visible programs to guard against potential outbreaks and maintain consumer confidence.

Policy instruments to share losses, policy costs and program benefits might be used to guard against losses at each level of the animal industry. Government intervention may prove necessary because market failures and public goods (such as public health) may not provide adequate private incentives to achieve efficient protection against animal health threats.

Accelerated response times to adverse food safety and animal health incidents are needed. This is especially crucial when timely responses can limit the spread of disease, or when there may be distribution or sale of infected or contaminated livestock products.

*Public and private partnerships:* Adding credible certification and labeling processes proposed by industry and improving coordination of animal health and food safety responses are ways governments might proactively partner with private industry. Funding research and developing programs to build scientific, educational and managerial capacity to respond to or



prevent animal health and food safety incidents are other possible government actions. Consumers may perceive that the government is addressing their needs by providing third-party verification of credence attributes promoted by private brands and firms.

In Canada, Mexico and the United States, government investments are made in research addressing veterinary science, food science, epidemiology and economics of animal health, and food safety issues. Under this option, government would support more research on technology and science to maintain a safe food supply, leaving the private sector to concentrate on investments in quality assurance. The public sector might increase consumer outreach, possibly in cooperation with nutrition education programs already provided by public institutions.

Because of its reputation for being impartial and science-based, the U.S. Land Grant university system could in its cooperative relationship with USDA play an expanded role in providing educational programs on the food system, animal health and food safety, and in providing research to undergird food safety programs at the regional, state and local levels. Additional research funding may be needed. Different relationships exist in Canada and Mexico.

*Coordination of public efforts:* In the United States, the national structure of the food safety system is expected to continue moving toward a single food safety system functionally, even if not through legislative changes to create a single food agency. Coordination of food safety efforts by government agencies will likely expand to identify the cause of food-related illnesses through source tracking and attribution to known and unknown pathogens.

Consideration should be given to developing a risk-based pathogen analysis system that would identify existing epizootic links from animals to humans, particularly in the face of potential outbreaks, such as the current situation involving avian influenza. For known pathogens, the ability to identify the common source of food-borne illnesses, even for geographically dispersed human cases, is expanding because of advances in genetic technologies. During the next five to 10 years, the increasing ability to identify risky products and remove them from market channels could even further reduce food-borne illnesses from known pathogens.

*A comprehensive NAFTA-wide diagnostic, monitoring and surveillance network:* Food safety and animal health threats go beyond the capability of a single entity to affect the entire animal production value chain and even the economy as a whole under the right circumstances. A cooperative and functional NAFTA-wide network would multiply the efficacy of networks in the United States and Canada and establish a comparable functioning network in Mexico. The network could include stockpiles of vaccines and treatment agents for many

diseases; serve as a clearinghouse for effective quarantine and animal disposal protocols to limit disease spread; and NAFTA-wide planning for dealing with outbreaks, which may allow options to address only affected sections of a country or region.

*Enhance capabilities for rapid and widespread information dissemination:* Both government and the industry would benefit from fast and widespread access and dissemination of information when dealing with food safety and animal health hazards. This information is essential to retain consumer confidence in the food systems at home and abroad. The establishment of national tracing systems would be important. Increased public and private investment could help reduce disease transmission and enhance public and animal health.

*Support new scientific tools and technologies:* New scientific tools and technologies are being developed that have the potential to enhance animal disease prevention, detection and diagnosis in North America. Work is needed in current animal health frameworks to evaluate, validate and implement rapid prevention strategies to protect the health of each nation's animal populations. One area of concern is strengthening border protection systems regarding the importation or unnoticed transfer of animals raised out of the mainstream food security network. Exotic animals, backyard poultry and backyard livestock have the potential to place national herds and flocks at risk.

*Establish indemnity insurance for animal agriculture:* In the United States, there are currently no uniform government-backed insurance programs for animal agriculture that parallel those for crop agriculture. Consequently, livestock producers may absorb catastrophic losses (destroyed animals, market loss, business interruptions) that may be associated with animal health events unless the disease is determined to constitute a national emergency, in which case producers would be indemnified 100 percent. Financial risk management of animal diseases is a question that government and industry must address in partnership to ensure that effective and efficient financial risk management tools are in place to deal with future animal disease outbreaks. An indemnity program could reduce private-sector uncertainty and thus increase reporting compliances. Participation in such a program would be predicated on following strict biosecurity protocols related to level of risk. A broader production certification program addressing food safety, animal health and emergency management could also be developed.

*International food safety and animal health standards for trade:* The lack of consistency in international standards and their enforcement creates inequities in trade among potential partners and may well limit trading arrangements. Eliminating this artificial trade barrier would allow competitiveness to be more accurately evaluated; gains from trade may be more fully realized. There are currently prescribed events and standards that signal

conditions for which trade interruptions commence, but such signals to recommence trade are not readily apparent. Establishing “triggers” that allow trade to resume once food safety and animal health concerns were alleviated could contribute to freer trade within NAFTA, as could true harmonization of standards and enforcement among NAFTA partners.

### Animal Welfare

The majority of the general public in North America has little direct contact with agriculture. In Canada and the United States, less than 3 percent of the working population is employed on farms. Even in Mexico, where roughly 17 percent of the labor force is employed in agriculture, the share of the population on farms is declining steadily. As a result, most consumers of meat and animal products are increasingly removed from how animals are raised. Nevertheless, the well-being of farm animals is becoming an important issue for the animal industries in North America.

A range of concerns are expressed about how animals are raised, transported, handled and slaughtered. Many of these concerns are associated with methods that have increased productivity in the animal production industries and reduced costs to consumers. Innovations, such as the use of confinement, have a mixed effect on animal well-being. Potential positive effects, such as reduced mortality from disease, predators and the effects of weather, must be balanced against potential negative effects. While animal welfare issues may create the potential for some producers to adopt less-intensive systems, such as that reflected by free-range eggs, and to sell at a price premium in niche markets that covers the additional costs, this is unlikely to be an option for most North American producers. Good animal husbandry practices are not inconsistent with profitability, but the imposition of higher standards, for example, through legislation, could lead to increases in costs, affect the global competitive position of the animal products industry and raise food prices. The central issue that faces the industry is how to modify existing production and handling systems so they respond to consumer concerns about animal welfare in a cost-effective way.

The livestock industry is taking steps to address some of the concerns expressed about current practices. Much of the effort centers on the voluntary development of standards and the application of codes of practice. This is in contrast to the situation in Europe, where legislation is playing a major role. Pressures for additional legislation are likely to intensify in North America if the general public perceives that self-regulation is not addressing public concerns effectively.

#### *Options for the Future*

*Improve the flow of information to the general public:* Many, but not all, stakeholders in the animal products industry have

developed clear public positions on improving animal well-being. Policy statements and positions are not always visible to the general public. One option would be for all stakeholders to develop a statement of principles for the treatment of farm animals, and to make this statement prominent in publicity material and on Web sites. Industry groups could also support the development of educational materials for the general public and for use in schools and colleges. This includes discussion of current practices and the reasons behind them. A potential consequence of this option would be to increase consumer choice and facilitate niche marketing.

*Develop and apply standards and codes of practice:* The industry has made substantial progress in applying a science-based approach to the development of standards and codes of practice for improving the well-being of farm animals. A multi-disciplinary approach is needed to develop standards. Increasing integration in the North American livestock industry requires that standards need to be developed and applied for transportation and slaughter, in addition to production methods. One option would be for the industry to ensure that standards and codes are developed for all types of livestock.

Industry groups could make the dissemination of information, and support for training in the application of appropriate standards, a high priority activity. They could also lend support to the development and application of appropriate science-based standards within North America, and assist government representatives in efforts to develop appropriate international standards through the World Organization for Animal Health (OIE). Industry groups across North America could work together to provide a more coordinated and harmonized approach for the development of standards, certification programs and labeling, including helping the general public understand what various types of certification mean. This is necessary to avoid confusion over labeling, which appears to be a problem in Europe. Governments could also play a role in the harmonization of standards. However, standardization could decrease consumer choice and reduce opportunities for niche marketing outside of agreed-on certification options.

*Research and education:* Research can play an important role in helping the industry improve the well-being of animals. One option would be to assign a higher priority to this issue in publicly funded research, for example, by increasing the proportion of total funding currently available for research in animal breeding and husbandry, farm facilities and processing methods. Particular emphasis could be placed on encouraging research into developments that are both practical and economically viable. A further step would be to ensure that all associate, baccalaureate, graduate and continuing education programs in animal science, veterinary medicine and related fields incorporate course material relating to the various aspects of animal welfare—not only biological, but also ethical and socioeconomic perspectives.

Finally, the dissemination of information and training activities on animal welfare could be made a priority in public extension programs, particularly for the training of farmers and ranchers, and employees in the animal products industry. A potential consequence of this option would be better understanding of the tradeoffs between increasing the welfare of animals and associated costs.

## Summary

### *Markets, Structure and Competition*

Traditional open commodity markets for animals are fading, but there will always be competition among different value chains offering a variety of products to consumers. The sale barn with multiple buyers is less a standard method of marketing, and most animals are marketed through contracts, cooperatives and a variety of arrangements that link production with processing and retailing of final products. Cooperatives play a key role in dairy.

Current production technologies and marketing arrangements have significant economies of scale that encourage large units for production and processing of beef, pork, poultry and milk. Production units are getting larger across the board. Fewer large firms dominate the animal-processing industry in North America. While small, traditional production units are still a major factor in Mexico, large-scale production units similar to those in Canada and the United States are growing rapidly in dairy, swine and poultry.

This economic environment challenges small and mid-size producers. Opportunities exist, and others are evolving. Because different consumers place different values on various product attributes, there will be markets for animal products with specific characteristics. For example, demand for organic products is growing rapidly. Many small and mid-size producers can flourish if they position themselves to provide products that command premium prices in the marketplace.

The North American animal agriculture industry also faces competitive challenges from other world producers and processors, in part due to the transferability of technologies and increasing worldwide demand for animal products. This has implications for trade, labor and the environment.

#### *What We Need to Know*

- Who receives the value from technological and business management innovations such as supply chains and traceability systems? How is this value distributed among producers, processors, retailers and consumers? Are there better ways to identify relationships among parties in these systems?

- What are the long-term impacts of increased energy production from corn, other animal feeds and animal waste on animal agriculture?
- To better understand the competitiveness of the North American livestock industry, a critical research need is a comparative analysis of the cost of producing and processing various animal products in different geographic locales in the world. Critical dimensions of this analysis would be to use a standardized methodology to measure costs and to analyze both commodity products, as well as higher-valued differentiated products.

### *Value in Integrated Markets*

There is economic value in an integrated North American market for animal products. The dairy industry remains protected to different degrees in all three countries, and the Canadian poultry industry remains protected. But there is significant evidence that NAFTA benefited the beef and swine industries in all three countries. Open borders allowed the industries to specialize with live animals, carcasses and processed products moving back and forth across all borders. The disruptions caused by the closing of the U.S.-Canadian border because of BSE demonstrated the degree of market integration that had developed in recent years. While some parts of the industry benefited from the border closing, the North American industry as a whole lost. There is value in an integrated North American market, and institutional mechanisms are needed to reopen borders quickly to prevent long-term economic disruptions.

#### *What We Need to Know*

- What are the true costs of border disruptions? Who benefits and who loses because of these disruptions?
- Have the “temporary” BSE-related border closings permanently altered animal trade flows in North America?

### *Demand Is Increasing*

Demand for animal protein depends primarily on income and population growth. Predicted increases in income in developing countries, particularly in Asia and Latin America, will increase global demand for animal products during the next generation. In high-income regions like North America and Europe, consumers are demanding animal products with specific characteristics related to nutrition and health concerns and specific production practices. As noted previously, demand for organic products is growing rapidly.

*What We Need to Know*

- What really influences consumer purchases of meat and animal products? How do consumers react to health and food safety concerns and to concerns about animal welfare?
- What is the economic impact of consolidation in the food processing and food retailing sectors? What are the impacts on farmers and on consumer choice?

***Environmental Regulation and Litigation***

Environmental regulations can be a significant cost factor for the industry and will likely be a major factor in future investment decisions by the industry. While predictions of a “race to the bottom” are made, the expanding variability of regulation from location to location will impact decisions concerning the location of future animal production and processing units. Differences in environmental regulation across countries, states and provinces are problematic for animal agriculture. Broader multi-jurisdictional regulatory approaches may represent an opportunity for more efficient environmental management and lower industry costs.

Litigation related to environmental issues is a growing problem in the United States. While litigation is a symptom, not a cause, of conflict continued litigation can be expected unless there is meaningful legal reform that provides the industry with some “safe harbor” legal parameters in exchange for assuming greater responsibility for environmental concerns. Litigation or legislative outcomes must provide legal rights and responsibilities that balance business practices with environmental concerns to resolve the issues. In the environmental arena, uncertainty is a greater problem than the level or type of environmental regulation.

*What We Need to Know*

- What are the costs and benefits of various regulatory systems? General trends are known, but more detailed information is needed, such as the impacts of regulation on different sized operations.
- What are the public health impacts of possible pathogens in air emissions from animal production facilities? How do we best measure the level of pathogens and their impacts?

***Immigration and Labor***

Many segments of animal agriculture in the United States and Canada depend on a foreign-born labor force. In the United States, many of these workers are from rural Mexico and are undocumented. The legal uncertainty associated with this undocumented work force has consequences for the workers and the companies for which they work. Workers may not

receive full legal protections and may be reluctant to complain about working conditions. Employers are vulnerable to a variety of legal sanctions and risk the loss of a significant portion of their work force if immigration laws are strictly enforced. This legal uncertainty creates a “cost” that can be mitigated with revised government policies.

*What We Need to Know*

- What are the labor market needs for animal agriculture, and how will specific immigration reform legislation impact the industry?

***Animal Identification and Traceability Systems***

Animal identification and traceability systems have a key role to play in the future of the North American animal agriculture industry. Whether the underlying issue is animal health, food safety, animal welfare, process assurance or quality attributes, animal identification and traceability are the keys. Canada is well ahead of the United States and Mexico on this issue. Identification and traceability systems will emerge rapidly during the next few years to enhance the industry’s ability to respond to natural and intentional disease outbreaks, improve food safety, and provide assurances of food quality and wholesomeness. Some elements of these systems will be developed and managed by government, other parts may be purely private, and some elements may require public/private partnerships.

*What We Need to Know*

- How could information generated by traceability systems be utilized to develop risk-management strategies to minimize the impacts of animal disease outbreaks?

***Communities and Communication***

There are no simple answers to the complex issues facing rural communities affected by animal agriculture. The issues are multi-faceted and link producers, processors, retailers, consumers, and the people living and working near farms and processing facilities. Reaching workable solutions requires patience, partnerships, information and clear communication. Solutions may require the cooperation of industry and multiple levels of government.

*What We Need to Know*

- What are the economic and social consequences of alternative regulatory systems for making siting/zoning decisions about animal production and processing facilities? What tools can be brought to bear to encourage cooperation among industry, government, the public and the various elements of the food supply chain?



- What are the actual economic multiplier effects of animal agriculture production and processing facilities on rural communities?

### Concluding Remarks

North America enjoys highly efficient livestock production systems that have adapted and evolved to meet changing conditions. New products are developed to meet changing consumer preferences. New production systems reduce costs. Contracts replace open markets and redefine the relationships among the stakeholders in the system. Technological developments increase farm-level productivity, processing efficiency, distribution systems and marketing. Every facet of the animal food chain—from genetics to retail and food service outlets—is adjusting to the rapid pace of change.

The North American animal agriculture industry remains competitive in the world market. However, it faces significant challenges and opportunities, both in North America and abroad. Farm Foundation initiated this project to compile a comprehensive look at the opportunities and challenges facing animal agriculture in North America today. How industry, government and academia use the information compiled here will help shape the future of this industry in North America.