ABSTRACT

Agribusiness is big business in the United States, representing approximately 15% of the nation's GDP. No longer limited to the family farm, today's agribusiness industry encompasses the spectrum from primary production of commodities through value added transformation of products and finally wholesale and retail distribution to the consumer. Globalization is an important aspect of the industry; technology has led to tremendous increases in productivity and an expanding export sector. To remain vibrant, however, the industry must deal with challenges such as consumer acceptance of GMOs, attention to environmental considerations, and threats such as agroterrorism.

Ms. Joyce Deshazo, *Dept of State*
Mr. Ted Gronda, *Dept of the Navy*
Mr. Michael Mann, *Dept of the Army*
LTC William Kittle, *Army National Guard*
Lt Col Jon Link, *U.S. Air Force*
LTC Mark Neumann, *U.S. Army*
Col Arthur Owuor, *Kenya Navy*
LTC Sam Palmer, *U.S. Army*
Ms. Cathy Purnell, *Dept of the Air Force*
COL Geneva Sanders, *U.S. Army*
Ms. Sanna Sims, *Defense Information Systems Agency*
Col Jeff Snyder, *U.S. Air Force*
COL Daniel Sulka, *U.S. Army*
CDR Tank Thorp, Jr, *U.S. Navy*
Lt Col Ben Trotter, *U.S. Air Force*
Ms. Elizabeth Thornhill, *Dept of State*

Mr. Phillip Gary, *Industry Chair*
COL Eddie Coleman, U.S. Army, faculty
Dr. Paul Sullivan, faculty
Dr. Faye Davis, faculty

Domestic Travel:

USDA, Agricultural Research Service, Beltsville, MD
US Army Medical Research and Materiel Command, Ft. Detrick, MD
U.S. Army Medical Research Institute of Infectious Diseases, Ft. Detrick, MD
Department of Veterinary Pathology, Armed Forces Institute of Pathology, Wash D.C.
Chicago Board Options Exchange, Chicago, IL
Chicago Board of Trade, Chicago, IL
Chicago Mercantile Exchange Inc., Chicago, IL
Federal Reserve Bank of Chicago, Chicago, IL
Heinnemann Bakeries, Chicago, IL
U.S. Coast Guard, 13th Coast Guard District, Seattle, WA
COSTCO Wholesale Clubs, Issaquah, WA

Trident Seafoods, Seattle, WA
Deep Sea Fishermen's Union on the Pacific, Seattle, WA
Weyerhaeuser Inc., Federal Way, WA
Department of Fish and Wildlife, Issaquah Salmon Hatchery, Issaquah, WA
University of California, Agriculture & Natural Resources, Blodgett Forest, CA
EarthSource Forest Products, Berkeley, CA
Rominger Farm, Winters, CA
Defense Commissary Agency, Fort Meade, MD
Defense Commissary Agency, Bolling AFB
Buzz Crown Enterprises, Virginia Beach, VA
Spanish Agricultural Attache, Spanish Embassy, Washington, D.C.

International Travel

Distillers Corporation, Stellenbosch, South Africa
Agribusiness in Sustainable Natural African Plant Products, Stellenbosch, South Africa
University of Stellenbosch, Dept of Agricultural Economics, Stellenbosch, South Africa
Bluefin Holdings Ltd, Hout Bay, South Africa
Republic of South Africa Navy, Simon Town, South Africa
WESGRO Development, Capetown, South Africa
African Farmers Union Mussel Farm, Saldanha, South Africa
South Africa Wine Industry Trust, Stellenbosch, South Africa
Institute Agricole et Vetranaire, Hassan II, Rabat, Morocco
Ministry of Fisheries, Rabat, Morocco
Aicha Company, Meknes, Morocco
Port Casablanca, Casablanca, Morocco
Cordoliva, Andalucia Cooperative Society, Cordoba, Spain
Mercamadrid, Madrid, Spain
Ministry of Agriculture, Fish and Wildlife Madrid, Spain
COVAP, Cordoba, Spain
Campofrio, Madrid, Spain

Introduction

This year, the agribusiness industry study has taken a dramatic shift in perspective in our examination of agribusiness. This shift in perspective parallels the ongoing evolution of the industry. Traditionally, the focus of the agribusiness industry study has been on the initial stages or nodes of production-- the farm, the forest, and the fishing boat. Although a myriad of difficult issues, policy debates and national security implications continue to arise from this initial segment. This year's study has emphasized the broader and more complex agribusiness networks and relationships that take basic agricultural commodities, add value to them or create new products, then distribute them for consumption around the world. The value added is often many times more than the cost of the original commodity. These networks distinguish American agribusiness and have led to vastly increased productivity, diversity, quality and safety in the nation's food supply. Agribusiness networks, both national and global, include not only the traditional components of agriculture but finance, private and public research and development entities, transportation, wholesale and retail grocery businesses, the food service sector as well as humanitarian relief organizations. These networks safely distribute agricultural goods on a scale spanning up-scale consumers in New York, Zurich and Tokyo to people in impoverished regions facing and sometimes failing in the elemental task of human sustenance.

In peacetime, the agribusiness network is an essential contributor to the economic and diplomatic elements of national power. During times of crisis, our vast agricultural resources provide the US a clear security advantage in meeting the nation's basic needs for food, clothing, construction materiel as well as agriculture-based energy resources. Agribusiness translates the country's favorable climate, abundant natural, technical and financial systems, and strategic geography into the ability to advance peace, stability and prosperity for this nation and the world.

This year's study examined many issues facing agribusiness networks and assessed the health and prospects of the main agribusiness sectors of food, fiber, forestry and fisheries. Our examination lead us to group these issues under five broad, and inter-related themes of food security, technology, environment, globalization, and distribution.

Food Security. For any nation, fundamental food security is the ability to produce or trade for the food necessary to feed its people in a manner their culture expects. Even after this fundamental condition is met, intentionally or unintentionally created conditions, such as disease and agroterrorism, can threaten a safe and affordable food supply. For the US, with agribusiness comprising 15% of the GDP and a significant portion of international trade, they pose a significant threat to the economy.[1]

Technology. Advances in biotechnology and information technology offer improved productivity and quality. Yet, questions arise over acceptability as well as the mix of private versus public investment in these technologies and their distribution to those needing them. A dichotomy still exists in agribusiness – certain sectors of this deeply rooted and enduring industry have been slow to part with trusted methods and

embrace technology. Other portions of the industry have gained incredible advantages through leveraging the most advanced technologies.

Environment. Agribusiness is inextricably linked to the earth's ecosystem. Determining appropriate practices and policies that preserve or renew natural resources, while promoting effective utilization of the productive capacity of the earth, is a fundamental concern of the industry as well as consumers.

Globalization. Since ancient times, trade has been a fundamental aspect of agriculture. Agribusiness is a global industry. The determination and protection of domestic interests, facilitation of international markets for the trade of agricultural products and technology is a primary concern of governments. Likewise, the impact of varying degrees of government involvement is a primary concern of agribusiness.

Distribution Networks. Evolving demographics and eating patterns are fundamentally affecting the kinds of food produced and the ways it is distributed in a global marketplace. In a shrinking world, the emergency distribution of food in times of humanitarian crisis is changing as well.

Industry Overview

Historically, agriculture has been viewed as an economic activity separate and apart from industry. Since World War II, American agriculture has steadily evolved from the traditional farm model of food production into a more complex, integrated system of industrial and distribution-oriented *agribusiness.* This system or network spans financial markets supporting highly capitalized initial production and a complex series of businesses that transform, package, and distribute food and fiber to consumers. Food production is now an industrial or manufacturing versus agrarian based enterprise. Industrial activities continually modify basic food commodities to create and meet market demand for products at retail venues for preparation in the home or in the food service sector. The farm itself is now only one component of what some call biological manufacturing. David Ginns of the Agribusiness Association of Australia describes agribusiness as "a 'chain' of industries directly and indirectly involved in the production, transformation and provision of food, fiber, chemicals and pharmaceuticals."[2]

Agribusiness, thus, encompasses the spectrum from primary production of commodities through transformation of the commodities and finally the wholesale and retail provision of products to the consumer. It includes the supply of inputs all along the supply chain and the provision of agricultural services such as education, capital, and technical advice.[3] In other words, agribusiness today includes farm, grocery store, biotech labs at universities, governments and corporations, financial exchanges, food service providers as well as a host of other distinct enterprises. Agribusiness is **big** business in the United States, comprising about 15% of the Gross Domestic Product, agriculture and related industries account for more than 18% of US employment.[4]

Rapid changes in culture, social structure and ensuing consumer demand are the driving forces in the economic organization and performance of the agribusiness industry. Changing

roles of women, diverse as well as aging populations, and increasing desire for leisure time create demand for new products and marketing channels to meet requirements of convenience, value, and quality. The industry has permanently transformed from a "sell what we produce" to a "produce what we can sell" model."[5]

Global capital markets demand an adequate rate of return on investments while increasing the pressure for performance. Risks and potential rewards for agribusiness are great. The pressure cuts two ways— it holds the industry to a predominately conservative approach to marketing given historically tight profit margins. But, in the face of an increasing velocity of change, it encourages innovation in products and delivery channels. Retail prices of food products have very little correlation to prices paid to the farm and everything to do with the value added during processing. US food demand is met predominantly by powerful food manufacturers selling to powerful food retailers.[6]

New Industry Structure The past decade has witnessed an accelerated rate of structural change in the agribusiness industry. Horizontal and vertical mergers have led to a much more concentrated industry with an accompanying decrease in the role of smaller, independent producers, packagers, distributors and food retailers. The sector, nevertheless, accommodates a large number of small players that freely enter and leave, sometimes unwilling, the network. Sometimes the new players grow to dominate discrete sectors. How many Starbucks could one find in 1990?

Traditionally made up of small-scale, relatively independent firms (the family farm, the fishing boat, the wet stall market or corner grocery store), the agribusiness industry has become increasingly dominated by large, national and multinational corporations who control all stages of the food production and distribution process. The change has been in progress for over fifty years, but three developments have rapidly gained significance in the last decade.

The fundamental structural change in agribusiness is the adoption of a manufacturing mentality and its process control technologies, according to Professor Michael Boehlje of Purdue University.[7] At the farm level, this has transformed the producer and processor of commodities to a manufacturer of "specific attribute products for unique end-use markets." This industrial model fosters much larger scale production. Large, efficient agribusiness firms are able to operate at a lower profit margin than smaller firms or family farms. The poultry industry is a prime example of where large volume production results in economies of scale and lower consumer prices.

The second important development is the creation of vertical supply chains that often control products from genetic development all the way to consumer delivery. ConAgra and other grain buyers, for example, own transportation fleets, to move grain within the US and abroad. ConAgra also owns the prepared food companies Armour, Swift, Butterball, Healthy Choice, Peter Pan Peanut Butter, Hunt's, and others. Giant agribusiness firms are now moving to acquire major names in the organic foods industry motivated by high growth rates in these niche firms.[8] In positive terms, the integrated supply chain concept offers improved efficiency in resource utilization and quality control and quicker response to changes in customer demand. There are some who feel industry concentration is already a threat, particularly to independent producers at the primary level of crop and livestock production. Anti-trust laws recently have dealt with some vertical mergers due to potential threats to competition.[9]

The third major change is the high level of industry concentration due to horizontal mergers. Like other sectors of the economy, the agribusiness industry over the last decade has

experienced a wave of buyouts and mergers. William Heffernan at the University of Missouri has identified three vertically and horizontally integrated "clusters of firms," which now dominate the food supply system: Novartis/Archer Daniels Midland; Cargill/Monsanto; and ConAgra. Each cluster includes a biotechnology alliance where cutting edge technology is leading to an ever-greater control of the food supply from seed to shelf. Not limited to the food system of the United States, these clusters increasingly exert power in the global arena, particularly with their control of the intellectual property rights of gene pools.[10] The market share these companies control is considerable. In 1998, for example, Monsanto sold 88 percent of the genetically engineered seeds in the US and controlled 87 percent of the US cottonseed market. The Cargill/Monsanto cluster controls as much as 40 percent of all corn exports.[11] Heffernan compares this concentration to an hourglass. "Commodities produced by thousands of farmers pass through a few large firms to millions of consumers." As a result, issues of market competition are on the rise. As with vertical integration, horizontal concentration in the agribusiness sector offers danger of anti-trust violation. In 1996, for example, Archer Daniels Midland was convicted of price fixing of corn.[12]

The significant structural changes in the agribusiness sector raise a number of public policy issues with national security implications. Industry concentration raises questions of oligopolistic -- and in some cases monopolistic -- power. There are valid arguments that concentration tends to stabilize prices, offers higher quality and more responsiveness to customers, and allows American companies to better compete in the fast paced global market. However, monopolies and oligopolies can also stifle competition and eventually run the risk of limiting innovation and causing prices to rise.

With a significant concentration of industry in a small number of corporations, who dominate research and development, biological uniformity of breeds has become a concern. Commercial poultry, for example, is so uniform that "breed" has lost all genetic meaning and refers only to the particular company's brand. While uniformity may offer efficiency and increased returns, it also presents a threat to the US food supply.

Agribusiness, as a type of "biological manufacturing", has assumed much of the character of other manufacturing. More and more agribusiness is being regulated in a similar fashion. Environmental, health and safety factors require constant oversight as do the trade and financial considerations, now under sharp focus in the World Trade Organization (WTO).

The United States is the world's largest producer and exporter of agricultural products. While the efficiency of the sector has kept costs low, the tendency for labor costs to rise in the US could conceivably begin to erode our market advantage. American agribusiness giants might move more and more production off shore.

The US agribusiness industry continues to provide abundant, cheap food and fibers to Americans. It is also an important global player, controlling approximately 12 percent of global agricultural exports.[13] The industry is currently undergoing revolutionary structural changes aimed at continuing this remarkable performance. Despite their positive dimension, however, these structural changes pose some risks for the US economy and American consumers. While the US Government maintains appropriately strong scientific, regulatory, financial, and diplomatic policy support to the agribusiness industry, it must continue to insure the industry moves in directions that assure the nation's food security and contribute to the overall health of the economy.

Having taken this broad look at the overall state of the US agribusiness industry, we will narrow our focus to selected topics under our broad themes.

Food Security

The United States is blessed with the natural resources that can provide for the basic needs of our population into the foreseeable future. Our economic strength allows us to freely access world markets for food not produced domestically. There are threats to the US food supply, however.

Modernization and mechanization have greatly enhanced the efficiency and productivity of American agriculture, but these same factors have also increased its vulnerability. Homogenization of plant breeds and livestock decrease genetic diversity, rendering animals and plants more susceptible to disease. The intensive use of antibiotics and steroids also make livestock more disease prone.

The concentrated production of most commodities also presents risks. Thousands of animals raised in close quarters present an easy target for the quick spread of contagion; geographic concentration of crops based on prime growing conditions could result in disaster due to bad weather or outbreak of disease. As an example, US Department of Agriculture (USDA) statistics reveal the dairy industry is highly concentrated in small portions of California, Wisconsin, Washington State and New England. All the environmental and disease threats that make agriculture a high-risk industry in the best of situations increase exponentially when consolidation of a commodity occurs.

Another vulnerability stems from the increased vertical integration of agribusiness, which could potentially allow accidents such as contamination of food to spread quickly throughout an entire system. Finally, vulnerabilities arise from export treaties and agreements whose terms may negate certain disease control options, or from the rapidity with which products are moved across international borders.[14] The 1997 outbreak of hoof and mouth disease in Taiwan and the ongoing battles against the disease in Europe illustrate the rapid and widespread devastation such disease can cause.

The nation's security depends on a safe and wholesome food supply. In addition, the importance of agriculture to the national economy means that the threats described above, if realized, could have devastating ramifications for the US financial system.

Agroterrorism: An Emerging Threat The United States is the supreme military power in the world today with no competitor on the horizon for decades to come. Nevertheless, in today's world, military supremacy does not ensure security. Those who oppose the US have alternatives. A credible threat by terrorists could disrupt a commodity sector. A successful attack on the food supply generated by biological terrorism could undermine confidence in the federal and state governments.[15] Bioweapons may be the poor man's atomic bomb.[16]

Recent advances in genetic engineering afford the possibility of producing highly lethal substances in vast quantities. Such weapons have the advantages of easy concealment and easy delivery. The Gulf War heightened awareness and the development of counter measures to the threat of biological agents during warfare. A much greater threat, however, and one that is only beginning to receive government attention, is the potential for economic and societal disruption that could result from an introduction of pathogens into the nation's food chain.[17]

Agroterrorism offers many advantages for those intent on attacking the United States. The agents for such attacks are readily available. The process for making biological pathogens into weapons is, in fact, easier than manufacturing munitions. Vulnerabilities in the food supply due to modern agricultural methods make it much easier to design a devastating attack with significantly fewer risks and consequences than attacks against humans. Biological attacks against livestock, for example, could be disguised as natural disease occurrences, making the attacks much harder to trace. [18] The ramifications of a biological agroterrorism attack would go well beyond destruction of the food supply. The immediate result would be economic destabilization. Loss of confidence in the government would likely ensue with possible mass panic and civil disruption. [19]

Many experts believe it is only a matter of time until the US does experience agroterrorism. The government is beginning to recognize the potential threat and to develop a response. The 2001 federal budget, for example, contained $39.8 million for the USDA to work on biological agroterrorism issues. USDA, the Department of Defense, the FBI, the CIA, and other security agencies are working to develop joint programs to address the threat.[20]

Technology

Within agribusiness, there appear to be two competing frontiers involving technology. On one hand, numerous efficiencies are easily obtained through the application of technology. Examples run the full spectrum from labor scheduling and exact duplication of feed mixture to combines that can do the work in a faction of the time it use to take. On the other hand, agribusiness has large sectors where processes are still done by hand or with methods, such as brewing beer or curing meats, developed early in history.

Advances in biotechnology and information technology offer improved productivity and quality. Yet, questions arise over acceptability as well as the mix of private versus public investment in these technologies and their distribution to those needing them. This year, among the many topics under this theme we examined information technology and genetically modified organisms (GMOs), including the perspectives on from on developing nations

Biotechnology and Genetically Modified Organisms (GMOs) In recent years, consumers have been caught up in an ever-expanding debate over the health and safety of genetic modification of the food supply. Advances in biotechnology have manifested themselves in the growing list of products that are targets for enhancement in the pharmaceutical and agriculture sectors. That which was unobtainable a decade ago is now commonplace.

Biotechnology and bioengineering are the broad terms applied to a variety of technologies involved with the commercial application of living *genetically modified organisms* (GMOs). GMOs are created through the deliberate manipulation of deoxyribonucleic acid (DNA) molecules within an organism and introducing genetic information not naturally occurring in that organism.[21] *Genetic engineering* is the

transgenic transfer of genes from one organism to another or gene modification within the same species.[22]

There is considerable domestic and pervasive international opposition to bio-engineering technologies. This opposition is based on concerns about possible negative effects on human health and environmental risks, as well as moral and ethical considerations. Many feel that these attitudes represent emotion over science.[23] An important follow on issue is whether products containing GMOs should be labeled. Industry and the US government distinguish between *content* labeling which lists ingredients in a product, and *process* labeling which identifies the process used to produce an ingredient, such as genetic modification. The United States opposes the later, while the European Union (EU) is leading the demand for GMO labeling on all imported products exported.

Currently about 70 % of processed foods in this country are GMO's. With US consumers increasingly questioning the GMO content of food, farmers are beginning to respond to pressure to limit or even eliminate GMO crops. In January 2000, Frito-Lay asked its farmers to not use genetically modified corn and in April 2000, J.R. Simplot, one of the nation's largest potato processors, told its farmers to avoid planting genetically modified potatoes.

Another concern to growers is the requirement to segregate modified from unmodified commodities. The National Grain and Feed Association estimates that only 5% of the nation's grain elevators could achieve segregation without major new investment.[24]

GMOs in the Developing World For most of the developing world, biotechnology has come at a crucial time of global transition. Many developing nations are ill-equipped to effectively regulate the impacts of biotechnology, given the overwhelming market forces. Increased research and use of bio-technologically improved products create concern and friction within less developed nations whose traditional economies tend to be agricultural based. For Africa in particular, many countries are concerned with the possibility of being used as "guinea pigs" for GMO testing. Developing nations are likely to lower standards or look the other way in order to allow to gain the new technology. They also are concerned with potential economic imbalances brought on by the use of biotechnology. A capital intensive, high-tech industrial solution may not be appropriate to problems that can be resolved simply and cheaply by traditional means.[25]

The biotechnology revolution, like the Green Revolution, is a technological solution to problems of production not to social injustice. Western technologies have increased socio-political tensions in developing nations. For biotechnology to benefit the world in a well-reasoned manner, it must be regulated by consensual international protocols and applied in a fashion that complements the development efforts of nations. Less developed regions such as Africa, are seeking through international collective action, a regulatory process for GMO products that assures objective and critical review. They want research and development funding and intellectual property considerations fairly distributed over the wider agricultural sector. Less developed nations and regions do not oppose biotechnology. They endeavor to critically evaluate potential impacts on their countries and be equal participants in finding solutions.

Information Technology Currently, technology is not only aiding in crop, animal and fiber development, but is also used to link producers and buyers of commodities and finished products, exporters and importers, indeed, entire supply chains, via the Internet. In fact, the Internet has begun to disassemble and rebuild market structures around the world-- eliminating many barriers. Agribusiness appears to have joined the IT party late, either with e-commerce (business to consumer transactions) or e-business (business to business transactions) ventures, leaving it much to gain from leveraging the Internet. Greg Frazier, former Chief Agriculture Negotiator, Office of the US Trade Representative, commented on the impact of increased use of technology as an emerging trend in agribusiness. "The Internet may well revolutionize the way food trade is conducted just as it has changed the way many of us buy books...there will be accompanying changes in food trade policy."[26]

Agricultural e-business offers traders market transparency, price discovery, liquidity and trading decision support. Internet connectivity brings traders together with banks, freight suppliers, exporters, end users and futures markets. The payoff for agribusiness is increased competitiveness in a world economy. E-business is creating market efficiencies that make US agriculture a more visible, accessible and reliable supplier at a competitive price.[27] As example, Farms.com provides real-time instantaneous agricultural markets. This multi-million dollar e-commerce venture, operates on the principle that every player in agriculture can participate and take advantage of the core of its success. Ben Zaitz, president and founder, boasts that "several thousand bidders can trade bids instantly, faster than at the Chicago Board of Trade or Mercantile Exchange." He believes the pace of agricultural markets demands a dynamic, robust trading system; a static system would not support the inherent volatility of agribusiness.[28] Another example of the use of information technology is the product tracking process developed by a Spanish farmer's cooperative in response to European customer demand for food safety. The co-op has implemented and marketed the capability to track a package of meat from the grocery store case back to the original farm and animal.

The federal government has begun several initiatives to expand the use of e-commerce and e-business. A careful balance is needed to ensure the private sector has the flexibility it needs to lead Internet growth, development and maximum self-regulation, while government provides a predictable, minimalist, and simple legal and security environment. In one policy measure, the US Trade Representative is to help ensure the elimination of foreign trade barriers to the deployment of advanced telecommunications capabilities. In addition, the US began an initiative to work with foreign governments to secure agreement that no products and services delivered across the Internet will be subject to tariffs. This is especially critical to agriculture, where tariffs have already taken an especially high toll on prices and market access.

Visits to agribusiness network nodes as diverse as the Seattle deep sea fishing fleet to Costco Wholesale Corporation's fresh food buying division dramatically demonstrated the powerful way information technology and the internet has created links for the agribusiness networks. These permit the management of basic production, advance design and sophistication of packaging as well as distribution of agricultural products from the point of production to their point of sale or in the food service sector to

the point of consumption. More and more information is being shared and handled in near real time resulting in a more efficient, less costly and less wasteful industry.

There is a popular notion insisting that anything done can be done better with the application of technology. This may not be the case at all in agribusiness. There are always management tools that look for the efficiencies in a process but no technology has yet decreased the 21-day gestation process for hatching an egg.

Environment

Environmental concerns have become a pervasive force affecting the agribusiness industry from many directions. Pressures arise from several quarters: government regulation, consumer demand, and the inherent conflict between short-term profit and long-term sustainability.

Since World War II, food and fiber productivity has soared due to introduction of new technologies, mechanization, chemical use, specialization and favorable government policies. The positive aspects of these changes have been offset with significant costs, often as the result of unintended consequences. Some of those costs are topsoil depletion, groundwater contamination, and cutting of old growth forests.[29]

Examples of unintended consequences are numerous. Introduction of hog factories, for example, where thousands of animals are fattened for slaughter in confined spaces, may have increased the efficiency of hog production and lowered the cost of a pound of pork, but the massive concentration of animals and their wastes produces significant environmental impact. Manure from the lots is collected in vast holding ponds whose smells contaminate the air of entire communities and where seepage occurs into ground water and streams.

In Morocco – a stop on this year's international industry study travel -- as in parts of the US, irrigation projects have been initiated to expand production yields of vegetables for the export market. In a water-stressed environment, however, increased irrigation is drawing down water tables and allowing salt-water intrusion into the drinking water supply. As one professor at the Institute of Agronomy and Veterinary Medicine in Rabat, Morocco noted, "We are a water deficient country. Yet in using irrigation to produce vegetables for Europeans markets, we are, in effect, exporting our scarce water."[30]

Among high profile examples of unintended environmental consequences is use of genetically modified corn with its own pesticide-containing *Bacillus thuringiensis* (Bt) genes. While this technological advance offers the benefit of reduced chemical pesticide use and run-off, it is still unclear whether pollen from the modified corn can kill off butterflies and beneficial insects.

Depending on one's perspective, government regulation of agribusiness for environmental protection either is hampering the industry's ability to increase productivity or has not gone far enough in protecting the public and environment from corporate greed. In either case, environmental regulation is factored into all aspects of US agribusiness today. That has advantages for many. Tim Henkel, President of the Deep Sea Fishermen's Union in Seattle, says that government regulation and curbs on over fishing have "saved the industry," reducing a bloated Alaskan fleet of over 400 boats to a manageable and profitable 170.[31]

Voluntary decisions to engage in environmentally friendly practices are also proving profitable in some agribusiness sectors. Some farmers in California's San Joaquin Valley are proving that environment and productivity can coexist. Having converted strips of land from crop production to natural grasses and bushes, they are seeing benefits in the numbers of birds and friendly insects in their fields and in the dramatic reduction in soil erosion. Additional economic benefits have accrued from as diverse directions as Audubon Society grants and rental of hunting privileges as sources of farm income.

One of the most interesting sources of environmental pressure on agribusiness comes from consumer demand. In their efforts to improve public image on the way to maximizing profits, firms are realizing the value of "green." Weyerhauser, the number one forest products company in the US, takes pride in the fact that it goes beyond government regulations and has won a Sierra Club award for its commitment to sustainable forestry. The company has also realized that sustainable practices have actually improved profitability in some instances.

The public's desire for organic products has also not been lost on the major agribusiness corporations, who have begun to buy up organic companies. Some environmentalists see this as a positive move towards changing corporate America while others lament the possible corruption of the sector or the loss of a niche market still hospitable to small producers.

The US Fishing Industry Even with government regulation and conservation efforts, officers at the 13th District Coast Guard in Seattle say the West Coast fishing industry is still over capitalized and over supplied by as much as half.[32] The US is the world's fifth largest fishing industry and, as of 1998, the largest exporter of seafood. As of 1993, however, 65 of 231 US marine fish stocks were classified as over fished, contributing to the over exploitation of 70% of fish stocks worldwide. These conditions were the result not only of the large number of boats but also to the size of nets and advances in technology – and to US government subsidies.[33] The Sustainable Fisheries Act of 1996 has helped to reverse that trend and with better legislation, enforcement, and use of new scientific management, prospects are now good for total recovery.

Aquaculture, the cultivation or farming of fish and shellfish, is one development that promises to relieve pressure on the fishing industry. Aquaculture is, in fact, the fastest growing sector of US agriculture, supplying one out of five fish eaten worldwide.[34] In addition to a strong domestic market, US aquaculture has excellent export potential.

Aquaculture is not without problems, however. Like other agricultural sectors, aquaculture is geographically concentrated. As a result, effluent discharge with high levels of nutrients presents threats to the surrounding environment. The Environmental Protection Agency is currently working on pollution standards for discharge from land and coastal aquaculture facilities.

A second problem yet to be addressed is the inadvertent release or escape of breeder fish into the wild. Many of these fish have been genetically altered for better adaptation to a farming environment. The question is whether these escapees could adversely affect the mating process or survival traits of native fish. As with all other aspects of primary production in agribusiness, fishing and aquaculture require

environmental vigilance and regulatory oversight to prevent undesirable unintended consequences.

Globalization

"US agriculture operates in a global, high-tech, consumer-driven environment. Capital and information flow instantly between buyer and seller. And changing consumer demands are challenging existing marketing institutions and traditional ways of doing business. Today, multinational companies are processing and sourcing products from all over the world, which they in turn sell throughout the world, in a marketplace that is driven by consumers who demand quality, safety, health, and convenience . . .. an agricultural policy for the 21st century should be one that can respond to the rapidly changing structure of global markets. It should be one that recognizes the interdependencies of the food chain."[35] **Secretary of Agriculture Ann Veneman, April 17, 2001.**

Globalization strategically affects American agribusiness in a variety of ways. America exports raw agricultural commodities and imports processed products. The revolutions in intermodal and air transportation have enabled an end to the tyranny of the seasons. Even when not grown locally, most food can be found year round in all US markets. Standardization of the food supply through the explosion of brands such as Coca-Cola and those of America's fast food industry has expanded beyond US borders to influence world eating habits. To meet these evolving markets, the United States exports agricultural products, services and business processes. McDonald's has restaurants in over 117 countries and is the best known name brand in the world.[36] Ben and Jerry's ice cream is found in Moroccan supermarkets.

At diplomatic policy levels, international fishing practices and issues of over-fishing the world's oceans clearly require multinational solutions to avoid serious diplomatic if not military confrontation. Environmental issues affecting agriculture, including water access, agricultural use and timber harvesting in rain forests and ozone depletion, also transcend national borders.

Developments in world commerce continue to influence American agricultural production, trade and policy. The numbers of transnational food companies and brands are rapidly rising and are sure to affect policy. In the near future Internet e-commerce may well revolutionize agricultural trade; its impact in the futures markets are already clear. While many of these challenges have traditionally been handled through bilateral policy processes, the rise of regional structures such as NAFTA and the EU have given rise to multilateral approaches. The most significant of these is the World Trade Organization.

Agribusiness in the World Trade Organization The agricultural sector has been among the most difficult to tackle under World Trade Organization (WTO) negotiations. The US Government has taken the lead in promoting substantial reform in international agricultural trade, seeking in particular to cut tariffs and reduce trade-distorting subsidies. Other important issues dealt with in WTO negotiations are biotechnology with associated safety and labeling issues as well as e-commerce -- with its ability to ignore borders.

From the US Government and agribusiness perspective, liberalized trade in agricultural products is essential for the continuing health of the industry. Fully 25 percent of agricultural sales go for export, making up approximately 10 percent of all US exports and approximately 12 percent of all agricultural exports worldwide. American officials contend, however, that more liberalized trade will not only benefit US farmers and agribusiness, but also provide global consumers with wider choices and lower prices generated by competitive, technologically advanced American farming methods. Liberalized trade is not supported by all sectors in the US, however. While large agribusiness firms stand to gain, many farmers see open markets as threats to their already fragile economic status. Their opposition was made clear in the protests in Seattle in November of 1999.

Central to all agricultural trade negotiations are domestic farm subsidies, which distort prices in international markets. Reducing farm programs in any nation is not a simple thing. Agricultural sectors are complex networks consisting of at least six interrelated domains- farm inputs, farm production, food processing, wholesaling, retailing and food service. Perturbations in any of these domains caused by reduction in agricultural subsidies causes repercussions in all but most significantly is felt in the domestic political sector of that nation. Even if governments could unilaterally eliminate their farm subsidies, there is the external factor. Other nations heavily subsidize their sectors at the direct detriment of the other nation's farmers competing for the same market.

Tariffs are an additional point of contention in the WTO talks. Tariffs on agricultural goods run at an average of 40% compared with well under 10% for manufactured goods.[37] The EU in turn accounts for more than 83% of the total world agricultural export subsidies while the US share is 1.4%. Yet, US producers face average tariffs of more than 50% when they sell overseas compared to 10% US import tariffs on agricultural products.[38]

Biotechnology is "the biggest issue in agriculture today," said a spokesperson for the US trade delegation at the Seattle conference in 1999.[39] Certainly GMOs are having a profound effect on the American export market. The United States is the world leader in bio-engineered crops; significant percentages of the important export crops of corn and soybean are now produced with GMO seeds. The US has countered European Union and Japanese demands for GMO labeling with arguments that such labeling violates WTO regulations. Regardless of who is right, purchases of the US agricultural exports in question have dropped significantly and global market share can be permanently affected unless US policy adjusts to consumer demand.

E-commerce is revolutionizing agricultural trade, but progress is needed to speed up worldwide access to improve productivity and expand US markets. The US has lobbied WTO members to extend the moratorium on imposing customs duties on electronic transmissions. This is especially critical to agriculture where tariffs have already taken a high toll on prices and market access.[40]

Agriculture has come late to WTO negotiations in large part because of the emotional and security issues attached to it. Many countries continue to believe that preservation of cultural heritage through traditional agriculture is more important than cheaper food. Japan maintains high tariffs on rice, for example, in order to protect its traditional rice culture. Within the US, as well, many independent farmers groups have

concluded that liberalized trade and increased exports primarily support the interests of big corporations but do not necessarily benefit farmers themselves. They point to statistics showing that when exports increase, actual prices for agricultural commodities go down, thus hurting the grower. Their concerns are significant and potentially explosive. The complexity and dynamism of these issues demands that US trade negotiators continually assess positions and methods of achieving desired ends. The health of the US agricultural export sector is critical not only for the US economy but also ultimately for the security of the US food supply and for significant portions of the world.

Distribution Networks

Evolving demographics and eating patterns fundamentally affect food production and distribution in a global marketplace. Agribusiness is driven by consumer demand and in turn responds by constantly adjusting the types of food offered in the marketplace, changing the patterns of distribution of food to consumers and it even changes the marketplace itself. This final section covers two distinct topics— evolving consumer demand for agribusiness products and the retail grocery and food service sector response to meeting that demand. In sharp contrast, there is fundamental change in the way humanitarian food relief is going to those without market access or find their markets empty due to natural or man made disturbances.

Consumer Demand and the Retail Food Sector Driving the transformation of agribusiness is the extreme demand that consumers place on food production for variety in what and how we eat, convenience, product information and the rapid expansion of agribusiness' ability to supply this "extraordinary" demand for products.[41]

Mega-trends influencing people in the United States, and to varying degrees, the rest of the world, drive how they think and organize their lives vis-à-vis their basic human need to eat. These trends include: changing work and lifestyles; changing demographics; increased mobility of populations; increasing wealth and education; expanding infrastructure and urbanization; social changes, such as the role of women in society; changes in information, transportation, manufacturing and biological technology; increases in farm and non-farm productivity; and the restructuring and integration of the global economy.

Yet, along with the mega-trends, there appear to be a globalized set of dichotomies. On one hand, we see great homogenization of consumption given the ubiquitous "Big Mac" and Coke. On the other, the major advances in production, processing, preservation, transportation and information technologies and trade liberalization have increased differentiation and variety in the diets of people. As stated earlier, revolutionary technology and trade practices have largely eliminated the tyranny of seasons and, to a lesser degree, the climate. We now have a global, year round food system. Though the industry is marked by mass production—it also is characterized by mass customization at the point of sale-- be it restaurant, fast food outlet or the salad bar in the supermarket. American consumers "want to have it their way." The increasing vertical integration in the agribusiness network in many ways enables changes in distribution to meet the demand for product availability and diversity. We are witness to

the transformation of human sustenance from an elemental and fundamental human activity to, for an increasingly large portion of the world's population, a secondary enabling cultural activity. This has resulted in a complex global "culture of consumption" with people using consumer goods to create social ties or distinctions.

Seventy-two percent of food is still prepared and or consumed in the home.[42] The retail grocery sector tracks influences and trends of consumer behavior to both find the products people want to eat and to establish the marketing and distribution channels to facilitate purchase of these goods. The major trends in the retail grocery products are: emphasis on good taste and quality, convenience and easy preparation, foods configured for new food preparation technology (i.e. microwaves, bread machines, rice cookers, etc.), health and safety, nutraceutical and functional foods (diet and supplements), ethnic foods as well as a convenient and entertaining shopping experience.

The rules of competition for the 21st Century consumer's stomach are dictated by dynamic shifting consumer demands for new products, shopping experiences and eating venues. Agribusiness response in changing the marketplace has been equally dynamic and flexible. In addition to convenience through expanded hours, the grocery industry is beginning to recognize the importance of improved customer service. There is great physical change in basic store infrastructure as grocery markets offer a variety of complementary services and products.[43] The grocery industry has also responded with advanced uses of technology and new business practices such as supply chain management and efficient customer response. These enable greater specialization, customization and highly tailored offerings to meet varied demand for quality and taste.[44] Finally, the late 1990's saw the re-invention of an old market format and distribution process. Before 1929, the beginning of the dominance of the supermarket, 14% of all food was delivered to the American home. There is a growing belief in a return to this channel through Internet based orders delivered directly to the home. For now, only a small number of people shop via the Internet and even fewer have established a practice of buying food that way.[45] There is strong faith by some in agribusiness in the viability of this market format.

Projecting out to the year 2050, Art Siemering, writes in the *Futurist* magazine that new technologies and shifts in cultures will cause a shift to "massfood"-- edible products that are uniformly sized, nutritionally correct, taste good and keep-able indefinitely at room temperature. Nutritional well-being will be a birthright in most advanced countries and an attainable goal in all others. This will leave all other food consumption to the realm of pleasure. By not having to focus on feeding the masses, the upper strata of food producers will concentrate on maintaining food quality appealing to the demands of consumers with the means and inclination for "eatertainment."[46]

Humanitarian Food Distribution The number of food emergencies around the world has increased dramatically in the last decade.[47] This fact, coupled with the changing nature of food emergencies, has result in a fundamental change in the way the governments react to these demands. For the most part world's relief organizations instead of governments react to these crises. Conflict has replaced drought as the primary cause of famine in the world as well as causing a significant increase in the world's refugee population. Today, 80 percent of the World Food Program's food aid is now being distributed to the victims of man-made disasters.[48] This has changed the nature of

humanitarian food distribution. Distributing aid in a post-natural disaster environment or in support of a development project had been under conditions where the government and the population were eager to cooperate with the relief organization. Many operations now are conducted in a more violent environment where refugees are co-mingled with combatants and some of the inhabitants of the area are openly hostile to the relief organization's efforts to feed the needy.

World's relief organizations of the early 1990's, focused on developmental programs and the occasional natural disaster, were largely unprepared for the new role of feeding refugees in a combat zone. As a result, during the early part of the decade, relief organizations found themselves relying heavily on the world's militaries as "first responders" during the early stages of a man-made disaster. It was an obvious solution for the relief organizations at the time. The US military had well-equipped, well-trained, and well-organized logistics infrastructures that understood the science of getting the right stuff to the right place at the right time, especially in a hostile environment. The relief organizations had no comparable infrastructure.

One organization, the World Food Program (WFP), has developed, over time, sophisticated capabilities to handle all contingencies. It now is responsible for "mobilizing all basic food commodities and funds for meeting transport costs, for all large-scale refugee feeding operations managed by the United Nations High Commissioner for Refugees. In 2000, the WFP had projects in 82 countries and a staff over 5,000 people around the world with their world headquarters located in Rome, Italy. In 1999, the WFP delivered 3.4 million tons of food aid that helped feed over 89 million people, including 29 million refugees.[49] The centerpiece of the WFP's food aid distribution process is an organization with the military-sounding title of "Transport and Logistics Division." This function organizes the distribution of food aid from the supplier to the refugee using a variety of transportation techniques and planning tools. The backbone of the WFP's food distribution network is ocean transport with forty chartered ships at sea at any one time. They have also developed contingency mechanisms that allow them the flexibility to divert any sea-borne food shipments on short-notice to react to an emerging food disaster.[50] The WFP moves food from a port to its final destination in a variety of ways. Additionally, delivery of food aid by airplane is used when rapid delivery of food is necessary in a crisis and the needy cannot wait for the food to arrive by surface means. The WFP also has the ability to airdrop food aid, a technique that, until recently, was performed largely by military forces.[51] It has also developed a military like capability for extensive infrastructure repair and reclamation capability.[52]

The evolution of organizations like the WFP poses challenges. Although WFP is the largest food aid organization and envisions itself as the overall food coordinator in an emergency, it is not the only organization working to provide aid to the needy in a food emergency. Relief organizations could find themselves in direct competition with each other for scarce resources such as transportation.[53] Another constant challenge is to ensure food aid gets to the intended recipient. Quickness and efficiency in a food distribution network is of little value if the food is then diverted, often by threatened or outright use of force, from those that really need it.[54] A military or police capability to confront or circumvent this phenomenon is not one the relief organizations seek. While challenges remain, relief organizations have adapted to the post Cold War humanitarian

relief environment, becoming more self-reliant and quicker to react to emerging food crises.

Conclusions

The US agribusiness industry is undergoing revolutionary structural changes aimed at continuing its remarkable performance of efficiently feeding a growing, diverse and demanding US population. It exports both raw agricultural commodities and highly refined and processed products on a scale unmatched by any single nation or trade group. The United States also provides substantial resources for relief operations conducted by increasingly professional and capable international private voluntary organizations and non-governmental organizations. In the US market, the supermarket continues to be the dominant mechanism for food distribution and will continue to provide efficiency as well as vigorously ensuring quality, variety, consumer knowledge and intrinsic "opportunity cost" value in its products. In addition, it serves as a social and entertainment destination.

Despite its positive dimensions, however, agribusiness structural change poses some risk for the US economy and American consumers. While the US Government maintains appropriately strong scientific, regulatory, financial, and diplomatic policy support to the agribusiness industry, it must continue to insure the industry moves in directions that assure the nation's food security and contributes to the overall health of the economy. It must be agile in both promoting US agribusiness sales abroad and in securing access to those products and commodities not available in the US.

While US agribusiness translates the country's favorable resources and strategic geography into the ability to advance peace, stability, and prosperity for this nation and to help feed an ever-growing world population, there are challenges facing the industry.

US agribusiness has enjoyed a history of successful effort in dealing with threats of naturally occurring animal and crop contagions. The industry must continue this effort in light of the increased vulnerabilities of production concentration and globalized agricultural trade. Government and agribusiness must work together in preparing for the very real possibility of agroterrorism.

Biotechnology's genetically modified organisms have brought a revolution in the agribusiness industry's production of food. Despite obvious benefits, the industry is confronting serious consumer confidence concerning GMOs. In particular, the industry's resistance to labeling food with GMO content has generated negative reactions from American and international consumers. This is particularly important in the international arena, where questions over GMO content and demands for labeling are affecting US export sales. Government and industry will surely continue to investigate substantive concerns related to GMOs. In the short term, however, they must address the public affairs issues that threaten to derail American industry advantage in this important new area.

Environmental concerns will continue to be a pervasive force affecting all aspects of the agribusiness industry. The industry challenge is to sustain its unprecedented productivity in an environmentally responsible fashion. If it does not, industry will pay the price in the short run in the marketplace and in the long run will find that agribusiness's fundamental resource – the earth – can no longer sustain it.

Expanding trade is essential for the continuing prosperity of US agribusiness. As technological advances and increased productivity continue to increase production, the industry must find new outlets for its products. For American consumers, as well, open trade provides access to safe and abundant year-round supplies of food. Trade barriers and domestic subsidies currently make agriculture the most distorted sector of the world economy. Given the harmful effects of these distortions and the positive consequences of their elimination, the United States must continue to lead the effort in the WTO to reduce distorting practices in agricultural trade.

Agribusiness is one of the great strengths of the United States and an important factor in the nation's security. It has tremendous impact on other sectors of the economy as well as the health of its citizens. As the industry advances through a period of rapid change, cooperation between the government and the private sector can insure its continued vibrancy.

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[1] Commission on 21st Century Production Agriculture, *Directions for Future Farm Policy, the Role of Government in Support of Production Agriculture,* Feb. 2001, page vii.
[2] David Ginns, "Issues Impacting on Agribusiness Today," Presentation to the University of Western Sydney-Hawkesbury, April 3, 2000, <http://www.agribusiness.asn.au/NewsLinksCongressEvents/events/eventpapers/3April2000_Gir (26 March 2001).
[3] Ginns.
[4] Commission on 21st Century Production Agriculture, *Directions for Future Farm Policy, the Role of Government in Support of Production Agriculture,* Feb. 2001, page vii.
[5] Allen, Dr. John W. Professor, Food Industry Management Program, Michigan State University, Remarks to the USDA Outlook Forum 2001, New Directions in the Meat Sector, Alexandria, Virginia; 23 Feb 2001.
[6] Cotterill, Ronald W. Dynamic Explanations of Industry Structure and Performance. April 25, 2000 Commissioned Paper presented at USDA Conference "The American Consumer and the Changing Structure of the Food System" Washington, DC, May 3-5, 2000.
[7] Michael Boehlje, "Structural Changes in the Agricultural Industries: How Do We Measure, Analyze and Understand Them?", *American Journal of Agricultural Economics,* 81, no. 5 (1999), 1028-1041. ProQuest (14 March 2001).
[8] Mark Harris, "Organic Futures," *Vegetarian Times,* 283, Mar 2001. Proquest (14 Mar 2001).
[9] Robert Wolf, "Agriculture and Law," *The North American Review,* 285, no. 3/4 (May/August 2000): 75-80. ProQuest (14 March 2001).
[10] Wolf, "Agriculture and Law".
[11] Bill Christison, " The Impact of Globalization on Family Farm Agriculture," *In Motion Magazine,* 01 August 2000. >http://www.inmotionmagazine.com/bcbrasil.html>
[12] Wolf, "Agriculture and Law".
[13] "WTO: Agriculture's Stake in WTO Trade Negotiation. M2 Presswire Coventry 22 Feb 2001;
[14] Norman Steele, Presentation to ICAF Agribusiness Industry Study on "Agricultural Bioterrorism," 2 February 2001, Beltsville, Maryland.
[15] Peter Chalk, "The US Agricultural Sector: A New Target for Terrorism?", *Jane's Intelligence Review,* 8 February 2001
[16] William Inskeep II, Presentation to ICAF Agribusiness Industry Study on "Biological Agents as Threats to Livestock," USAMRIID, 27 April 2001.
[17] Peter Chalk, "The US Agricultural Sector: A New Target for Terrorism?"
[18] Ibid.
[19] Ibid.
[20] Inskeep II.
[21] Wolfert, Lauren. (March 8,2001) Genetically Modified Foods: The Issues Now and in the Future. pp 1 and 2.

[22] Liu, K. (May 1999) Biotech Crops: Products, Properties and Prospects. Food technology, 53 pp 42-48
[23] Leisinger, Klaus M. (Summer 2000) Yes: Stop Blocking Progress. Foreign Policy no119, pp. 113-122.
[24] Shere, Craig K. (July 6, 2000) Standard and Poor's Industry Survey: Agribusiness. pp. 10.

[25] N. Patrick Peritore, Ph.D., *Biotechnology: Political Economy and Environmental Impacts.*
[26] Frazier, Greg. "A US Perspective on Approaches to Market Access." Agricultural Outlook Forum 2001, Speech Booklet 6, Late Speeches, Thursday, February 22, 2001
[27] Pool, Bill. "How Will Agricultural E-markets Evolve?" Agricultural Outlook Forum 2001, Speech Booklet 6, Late Speeches, Thursday, February 22 2001.
[28] "Farms.com: Making Online Markets for Agriculture. Agri Marketing. Jan. 2000. FirstSearch. National Defense University Lib., Washington, D.C. 23 March 2001. http://firstsearch.oclc.org
[29] "What is Sustainable Agriculture?", University of California Sustainable Agriculture Research and Educaton Program, http://www.sarep.ucdavis.edu/concept.htm (12 March 2001).

[30] ICAF Agribusiness Industry Study meeting with professors at the Institute of Agronomy and Veterinary Medicine, Rabat, Morocco, 12 May 2001.
[31] ICAF Agribusiness Industry Study meeting with Deep Sea Fisherman's Union, Seattle, Washington, 09 April 2001.
[32] ICAF Agribusiness Industry Study meeting with 13th District Coast Guard, Seattle, Washington, 9 April 2001.
[33] Eugene H. Buck, "Overcapitalization in the US Commercial Fishing Industry," National Council for Science and the Environment, 22 February 1995, p. 1.
[34] Bob Holmes, "The Blue Evolution," *World Press Review*, June 1997, pp. 18-19.
[35] Veneman, Remarks at the Sparks Companies 9th Annual Food & Agriculture Policy Conference.
[36] Eric Schlosser, *Fast Food Nation: The Dark Side of the All-American Meal*, New York: Houghton Mifflin Company, 2001, p. 229.
[37] Anonymous, *Agriculture and Technology: A Not So Perfect Market*, The Economist, London. March 25, 2000.
[38] The News Tribune, *Viewpoint: Until US Takes an Aggressive Tariff Stance, Farmers Will Suffer.* Tacoma, WA Feb. 20, 2000.
[39] Kristin Dawkins, "Biotechnology and Biosafety: Battle Royale of the 21st Century," TWN Online, January 2000. http://www.twnside.org.sg/title/battle-cn.htm (24 March 2001).
[40] "Towards Digital eQuality." The US Government Working Group on Electronic Commerce. 1999. 23 March 2001. http://www.ecommerce.gov.
[41] Jekanowski, Mark D. and Binkley, James K.; Food Spending Varies Across the Unites States. *Food Review.* Washington, Jan-Apr 2000; Bhandari, Rajika and Smith Frank J. Education and Food Consumption Patterns in China: Household Analysis and Policy. Journal of Nutritional Education; Jul/Aug 2000; Miele, Mara; Short Circuits: New Trends in the Consumption of Food and the Changing Status of Meat. *International Planning Studies;* Abington, Carfax Publishing Co. Oct 1999
[42] Carlson, Andrea, Kinsey, Jean, and Nadav, Carmel; Who Eats What, when and From Where. Working Paper 98-05- University of Minnesota: The Retail Food Industry Center, 1998 (www.agecon.lib.umn.edu)
[43] Rich, Norm. Retailers Cautiously Optimistic for 1999. Interview conducted by *Food World*, Jan 1999, (www.best-met.com); Hutchinson, Barabara: Challenges for the International Market in the Coming Decade. Food Marketing Institute, Paper presented to the USDA Agricultural Outlook Forum Feb 1998. (from USDA Web site); and Progressive Grocer. In the Trade: News and Trends. Mar 2001 (www.progressivegrocer.com)
[44] Cotterill, Ronald W. Dynamic Explanations of Industry Structure and Performance. April 25, 2000 Commissioned Paper presented at USDA Conference "The American Consumer and the Changing Structure of the Food System" Washington, DC, May 3-5, 2000
[45] Senauer, Ben; Changes and Trends in Consumption Patterns. Department of Applied Economics, University of Minnisota. Paper presented to the USDA Conference on The American Consumer and the Changing Structure of the Food System May 3-5, 2000; Washington, DC, and Arlington, VA
[46] Siemering, Art. Food Forecasts for 2050. *The Futurist* Washington; Nov/Dec 2000
[47] "Tackling Hunger in a World Full of Aid: Tasks Ahead for Food Aid", Background paper presented for World Food Summit in November 1996, http://www.wfp.org/info/POLICY/HUNGER/P2.html

[48] Ibid.
[49] "World Food Programme 1999: Facts and Figures", http://www.wfp.org/info/intro/facts99,html
[50] "World Food Programme: Ocean Transport Service", http://www.wfp.org/logistics/transport/OTS.html
[51] "United Nations World Food Programme Food Aid Air Delivery Programme", http://www.wfp.org/logistics/transport/AirOps.html
[52] "Getting Food to the Hungry: WFP Logistics", http://www.wfp.org
[53] Cassidy, William B., "Transporting Relief", Traffic World, Vol. 258, Issue 3, 19 April 1999, Washington, D.C.
[54] For more on this topic see: Sadruddin Aga Khan, "Humanitarian Relief Aid: Does it Protect the Needy?", Speech given in the course of the *RENCONTRES DE LA SORBONNE* at the *Cite' de la Reussite* in Paris on 25 October 1992, http://www.gic.ch/git/Sorbonne.html; Newman, Richard J., "The Perils of Doing Good", US News and World Report, Vol. 121, 2 December 1992, and Newman, Richard J., "The Perils of Doing Good", US News and World Report, Vol. 121, 2 December 1992