

**Spring 2007
Industry Study**

**Final Report
*Agribusiness Industry***



ICAF

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AGRIBUSINESS 2007

ABSTRACT: American agribusiness provides a secure and safe food supply to our people, filling the first requirement of any sovereign state: to feed its people. In doing so, the industry accounts for about 12% of America's gross domestic product and employs about 17% of its workforce. It is thus central to both the security and the economic health of the nation. The ability of the agricultural sector to accomplish these feats reaches back to the founding of the nation, and has never been called into question—a history that has created a tendency toward complacency in policy makers as the industry faces increasing pressures from a range of sources. The specter of bioterrorism has intersected with the increasing globalization of the food supply chain to call into question the security and safety of the nation's food supply. Meanwhile, the pressures of an increasing population, urban encroachment, and concerns about domestic security have placed pressures on the three basic requirements for agricultural production: land, water, and labor. More recently, the competition between food and energy in ethanol production has increased these pressures, with second and third order effects rippling throughout the agribusiness industry. These pressures demand an integrated response by government if the nation is to preserve its ability to feed its people—but this response is complicated by the diffuse structure of the industry and its regulators, and by the processes through which the nation establishes its farm policy.

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PLACES VISITED

Domestic

Kern County Water Agency, Bakersfield, CA
Rain for Rent, Bakersfield, CA
North Kern Farm Equipment, Delano, CA
Randolph Farm, Delano, CA
Stamoules Produce, Mendota, CA
Beaulieu Vineyard, Napa Valley, CA
Paramount Exports, Oakland, CA
American President's Line, Oakland, CA
BSCC Produce, Salinas Valley, CA
SYSCO Foods, Salinas Valley, CA
Duda Fresh Farms, Salinas Valley, CA
Tanimura and Antle Produce Company, Salinas Valley, CA
Purdue University, College of Agriculture, West Lafayette, IN
Purdue Agronomy and Animal Sciences Farm, West Lafayette, IN
Iroquois Ethanol Plant, Rensselaer, IN
Huffman and Hawbaker Farms, Tippecanoe County, IN
US Department of Agriculture, Agricultural Research Service, Beltsville, MD
Clagett Farm, Upper Marlboro, MD
Campbell Soups, Camden, NJ
Agriculture Experimentation Station, Adams County, PA
Mason/Dixon Farms, Gettysburg, PA
Hollabough Brothers, Inc., Gettysburg, PA
Mott's Processing Plant, Gettysburg, PA
Smithfield Meat Processing Plant, Smithfield, VA
Office of US Trade Representative, Washington DC
USDA Chief of Staff, Capital Hill, Washington DC
Senate Agricultural Committee Staffer, Capital Hill, Washington DC

International

Ministry of Agriculture, Beijing, China
Chinese Academy of Agricultural Sciences, Beijing, China
Zucheng Wanyang Food Processing Co, Shandong Province, China
Shauguong Market, Shauguong, China
Sino Analytica Food Residue Analysis Lab, Qingdao, China
Yangling Agriculture Development Zone, Yangling, Shaanxi Province, China
Clone Goats Base, Yangling, Shaanxi Province, China
Chaun Kou Village, Yangling, Shaanxi Province, China
Caotan Farm, Yangling, Shaanxi Province, China
No. 5 Dairy Farm, Yangling, Shaanxi Province, China
Zhongkang Agricultural Development Company, Shandong Province, China

Agribusiness and American National Security

“When tillage begins, other arts follow. The farmers therefore are the founders of human civilization”
Daniel Webster, *On Agriculture*, January 13, 1840

Introduction

There is no more fundamental obligation of government or more basic requirement for civilized, ordered society than sufficient, safe and consistent food production and distribution. The United States (US) has long enjoyed the luxury of significant quantities of arable land, fertile soil, and equable climates conducive to year round growth and sustenance. When our natural resources are combined with our relentless and spirited push to improve yields in both quantity and quality, we are in the enviable position to not only feed our own nation abundantly, but we are also blessed with excess capacity to feed other nations.

While some may debate the relative primacy among a sovereign’s chief responsibilities - governing, defending and feeding its citizens - for any society to be *governed* responsibly and *defended* effectively, bellies must first be full to both govern and defend a people. Thus, as Daniel Webster observed above, agriculture is the keystone of civilization and remains so to this day.

In our studies and travels, the Agribusiness Industry Study Group found that this American keystone remains a robust and innovative industry, full of creative, hardworking and dedicated people. However, we also found a variety of “soft spots” in the underbelly of the industry that, with the wrong policy decisions, and/or with negligent or bad actors, could quickly and profoundly compromise our food supply on a large scale. Propelled by the dynamics of technological advance, globalization, government policy, consumer preferences, and relentless pressures from a growing population, the American agribusiness industry continues to adapt to maintain its competitiveness.

Our group offers this paper to further not only our collective understanding of the current state of the US agriculture industry, but to understand the domestic and global dynamics swirling above our fields and pastures and to offer recommendations informed by careful study, travel and thoughtful query.

We begin with a discussion of why agriculture is central to our national security and then examine the structural framework of the industry. Within this framework we examine some of the salient dynamics, such as the Farm Bill and food safety that are changing the way the industry conducts business. We close with recommendations for the industry and policymakers as they look forward into our new century.

I. Agribusiness and National Security

Agriculture remains stage center in our national strategic architecture in the 21st Century. Not surprisingly in our post 9/11 world, US agribusiness was identified by the President as critical national infrastructure in 2004.¹

The recent “spinach crisis” of 2006 demonstrates all too plainly the importance of safe food supplies and the impact of contaminated food on the American dinner plate, psyche, and economy. Once E.Coli bacteria was reported in spinach, with associated

sickness and death, sales of this multi-million dollar crop dropped precipitously, along with related leafy green crops. Consumers' perceptions of safe food were seriously shaken – and all this from an inadvertent contamination.² The recent Chinese wheat gluten pet food contamination, which then morphed into the human food supply through hogs, chicken, and fish is yet another example of our vulnerability in this interdependent global economy and the speed by which our infrastructure can be compromised. One can only imagine the economic, social, and security impact of agro-terrorism, that is, a deliberate contamination of a food source.

Food safety is but one symptom of our globally interconnected agricultural community and just one national security lens on agriculture. Sufficient and consistent food supplies are also vitally important to national security. Consider the cantaloupe and broccoli farmer who scratches his head, knee deep in broccoli, wondering how he will bring in his summer harvest after Immigration and Customs Enforcement (ICE) has swept through the nearby town of Mendota, California, arrested 1000 migrant workers and shipped them back to Mexico. This sentiment was universal among US growers – exasperation at the lack of any viable alternative to harvest the crops. Field labor is, indeed, America's Achilles Heel.

American farm policy, defined in the Farm Bill, operates at the intersection of domestic politics, budget constraints, and the international trade regime that is critical to the American economy and agribusiness. These influences will threaten to compete with the policy choices necessary to sustain the industry in the years to come. The trade regime in which American agribusiness operates is further complicated by the widespread practice of using phytosanitary standards as a means of restricting trade, in lieu of more traditional means of tariffs and quotas.

Threats to the Industry

There are two principle areas where agribusiness and national security intersect most visibly.

- ***Agroterrorism and Food Safety.*** The continuing threat of contamination of our food supplies is palpable – whether through inadvertence or deliberate sabotage. Did the spinach problems of 2006 or the contaminated peanut butter³ or Chinese wheat gluten of 2007 embolden our enemies to pursue such a tactic? Despite our national best efforts, our study group found that the complexity, breadth and “soft spots” throughout the industry make such an attack not an “if”, but a “when.”

- ***Increasing pressure on the basic elements of production:*** There are a variety of growing pressures that affect our ability to produce sufficient food supplies. The seemingly inexorable loss of arable land to urban encroachment, ever more frequent water shortages, the use of corn for ethanol fuel, and increasingly unpredictable migrant field labor force are just some of the topical pressure points. Some estimates project that these pressures, coupled with a growing population, will by 2050 bring America to the point where it cannot feed its people. This will be a historic turning point, and clearly raises some critical questions for policy makers. If the US cannot feed its people, who will? And are we comfortable, with a nation, relying on external sources for the basics of existence? What effects might this fundamental change in our security requirements have

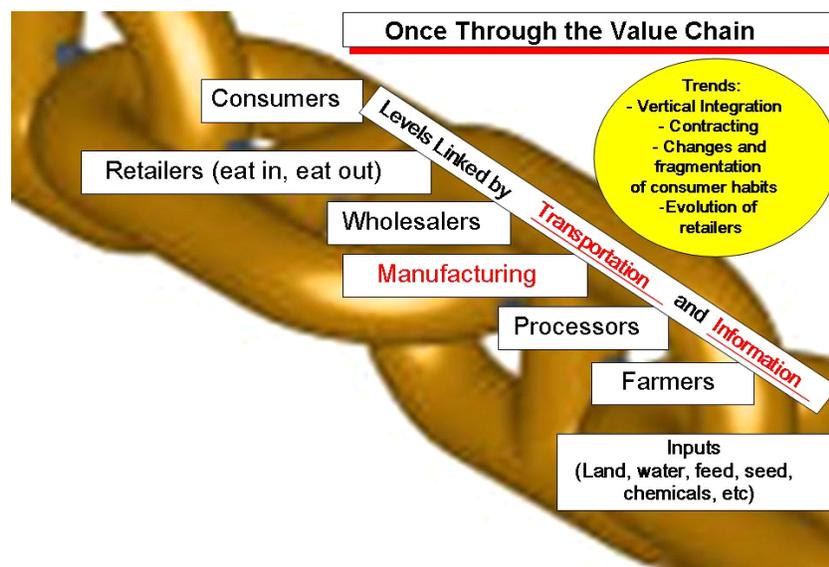
on our security policies? What measures should we adapt now in our agricultural sector to preserve our capabilities?

Among these, we have focused on ethanol and labor as the most acute. The almost Hobbesian choice between using corn for ethanol or for feed stock is stark in discussions with those who study our agricultural heartland and watch with ever increasing anxiety the current proliferation of ethanol plants. Additionally, the basic input of manual labor that permits the grower-producer to harvest the crop is as important as sun and water. But for the American farmer, labor is becoming far more unpredictable than, and as uncontrollable as, the sun and water. The availability and consistency of migrant labor, due in part to our ongoing national debate and associated immigration enforcement initiatives, was an issue common to virtually every conversation our study group had with grower-producers.

II. Structure and State of the Industry

The agribusiness industry is vast in breadth, enormously complex, and composed of countless subordinate ‘markets.’ The industry is best defined as a series of activities or steps, generally known as the “value chain.” This value chain is composed of myriad inputs that include things as simple as seed, soil, water, and sunlight, and advance to processors, manufacturers, and wholesalers who take the raw materials, i.e., broccoli, cotton, soy, cattle, or pig, and process them into consumable retail items by packaging, marketing, and transporting them to retailers who sell to restaurants or grocery stores.

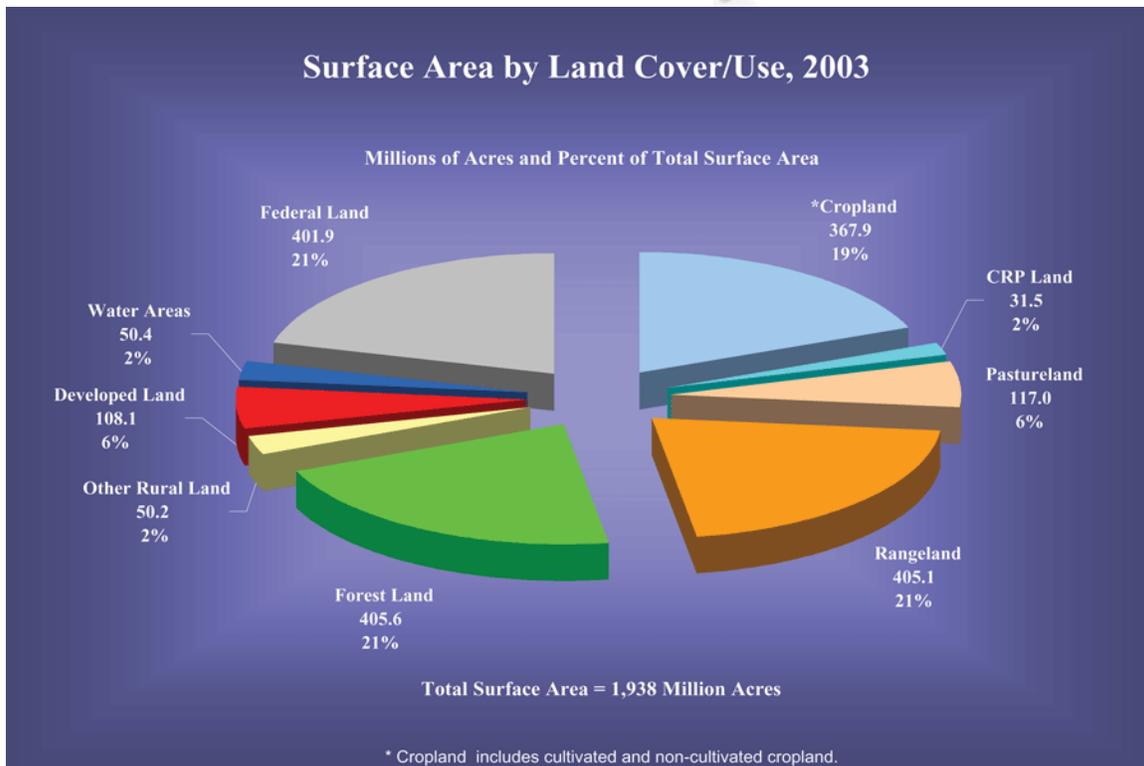
The diagram below is a shorthand visual of this enormously productive and efficient, albeit vulnerable value chain. Each step has its own infrastructure and processes that transform raw materials into a consumer driven range of products distributed for a reliable and safe food supply. That said, we also found that each step in the value chain comes with vulnerabilities and inherent risks of contamination. Taken cumulatively, these risks have the potential to considerably alter the safety of an otherwise simple food. As we shall discuss later, given the complexity of this industry it is remarkable that our food remains as safe as it does.



1. Land and Labor – Feeding 300 Million People a Day

In both fertile land and salutory climate the US reigns supreme. From coast to coast, through multiple climate zones, across vast changes in topography and temperature, the North American continent is the most productive agricultural region in the world.⁴ Our natural conditions, combined with technology and the uniquely American business spirit generate an unmatched competitive advantage.

Of the total US land mass of over 2 billion acres, the majority, or almost 1.4 billion acres (71%) is in nonfederal rural land uses (rangeland – 405 million acres, forest land – 406 million acres, cropland – 368 million acres).⁵ A subset of this land is considered “prime farmland – those lands with the best combination of physical and chemical characteristics” for producing food and fiber and that is available for such uses.⁶ The most recent data from The US Department of Agriculture (USDA) shows that of the 368 million acres of prime farmland in the lower 48 states, 16% or 58 million acres of this is non-cultivated (up from 11% or 44 million acres in 1982).⁷ These 368 million acres produce a crop and livestock output of \$258 billion annually.⁸ The agribusiness industry represents 12% of our gross domestic product, or \$1.24 trillion.⁹ It is no small thing to say this acreage produces an abundance of safe consistent food to over 300 million Americans every day and to many millions more around the globe.



<http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landusemrb.html>

Agribusiness' labor sector (including all components of the value chain), while shrinking every year, employs approximately 23 million people.¹⁰ Production agriculture has not only changed the face of the farm, but has concomitantly made the more efficiently produced food far cheaper resulting in food that consumes less of the average

American monthly budget than ever before.¹¹ The chart below demonstrates the massive changes wrought by innovation, technology and market changes.

Farming's changing role in the Nation's economy

1900
41 percent of workforce employed in agriculture

1930
21.5 percent of workforce employed in agriculture;
Agricultural GDP as a share of total GDP, 7.7 percent

1945
16 percent of the total labor force employed in agriculture;
Agricultural GDP as a share of total GDP, 6.8 percent

1970
4 percent of employed labor force worked in agriculture;
Agricultural GDP as a share of total GDP, 2.3 percent

2000/02
1.9 percent of employed labor force worked in farming (2000); Farming GDP as a share of total GDP (2002),
0.7 percent

Source: Compiled by Economic Research Service, USDA. Share of workforce employed in agriculture, for 1900-1970, Historical Statistics of the United States; for 2000, calculated using data from Census of Population; agricultural GDP as part of total GDP, calculated using data from the Bureau of Economic Analysis.

2. Farms and Farmers Transformed

Clearly, the face of the farm is no longer Ma and Pa Moses dourly holding a pitchfork and tending their 100 acre farm. Instead, the modern American farm is large, often a patchwork of owned and leased land, and run by well educated technology savvy, globally focused, businessmen and women and corporations who set the standard for production agriculture using bioengineered crop seeds and computer networked farm and irrigation equipment. Farm equipment mechanization alone tells the tale of a transformation in US agriculture (below left). Although technology and production agriculture generated a massive productivity, they also gave rise to a massive exodus of the population from the farm (below right).

Mechanization

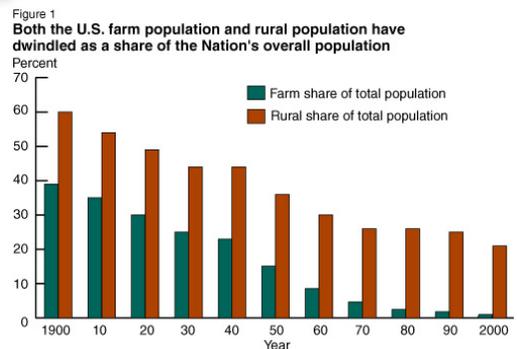
1900
Number of work animals: 21.6 million

1930
Number of horses, mules: 18.7 million
Number of tractors: 920,000

1945
Number of tractors: 2.4 million
Number of mules and horses used for work power on farm: 11.6 million

1960
Number of tractors: 4.7 million
Number of horses and mules used for work power on farm: 3 million

Note: Data on work animals were no longer collected by the Census after 1960.
Source: Compiled by Economic Research Service, USDA, using data from Census of Agriculture and Census of the United States.

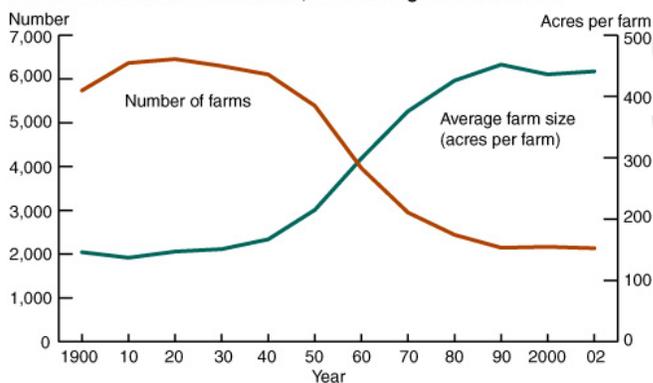


Source: CRS Publication – The Farm Economy, February 21, 2007

As the number of farms fell dramatically in the last century, the average size of those that remained increased just as dramatically (below left). Moreover, farms began to specialize (below right) thereby radically decreasing the number of commodities produced per farm (from an average of five commodities per farm in 1900 to one per farm in 2000).¹² This reflected the production and marketing efficiencies gained over time and the reduced risk of single crop reliance.¹³ Remarkably, all of this has occurred with a negligible change in the amount of land under till.¹⁴ Today, most food consumed is produced by dynamic, high-tech/high-volume farm operations, which have incorporated numerous mechanical and biological advancements. Developments in science and technology have contributed to better soil, nutrients, water, and pest management. They have also contributed to more efficient methods of planting, harvesting, storing, processing, and transporting farm products.

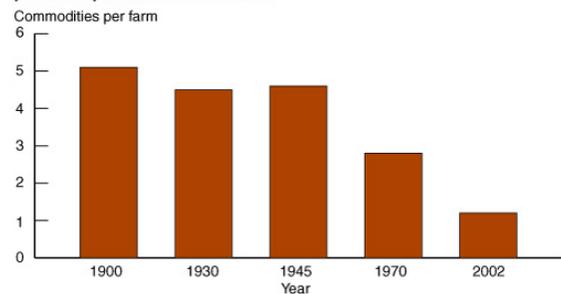
This fundamental transformation in production, distribution, and consumption of the food supply will continue to “industrialize” and centralize the industry and will escalate the risks inherent in food production. This centralization across every agricultural component means that even crops like fruits and vegetables are now grown, packaged, and shipped like industrial commodities. Economic and logistics efficiencies, however, bring a new level of risk in food safety: a little contamination can go a long way. For example, in the fresh fruit and vegetable sector just 20% of the farms in America contribute 75% of total commodity sales.¹⁵ In the recent case of fresh cut spinach, contamination from a single area resulted in outbreaks of E-coli in 26 states.¹⁶ Globalization and industrialization of the food supply has resulted in more and better quality food than in the past. However, this centralization presents new opportunities for food borne illnesses to infect large numbers of consumers. The effect of this change has been to exponentially magnify the problem of food safety and play a part in how the industry continues to transform.

Figure 3
As the number of farms declined, their average size increased



Source: Compiled by Economic Research Service, USDA, using data from *Census of Agriculture*, *Census of Population*, and *Census of the United States*.

Figure 4
As farms have become more specialized, the number of commodities produced per farm has decreased



Note: The average number of commodities per farm is a simple average of the number of farms producing different commodities (corn, sorghum, wheat, oats, barley, rice, soybeans, peanuts, alfalfa, cotton, tobacco, sugar beets, potatoes, cattle, pigs, sheep, and chickens) divided by the total number of farms.
Source: Compiled by Economic Research Service, USDA, using data from *Census of Agriculture*, *Census of the United States*, and Gardner (2002).

The continuing transformation of the US agricultural industry beginning in the 20th Century has been as momentous as it will be far reaching. It is impossible to exaggerate the sheer enormity of this ultra modernized industry. Hybridized or biotech corn seeds are now nearly impervious to pesticides and herbicides. From irrigation technology and infrastructure, to marshalling the manual labor required to harvest, to

specially designed machinery, to transport trucks, to cavernous cold storage within minutes of harvest, to a wholesale/retail chain that speeds refrigerated trucks and containers along extensive and efficient routes of commerce of many thousands of miles - a fresh head of broccoli and lettuce lands in the chilled and computer controlled misting display cases of grocery stores as soon as 24 hours but no later than 5 days of field cutting.¹⁷ This remarkable field to fork time is a story of hard work, ingenuity, technology, and spirit. The state of this industry is unmatched anywhere in the world; and although not without evolving challenges like food safety – this is the essence of America’s agricultural *competitive advantage*.

III. The Role of Government

Throughout history, governments have exercised some level of influence over the agricultural sector. Today, the US government provides significant indirect and direct support to the agriculture industry. Indirect support includes transportation and water infrastructure (California water canal at right), and information infrastructure. Many farmers are hooked in digitally to global positioning systems (GPS) to plow fields and use satellite weather or soil image mapping down to the quarter acre. Direct support consists of efforts by USDA to regularly provide available research on marketing and production. Land grant universities have long stood as a clear message of the centrality of agriculture in US national agriculture policy. These universities, first established in the mid to late 18th century, continue to enhance agricultural research and development and the overall quality of American agriculture. Additionally, the USDA extension services work closely with farmers to address practical issues on modern farms.



1. Economic Regulation

Government’s role in an agricultural regulatory scheme is most visible and perhaps most notorious in legislation. The ongoing legislative cycle will promulgate the latest iteration of the 2007 Farm Bill. The Farm Bill, revised every 5-7 years, is quite nearly a political manifesto – yielding a portrait of American agriculture at the time of its passage. The original purpose of the Farm Bill was to enable farmers to succeed with volatile markets and unpredictable weather. Now an extremely complicated Bill with ten Titles, the latest iteration is due for passage sometime in late 2007 and is arguably quite removed and unrelated to its original “life-vest” foundation. Some of its most controversial elements, to be covered below in more detail, are the direct and indirect payments to select farmers for select crops. When squared off against the WTO, a battle royal emerges for 2007-2008. WTO rulings suggest that substantial revision to the Farm Bill’s arguably market distorting subsidies and tariffs will be required. Government regulation reaches into other areas, as well. As an example, in early 2007, the Department of Energy selected 11 cellulosic ethanol conversion projects to receive up to \$408 million dollars in federal funding, as part of the Government’s alternative and renewable fuel initiatives that will be continued in the new Farm Bill.¹⁸

2. Social Regulation – Food Safety

Food safety and quality and animal health are regulated by USDA and the Food and Drug Administration (FDA). USDA inspectors are an important example of the vital role the government plays in ensuring, for example a safe meat supply. Positioned in a slaughterhouse, monitoring animal intake, the manner of death, the ready to eat line, the fresh meat line, the cold storage facility, the daily cleaning of the slaughterhouse, the management of effluent – all of these potentially contaminating events and environments are under the purview and watchful eye of permanently assigned inspectors. Given the scale of operations at just one slaughterhouse we visited – 10 thousand head of pig in a day – the importance, scale and success of these inspectors is as remarkable as it must be precarious. Opportunities to make a mistake in such a complex operation are great. A finite number of eyeballs cannot be everywhere at once.

3. Environmental Sustainability

Sustainable agriculture is a growth industry in the public and private sector. Public policy and governmental action at all levels play key roles in this initiative. Sustainable agriculture is science-based and treats the farm as an integrated whole composed of soil, plants, animals, and insects whose interactions can be used to solve problems and maximize yields.¹⁹ The relationships among these elements can be altered to accomplish the goals of growing crops and raising livestock while relying on fewer (if any) fertilizers and pesticides.²⁰ Key elements of sustainability include farming systems that are capable of maintaining their productivity and usefulness to society *indefinitely*. These systems are characterized as resource-conserving, socially supportive, commercially competitive, and environmentally sound.²¹

The key to sustainable agriculture lies in an approach that requires coordinated policies and government support. In order for farmers to transform to more sustainable farming practices, the US Government must place a greater focus on properly directed subsidies.²² Current policies support the food industry through enormous subsidies and direct payments to farmers, particularly those growing commodity crops. Conservation is one among many existing *and* emerging priorities in the 2007 Farm Bill. Subsidies are currently allocated through the Conservation Security Program. *All* farmers may qualify for these subsidies by developing conservation plans specific to their own land. These subsidies alone may be enough of an incentive for farmers to change their current farming practices. As we move forward, government's role in the promotion of sustainable agriculture will be critical.

IV. Dynamics of Change

Like so many aspects of our modern, globalized world, American agribusiness dynamics are complex, profound and dynamic. As change is a constant in life, so it is in our agricultural sector. We found in our travels essentially four broad areas that keep the industry in constant evolution and the US at the crest of the wave of change.

1. Technology

The strength of US agribusiness is not only in our land but in the creative ingenuity of our people. So long as we continue to pursue a technological edge in agriculture, we will be well positioned to sustain our lead in productivity.

Technologies used to support agribusiness have changed significantly in the last 20 years. While genetic plant and animal research have improved varieties and yields, the introduction of information systems and precision management techniques have allowed reduced inputs (nutrients, herbicides, and insecticides), increased yields, and reduced environmental pollution. The technologies which have provided these improvements in agricultural production and environmental protection include the global positioning system (GPS), remote sensing, geographic information systems (GIS) (i.e. satellite imaging of soil quality or water content) and variable rate distribution (i.e. of fertilizer).

Recent research in agriculture has been targeted at evaluating and developing the concept of precision agriculture and farming. The concept of precision agriculture is that agricultural inputs such as seed, fertilizer, water, pesticides, and herbicides should be applied at variable rates rather than uniformly as historically practiced. Precise variable application of inputs will maximize yield and/or economic returns while minimizing detrimental affects on environmental resources and the ecology – part of our sustainability drive, as well.

From disease resistant crops, to GPS controlled plows, to computer controlled drip irrigation over vast acreage, to cavernous cold storage of fresh cut vegetables, to 270 lb pigs ready for slaughter in only 6 months, to the emergence in full splendor of the ethanol stepchild – technology drives American agribusiness and sustains America's competitive advantage around the world.

During our travels, we found farmers constantly looking for ways to modernize and wrestling with ways to mechanize for example, the vegetable harvest. Indeed, we found some farmers shifting from hand-picked labor intensive field crops like broccoli to almond and pistachio tree crops that are harvested by machines. As they have historically, technological advancements affect labor requirements and manifest the second and third order dynamics of technology.

Finally, as cloned animals, animal growth hormones, and biotech crop seeds push new boundaries in experimentation and productivity, policy makers, producers, and consumers (both domestic and international) will wrestle with and benefit from the brave new world of agriculture that technology portends.

2. Globalization

Like technology, globalization continues to revolutionize agribusiness – from the farmer, to the manufacturer, to the wholesaler, to the retailer, to the consumer. The industry has opened up world markets in ways unanticipated years ago. Imported produce has become an increasingly important component of the US diet. USDA statistics show that in 2004, 2005, and 2006, US agricultural imports (\$61.5 billion) were nearly equal in value to US agricultural exports (\$64.5 billion).²³ Moreover, the entire US food industry is generally thought of as a \$1 trillion to \$1.25 trillion industry.²⁴

Across the globe 2 billion metric tons of grains are produced yearly, along with 400 million metric tons of dairy products and more than 200 million metric tons of meats.²⁵ Food has been mobilized as a commodity in global production and trade systems and governed through global institutions. Globalization and new manufacturing capabilities have changed the makeup of the food that Americans put on their table. Food processors in the United States are buying a greater number of ingredients from other countries and becoming more of *an assembler* in the nation's food supply chain. Globalization has also led to the rise of massive multi-national food processing companies which often sell their foods under local names in local languages, after producing them in regional factories worldwide.²⁶ "With globalization, American food processors are turning to less-developed countries to get food ingredients because they can get them so much more cheaply."²⁷ "In the same meal these days, we may be eating food from several regions of the world..., [b]ut you get what you pay for in terms of food safety. These food processors may be looking for a cheap new source, but they may pay for it down the line."²⁸ The sheer magnitude of the volume and the diversity of internationally traded agricultural products have heightened the concern for food safety and security. As a dynamic of change, globalization has not only changed how we "do agribusiness" but also, it has changed the inherent risks in the business.

The consequences of the wheat gluten incident²⁹ highlight the complex interaction between all parts of the food value chain which are exponentially magnified when placed in the global arena. Globalization, industrialization, and centralization of the food supply have resulted in more and better quality food than in the past. However, this centralization presents new opportunities for food borne illnesses to infect large numbers of consumers. Indeed, the risks are exponentially magnified.

Last year, US inspectors sampled just 20,662 shipments out of the more than 8.9 million that arrived at American ports. China, which in one decade has become the third largest exporter of food, by value, to the United States, sent 199,000 shipments, of which less than 2 percent were sampled. In this game of Russian roulette, are you feeling lucky?

3. Government Policy

Government policy permeates almost every aspect of the agribusiness industry. The upcoming 2007 Farm Bill manifests the most potent example of not only domestic impact on all elements of the industry, but directly affects our international trading posture. With the likelihood that commodity support programs will continue in some form in the Farm Bill, and the predictable collision with our international trading partners at the World Trade Organization, it remains murky at best how this dynamic will impact the industry. Such uncertainty has its own motivating force as elements of the industry try to predict their best course for economic success. Clearly the influence of government policy stretches beyond the Farm Bill, to include environmental regulation and energy incentives. The second, third, and fourth order effects of this sampling of government oversight and supervision are almost limitless.

4. Consumer Demand

Consumers worldwide are driving the changes in agriculture. Rising consumer income, changing demographics and lifestyles, and shifting preferences due to new information about the links between diet and health all contribute to new demands for foods.³⁰ For hundreds of years, farmers have “pushed” their products into the market and consumers have eagerly consumed what was provided. Now, however, consumers are influencing the market mix. Consumers are demanding quality, convenience, nutrition, and health from farm products and processed foods. The aging baby boom population and increased life expectancy of Americans have boosted demand for fresh produce, lean meat products, and organic and specialty crops from both imported and domestic sources. Consumers also want meal solutions that save time and come in individual portions. They seek products to provide added health benefits without compromising on taste. The impact of this is to reshape what is produced, how it is produced, and how it is brought to market.

V. Challenges – Selected Issues and Recommendations

In an effort to highlight the more salient forces impacting the future of agriculture and our national security we will focus on four primary issues; 1) food safety 2) the ethanol boom 3) migrant labor and 4) the US Farm Bill. Although there are additional issues that lay at the intersection of our agricultural base and national security, in our view these are the most influential.

Issue Area 1: Food Safety and Security – Are You Feeling Lucky?

“Hazards in food cause an estimated 76 million illnesses, 325,000 hospitalizations, and 5,000 reported deaths in the United States each year ... These illnesses cost American taxpayers approximately \$6.9 billion annually”³¹

Food safety is now a highly visible issue for both the American consumer and the food industry. Inadvertent or negligent food borne bacterial contamination is almost a daily news event. Moreover, the tragic events of 9/11 jarred America into accepting the unthinkable – that the nation is vulnerable to not only a catastrophic terrorist attack but also what is now referred to as “agro-terrorism” - the intentional introduction of harmful pathogens into the food supply causing widespread sickness and/or death.³² Whether inadvertent, negligent, or intentional, food contamination threatens our national security unlike any other time in our Nation’s history.

a. Food Security and Food Safety

Unlike national defense, protecting the nation’s food supply from deliberate attack is a shared responsibility among federal, state, and local governments and private industry. It will require an unprecedented public-private partnership which is ultimately at the heart of homeland security – infrastructure protection.

The same can be said for food safety, that is, prevention of inadvertent or negligent contamination. Modern food production is extremely complex and requires a sophisticated infrastructure which favors larger food companies. Food safety crosses several federal regulatory boundaries as well as state agencies, academia and industry. Both food safety and food security require an integrated, systems approach that is built on scientific expertise, is risk based and is capable of recognizing and responding to new risks.

b. Securing a Complex Multifaceted Industry

The US food and agriculture sector has a tremendous capacity to feed people beyond the boundaries of the nation. More than 2 million farms, about 900,000 firms and 1.1 million facilities comprise the US agriculture value chain, and are almost entirely under private ownership.³³

Although the US food supply is among the world's safest, increases in the variety of foods, concentration of food production, exponential growth in food imported into the US, the global nature of food commodities, and availability of convenience items contributes to public health concerns. The complexity of the food industry, and of the technologies used in food production and packaging, is increasing. The sector is also highly dependent on several other critical infrastructure sectors that span the entire farm-to-table continuum, including chemical, water, transportation, and energy. While interdependency is not unique to this sector, it presents additional challenges because of the openness, diversity, and breadth of agricultural production. Securing this sector presents unique challenges because US agriculture and food systems are extensive, open, interconnected, diverse, and complex structures providing attractive potential targets for terrorist attacks and endless opportunities for negligent or inadvertent contamination.

For example, an attack on the food supply, or a failure to follow grower safety protocols could result in severe public health consequences. The affects of the recent spinach contamination were profound, with death and sickness reported, albeit on a comparatively small scale, across the nation. Moreover, this contamination rippled through the nation's entire food supply chain. Indeed, the recall didn't shut down only a company, but affected the entire fresh leafy greens produce sector. Understandably, growers and markets have a powerful built in incentive not to poison their customers, and the estimated loss from the spinach E.coli outbreak, of between \$37M-\$74M, reinforces this message.³⁴

This economic loss was the result of negligent contamination within the industry. Any deliberate attack on the food system has potential to significantly impact both the economy in addition to causing widespread disease and/or death, as well as panic. The speed by which a product gets to market and the time required for detection and identification of a causative agent complicate the nature of the sector.

c. More Frequent Contamination, Changing Risk Profiles – a Conundrum

Produce related outbreaks of food borne illness have increased from 29 outbreaks in 1997 to 86 in 2004.³⁵ Americans are now more likely to get sick from eating contaminated produce than from any other food item. Fundamental changes to

production, distribution, and consumption of this part of the food supply have changed the risk profile in certain foods such as fresh cut produce. The industry is more centralized and as a result, a little contamination can go a long way. For example, a single producer of spinach potentially can have an impact across the entire country or the world within a week or less. Further, as food production, distribution and consumption trends continue to evolve, the affect is to exponentially magnify the problem of food safety.

When taken cumulatively, seemingly minor and insignificant changes in food production methods (i.e. packaged precut lettuce), society (desire for convenience foods) and the environment (livestock surface effluent contaminating irrigation wells) have the potential to considerably alter the risk profile of something relatively simple, such as fresh cut spinach.

Modern food production then is extremely complex. The fundamental changes to production, distribution, and consumption of the food supply have changed the risk profile in certain food products such as fresh cut produce. A systematic overarching approach is therefore, required to identify and monitor hazards and risks at each point in the food chain.

d. The Regulatory Response to the Risks - Food Security

Unlike other critical infrastructure sectors which have a clear federal government agency lead, two main federal government agencies regulate the food and agriculture sector: the Food and Drug Administration (FDA) and the US Agriculture Department (USDA). The Department of Homeland Security (DHS) is the overall coordinator, and works with these two agencies to interact with state, local and private sector partners. Artificially bifurcated, USDA is responsible for the safety of 20 percent of all food consumed in the US, including meat, poultry, and eggs. The FDA regulates everything else.³⁶

Significant progress on homeland security goals is being accomplished through a unique public-private partnership organized under two main bodies called coordinating councils. The Sector Coordinating Council (SCC), a self-governing body, represents the food industry and provides a forum for the private sector to discuss infrastructure protection issues among themselves, or communicate with the government. The Government Coordinating Council (GCC), with representation from federal, state, local, and tribal governments, is the public-sector component. The GCC coordinates food security strategies and activities, policy, and communication across government and to the sector to support the nation's homeland security mission. The SCC-GCC partnership provides leadership on food, agriculture, and natural resources, including planning and executing sector-wide security programs to defend the nation's food and agriculture infrastructure. The forum is a way to introduce new initiatives for mutual engagement, evaluation, and implementation, and to resolve issues.

e. Food Safety

The same overarching partnership approach does not exist for the food safety portion of the equation until *after* an incident occurs. The American food-safety system is

thought by some to be hampered by overlapping bureaucracies. For example, 15 agencies have been identified as collectively administering at least 30 laws related to food safety. These 15 agencies have also entered into 71 interagency agreements aimed at better protecting public health and coordinating food safety activities.³⁷ These numerous federal agencies have yet to include the state or private component stakeholders in the process.

Reports on the 2006 spinach contamination recommend a fundamental re-examination of the federal food safety system.³⁸ Put simplistically, the current federal food safety system has emerged piecemeal over many decades. The result is a “fragmented legal and organizational structure that gives responsibility for specific food commodities to different agencies and provides them with significantly different authorities and responsibilities”.³⁹ Furthermore, “[a] federal food safety system with diffused and overlapping lines of authority and responsibility cannot effectively and efficiently accomplish its mission and meet new food safety challenges ... fundamental changes are needed ... there is a need to overhaul existing food safety legislation to make it uniform, consistent, and risk based”.⁴⁰

f. Conclusion

The food and agriculture sector provides an abundant and safe food supply for the nation and the world. Protecting this sector represents a difficult, yet critically important responsibility. The continued development of comprehensive security policy and strategies for protecting the sector’s critical assets, systems and networks will help meet this responsibility. In terms of food safety, there is considerable disagreement among all the stakeholders as to whether or how to establish a systemic overarching approach; however, there is one area of agreement - the consequence of inaction. “Unless something changes, we will have another outbreak.”⁴¹ As the US endeavors to maintain its credibility as having one of the cheapest, safest food supplies in the world, it must seriously consider the consequences of its current inaction relative to food safety, and by implication, food security.

g. Recommendations

1) Food Security – Baking Security into the Process

While tremendous progress has been made in food security over the past few years, more remains to be done. The SCC-GCC is jump-starting the process. A continuing challenge will be to reach local communities across the US. After all, all incidents are local. The SCC-GCC must strive to include small and medium size business and other players “outside the beltway.” More importantly, the SCC-GCC must make the case for security among competing priorities. Security needs to be a natural part of doing business. The goal is for security to be “baked in” the process. Success is only possible with more partners and investment in security. It will require the full support of federal, state, and local governments, and private industry.

2) Food Safety – A Single Agency to Manage an Integrated, Systems Approach

Food safety requires an integrated systems approach and, currently, this does not exist. Forming a centrally managed federal food safety agency, which consolidates the 15 current food safety agencies under a single independent agency or department, is the only reasonable solution. Inaction is not an option. Such an agency would implement a science-based system to ensure that surveillance, regulatory, and research resources are allocated to maximize effectiveness towards risks that have or will have the greatest significance on food safety. The final food safety of any product is the result of interaction among multiple factors across the entire food supply chain. The world is constantly changing and any implemented system must be flexible and continue to change with it. It must be built on scientific expertise, be risk based and capable of recognizing and responding to new risks. There is no silver bullet for this problem.

Issue Area 2: Crops for Food versus Crops for Fuel – the Ethanol Dilemma

“It’s in our vital interest to diversify America’s energy supply -- using everything from wood chips to grasses, to agricultural wastes. Let us build on the work we’ve done and reduce gasoline usage in the United States by 20 percent in the next 10 years. To reach this goal, we must increase the supply of alternative fuels, by setting a mandatory fuels standard to require 35 billion gallons of renewable and alternative fuels in 2017.” State of the Union Address, 2007, President George W. Bush

The intersection of the energy and agribusiness industry sectors is undeniable. Motorists in the United States consumed 140 billion gallons of gasoline in 2006. Both for national security and environmental reasons, we must develop alternative renewable sources of fuel to reduce our reliance on imported oil from the Middle East and lessen carbon monoxide emissions harmful to the environment. President Bush’s “Twenty in Ten” initiative and renewable fuel standard goals exemplify the government’s pro-alternative energy initiatives that have triggered an ethanol boom in the United States. Ethanol use rose from 1.8 billion gallons in 2001 to 5.4 billion gallons in 2006, comprising 3-4% of automobile fuel, notwithstanding that ethanol is more expensive to make than gasoline and only 70% as efficient.⁴²

a. The Main Ingredient – Corn

Of the 5.4 billion gallons of ethanol used, the US produced 4.9 billion gallons - 95% from corn. The remainder was imported, primarily as Brazilian sugar-based ethanol. The US imposes a 54 cent per gallon tariff on sugar based ethanol imports unless the ethanol is reprocessed in Caribbean Basin Initiative countries.⁴³

In the 2006/2007 marketing year, more than 18% of the 2006 corn crop was used for ethanol production – up from 13% of the crop yield in 2005.⁴⁴ As of April 2007, there were 116 existing ethanol plants and 78 new ethanol plants and 7 expanded plants under construction. Together these plants are projected to enable the US to produce 12 billion gallons of corn-based ethanol a year by 2008.⁴⁵

Even if every one of the 70 million acres on which corn is now grown was used for ethanol, the amount produced would displace only 12% of US gasoline motor fuel

demand.⁴⁶ The bottom line is that the US cannot harvest enough corn to replace a significant amount of gasoline as a motor vehicle fuel.

b. Food versus Fuel

Debate is intensifying over the food vs. fuel issue. Historically, the bulk of our corn supply has been used as animal feed and to produce high fructose corn syrup. In 2007, 25% of the US corn harvest is expected to be used in ethanol production – up from 18% in 2006.⁴⁷ The percentage of corn for ethanol is expected to increase even further as the 78 new ethanol plants become operational. Corn production acreage is expected to increase from 70 million to 90 million acres in 2007. This increase in corn production acreage comes at the expense of other crops, such as soybeans, which will likely result in an increase in the prices of those crops.⁴⁸ This increased demand for corn as raw material for ethanol production has produced some detrimental externalities.

Corn prices have increased to record heights (from \$2.50 per bushel in 2006 up to \$4.16 per bushel in 2007) driving up land prices for corn acreage.⁴⁹ Ethanol competes with animal feed and high fructose corn syrup for existing corn. Thus, higher prices for corn caused by the ethanol demand is causing a rise in cost for high fructose corn syrup and animal feed, driving up consumer prices for chicken, pork, beef, and products, such as soft drinks, made from high fructose corn syrup.⁵⁰ While these price increases have not initiated a public outcry in the US, there are reports that diversion of corn to ethanol abroad has had an impact. In January, 2007, riots in Mexico followed a 30% increase in the price of corn tortillas. Conversely, China is declining to expand its corn-based ethanol production out of concern for the negative externalities to its food supply.⁵¹

c. The Hoped-For Alternative – Cellulosic Ethanol

Corn may fade over time as the main ingredient in ethanol if cellulosic ethanol can be produced profitably. Cellulosic ethanol is made from a wide variety of plant materials. It has an energy yield at least 4 to 6 times that of corn-based ethanol and can reduce greenhouse gas emissions relative to gasoline.⁵² Cellulosic material has potential to produce ethanol more efficiently than corn and is safer for the environment.

However, generating cellulosic ethanol remains technically complex and commercially unprofitable. Although technology for producing cellulosic ethanol (biomass to include agricultural waste and switchgrass) is available, bringing the price down to competitive levels will require significant investment, research, and development.⁵³ In early 2007, the Department of Energy (DOE) selected 11 cellulosic ethanol conversion projects to receive up to \$408 million dollars in federal funding over the next four years.⁵⁴ DOE has set a goal of reducing the overall cost to produce cellulosic ethanol to \$1.07 per gallon by 2012 which is less than half the cost of producing it now and lower than the current cost of about \$1.50 a gallon for corn-based ethanol. When fully operational, the bio-refineries are expected to produce more than 130 million gallons of cellulosic ethanol per year.⁵⁵

Practical problems for cellulosic ethanol production are logistics (transporting and storing the raw product) and financial (the high cost of producing cellulosic ethanol raises questions whether operating plants can be profitable – even with significant government

assistance).⁵⁶ No cellulosic ethanol plants operate in the US today. Thus, we cannot accurately forecast the potential viability of cellulosic ethanol production or the potential amount of ethanol that cellulosic ethanol plants could produce.

d. Fine to Produce It – But Can We Deliver it to Users?

Transportation for both corn and cellulosic grasses appears to be a major concern for future growth. US infrastructure in both city and rural communities is lacking. The US rail system has evolved into an industry focused on volume movements via unit trains (75 or more cars in the train). Yet, as of June 2006, only four fuel terminals in the US had the capacity to receive unit trainloads of ethanol. Pipelines are not used for shipping ethanol for technical and operational reasons. In addition, most pipeline systems run from the Gulf Coast to the North or Northwest. Construction of new ethanol-dedicated pipelines is viewed as infeasible due to low shipment volumes of ethanol.⁵⁷

e. How to Use Ethanol - E10 or E85 and the FFV

Currently, 99% of the ethanol produced is mixed with gasoline to make E10, a 10% ethanol/90% gasoline blend. 46% of US gasoline is E10, which can be used by standard vehicles.

E-85 is an ethanol/gasoline blend containing 85% ethanol. Only 1% of ethanol produced is used for E85. Ethanol blends over 10-20% ethanol require a special flexible fuel vehicle (FFV). FFVs can operate on any blend of ethanol up to 85% ethanol (E85) or on gasoline. One problem precluding wide use of E85 is that it requires special fuel pumps costing approximately \$100,000 - \$200,000 each to install.⁵⁸ To date, only about 1,100 gas stations have E85 gas pumps, the majority of them in the “Midwest Ethanol Corridor” in Missouri, Kansas, and Illinois.⁵⁹

Most of the 6 million FFVs in the US are registered in Texas, Florida, and California. 22 states have less than 10 E85 pumps and 11 states have no E85 pumps.⁶⁰ A logical assumption from this lack of infrastructure is that most FFVs on the road today operate on gasoline or E10, not E85.

f. Government Incentives to Promote Ethanol Production and Use

The government provides a variety of incentives to encourage ethanol production including a 51 cent per barrel tax credit and a 30% tax credit to businesses installing E85 infrastructure. The government also requires federal and state agencies to purchase FFVs and to use E85 when it is available.⁶¹ As an incentive to automobile manufacturers to produce FFVs, the government allows manufacturers to calculate Corporate Average Fuel Economy (CAFÉ) minimum miles per gallon standards to presume FFVs use E-85 instead of gasoline. This allows automobile manufacturers to receive CAFÉ credits for FFVs that actually run on gasoline rather than E85.⁶² The Big Three automakers have pledged to produce 50% of their fleet as FFV by 2012.⁶³

A number of state and private initiatives are underway or in planning stages to increase E85 availability. For example, New York and Pennsylvania have programs to install E85 pumps throughout their interstate road systems.⁶⁴ Walmart has announced that

it plans to offer E85 at its stores that sell gasoline.⁶⁵ The Governor's Ethanol Coalition (GEC), a group of 36 governors instrumental in forming the recommendations to increase ethanol production and use that led to the Energy Policy Act of 2005 (2005 EPACT), wrote to President Bush and Congress in December 2006 with the following recommendations expected to result in ethanol replacing 25% of US gasoline by 2025: (1) expand renewable fuel goals to 12 billion gallons a year of ethanol and biodiesel by 2010 and increase ethanol percentage of motor vehicle consumption from the current 3.5% to 15% by 2015 and 25% by 2025; (2) add cellulosic ethanol tax credits; (3) establish a 5 year timeline to deliver E85 to regions rather than just to metropolitan areas and require 70% of new vehicles to be FFV in 10 years; and (4) fund biofuel research authorized in the 2005 EPACT, particularly for cellulosic ethanol development and production, plug-in hybrids, FFVs, and E85 infrastructure.⁶⁶

g. Recommendations

1) The US should phase out the 54 cent tariff on sugar-based ethanol imports.

In the short run, the US lacks capacity to produce enough ethanol to meet demand. This would increase ethanol supply without threatening corn growers. Even with sugar-based ethanol imports, there isn't enough ethanol supply to meet demand.

2) The US should continue to incentivize research, development, and production of cellulosic ethanol and improve infrastructure to transport raw materials for ethanol production as well as the ethanol itself.

3) The government should use available ethanol to increase the percentage of E10 gasoline and require its use rather than promoting E85, eliminate tax credits for building parallel E85 infrastructure, eliminate incentives for FFV production, and eliminate requirements for state and local agencies to purchase FFVs.

The US would decrease dependence on gasoline and clean up the environment better in the next decade with all motorists using E10 and, perhaps E20, blends than by using available ethanol to produce a small amount of E85 that is optional for motorists. Until cellulosic ethanol actually proves to be a viable renewable fuel alternative to replace significant quantities of gasoline, E-85 is not realistic as a widely used alternative renewable fuel.

4) Even if the government continues to encourage E85 and FFVs, there should be non-CAFÉ incentives for FFV production.

Current CAFÉ credits for FFV production actually harm the environment by allowing automobile manufacturers to claim CAFÉ credits for vehicles that actually use gasoline rather than E-85.

Issue Area 3: Migrant Labor – Reform or a Crippled Economy?

It is beyond debate that if illegal immigrants in the United States were suddenly deported en masse, “we would face an economic crisis.”⁶⁷ Illegal immigrants represent nearly half of all farm workers and account for nearly 5 percent (12 million workers) of the US labor force.⁶⁸ Migrant labor, both legal and illegal is a fact of life on the American farm and part of the backbone of our agriculture industry. Hardworking, often striving to feed families and with a hardy work ethic, illegal migrant farm workers are as much a part of our landscape as the fields they work in. They do the work most Americans don’t want to do. What we do about those who are here illegally will significantly affect our food value chain.

Facing the issue squarely requires new immigration policies that are favorable to the farmers and immigrant workers alike while also preserving our national borders and national security.

a. The Farmer’s Perspective

Many farmers argue that a strict immigration policy will severely limit the availability of reliable seasonal farm workers and seriously threaten the stability of the entire sector. Some growers believe that new policies with strict reporting requirements will be onerous and detrimental – such that crops would not be harvested, costs to consumers would rise and worse, farmers, unable to bring crops in, would go bankrupt. A third-generation California farmer said flatly, although to the surprise of no one, that US born workers are not willing to labor in the hot midday sun picking fruits and vegetables. Even if you could entice them to the fields “we would have to raise our wages to \$20-\$30 an hour to get Americans to do this job, which would ultimately raise the cost of produce.” Mexican laborers have filled the void, some having worked for this grower 20 years, although he must admit he still has no way of knowing if their documentation is legitimate. What he does know, as did every farmer we talked to, is that the migrants are providing reliable, indispensable help to get the crops in on time.

b. Demographics

Out of the total hired farm workforce of 2.5 million, 1.2 million (nearly half) are unauthorized.⁶⁹ They are young and family-oriented, with 58% being married and half younger than age 31. Spanish is the native tongue for 81% (44% can’t speak English at all), and many have not completed school past the seventh grade. Wages average \$7.25 per hour – the federally mandated minimum wage. While family incomes can average between \$15,000 and \$17,499, it is still considered below the poverty guidelines. Over half of the farm work force does not have unemployment insurance. Over 75% do not have health insurance.⁷⁰

c. Benefits and Challenges

For the US to retain its agricultural competitive advantage, migrant labor is an accepted necessity. Benefits derived from these farm workers are widely known: 1)

production agriculture is able to thrive and compete internationally; 2) taxpayers are added to the population, with both local and national economies benefiting by employers withholding taxes as required by law; 3) foods harvested from these farms are the most affordable in our history; and 4) the industry is providing a way of life that supports both the American farming tradition – a free market based society that creates opportunity for anyone to succeed. On the negative side, illegal immigrants pose an increasing threat to national security, display disregard for the rule of law, put a financial burden on states and local communities (education, more health care, and more prisons), and suppress the wages of less skilled American workers.

d. Regulatory Systems and Legislative and Policy Proposals

The DHS's H-2A program allows for the temporary admission of foreign workers to perform agricultural work of a seasonal or temporary nature, provided that US workers are not available. The program has protections that include guaranteed employment for three-fourths of the period ("3/4ths rule"), hiring qualified workers as long as they apply during the first half of the season ("50 percent rule"), protecting vacant positions during a strike, providing workers' compensation insurance, and reimbursing workers for transportation costs. Farmers complain that the process is long and cumbersome, while workers argue that there are too few protections (rights in court, for instance).⁷¹ Current legislation does not permit sufficient numbers of workers to cross the border and meet the demand.

In early 2007, Senators Kennedy (D-MA), Feinstein (D-CA), and Craig (R-ID) introduced the Agricultural Job Opportunities, Benefits and Security (AgJOBS) Act of 2007. This bipartisan bill aims to achieve a stable and legal agricultural work force by allowing undocumented agricultural workers *already* in the US to apply for temporary resident immigration status and then earn permanent resident immigration status after completing 3-5 years of additional employment. Worker protections mentioned above in the H-2A program will continue, with the addition of new protections, to include the private right of action in Federal court. In addition, advocates argue that this bill will create a streamlined, secure and fair visa system.⁷²

Also in 2007 Representatives Gutierrez (D-IL) and Flake (R-AZ) introduced the Security Through Regularized Immigration and a Vibrant Economy (STRIVE) Act. The STRIVE Act will provide temporary status and a path to eventual permanent residence for an estimated 11+ million undocumented immigrants in the US who were in the states before June 1, 2006, after a \$500 fine, a security clearance, and proof that they had been actively employed before that date. After six years, immigrants who learned English and stay crime free could become eligible for permanent residency after paying a \$1,500 fee. For citizenship, illegal immigrants would have to return to their countries within six years, including exemptions for children and non-working spouses taking care of children.⁷³

The President's new immigration policy calls for the deployment of 6,000 additional Border Patrol agents on the southern border, with 200 miles of vehicle barriers, 370 miles of fences, a 300 mile wall with electronic sensors, and a new employment verification system. Once enacted, immigrants would have to register for temporary status after six months, get background checks and cards known as Z-visas. These would

be renewed every three years, with the applicant paying a \$2,000 fine and a \$1,500 processing fee each time. To get permanent legal residency, Z-visa holders would have to return to their home countries and apply to reenter the United States legally through US embassies and consulates. Then they would have to pay \$2,000 to apply and \$8,000 if approved.⁷⁴

e. Recommendations

1) Combine legislative and policy proposals.

The deportation of illegal immigrants would force a self-inflicted economic crisis and compromise national security by crippling our ability to feed our nation. Combining the STRIVE and AgJOBS bills, with caveats highlighted below, creates the best of both worlds for employers, migrant workers, and all Americans. By blending the STRIVE Act's requirements (earn citizenship and immediate temporary status) with the AgJOBS many protections (housing, insurance, and transportation costs just to name a few), we not only help secure our borders and our national security, but we also provide a stable and reliable migrant work force, which is the backbone of our agriculture industry.

Moreover, such a blended approach advances basic American principles and provides the necessities for a much-needed immigration policy: 1) a fair means to provide citizenship for the required labor force; 2) the creation of incentives for migrants to return home when their temporary-worker visas expire; 3) necessary protections and rights; 4) and fair citizenship requirements for both workers and their families.

2) Caveats – Burden Sharing and Enforcement

Assuming these farm workers are earning a fair wage, new legislation should recognize a migrant's individual responsibilities. The legislation needs a formula to establish a fair share of the burden to pay for the worker protections. Additionally, there must be personal responsibility on family members as well to complete education standards and hold jobs in which all the required taxes, insurance and entitlements are paid. Our policy should not contemplate the simple granting of amnesty for being a spouse or child. And finally, a new policy must address a fair and achievable enforcement strategy, one that is not burdensome or adds months or years to the process.

Immigration is not, and should not be thought of as an intractable issue. If the work of illegal immigrants in our fields is good for the economy—and plainly it is—it only makes sense to find a way to manage it more effectively. There is certainly a cost for a favorable immigration policy to support the agribusiness industry, but these workers are a commodity we can't afford to lose.

Issue Area 4: National Farm Policy and the Farm Bill

Roughly once every five years Congress cobbles together a new Farm Bill. As Congress drafts the 2007 Farm Bill, it takes on new importance in our increasingly globalized interconnected trading world and impacts the health of our relationships throughout the world, whether through our dealings with the WTO or with key international trading partners. Without question, the legislation will influence whether the US continues its dominant agricultural role in the world. On a policy level, it has far

reaching domestic and international implications. On a practical level, it contains provisions as far ranging as school nutrition standards to what some critics refer to as market distorting subsidies.

Although most legislation of whatever kind has its critics, the Farm Bill historically generates tremendous hue and cry internationally but has enjoyed bipartisan support domestically due to fundamental and long-standing respect for our farmers as well as their political muscle. Critics describe the Farm Bill as a patently political document, full of pork-barrel, outdated and wasteful spending. Some argue its current incarnation costs taxpayers roughly \$90 billion per year in taxes and costing billions more in higher prices and opportunity costs. The President, through the USDA in an effort to influence this legislative process and seek meaningful reform, has defined essentially three strategic goals or driving forces he hopes to pursue in the new bill – 1) economic and social stability, 2) health and safety, and 3) conservation.⁷⁵ Whatever the reality, this current legislative cycle presents unique opportunities in our globalized trading position to begin to make fundamental changes to our farm policy that will position us strategically both short and long-term to strengthen our agricultural sector and our national security.

a. Necessary Protections or Market Distorting Price Support Programs?

The Farm Bill's heritage encompasses policy objectives born of the New Deal and surrounded by the fear and dread of the Great Depression and Dust Bowl experience. In the mid 1930s 45% of Americans lived in rural areas. Farm commodity prices were severely depressed and farm programs were designed to provide stability for farm income and ensure some prosperity for rural farm communities and thus support the nation.⁷⁶

Today, however, these support programs (i.e. tariffs, quotas, counter-cyclical payments, marketing loans and direct payments) have dramatically morphed and, as many critics argue, are little more than entitlement programs. Some of the Bill's harshest critics argue that current programs act to "stimulate overproduction; disrupt global agriculture markets; channel money to producers of a handful of agriculture commodities; fuel budget deficits; distribute financial benefits to primarily the largest farms; and squeeze out funding for other types of agricultural programs that reflect society-wide concerns such as conservation and rural development".⁷⁷

Income support for wheat, feed grains, cotton, rice, and oilseeds is provided through three basic commodity programs: direct payments, counter-cyclical payments, and marketing loans that are contained in Title I of the Farm Bill. While these so-called "white crops" are heavily subsidized, specialty crops such as fruits and vegetables are essentially left to market forces. These income supports total approximately \$7B to \$20B per year. According to the USDA's Economic Research Service, "approximately 40 percent of all farms received government payments in calendar year 2004. Payments averaged \$12,034 for those operations receiving payments, accounting for about 5 percent of gross cash income and 22 percent of net cash income in 2004 for those farms. The largest 7.5 percent of farms in terms of gross receipts received 56 percent of all government payments in 2004."⁷⁸

Based on our study and travel, it is hardly a controversial view that subsidies are not distributed evenly, and do not necessarily assist family farmers in distress. Counter-

cyclical payments demonstrate the extraordinary way price support programs have distorted their original intent. Counter-cyclical payments can, counter-intuitively “reward” farmers during higher yield years while “punishing” them during lower yield years, perturbing the original goal of price supports. Essentially, a target price for the commodity is set. In high yield years the commodity price will fall due to the higher supply and payments will be made to make up for the low price. In poor harvest years the price will increase and payments can be completely eliminated. This completely reverses the Depression-era intent of supporting farmers in distress.

Direct payments are based on historically fixed acreage and yields. If a farmer’s cropland was used to grow a covered commodity (vs. specialty crops such as fruits and vegetables) he will receive a payment from the US government per acre whether he grows that crop or not. If the farmer grows nothing – he can continue to receive payments. If, however, he changes to an economical alternative specialty crop, the payments will ultimately stop. Despite this disincentive (losing the payment), many farmers have switched to more economical “specialty” crops such as fruits and vegetables to become more profitable.

Quotas and tariffs⁷⁹ on imports of products such as ethanol, sugar and dairy similarly encourage market distorting and second order effects that increase prices for related industries (confectionary industry prices rise) and suppress world market prices and production.

b. World Trade Organization (WTO)

The WTO is now exercising tremendous influence over global trade and US agribusiness, and the upcoming Farm Bill is not immune from this pressure. The current round of WTO negotiations (known as the Doha Round) has been stalled based on agriculture subsidies in the developed world – which includes practices within the US and the European Union. The developing nations have accused the developed world of using unfair trade practices through their agricultural subsidies. Specifically, Title I of the current and upcoming Farm Bill contains the type of subsidies that are the subject of the WTO’s scrutiny. An ongoing example of alleged unfair trading is the recent WTO ruling that US cotton marketing loans and counter-cyclical payments are trade distorting and unfairly suppress world cotton prices. Brazil has requested permission to retaliate and a ruling is expected in 2007.⁸⁰

The perception that the US is an “unfair” trading partner has a detrimental effect on foreign relations and trade at a minimum, and will likely influence the form and character of the 2007 Farm Bill.

c. Politics

In addition to international perceptions, it is no secret that politics has historically factored into the apparent distortions of US farm policy. There are both bill payers and those who benefit from every governmental program or regulation – agriculture is no exception. The Farm Bill originates in Congressional Agriculture committees. Not surprisingly, members whose states retain a strong agricultural interest dominate the committee composition. With the recent ascent of the Democrats into the leadership, one

might naturally expect a change in focus. Ironically, the focus change is not along partisan lines, but determined by regional affiliation. The current chairmen of the 110th Congressional committees are from Minnesota and Iowa and represent crops that dominate the upper Midwest (corn, sugar beet). The ousted Republican chairmen are now ranking minority members whose constituency is southern agriculture (cotton, peanuts).

Current US farm policy, however, does not effectively support the long-term economically efficient maintenance of a food supply to support the demands both the US and international markets. The politics of largess as well as the impact on past investment decisions based on existing policy makes it very difficult to change support programs once implemented.

d. Lobby Groups

Lobby groups exert a strong influence on agricultural policy as well. Each of the major commodities that receive subsidies, price supports or tariff protection is represented by a lobby organization. The American Sugar Alliance is an example of an effective lobby group. The Alliance claims that US produced sugar is responsible for creating 146,000 US jobs and \$10B in economic activity. They also claim that all sugar beet processing factories are farmer-owned and that nearly $\frac{3}{4}$ of US cane refining capacity is employee or farmer-owned. This is somewhat misleading when compared with the concentration of refined sugar sellers (67% capacity with three companies) according to the world sugar journal. The sugar lobby argues that any reduction in US Tariff Rate Quotas (TRQ) would be tantamount to “unilateral disarmament” in the face of a subsidized competition from overseas.⁸¹ What they do not share are the estimated costs of these policies at between \$400M and \$1.9B per year to US consumers as well as \$140M per year in direct taxpayer costs. The high price for US sugar also encourages sugar production in areas where environmentally sound production is less apparent due to the unnaturally high margins. Opportunity cost to the US economy for maintaining inefficient production when human and financial capital could be more efficiently used elsewhere is also overlooked. On the other hand, the Sweetener Users Association argues that liberalizing trade would benefit the US through lower prices, and by keeping food manufacturing jobs in the US.⁸² Similarly effective, the Cotton Lobby is widely credited with legendary access to Agriculture Committee drafting of the Farm Bill.

f. Recommendations

1) Phase Out Subsidy and Protectionist Supports - Encourage Market Oriented Policy

Commodity production decisions should be more influenced by market forces than government subsidies. This will drive the industry to equilibrium, allowing the most efficient application of US resources. Producers of subsidized crops can quickly determine where their comparative advantage lies and move toward those areas. There are those who criticize such a reform as disarming US growers, but in fact, the US will benefit overall from lower world prices and market-driven investments of capital and human resources. If foreign sources continue to subsidize, their taxpayers will simply be

subsidizing cheaper products for us, making us wealthier and able to better pursue conservation, technology, food safety and critical infrastructure.

2) Increase Conservation Practices

A portion of the funding saved from a reduction of Title I Commodity subsidies should be diverted to more comprehensive incentives to conserve prime farmland for future agricultural security, the subject of Title II - Conservation. The USDA suggests an additional \$4.25B for the Environmental Quality Incentives Program (EQIP), “Sod Saver” and wetlands protection.⁸³ This entire Title should focus on ensuring that future generations will have the use of our prime farmland as populations in the US are estimated to double by 2050. Alternative means of maintaining support for rural land conservation include tax incentives and voluntary restrictive contracts (equivalent to zoning restrictions that retain farm land) such as California’s Land Conservation or “Williamson Act.”⁸⁴

3) Increase Technology, Food Safety and Infrastructure

Supporting key agriculture-wide initiatives in technology, safety and critical infrastructure can help unleash private efficiency and productivity leading to a more food secure America. Title VII of the Farm Bill “Research and Related Matters” merits renewed focus. A well-funded coordinated governmental policy that encourages and supports private invention and innovation is money well spent. The fruits of this research should be available to all but the major focus should be incentives for private industry to enhance productivity. Examples of technological research areas include livestock waste mitigation, cellulose for fuel, and genomics. Food Safety is a critical national security issue. Despite the clamor by industry for self-regulation, government standards have been seen as an economic necessity and a welcomed baseline by companies such as Wal-Mart. A separate Title and organization responsible for national food safety issues within USDA are called for. Finally, critical infrastructure including dams, roads, and railheads should be factored in to the Farm legislation. The actual impact is likely to be financially felt in the transportation bill, but provisions for supporting private harvest is a national security imperative that belongs in farm policy.

VI. Agribusiness in China: A Study in Contrasts

Our Industry Study executed its international field study in China—in part to better understand China’s agricultural sector, but also to gain a clearer perspective on America’s through a look at a fundamentally different system. Our travels through China provided a comparative understanding of the strengths, weaknesses, and challenges each country faces in the areas of government policy, food supply and safety, technology, labor, water shortages, and environmental issues.

1. Governance and Systemic Handcuffs

Throughout our study and travels in China, certain systemic paradigms repeatedly surfaced. These paradigms profoundly color how China has historically dealt with its agricultural challenges and how it will deal with them in the future.

First, there is a fundamental and persistent tension between the central government and powerful provincial governments on policy and execution matters. The central government, despite our almost myth-like notions of the power of a communist regime, has limited control over what happens in the provinces. Second, government corruption appears rampant at both the central and provincial levels. Efforts to rectify it through investigation and trial are widely publicized. Third, and perhaps culturally unique to China, is the almost “campaign-like quality” to problem resolution. The Chinese tackle a problem with a well planned, massively resourced and phased execution plan of limited duration. The underlying assumption is that at the conclusion of the phased execution, the problem is solved. Energies and resources can then be focused elsewhere. As there is no follow through, many of the visible results of the “campaign” quickly fall into disrepair and neglect. These three systemic paradigm “handcuffs” will affect how China faces its problems in the 21st Century.

That said, during our visit to the Chinese Ministry of Agriculture (MOA), the gracious representative was surprisingly candid regarding the challenges China faces in its agricultural sector. He openly acknowledged that, during the last few decades, China had focused on its manufacturing sector and the rise of its urban centers to the exclusion of adequate policies and support to the 900 million citizens living in rural China. The MOA representative was frank in his assessment of the scale of the challenge, including the impact of fragmented farms, the issues of water shortages and pollution, and outdated farming practices.

At the central government level, new policies such as the total elimination of the agricultural tax on farmers show clear awareness of issues and an attempt at solutions. The real question is whether the central government is capable of effectively implementing the new policies in the face of the “handcuff” governance issues that riddle China’s internal political landscape.

2. Eating Seed Corn – Urban Encroachment and Fragmentation

We found that China is an industrial juggernaut that quite literally is eating its seed corn. A victim of its own success, China has spent the last 25 years investing in modernization and industrialization. Arguably, China has paid scant attention to the 900 million Chinese residing on 220 million farms putting rice and noodles on the plate. A reflection of this neglect of the farmer and the breakneck, seemingly unconstrained march towards industrialization, is the pace of urban encroachment. In the first 10 months of 2006, China’s already limited arable land shrank to 301 million acres, losing 758,100 acres to urbanization.⁸⁵ For a country housing one-fifth of the world’s population on 7% of the world’s arable land, this land consumption rate is unsustainable and must be arrested or at least planned and controlled.

Nonetheless, the magnitude of China’s agricultural sector, like that of the US, is hard to conceive. China is roughly the size of the US with a comparable amount of arable land. China supports over 220 million individual farms. In contrast, the US marshals just over 2 million. China’s intense farming of its arable land over thousands of years has resulted in excessive fragmentation of its farmland. The average size of a Chinese farm is 1.2 acres; the average size of a US farm is 184 acres. This fragmentation significantly impedes mechanization, technological advancement, and

capital investment. It also makes it nearly impossible to effectively regulate the food supply, ensure food safety, and fully implement government policies. However, it does appear that at some level China is taking steps to consolidate farms to improve productivity. Although the actual number of cultivated acres is decreasing, the overall yield remains the same or is increasing.

3. Food Safety and Traceability

China's expansion of agricultural products for domestic and international consumption is as important as it is conspicuous. China exports only about 1% of its crops, leaving the remainder to feed its massive population. Food safety was a matter of pride for many Chinese people who we met during our travels. Curiously and continuously during our travels most food grown in fields was referred to as "organic." However, upon inquiry, there was no apparent nationally publicized standard of what constitutes "organic." Indeed, during a tour of an "organic" peach orchard we learned that each peach was individually covered with a plastic bag at which time pesticides were then applied. Certainly not organic by US standards, such practices and notions of "organic" were commonplace and represent a wide variance between China and the US. Perhaps this is another reflection of a past "campaign plan" to "go organic."

The recent contaminated Chinese wheat gluten found in American pet food and later in hog, chicken, and fisheries feedstock is the best recent example of the immaturity of the Chinese food value chain. According to reports, when the US Food and Drug Administration (FDA) arrived at the identified additive producing plants it appeared the facilities "had been hastily closed down" with no trail to follow.⁸⁶ In a story published in China during our visit, two Chinese companies were identified by the Chinese General Administration of Quality Supervision, Inspection, and Quarantine as "illegally add[ing] melamine to the wheat gluten and rice protein ... to meet the contractual demand for the amount of protein in the products."⁸⁷

Once again, however, the central government is aware of the pressures, international scrutiny, and the challenges it faces. On a visit to a dairy farm, we learned that within the next 12 months, four dairies would be consolidated into one. The purported purpose was to gain efficiencies and to better address issues of food safety, quality, and traceability. In line with what we learned from the MOA representative, this was a small discrete example of presumably central government policy implementation on the ground. However, such examples are hard to assess in relation to the scale of farming in China, and by themselves, represent a small proportion indeed of China's overall reform needs.

Thus, food safety will remain an intractable problem for both domestic and international goods. With very little exception, traceability of contaminated food is impossible. There is simply no way - given large number of small farms and the primitive value chain - to track the source of food. Exports are a bit easier, but still a challenge. Although China is likely deeply concerned about its international trading reputation and desire to not "lose face", the swift closure of the offending plants and the underlying inability to hold accountable anyone or anything leaves the trading market and American consumer confidence shaky. As new revelations continue to unfold about yet

another US food product that fed on the contaminated gluten, the potential backlash to the Chinese export market could be significant.

4. Water Shortages and the Environment

Water shortages in the north and overall environmental neglect are two other key challenges for China. Inefficient water management – flood irrigation - and persistent failure to responsibly dispose of effluent from cities, villages, farms, and factories, have resulted in toxically adulterated bodies of water, including subsurface aquifers. In one anecdote shared with our delegation, the story was told of a state-of-the-art water filtration plant that only activated its filtration system when the central government inspectors paid a visit. Although China is building a massive water pipeline system from the water-rich South to the water-starved North, the inability to centrally direct responsible water usage will likely compromise the overall success of this project.

When one combines these challenges with the sheer number of farmers (900 million) and the fragmentation of farms, it is unlikely that irrigation techniques will be modernized in the near future. What small farmer has the resources or interest to invest in expensive drip irrigation on land he can only lease (private ownership of land is still prohibited) and when no one in authority is directing him to discontinue flood irrigation? Responsible stewardship is not in the farmer's immediate interest. Trusting in an outpouring of visionary altruism on the part of 900 million rural inhabitants, most who are poor, is foolhardy.⁸⁸

5. The Future

China faces significant challenges as it completes its transition from an agrarian to industrialized society. A comparative assessment between China and the US reveals a large chasm between the complexity and maturity of each country's public-private interface, technological sophistication, and developed infrastructure.

We are then led, ineluctably to the strategically chilling challenge faced by Chinese policy makers. How do you modernize 220 million farms and 900 million rural inhabitants and what do you do with them after you modernize? Assuming modernization frees labor – this simply buys a new set of problems – can the cities handle this massive influx of excess labor? Current policies, in fact, prohibit farmers from migrating to cities (unless on temporary permits as urban workers). Policies would require amendment – but to what end if there is no place to live and work? This is a strategic challenge of enormous import and one in which the sum total of China's agricultural issues plays a part, from systemic handcuffs, to urban encroachment, to food safety, to water usage and environmental excesses.

China today is a bustling, vibrant and complex economic engine. We found the Chinese to be universally gracious, open and warm in hospitality and gratitude. Whatever ails China, there is no question that the industriousness of its people and their zest for self-improvement will give them every chance for success. However, the challenges are on such a scale that they defy easy resolution, short time windows and a “campaign mentality.” The Chinese, for all their vaunted abilities at taking the “long

view,” have much to overcome. Only time will tell whether it is a country in transition or tailspin.

VII. Conclusion

Vast in breadth and implications for the future health and security of the United States, the Agribusiness industry must remain central in the minds of our political and military leaders now and into the future. Our first priority as a nation is to feed our people. Globalization, for as many opportunities as it presents, proliferates risks to our ability to feed ourselves safely and adequately. Policy debates that reach fruition in the upcoming 2007 Farm Bill, our migrant labor conundrum, and our ethanol initiatives, are among the many issues that will directly impact American dinner plates for the foreseeable future.

Our comparative assessment of China instructively paints a picture of not only our national strengths but our weaknesses. We would do well to heed them. As China’s future is full of challenges, so it is bright with potential. In this, as in many things, our nations share something in common. We are convinced, after our study and travel, that global trading partners, like China, are the fabric of our future. Our duty, in this cloth of the future, is to remain the strongest and brightest thread, understanding that ultimately we must turn global integration into our strength. Although a challenge, we found the relentless American farming and business spirit more than up to the task.

¹ Homeland Security Presidential Directive/HSPD-9, Defense of United States Agriculture and Food, January 30, 2004. “This directive establishes a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies.

² US Food and Drug Administration (USFDA) Center for Food Safety and Applied Nutrition (CFSAN). (2007). *Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables*. Draft Final Guidance. Contains Non-Binding Recommendations. <http://www.cfsan.fda.gov/~tdms/prodgui3.html#ftn5> downloaded on 15 Mar 07.

³ US Food and Drug Administration (USFDA) Center for Food Safety and Applied Nutrition (CFSAN). (2007). *Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables*. Draft Final Guidance. Contains Non-Binding Recommendations. <http://www.cfsan.fda.gov/~tdms/prodgui3.html#ftn5> downloaded on 15 Mar 07.

⁴ According to recent estimates, under current practices, the US has agricultural capacity to feed upwards of 520 million persons, Pimentel, p 15.

⁵ National Resources Inventory, USDA, 2003, *2003 Annual NRI*, Retrieved in May 2007 from <http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html>.

⁶ National Resources Inventory, USDA, 2003, *2003 Annual NRI*, Retrieved in May 2007 from <http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html>.

⁷ National Resources Inventory, USDA, 2003, *2003 Annual NRI*, Retrieved in May 2007 from <http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html>.

⁸ CRS Publication – The Farm Economy, 21 Feb 2007

⁹ Economic Research Service, USDA, 2002, *Economics of the Food and Fiber System*, Retrieved in May 2007 from <http://www.ers.usda.gov/>

¹⁰ Economic Research Service, USDA, 2002, *Major uses of land in the United States*, Retrieved in May 2007 from <http://www.ers.usda.gov/Data/MajorLandUses/>

¹¹ Economic Research Service, USDA, 2002, *Economics of the Food and Fiber System*, Retrieved in May 2007 from <http://www.ers.usda.gov/>

¹² *The 20th Century Transformation of US Agriculture and Farm Policy/EIB-3*, Retrieved in May 2007 from <http://www.ers.usda.gov/>

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- ¹³ National Resources Inventory, USDA, 2003, *2003 Annual NRI*, Retrieved in May 2007 from <http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html>.
- ¹⁴ National Resources Inventory, USDA, 2003, *2003 Annual NRI*, Retrieved in May 2007 from <http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html>.
- ¹⁵ Maki, D. (2006). Don't Eat the Spinach – Controlling Foodborne Infectious Disease. *The New England Journal of Medicine*, 355 (19), 1952-1955.
- ¹⁶ US Food and Drug Administration (USFDA) Center for Food Safety and Applied Nutrition (CFSAN). (2007). *Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables*. Draft Final Guidance. Contains Non-Binding Recommendations. <http://www.cfsan.fda.gov/~tdms/prodgui3.html#ftn5> downloaded on 15 Mar 07.
- ¹⁷ Seminar site visit to Stamoules grower in May 2007.
- ¹⁸ US Department of Energy (March 27, 2007), *DOE Selects Five Ethanol Conversion Projects for \$23 Million in Federal Funding*, Office of Public Affairs. US Department of Energy (April 2007), *Energy Policy Act of 2005*, Alternative Fuels Data Center.
- ¹⁹ Sustainable food choices. (2007). Union of concerned scientists. Retrieved March 13, 2007, from http://www.ucusa.org/food_and_environment/sustainable_food/?print=t, The conservation security program: an innovative approach to sustainable agriculture. (2007). Union of concerned scientists. Retrieved March 13, 2007, from http://www.ucusa.org/food_and_environment/sustainable_food/the-conservation-security-program.html
- ²⁰ Biotechnology and sustainable agriculture. (2007). Union of concerned scientists. Retrieved March 13, 2007, from http://www.ucusa.org/food_and_environment/sustainable_food/biotechnology-and-sustainable-agriculture.html
- ²¹ What is sustainable agriculture? (2007). Alternative farming systems information center, sustainable agriculture resources. Retrieved March 13, 2007, from <http://www.nal.usda.gov/afsic/agnic/agnic.htm>
- ²² Biotechnology and sustainable agriculture. (2007). Union of concerned scientists. Retrieved March 13, 2007, from http://www.ucusa.org/food_and_environment/sustainable_food/biotechnology-and-sustainable-agriculture.html
- ²³ National Resources Inventory, USDA, 2003, *2003 Annual NRI*, Retrieved in May 2007 from <http://www.nrcs.usda.gov/TECHNICAL/land/nri03/nri03landuse-mrb.html>.
- ²⁴ Economic Research Service, USDA, 2002, *Economics of the Food and Fiber System*, Retrieved in May 2007 from <http://www.ers.usda.gov/>
- ²⁵ Plunkett Research, Led (2007b). Major trends and technologies affecting the food & beverage industry. Retrieved March 19, 2007 from www.plunkettresearch.com
- ²⁶ Plunkett Research, Led (2007b). Major trends and technologies affecting the food & beverage industry. Retrieved March 19, 2007 from www.plunkettresearch.com
- ²⁷ Barrionuevo, A. *As US imports more food, FDA falters*. (2007) Retrieved in May 2007, from <http://www.iht.com/articles/2007/05/01/news/fda.php>
- ²⁸ Barrionuevo, A. *As US imports more food, FDA falters*. (2007) Retrieved in May 2007, from <http://www.iht.com/articles/2007/05/01/news/fda.php>
- ²⁹ Barrionuevo, A. *As US imports more food, FDA falters*. (2007) Retrieved in May 2007, from <http://www.iht.com/articles/2007/05/01/news/fda.php>
- ³⁰ According to the Federal Reserve Bank of Dallas, in 1901 46.4% of a typical American household's income went to food. By 1995, that ratio had dropped to 14.0%, and in 2003, it was less than 10%. (Plunkett, 2007b, p3)
- ³¹ Food Safety. (2007). Center for Science in the Public Interest. *Mission Statement*. <http://www.cspinet.org/foodsafety/> downloaded on 2 Feb 07.
- ³² Parker, Henry (2003). *Agricultural Bioterrorism: A Federal Strategy to Meet the Threat*. Institute for National Security Studies, National Defense University. McNair Paper v-103.
- ³³ Food and Drug Administration (Not publicly available). *Food and Agriculture Sector-Specific Plan*, draft version, pre-decisional. The United States Agriculture Department (Not publicly available). *Food and Agriculture Sector-Specific Plan*, draft version, pre-decisional.

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- ³⁴ GAO-07-310. (2007). *High Risk Update*. <http://www.gao.gov/new.items/d07310.pdf> downloaded on 15 Feb 07.
- ³⁵ Burros, M. (2006a). Growing Peril on Path From Field to Plate. *New York Times*, Dec 7, 2006, p. B.8.
- ³⁶ Food and Drug Administration (Not publicly available). *Food and Agriculture Sector-Specific Plan*, draft version, pre-decisional.
The United States Agriculture Department (Not publicly available). *Food and Agriculture Sector-Specific Plan*, draft version, pre-decisional.
- ³⁷ GAO-05-549T. (2005). Overseeing the US Food Supply. Steps Should Be Taken to Reduce Overlapping Federal Inspections and Related Activities. <http://www.gao.gov/new.items/d05549t.pdf> downloaded on 15 Feb 07.
- ³⁸ GAO-07-310. (2007). *High Risk Update*. <http://www.gao.gov/new.items/d07310.pdf> downloaded on 15 Feb 07.
- ³⁹ GAO-04-588T. (2004). Federal Food Safety and Security System. Fundamental Restructuring Is Needed to Address Fragmentation and Overlap. <http://www.gao.gov/new.items/d04588t.pdf> downloaded on 15 Feb 07.
- ⁴⁰ GAO-04-588T. (2004). Federal Food Safety and Security System. Fundamental Restructuring Is Needed to Address Fragmentation and Overlap. <http://www.gao.gov/new.items/d04588t.pdf> downloaded on 15 Feb 07.
- ⁴¹ Shin, A. (2006). Outbreaks Reveal Food Safety Net's Holes: Produce Growers Balk At Calls for Regulation. *The Washington Post*, Dec 11, 2006, p. A.1.
- ⁴² Yacobucci, Brent D., *Fuel Ethanol: Background and Public Policy Issues*, Congressional Research Service Report for Congress, January 24, 2007, p. 6.
- ⁴³ Yacobucci, Brent D., *Ethanol and Biofuels: Agriculture, Infrastructure, and Market Constraints Related to Expanded Production*, Congressional Research Service Report for Congress, March 16, 2007, p. 10.
- ⁴⁴ National Corn Growers Association (NCGA), *Understanding the Impact of Higher Corn Prices on Consumer Food Prices.*, March 30, 2007, www.ncga.com/ethanol/main/index.asp. The NCGA conducted an analysis of future corn use dynamics and concluded that because of increasing yields, incremental acreage shifts, new technology and the displacement effect of distillers' grains, corn growers could harvest a crop of 14 to 15 billion bushels by 2015-2016. Under this scenario, approximately 5.5 billion bushels would be available for ethanol conversion. At a conservative conversion rate of 2.9 gallons per bushel, this would equate to nearly 16 billion gallons of ethanol or roughly 10-12% of the US expected gasoline demand. See National Corn Growers Association (NCGA), (April 2007). *How Much Ethanol Can Come From Corn?*, pp. 2-4, www.ncga.com/ethanol/main/index.asp.
- ⁴⁵ Testimony to House Ways and Means Committee Subcommittee on Select Revenue Measures by Bob Dinneen, President of the Renewable Fuels Association, 19 April 2007; The National Corn Growers Association conducted an analysis of future corn use dynamics and concluded that because of increasing yields, incremental acreage shifts, new technology and the displacement effect of distillers' grains, corn growers could harvest a crop of 14 to 15 billion bushels by 2015-2016. Under this scenario, approximately 5.5 billion bushels would be available for ethanol conversion. At a conservative conversion rate of 2.9 gallons per bushel, this would equate to nearly 16 billion gallons of ethanol or roughly 10-12% of the US expected gasoline demand. NCGA, *How Much Ethanol*, 2007, pp. 2-4.
- ⁴⁶ Tilman, D., Hill, J., *Corn Can't Solve Our Problem*, March 25, 2007 washingtonpost.com, p. 1.
- ⁴⁷ Quaid, Libby, *Demand for Corn Driving Up Mean Prices*, The Associated Press (2007).
- ⁴⁸ Associated Press, *Ethanol Fuels Largest Corn Sowing Since 1944*, MSNBC.com (March 2007).
- ⁴⁹ Paulson, Amanda, *In US Midwest, Young Farmers Priced Out of Land*, The Christian Science Monitor, March 22, 2007.
- ⁵⁰ Quaid, Libby, *Demand for Corn Driving Up Mean Prices*, The Associated Press (2007).
- ⁵¹ Yacobucci, Brent D, *Ethanol and Biofuels: Agriculture, Infrastructure, and Market Constraints Related to Expanded Production*, Congressional Research Service Report for Congress, p. 6, (March 16, 2007).
- ⁵² Financial Times. London: Feb 1, 2007. Ethanol Demands Intensify Debate Over Corn as Food or Fuel.
- ⁵³ Davis, C. *Global Biofuel Trends*, Earthtrends, The Environmental Information Portal, p. 4, March 2007.
- ⁵⁴ US Department of Energy (February 28, 2007), *DOE Selects Six Cellulosic Ethanol Plants for Up to \$385 Million in Federal Funding*, Office of Public Affairs; and US Department of Energy (March 27,

2007), *DOE Selects Five Ethanol Conversion Projects for \$23 Million in Federal Funding*, Office of Public Affairs.

⁵⁵ Wald, M., Barrionuevo, A., *A Renewed Push for Ethanol*, New York Times, <http://www.nytimes.com/2007/04/17/business/17ethanol.html?bl=&ei=5087%0A&en=0e8>, p. 3, April 2007.

⁵⁶ Torkelson, Roy, *Commercialization of Cellulosic Ethanol Facilities, a Financial Perspective* (2006).

⁵⁷ Dooley, F. *The Effect of Ethanol on Grain Transportation and Storage*, Purdue Extension, Purdue University, Dec 2006.

⁵⁸ Yacobucci, Brent D., *Fuel Ethanol: Background and Public Policy Issues*, Congressional Research Service Report for Congress, p. 6 (January 24, 2007).

⁵⁹ Yacobucci, Brent D., *Ethanol and Biofuels: Agriculture, Infrastructure, and Market Constraints Related to Expanded Production*, Congressional Research Service Report for Congress, p. 10 (March 16, 2007).

⁶⁰ National Ethanol Vehicle Coalition (March 23, 2007), *NEVC Obtains State FFV Counts*, FYI Newsletter, Volume 13, Issue 4.

⁶¹ US Department of Energy, *Energy Policy Act of 2005*, Alternative Fuels Data Center (April 2007).

⁶² Merrill Lynch, *Alternatives for the Clean Car Evolution*, Energy, Security and Climate Change, Industry Overview, pp. 17-18 (November 2006).

⁶³ Shepardson, David, *Big Three, Bush Bury Hatchet on Fuel Goals*, Detroit News, Washington Bureau (March 27, 2007).

⁶⁴ National Ethanol Vehicle Coalition (8 March 2007), *New Jersey Needing E85*, FYI Newsletter Volume 13, Issue 3.

⁶⁵ Dateline NBC, *A Simple Solution to Pain at the Pump, Greener and Cheaper, Ethanol Could Fuel Rural America – and Won't Feed Mideast Terrorism*, MSNBC.com (2007).

⁶⁶ Letter from the Governors' Ethanol Coalition to President Bush (December 27, 2006).

⁶⁷ Ladika, Susan, *Trouble on the Hiring Front*, HR Magazine, Employment and Staffing, pp. 56-61, October 2006.

⁶⁸ Id.

⁶⁹ Congressional Digest, *Guest Worker Program Overview, Current Policy and Issues for Debate*, pp. 164-92, June 2005.

⁷⁰ Congressional Digest, *Profile of US Farm Workers, Characteristics of the Agricultural Labor Force*, pp. 169-70, June 2005.

⁷¹ Congressional Digest, *Guest Worker Program Overview, Current Policy and Issues for Debate*, pp. 164-92, June 2005.

⁷² Congressional Digest, *Should the Senate Approve the Agricultural Job Opportunity, Benefits, and Security (AgJOBS) Act?* Pp 174-82, June 2005.

⁷³ Weisman, J., *President Renewing Efforts on Immigration*, The Washington Post, p. A1, April 9, 2007.

⁷⁴ Fears, D., *Guest-Worker Program Part of Government's Immigration Plan*, The Washington Post, p. A8, March 30, 2007.

⁷⁵ USDA FY 2008 Budget Summary and Annual Performance Plan, p. 1.

⁷⁶ American Farmland Trust, *Agenda 2007: A New Framework and Direction for US Farm Policy*, p. 7, May 2006.

⁷⁷ Id. at p. 8.

⁷⁸ USDA, Economic Research Service, *Farm and Commodity Policy: Government Payments and the Farm Sector*, updated April 4, 2007, <http://www.ers.usda.gov/briefing/farmpolicy>

⁷⁹ Although tariffs and quotas are not explicitly provided in the Titles of the Farm Bill, the policy that influences the tariffs and quotas is contained in the Farm Bill.

⁸⁰ USDA 2007 Farm Bill Proposals, p. 10 (January 2007).

⁸¹ American Sugar Association, *By the Numbers*, www.sugaralliance.org/desktopdefault.aspx?page_id=138

⁸² Congressional Research Service, *Report for Congress, Sugar Policy Issues*, 26 February 2007, p. 2, 12.

⁸³ Id. at 42-48.

⁸⁴ The California Land Conservation Act (Williamson Act) of 1965, <http://www.consrv.ca.gov/DLRP/lca/index.htm>

⁸⁵ Chinese Government's Official Web Portal, Gov.cn, *Arable Land Shrinks to 121.8 Million Hectares*, April 13, 2007.

⁸⁶ *FDA Finds Chinese Food Producers Shut Down*, The Washington Post, May 11, 2007, A10

