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Dr. Harl served as President of the American Agricultural Economics Association and President of the American Agricultural Economics Foundation. He has been named a Fellow of the American Agricultural Economics Association. He was an organizer and first President of the American Agricultural Law Association. He has received more than 30 major awards including the USDA Superior Service Award in 1987; Charles A. Black Award from the Council for Agricultural Science and Technology in 1997, for effectiveness in communicating with the public; the Distinguished Service to Agriculture award from the Chicago Farmers Club in 1999, and the *Wallaces Farmer* Iowa Master Farmer Award for Exceptional Service to Agriculture in 2000. Dr. Harl served for seven years by Congressional appointment to the Office of Technology Assessment, Technical Assistance Advisory Committee, and chaired that group in 1993-94. He also served on the 16-member Commissioner's Advisory Group, Internal Revenue Service, in 1979-80. In 2000, he was appointed by the U.S. Secretary of Agriculture to the Advisory Committee on Agricultural Biotechnology. Dr. Harl served from 1981 to 1986 on the Biotechnology Committee of the National Association of State Universities and Land Grant Colleges.

Dr. Harl has published widely including 24 books; more than 300 professional articles and bulletins; and more than 800 articles in farm and financial publications. He is the author of the 15-volume treatise, *Agricultural Law* (Matthew Bender & Co.), *Agricultural Law Manual* (Agricultural Law Press) and *The Farm Debt Crisis of the 1980s*. He is co-author of *Principles of Agricultural Law* (Agricultural Law Press) with Roger McEowen. He broadcasts daily on 70 radio stations, "The Law of the Land."

Statement
for
U.S. Trade Deficit Review Commission
Federal Reserve Bank of Kansas City
April 26, 2000

by

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As is widely known, trade is immensely important to U.S. agriculture. Without a robust level of trade in farm products, the overproduction problem (which is the major cause for current farm woes and the major reason for large cash infusions by the federal government in 1998 and 1999) would be more severe.

I. Volitility in Exports of Farm Products

As can be seen in Figure 1, agricultural exports peaked in 1995 and 1996 above $60 billion. Exports have declined since with agricultural exports expected to total about $49.5 billion in 1999-2000.

As can be seen from Figure 1, U.S. agricultural exports declined about 40 percent from 1981 to 1986. During that time, corn, soybeans and wheat piled up in storage, in barges on the Mississippi river and up and down main street. Government payments shot above $25 billion in the worst of these years.

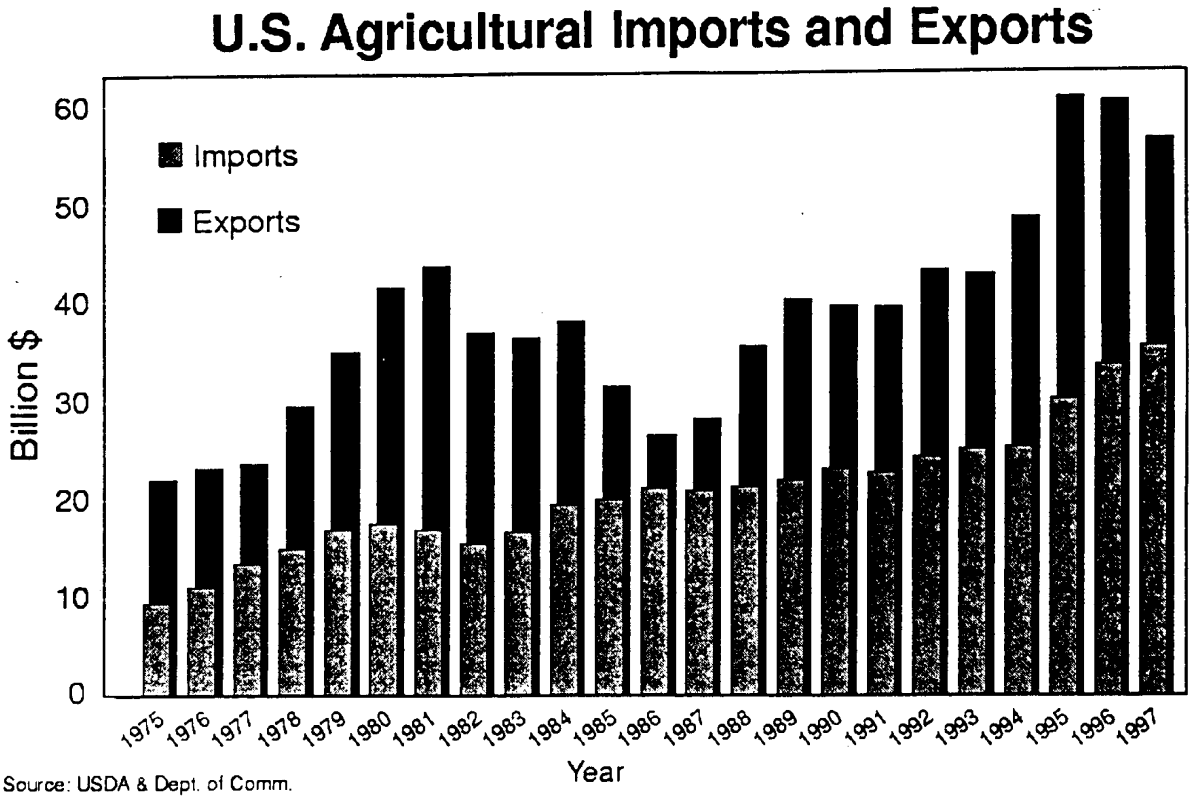
Exports have fallen short of projections for several reasons.

Increases in output in Argentina and Brazil, in particular, have been substantial and may well go higher.

What impact did the Asian crisis have on world food demand and on U.S. farm exports? For the better income countries, where credit isn't a major problem, commodity demand for food purposes declined only modestly. But for low income areas—especially where credit is a problem—the impact was much greater.

As the slide in Asian economies has bottomed out, it appears that food demand in that area changed only modestly. So far, increases in demand elsewhere in the world have offset some—but not all—of the decline in Asia.

Figure 1.



Source: USDA & Dept. of Comm.

In countries with higher per-unit costs of production, as trade barriers fall, producers are unlikely to fold their tents and abandon their land. The more likely scenario is that land values will fall in those countries and producers will continue producing so long as they can more than cover their variable costs with the most profitable crop.

After all, land values are price determined, not price determining. Land has value as expected profitability is capitalized into the value of land. Some areas of the world can realistically expect significant declines in land values as trade barriers are demolished.

It is abundantly clear that stability in fiscal and monetary policy is in the best interests of the agricultural sector.

II. Transitioning Toward Gradual Removal of Trade Barriers

With trade agreements, like deregulation, the winds of trade liberalization have been blowing for years, but with increasing intensity under GATT, the North American Free Trade Agreement (NAFTA) and the WTO. Consumers everywhere are seeking rising standards of living; producers everywhere are seeking a "level playing field" where decisions are based upon the economics of comparative advantage and not the politics of trade barriers.

In the United States, the removal of import restrictions will have major impacts on all areas of agricultural production. The net effect is that consumers in general will benefit. Some producers will face increased risk exposure with at least short-term reductions in income. Long-term, economic relationships including land values should be re-established and stabilized at new levels.

This dimension of the transition phenomenon for U.S. agriculture will likely require most of the first decade of the new century. Steps already taken in trade liberalization should eventually produce higher levels of exports in products produced, manufactured or processed in the U.S. over the next decade. The effects will be felt gradually and should affect the exports of meats and meat products, grains, soybeans and durable manufactured goods. The economic impacts will be gradual but unmistakably positive for the U.S. economy.

Similar effects should be felt from the North American Free Trade Agreement (NAFTA) as negotiated reductions in duties on exports to Mexico and Canada are phased in over the next several years. The benefits will come from increased exports of feed grains, oil seeds and high technology manufactured goods. U.S. agriculture has an overwhelming productivity edge in the growing of corn, wheat and soybeans. Mexico has relatively little water, inadequate amounts of arable land, technology that lags the United States and weaknesses in transportation and processing of agricultural products.

The process of demolishing trade barriers is likely to be much slower than the proponents of removal would like. At the same time, the process is likely to be much more rapid than opponents of change would approve. Not until consumers in countries with substantial barriers to imports of agricultural products insist on living better are politicians likely to be fully responsive to arguments to reduce the level of trade barriers.

III. Consequences of Trade Liberalization

Over the next several years, food consumption patterns are likely to change worldwide—

- Diets will be improved, allowing for more caloric intake per person.

- Consumers will gradually shift to a more protein-rich diet. For many that means a shift away from a cereal-based diet.

- The per capita utilization of grains will likely double or even triple as dietary patterns converge toward the U.S. model of protein-rich but increasingly health-conscious consumption.

In general, in a world of no trade barriers, countries are expected to export those goods that utilize intensively the resources with which the country is relatively well endowed. Thus, countries with large populations relative to the supply of arable land can be expected to produce labor-intensive products and to import products requiring arable land such as feed grains. Likewise, countries with a heavy endowment of arable land and a favorable climate for crop production are expected to produce for export those products requiring arable land. Thus, meats, feed grains and other processed food products requiring feed and food grains should be produced by countries such as the United States, Ukraine, Canada, Brazil and Argentina.

What will this mean for wages, land values and the level of prosperity in agriculture? A compelling case has been made[1] that so long as capital, technology and goods can move freely across international boundaries, wages and land rents should be the same in every country. Note that this theorem does not require the free movement of people, only the free movement of capital, technology and goods.

The consequences of completely free trade should be— (1) a gradual increase in grain prices, (2) higher farm incomes in the short-run in the countries with a favorable land endowment and (3) higher land values in the long-run in those countries as farmers bid the higher prices and incomes into land values. At the same time, it could mean lower farm incomes and lower land values in countries with less productive land that have protected their agricultural sectors with barriers to imports.

Wage levels would gradually move toward a common level except to the extent a country develops technologies and manages to retain the benefits of those technologies for a time.

The rate of progress toward completely free and open trade will be determined by political considerations. Trade barriers will be reduced as consumers in a country communicate to their governments that they want to eat better and live better. Until that happens, trade barriers in food products will continue.

IV. Increasing Food Demand

The last frontier for increasing food demand is the Third World. While only about 20 cents of each additional dollar of income in the U.S. goes for food, the figure in Third World countries is more than three times as great. The key is per capita income. An accelerated pace of economic development, with higher per capita incomes, is the long-term answer. It is in the interests of low cost producers of food to the world to be supportive of efforts to boost economic development in the struggling economies of the world. Another dimension of potential food demand world-wide is that USDA, in a recent Food Security Assessment, indicates that the number of the world's hungry people will rise by 23 percent to 526 million by 2007.

Although the fast-growing economies of Asia have encountered a stiff economic and financial headwind related to reluctance to adopt necessary reforms in the financial sectors and dogged continuation of misguided industrial policies, I remain optimistic that the problems are relatively short-term. We wish we had a costless, painless solution to the queuing problem headed by countries such as Korea, Taiwan, Indonesia and others. Central Africa may well follow in the queue but it may take several decades for economic development to lift those countries out of the category of being perpetually embattled and endangered economically. A critical element is a commitment by stable local governments to take the necessary steps to begin the long climb out of poverty.

While we are talking about economic development, we must mention the People's Republic of China. If that country, which is well-launched on its *economic* revolution, can proceed through its *political* revolution without getting off track economically and without walling itself off from the rest of the world, it will forever alter the trade landscape in food and

[1] See Leamer, *Theory of International Comparative Advantage*, Ch. 1, MIT Press, 1984.

food products. There is awesome potential as incomes in that country rise and as diets are upgraded. Steps taken recently to move toward WTO member status are heartening and could lead to substantially greater trade in some agricultural products.

V. The Impact of Genetically Modified Crops on Trade

Without a doubt, the greatest single threat to trade in agricultural commodities is the genetic modification issue. Although the controversy is in its early stages, the United States has already lost somewhere between 100 and 120 million bushels of export corn to the European Union. In 1997-98, exports of soybean oil meal to Europe totaled 1.78 million metric tons. For this marketing year, the soybean oil meal exports are running at a rate of 0.18 million metric tons. A vessel of corn was turned back from Brazil within the past few weeks. Exports to Asia are certain to be reduced in both corn and soybeans in light of recent announcements on tolerance (for GMO content) and labeling in the countries of the Pacific Rim, headed by Japan and South Korea.

Scope of the Problem

In the Spring of 1999, the problem involved seven transgenic corn hybrids which hadn't been cleared by the EU for import. However, the problem has widened in recent months.

Announcements over the past few weeks have confirmed an old adage in open, market-oriented economies. *The Consumer is King.* Whatever the consumer wants the consumer will get. The big concern—no one knows for sure what the King wants. This is a ranking research need that needs to be addressed more definitively than has occurred to date.

Here are several of the more significant developments—

- In July, Gerber and Heinz announced they were planning to drop genetically-engineered ingredients. Particularly instructive is the fact that Gerber is owned by Novartis, a major transgenic player.

- ADM stunned the trade on August 31 with a statement that it was bowing to a perceived change in consumer demand with a statement encouraging their suppliers "to segregate non-genetically enhanced crops to preserve their identity."

- On September 1, Fuji Oil Company, the largest maker of soybean protein food products in Japan, joined some corn processors in that country in switching to non-genetically altered ingredients. The company indicated it was starting the switch to non-GMO soybeans in the October-March period. Fuji uses 80,000-100,000 metric tons of soybeans annually, mostly imported from the United States.

- In late August, Consolidated Grain in Cincinnati, Ohio, announced there will be premiums on "non-GMO crops and certification statements will be requested of producers that they have kept the crops separate from GMO varieties."

- In early August, Japan, Australia and New Zealand announced that foods produced with genetically modified grain or oil seeds would face mandatory labeling. For Japan, the

labeling move will be phased in with the requirements formalized in April of 2000 with a one-year implementation period ending in 2001. Other countries moving toward labeling include South Korea, Philippines, Thailand, India and Russia.

- Processor and consumer concerns have continued in 2000 with a recent announcement by Frito-Lay of its intention not to use GMO ingredients.

- The Montreal Biosafety Protocol in late January established a Biosafety Clearing House for sharing information on GMOs; exempted commodities intended for food, feed and processing from Advance Informed Agreement (AIA) approval but specified that the commodities are to be labeled "may contain" GMOs; and embraced the "precautionary principle" (countries do not have to show complete "scientific certainty" to block imports of a GMO that they fear could be harmful to biological diversity and human health).

- In March, 2000, the Japanese Government announced zero tolerance for GMO germ plasm in non-GMO corn used for food. Japan imports about 660 million bushels of corn per year.

What does all of this add up to? The most probable scenario is labeling on a world-wide basis within a few years, including the U.S. Food processors are notably cautious when it comes to perceptions about food safety. Memories of serious missteps by manufacturers are fresh in the minds of many in management suites. While the consumer is king, the demand for non-GMO ingredients is almost certain to be driven by processors who are assessing market advantage as well as risk.

Economic Issues

The situation is likely to be governed by three key economic issues—

- The demand for GMO and non-GMO crops, which will stem directly from consumer acceptance or non-acceptance of GMO varieties.

- The supply of GMO and non-GMO crops which will be determined by producers and landowners as decisions are made on seed for 2000 and 2001.

- The costs of maintaining a separate, two-track marketing system for GMO and non-GMO crops.

In all likelihood, consumer demand will be influenced by the relative cost of products containing GMO ingredients and those labeled as not containing GMO. Indeed, it may take a few years of adjusting—by consumers and by producers—before a stable, predictable relationship is established.

Hazards of Contamination

There's been a great deal of discussion about the possibilities of contamination of non-GMO crops with GMO varieties. Certainly, opportunities for contamination exist in planter boxes, combines, augers, elevators, wagons, bins, trucks and at the elevator.

But one source of contamination that hasn't received as much attention is pollen drift in corn.

Example: Farmer A decides in early 2000 to plant all GMO in the coming crop season. Of the four close neighbors, two chose to plant only non-GMO corn varieties. All farm across the fence from A. The distance is short enough to assure that several rows of non-GMO crop will be contaminated with GMO germ plasm, perhaps up to a quarter of a mile.

Could that lead to liability for A? Could the non-GMO producers bring an action for contamination of their crops?

Thus far, there's no precedent. But similar problem situations have been litigated—

- In a significant number of cases, spray drift has been litigated. In a few states, it's a matter of strict liability—particularly for aerial spraying or dusting of crops. In other states, it's resolved on the basis of negligence principles. But liability has been established in numerous cases.

- In a California case, fumes from leaking chemicals stored in a tank across the road from crops drifted across the road and caused damage. The owner of the chemicals was held liable under a theory of trespass—the fumes trespassed upon the nearby land.

All of this suggests that litigation likely lies ahead—if both GMO and non-GMO production takes place for crops, like corn, where pollen can and does drift.

Right now, it seems prudent to check with neighbors to see what's planned for 2000 and the planting patterns for GMO and non-GMO varieties.

Guidelines for Producers and Exporters

With the consumer resistance to products containing genetically modified ingredients in Europe, Asia and elsewhere rising in recent months, and processors responding to that resistance, the focus has been on how producers can protect themselves. It's especially critical for those producing non-GMO varieties.

Here are some points to consider—

- Several processors have signaled that products must be kept separate and there will likely be differential pricing for GMOs and non-GMOs. Indeed substantial premiums are available in some markets

- That means exporters have to keep the products separate if they are to sell into those markets.

- In turn, elevators and other first purchasers are expected to request the same of producers.

• As a practical matter, actual testing for GMO germ plasm for the 1999 crop was spotty with heavy reliance on producer representation as to which loads were GMO and which were non-GMO.

But it's not as simple as stating that a load of corn, soybeans or other crops is GMO or non-GMO. Some of the seed companies concede that their seed purporting to be non-GMO contained low levels of GMO germ plasm. Besides, contamination from pollen drift may have added to the level of GMO germ plasm in non-GMO crop. And there may have been mechanical contamination in augers, wagons, storage bins or even in the combine itself.

All of this adds up to a high stakes legal and operational problem for everyone involved. Eventually, with reliable testing at every point at which the crop is commingled—at the elevator, the processor's bins or at export vessels—it will be possible to monitor more closely what is GMO and what contains only low levels of GMO germ plasm. But the system is not there yet and won't be capable of that type and extent of testing this crop season.

Impact on Exports

Without testing in place at every point of commingling and the discipline that only testing can bring to the process, the U.S. is not well equipped to serve the non-GMO markets. Seed companies, many commodity groups and many farmers believe the problem will somehow fade away. That appears to be wishful thinking. That outcome will become reality only if consumers, worldwide, recede from their expressed preferences for labeling and, to a lesser extent, expressed preferences for non-GMO ingredients in foods.

It is a fundamental tenet of free market economic systems that the consumer is king. Thus far, the consumer sees no price advantage from GM foods and no other advantages. Thus, any concerns about food safety or the environment result in a preference for non-GM products.

What about producers? This brand of technology is mostly output-increasing or cost-decreasing or both. That means early adopters benefit from a successful introduction but all producers lose in the long-run as the technology boosts output with price and profitability dropping disproportionately, in the face of inelastic demand for many products. That's the case even if the effect is cost-decreasing. Cost-decreasing technologies have a built-in profit incentive to boost output at the margin. And that ultimately means lower prices and profits.

Finally, what's the likely impact on structure of the agricultural sector? Disappointing acceptance rates by consumers will slow the trend toward vertical integration of the crop sector—and could derail much of the momentum.

The seed/chemical companies stand to be the big losers from consumer resistance to genetically modified foods. The recently released USDA planting intentions report shows a 24 percent decline in genetically modified corn plantings in the six major cornbelt states for 2000, a 28 percent decline in GM cotton plantings and an 8.8 percent decline in GM soybean plantings.

The future of biotechnology in agriculture rests on a rather infirm base of consumer resistance which, unless changes in practices and attitudes occur soon, will mean further reductions in agricultural exports from the United States.