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SUBMISSIONS FOR THE RECORD

U.S. AGRICULTURAL COMPETITIVENESS

WEDNDESDAY, MARCH 4, 1992

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, DC.

The Committee met, pursuant to notice, at 10:12 a.m., in room B–353, Rayburn House Office Building, Honorable Lee H. Hamilton (vice chairman of the Committee) presiding.

Present: Representatives Hamilton and Armey.

Also present: Stewart Smith, professional staff member.

OPENING STATEMENT OF REPRESENTATIVE HAMILTON, VICE CHAIRMAN

REPRESENTATIVE HAMILTON. The meeting of the Joint Economic Committee will come to order. This is a hearing on U.S. agriculture competitiveness. Nearly six years of negotiating more liberal trading terms under GATT have yet to bear fruit. Negotiations with Mexico and Canada on the North American Free Trade Association are proceeding. One of our major grain buyers of the past decade, the U.S.S.R., has disappeared. In its place, the Commonwealth of Independent States purchases grains with export credit guarantees.

U.S. exports have recovered somewhat from their 1980s decline, but they show little growth. So this is a good time to search for the proper role for U.S. policy regarding agriculture and agricultural exports. We need to know what policies will best serve American interests and needs, and especially the interests and needs of our farmers. We need to promote growth where it is promising, but not hold our hopes that will not be achieved.

Today, we are interested to learn how trade talks on GATT and the North American Free Trade Agreement will affect the U.S. economy, including agriculture, how restructuring in Eastern Europe and the former Soviet Union will affect U.S. farmers, how U.S. Government policies can improve agricultural competitiveness, and if those policies should be pursued.

We are pleased to have a distinguished panel this morning with strong policy experience, as well as academic credentials. Dennis Avery is Director of Global Issues at the Hudson Institute and author of a recent book on global food issues.

Dr. Dale Hathaway is at the National Center for Food and Agricultural Policy. He has written widely on policy issues and served as Undersecretary for International Affairs and Domestic Programs at the USDA.

Dr. Robert Paarlberg is a political scientist at the Harvard University Center for International Affairs. He has written widely on agricultural trade issues.

Dr. Robert Thompson is Dean of Agriculture at Purdue University. He served as Assistant Secretary for Economics in USDA.

Before proceeding, I would also like to enter into the record the statements of David Seckler and Otto Doering.

[The prepared statement of David Seckler starts on p. 57 of Submissions for the Record; and the prepared statement of Otto Doering starts on p. 65 of Submissions for the Record:]

We welcome each of you gentlemen before us. We will hear from you in order. Dr. Thompson, we will begin with you and then go down the line, if that's alright, unless you have some other order you prefer. I think Congressman Armey would like to make a statement to begin.

OPENING STATEMENT OF REPRESENTIVE ARMEY

REPRESENTATIVE ARMEY. Let me express my appreciation to you for putting this hearing together today. It is an extremely important subject, one that I am frankly very much interested in and have been all my life. The timing is extraordinarily good for this hearing and I am very pleased and impressed with the panel.

I have believed and continue to believe with very rare disappointments that in the profession of economics there are none so well-trained as agricultural economists. They are clearly the cream of the crop in my profession and I mean that sincerely, the reason being that agricultural economists must have a basis in their formal training of microeconomics and do not have their thinking so thoroughly diluted by macroeconomics as normal economists.

I might mention also Purdue University is clearly a university of outstanding reputation in this important field. And Dennis Avery is a man who has clearly distinguished himself for his work in the area, particularly of both global food programs, which he published in 1989, and can clearly be called a visionary in this field. He has seen agriculture in its role with comparative advantage in the world economy, with eyes as clear as David Ricardo, and one of the few that have done so.

And I am very excited about the panel and I look forward to hearing the witnesses.

REPRESENTATIVE HAMILTON. Thank you, Congressman Armey. We will begin with Dean Thompson.

STATEMENT OF ROBERT L. THOMPSON, DEAN OF AGRICULTURE, PURDUE UNIVERSITY

DR. THOMPSON. Thank you Mr. Chairman. Good morning, Mr. Armey. I am pleased to appear before you today to testify on U.S. agriculture competitiveness. Exports provide the outlet for over one-third of the output of American agriculture, and farm exports are one of the strongest components of the U.S. balance of trade. In the future, American agriculture is likely to be even more dependent on the export market for a larger fraction of its revenue.

Federal budget realities caused a cut in the subsidies to American agriculture in the 1990 farm bill and in the budget package that followed. Moreover, the GATT round of international trade negotiations is likely to bring about some across-the-board cuts in farm subsidies in all member countries, including the United States.

For all of these reasons, the ability of American agriculture to compete on the world market is a very important issue.

There are two basic components of the competitiveness of American agriculture: government policy and its underlying cost competitiveness. Government policies may mask or enhance the underlying competitiveness of the Nation's agricultural sector. This is certainly true of macroeconomic policy. In the late 1970s, U.S. macroeconomic policy led to a "weak" dollar, which made American goods cheap in price relative to other countries. This made it very easy to export, and certainly contributed to the U.S. farm export boom of the late 1970s,

In contrast, the very strong dollar of the early 1980s made all of U.S. exports more expensive to foreign buyers. This contributed to the 40 percent drop in farm exports in the first half of the 1980s and in turn to the severe financial distress of the farm sector.

Agricultural policies may either enhance or mask a country's underlying agricultural competitiveness. If one country sets its foreign price supports above world market prices, it prices those products out of the world market. This happened with U.S. loan rates under the 1981 farm bill. When the high loan rates were combined with the strong dollar, U.S. farm exports became uncompetitive and plummeted.

The benefits of high price supports, marketing quotas and acreage reduction programs also get capitalized into land values. This raises the capital cost of farm production and reduces the country's international competitiveness.

Similarly, imposing tougher regulatory policies than exist in other countries can raise the country's cost relative to its international competitors. On the other hand, input subsidies that stimulate larger production and lower market prices can artificially increase a country's ability to compete.

Exports subsidies have been used by a number of countries to artificially gain export competitiveness. When a country supports its domestic farm prices, this causes larger production and smaller consumption than would otherwise occur. It then subsidizes farm exports and exports more than it would otherwise, displacing exports from other countries with more efficient production. The most egregious abuser of this has been the European Community. The U.S. export enhancement program provides export subsidies to compensate for unfair competition from the EC.

The conclusion of this section of my testimony is that domestic macroeconomic in agricultural policies may enhance or mask a country's underlying competitiveness. As long as a country's government has deep enough pockets and its farmers have enough political clout to access those funds, exports subsidies can offset almost any underlying cost disadvantage or artificial disincentive caused by other policies.

However, in the last few years, budgetary problems and the declining political power of farmers have resulted in cuts in farm subsidies in the United States, the European Community and several other countries. The international trade negotiations now underway, under the auspices of the GATT, are likely to bring agreement to make further across-the-board cuts in subsidies linked to the volume of farm production and exports. In addition, most, if not all, nontariff barriers to imports, like quotas and variable import levies, are likely to be converted to tariffs. By so liberalizing the world market in which all countries' farmers compete, the underlying cost competitiveness of

American agriculture will be an even more important determinant of our future export success.

I now turn to discuss this critical issue. One key determinant of a country's underlying cost competitiveness is its natural resource endowment; that is, its soils and climatic conditions. The Midwest of the United States is blessed with an abundance of deep, black fertile soils. Favorable temperature and rainfall conditions make this one of the most productive agricultural regions in the world.

Another important factor in a country's international cost competitiveness is its transportation infrastructure. Water provides the cheapest form of transportation. The United States has one of the greatest river transportation systems of the world for transporting farm products to markets—the Mississippi river system. However, one problem throughout rural America is the extent to which railroad abandonment and inadequate maintenance of rural roads and bridges is raising the cost of getting our products from the farm to river transport or to the port of exportation.

While the endowment of natural resources is a fundamental determinant of a country's underlying cost competitiveness, we must keep in mind that, as recently as the 1930s, there was no significant difference in grain yields between the United States, England, Argentina or India. The observed difference today in those yields is accounted for by differences in technology—the product of research and technology transfer. Investments in agricultural research and development are the most important shifters of the locus of international competitiveness in agriculture.

Starting in the late 19th century, the United States led the world in public investments in agricultural research. The large public and private investments in agricultural research gave American agriculture a faster rate of growth in productivity than was experienced in other countries.

By the mid-20th century, other countries had caught onto the source of agricultural productivity and competitiveness and began increasing their investments in agricultural R&D. Unfortunately, about the same time as this occurred, the United States did the opposite and began to let its investments slide. Our investments flattened out and declined at the same time that several other regions of the world were significantly expanding theirs.

To a very real extent, we are on a global agricultural research treadmill today. We have to keep investing just to maintain our own competitive position. Today, we have at our disposal an array of powerful research tools, including biotechnology, electronic sensors, information processing and robotics. These have the power to permit us to continue producing the world's safest, most nutritious supply of food in as environmentally sensitive a manner as possible, while still ensuring our international competitiveness.

The most encouraging recent development on this front was the National Agricultural Research Initiative that was authorized in the 1990 farm bill, although it has been funded at only 20 percent of authorized levels.

When discussing agricultural competitiveness, it is important to recognize that there is wide variation in the cost competitiveness among individual farmers within each country. Different farms have different soil types and climatic conditions. Some farmers are more skillful managers than others. And there are wide variations in the technologies in use among farms, even in

relatively narrow geographic areas. The most efficient and low-cost producers in each country—by definition, the most competitive—will benefit from the greater market opportunities created by trade liberalization. Inefficient producers in every country, who have been sustained by protection from import barriers, farm programs and export subsidies to offset their high costs, will be less well off. To survive, the highest cost-producers will have to adopt cost reducing technologies and improve their management to permit them to compete with lower cost producers here and abroad.

The inescapable conclusion is that efficient, low-cost producers everywhere will benefit from the market growth potential that will result from a successful GATT round. In most commodities, the United States has numerous highly competitive producers. The U.S. Government can help ensure that the greatest number are competitive by investing adequately in agricultural research, rural infrastructure, including education and technology transfer to farmers.

[The prepared statement of Dr. Thompson starts on p. 32 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you, Dean Thompson.

Dr. Hathaway, please proceed.

STATEMENT OF DALE E. HATHAWAY, VISITING FELLOW, NATIONAL CENTER FOR FOOD AND AGRICULTURAL POLICY RESOURCES FOR THE FUTURE

DR. HATHAWAY. Thank you, Mr. Chairman.

U.S. agricultural exports are most competitive during periods of rapid growth in world consumption and trade. We remember the 1970s with great fondness because that was such a period and it resulted in great growth in exports, at least for a number of commodities.

During the 1980s, the U.S. position eroded substantially. If one looks at the situation, you have to conclude that world market growth is a crucial element in determining U.S. competitiveness. And, then, within the context of the market growth or changes that are occurring, U.S. policies become very crucial.

I do not believe that the 1970s are about to be repeated. Indeed, I think that the contrary is true. It was unique in several regards. It was an artificial situation in a large number of developing countries in which they expanded income and consumption levels of agricultural products by foreign borrowing. We had an abnormally high rate of growth of consumption in Eastern Europe and in the Soviet Union. That consumption depended heavily upon imports, and the United States was able to capture a significant portion of the growing trade.

The 1980s saw a sharp slowdown. We had major difficulties in a number of developing countries as a result of their debt accumulation. Eastern Europe and now the former Soviet Union have gotten into immense economic difficulties. Consumption growth slowed and trade growth ended or was reversed, and U.S. policies focused on elements other than competition. As a result, we lost market share drastically.

I think the question today is about the market situation in the period ahead and what should the United States do in terms of remaining competitive in that market. As I assess the situation, the developing countries become increasingly crucial as a market for U.S. market products in the decades ahead. The former Soviet Union seems likely to follow the path that has occurred in Eastern Europe. That pattern essentially has been that the first time that their consumers suddenly face world prices is at a time when their incomes are drastically declining and their job situation is worsening. As a result, you have had significant declines in the consumption of some products in the East European countries. And the decline in consumption has come out of imports as they have had to face the reality that there are no longer countries that want to offer them credit to import food. The net result is that they have dropped out of the market for imports.

I think that the prospects are that the former Soviet Union will follow this path and follow it reasonably rapidly. For the first time ever, their consumers face a world market price, and in the face of declining incomes and substantial readjustments, we will see a disappearance of the import demand for agricultural products in the former Soviet Union. This will create a good deal of market uncertainty and a highly competitive situation as various exporters fight for the remaining world markets.

The question, then, is what will happen to offset these trends? My view is that what happens to income growth pattern in developing countries becomes crucial. That, unfortunately, is not under our control. We can be of assistance, but in order to become a major and growing market for farm products, they must have both a rapid growth pattern and external earnings through trade in order to be able to buy things from abroad. Basically, that means that our overall trade policies become important to U.S. agricultural producers as well as our agricultural policies.

Now, in terms of policies that will help the situation in the period ahead, first, I would concur that if there is a GATT agreement that it will be moderately helpful in terms of reducing the heavy dependence of the world upon export subsidies as a form of competition in world markets.

I do not, however, think, given the nature of the changes occurring in the European Community's policies, that they are, in fact, going to withdraw from world markets and cease to be competitive. In fact, one of the things that gives U.S. producers some pause is the fact that the Europeans say flatly that they have modeled their new policies on the U.S. policies. It would be hard to argue that the U.S. policies were deliberately designed to withdraw U.S. producers from a competitive position in world markets.

Therefore, we face a continued period, even with a successful GATT agreement, in which we are going to have substantial and significant competition from that area of the world, as well as from low-cost exporters in Latin America and elsewhere.

That gets me to the matter of domestic support and trade policies. It seems to me that the United States in this period ahead will have to face certain issues squarely, which they have not faced in recent periods. Part of the problem of the 1980s was the fact that our domestic support and income policies were oriented toward one set of goals at a time when our export policies were oriented toward another. It seems to me that it is possible to provide income

support to farmers without busting the budget or without hurting our competitive position. Our domestic policies in recent years have, in fact, sometimes hurt our competitive position in world markets.

If we are serious about this, it seems to me that the first question ought to be, what will this policy do in terms of our position in world markets as these markets change and grow? And then second, how can we, given that situation, do the best job of maintaining whatever level of income support that we wish for farm producers?

I think, in the past, what we have been doing is almost the reverse, at least in the 1980s. We said first, what can we do to protect the domestic producer incomes? Second, how can we do it with the least budget cost? And then third, oh, incidentally, we are now losing world market positions, so what should we do to get that back? Why don't we do some export subsidies? It seems to me that that is not the policy choice that we ought to be making as we look at the period ahead. It is not going to be a period that is going to be, at least in the intermediate run, easy. And we are going to have to look at it in terms of, do we wish to maintain our competitive position in the world?

Thank you.

[The prepared statement of Dr. Hathaway starts on p. 35 of Submissions for the Record:]

Representative Hamilton. Thank you, Dr. Hathaway.

Dr. Paarlberg, please proceed.

STATEMENT OF ROBERT L. PAARLBERG, HARVARD CENTER FOR INTERNATIONAL AFFAIRS

DR. PAARLBERG. Thank you, Mr. Chairman. My statement reviews some of the more important and less important factors to keep in mind when considering export prospects for agricultural products in the years ahead. I will summarize my statement.

First, I single out three factors as being relatively less important to our commercial export prospects in the years ahead. I include, among these, actual human food needs abroad, the size of USDA export programs; and, third, the Uruguay Round of GATT negotiations. I know that our policy discussions often revolve around some of these factors. But their real significance in my view has been exaggerated.

Very quickly, first, consider the food-needs factor. Human food needs abroad, by themselves, do not constitute a commercial market. Large numbers of hungry people in poor countries are not a commercial market. They are just large numbers of hungry people.

Consider the case of Africa; Africa has food needs galore, but it purchases very little from us. Tiny little South Korea, with just a fraction of Africa's population, purchases five times as much as all of the Sub-Saharan African countries combined, because Korea has been a developmental success and has income.

So lesson number one: Food needs do not create foreign markets. Purchasing power creates foreign markets.

The second item that is not very important for commercial agricultural exports is the export promotion budget of the U. S. Department of Agriculture.

The most heavily used USDA export promotion programs, including EEP, the GSM export credit guarantees, and P.L. 480, are all poor substitutes for real purchasing power abroad. These programs do not build foreign commercial markets. At best, they "rent" those markets at the expense of U.S. taxpayers. And, at worst, they can actually reduce the size of our real commercial markets abroad by sending out low-priced concessional goods in place of our normal unsubsidized commercial sales.

USDA is often forced under intense political pressure to operate these programs. And when it does, it tries to claim success, often by bragging about the share of total sales that go out with export subsidies or credit guarantees attached. What USDA doesn't like to admit to is the small share of these sales that are truly additional to the normal commercial sales that would have been made otherwise. Most of the subsidized commodity sales made under these programs—up to 90 percent of the sales in the case of U.S. wheat under the Export Enhancement Program—are simply replacing commercial sales that would have been made anyway and at a higher price.

I would call such programs not really export enhancement programs. In some ways, it is more accurate to describe them as export displacement programs.

As for the small share of sales made under the export subsidy programs that are truly additional, remember the high cost to the taxpayers of making each of these additional sales. On a per-bushel basis, the cost is often more than the commodities themselves are worth. And remember these additional sales will continue only so long as the subsidy continues.

A third variable in our farm export equation that I think is likely to be less than decisive in the years ahead is the outcome of the Uruguay Round of GATT negotiations. I support the U.S. objective in this negotiation, to open markets abroad—especially for value-added products—and to bring down subsidy levels inside the European Community.

But I am dubious of the chance that these negotiations will produce a significant breakthrough. The cumbersome 100-nation GATT format creates too many opportunities for the European Community to posture and delay and evade accountability for the failure that may be coming. Nearly six years have passed since the negotiation began. Nothing has been achieved for sure yet. And most of the reforms now being talked about in the Dunkel draft are reforms that will have already been taken anyway, or are about to be taken anyway—past actions for which we will simply be given "credit" by GATT.

It is interesting that wherever the current Dunkel draft agreement goes beyond reforms already expected to be taken, the reforms in question are in the process of being rejected or resisted by the farm groups in question. France has said no to the projected volume reduction in European Community subsidized exports; other countries have said no to the projected restrictions on partly de-coupled cash payments to their farmers; Japan, Korea, Canada are saying no to the tariffication of import quotas. In the United States, the Administration has said yes to most of the Dunkel draft, but some of our import competing farm groups—dairy, sugar and peanut producers—are saying no. And the negative views of these few import competing groups seem to be getting much more political attention than the positive views of the export competing groups that would benefit from the agreement. So I expect the Uruguay

Round to add little to the slow pace of farm policy reform in the industrial world that is already underway.

But so much for the variables that probably won't be decisive. Let me turn quickly to some of the variables that can strongly affect the future growth of U.S. farm sales abroad. The most important of these—and Bob Thompson touched on this point—are what I would call the macrovariables. First, the macroeconomic variables, such as economic growth cycles abroad, or exchange rate fluctuations, or debt burdens. Second, macropolitical variables, such as the breakup of the Soviet Union, the Gulf War last year, or perhaps the future enlargement of the European Community. And third, a macrodevelopmental variable—the success or failure of long-term economic development in Asia, Africa and Latin America. I will stress the third of these.

In the past decade or so, U.S. farm exports have been negatively affected by some powerful macropolitical variables, but positively affected by the macrodevelopmental variable. And, fortunately, I think that is a positive effect that will continue. When poor countries can succeed in developing abroad, U.S. farm exporters are among the very first beneficiaries.

We can't emphasize the point enough. It is the process of rapid development that has recently been building good export markets for U.S. farmers abroad, for example, in countries like Japan. We sometimes forget that,as recently as 1962, President Kennedy referred to Japan as a "developing" country. Indeed it was. It is now our very best foreign market for agricultural products.

Elsewhere in East Asia—Taiwan, South Korea, Malaysia, Indonesia and Thailand—they are following now in the same path. In another 10 years, if the recent rate of growth continues, the economy of Thailand will be as large as the economy of Korea is today. And Indonesia is coming along very quickly as a good market for U.S. exporters in East Asia. In another 13 years, the Indonesian economy will be as large as the Korean economy is today.

And we can even look beyond East Asia. Perhaps, the most promising of the Pacific Rim markets for U.S. agriculture in the years ahead will be Mexico—a Pacific Rim country, I remind you. Even without a free-trade agreement, Mexico purchased $2.87 billion worth of U.S. agricultural products last year, which is roughly twice the level of the mid-1980s. The potential for future U.S. market growth in Mexico is now extremely high. Already the average Mexican consumer purchases about $300 worth of U.S. goods—farm goods and nonfarm goods—every year, compared to only $265 worth of purchases per citizen of the European Community, even though income levels in the European Community are far higher than they are in Mexico. If income levels go up in Mexico, and if that growth is fortified by a free-trade agreement, I expect Mexico to be a wonderful market for U.S. agricultural exporters.

Of course, the frustrating feature of these important macrovariables—and Dale Hathaway mentioned this—is that they're not always under our direct policy control.

But I would like to end by pointing to one variable that is more nearly under our control and which is also vital to the future success of U.S. agricultural exports: the availability of low-cost exportable supplies. In our fiercely

competitive world markets today, we need adequate exportable supplies if we hope to seize export opportunities when they become available.

We haven't always done a very good job of this. Look at what has happened in world wheat markets. World wheat imports have expanded by 70 percent over the last 18 years. But the U.S. has lost market shares. In this period, our market share has fallen from 53 percent down to 32 percent, partly because our wheat production hasn't expanded very much at all. It has expanded by about 15 percent.

Our production has been, I think, unfortunately constrained by our own unilateral acreage reduction programs. Talk about unilateral disarmament, our unilateral acreage reductions are, I think, "exhibit A." The United States is the only country in the world to make a policy out of unilaterally removing its own good farmland from production. The chief effect of our unilateral acreage reduction programs has been to open up foreign marketing opportunities for our competitors, especially in the European Community and Canada.

More immediately, look at our situation today in wheat markets. Weather problems around the world have pushed up wheat prices to high levels, nearly a dollar a bushel higher than a year ago. But U.S. wheat farmers are caught with low stocks—even smaller than Canadian stocks, only half the level of European stocks—so low that most of the new highly lucrative international sales will again be going to our foreign competitors. I see forecasts that U.S. wheat exports in 1992 will be down to just a billion bushels, a 20 percent drop from last year.

Taking better care of this U.S. exportable supply variable may not be sufficient by itself to offset the other disadvantages we encounter. But making sure that we have the supplies needed to service export markets is at least one thing under our own policy control. When our commodity programs deny planting flexibility to farmers, or even worse unilaterally remove good U.S. cro [The prepared statement of Dr. Paarlberg starts on p.42 of Submissions for thp land from production, we make what is a difficult enough problem for U.S. agriculture even more difficult.

Thank you.

[The prepared statement of Dr. Paalberg starts on p.42 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you, Dr. Paarlberg. Mr. Avery, please proceed.

STATEMENT OF DENNIS T. AVERY, DIRECTOR, GLOBAL FOOD ISSUES, HUDSON INSTITUTE

MR. AVERY. Thank you very much, Mr. Chairman. I spend most of my time looking at other countries in terms of long-term trends and technology developments. And the things I look at emphasize very strongly that this is a highly opportune time to be examining U.S. agricultural competitiveness, not only for the reasons that have already been cited, but because of the very strong surge of economic growth, which is occurring today in quite a number of countries, but particularly in densely populated Asia. I credit this growth primarily to the existence of the General Agreement on Tariffs and Trade and the pioneering of the Asian tiger model by Japan, South Korea and Taiwan,

and now, being strongly and rapidly followed by Thailand and Indonesia. I would personally include China on my list of growing Asian tigers.

I would also call your attention to a long-term trend away from price supports for farmers in the affluent countries of the world and a long-term trend toward wider use of better farm technology in other countries. The key thing that I would like to bring up this morning is an estimate. I don't offer this estimate as the final world but as a ballpark figure for discussion, and as a way of emphasizing to the Congress and to our farmers the potential that exists in liberalized foreign trade for American agriculture. I estimate that U.S. farms could earn an extra $60 billion per year from farm exports as world demand for farming resources basically triples in the next few decades. Most of the extra cash would go to farmers in rural communities. But as a side benefit, the government would save $12 billion per year in farm subsidy costs, the equivalent of a permanent tax reduction of $150 per family for American taxpayers.

However, the United States would need to initiate a major and highly visible shift in its agricultural policies's emphasis and do it soon in order to achieve very much of these gains. If we do not make such a major shift in our agricultural emphasis, we are likely to see shrinking agricultural exports regardless of our competitiveness.

Most of the world's increased food demand will be in Asia, where the population will double and the per capita incomes are growing most rapidly. As examples, I point out that China's consumption in the last five years has doubled from 2 million to 4 million tons, while the Japanese market was increasing 100,000 tons. India's milk consumption is rising at about 1 million tons a year. Indonesia has just announced that it will clear a million and a half acres of tropical forest to grow soybeans for its poultry industry, which is expanding at 25 percent a year.

It would take that radical shift in our farm policy emphasis to get access to these Asian growth markets. We would have to abandon a 60- year history of demanding high prices and diverting production. We would instead have to pursue high-volume sales of commodity exports at competitive prices. And we would have to pursue GATT farm trade liberalization a bit more aggressively than we are currently doing.

If the current GATT talks fail, which is very likely, it may well take another 10 to 15 years to get a farm trade reform agreed to and phased in. By then, much of the investment to feed Asia will have been made in Asia. At that point, there will be far less growth for the U.S. agriculture to participate in, except for low-value industrial feed stocks.

I do not believe either our farmers or the congressional agricultural committees see this opportunity. They are still remembering the OPEC boomlet of the 1970s, when the food demand fell back with the oil prices. They are not looking at Asia's economic growth trends.

In addition, our farm policy has been fixated on prices, even though sales volume and cost are equally important to net farm income.

It is unfortunate, but I think it is crucially important for us to focus on the fact that the strongest trend in world agriculture for at least the past decade has been national food self-sufficiency. World grain demand rose 331 million tons per year during the 1980s, while trade declined 10 million tons. The

world is currently supplying only 10 percent of its grain and oil seeds through trade and about 6 percent of its meat, despite the fact that comparative advantages in agriculture are much bigger than those in manufacturing.

This self-sufficiency trend is being produced by the traditional farm trade barriers but amplified by technology. Seed breeding, expensive irrigation and heavy use of chemicals are all stimulated by high price supports. When Saudi Arabia in the desert and Finland at the Arctic Circle can produce farm surpluses, there are few countries that could not.

God may not be making more farmland, but agricultural research is. It has already tripled the yields on most of the world's good cropland. One of the latest developments is new acid tolerant seeds—produced in Brazil and Colombia—able to produce high yields of crops and forage on a billion acres of hitherto useless acid savannah. One third of this land is in Latin America, a third of it in southern Africa and the rest of it is in Southeast Asia.

Our traditional advantage in cropland is rapidly being offset. Thus, technology makes a bad joke of the traditional U.S. supply management approach to farm policy. Our price supports and cropland diversion actually invite other countries to expand. In that sense, the EC's common agricultural policy is our foster child.

If densely populated Asia follows the recent trend in self-sufficiency in food, then semi-arid India, mountainous China, water-logged Bangladesh, and tropically forested Indonesia will be ploughed up for grain, while the fields of Iowa and North Carolina lie idle.

I project that world demand for food in the next decade will rise twice as fast as it did in the 1980s, primarily due to the rapid economic growth in the third world, primarily Asia. This will mean meat consumption expanding at 80 million tons of grain and oilseeds per year, plus 7 million tons of meat.

I further project that exports in that trade in the liberalized world would gain half of this expansion. That is because few investments have been made in other agricultures until the existing capacity in the United States and Argentina have been brought into production. The hothouse farming investments, which have typified the European Community, Japan and South Arabia, would not be made at all.

Another major advantage for the U.S. farmers is the unmatched agricultural infrastructure—the roads, rails and river transport—which are simply not available to farmers in other countries. As a result of this, we project that the United States would get half of the early gains in farm trade. In fact, we are the only exporter that can cut both its per unit costs of production and its per unit costs of delivery by expanding our output.

Our farms could use the set-aside farmland that they already own instead of diverting it. They could either cut their out-of-pocket costs by roughly 15 percent or they could produce roughly 15 percent more without incurring additional cost. That 15 percent translates into roughly $22 billion a year. Farmers would also get trade expansion gains, and I am estimating them at $6 billion to $7 billion a year in the first few years until our set-aside was brought back in. We project these trade expansion gains would average at least $22 billion per year over the first decade.

America's big problem in seizing world trade expansion is the stalled GATT reform and the very unhappy set of farm trade rules. We have invested

seven years in this GATT reform process and may get nothing from it. The EC is blocking it on behalf of an already moribund agriculture policy, even though the CAP is drowning 12 countries in farm surpluses, environmental damage and deficits.

Unless the United States breaks through the EC blocking position, we will lose 7 to 15 years in the farm-trade reform process. Delay will impose a severe penalty on our farmers and our budget during the short term. It could also mean heavy losses in our farming comparative advantage for the long run. Once investments in agriculture are made, they stay.

Despite these high stakes, the U.S. Government has made little effort to communicate any major shift in its foreign policy to the European Community, to its own farmers, or to the public. No new initiative is being unveiled to revive the GATT talks or to convince the EC that their current farm price policy is futile. Thus, we may well see our major comparative advantage in agriculture displaced by cloned palm oil seedlings in Indonesia, genetically-engineered pork growth hormones in China, desert oilseed crops in the Middle East, and high-cost tropical wheat around the equator.

Thank you.

[The prepared statement of Mr. Avery starts on p.47 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Let us start our questions with Congressman Armey.

REPRESENTATIVE ARMEY. Thank you, Mr. Chairman.

As I recall my history, David Ricardo discovered the notion of the margin in examining agriculture. And the great contribution to be made was that the marginal acreage would be brought into play as the price went up. I think you're saying that the marginal agri-technological innovations get brought into play as the price gets up. Is that what you're saying?

MR. AVERY. This is certainly part of what I'm saying.

REPRESENTAIVE ARMEY. Gentlemen, I have an abiding belief, when God looks at the world's agricultural policy, it makes him very angry and frustrated with the human race and he probably denies that we were created in his image.

But see if I got it right. There are essentially two kinds of nations in the world, and I want to talk about agriculture as a generic. There are those nations that are rich in their ability in the resource to produce food and those that are less so.

The history of agricultural policy, led by the United States—let's just say since World War II—has been one where nations that are capable of producing and feeding their populations and perhaps the populations of other nations have mandatorily restricted that production, while they held their prices above the market price, and while the nations that were not able to gain an efficiency in production were unable to further define a way to feed themselves in a world of prices higher than they would have been had there been more production. Is that a fair characterization?

MR. AVERY. I really think that you can characterize this—except for the United States—as an attempt at self-sufficiency. You also have to accept that the Europe Community and the West European countries, which found it

convenient under our set-aside policy to subsidize exports. Those are the exceptions to the self-sufficiency trend.

REPRESENTATIVE ARMEY. I understand that. But certainly the European nations have had a protectionist attitude towards agriculture that is greater than what you have seen elsewhere.

If you really boil it down, can the GATT sometimes work like a cartel? It is the General Agreement on Tariffs and Trade, where they finally decided, instead of everybody getting after each other, let's all get together and fix the terms of the world's restrictions on trade in a manner in which we can agree. Now understand, I'm a big fan of GATT. But I'm concerned that GATT can become a place where you say, well, let's take a little bit of the gamesmanship out of world trade restrictive practices and get together and work out an agreement that we can hold together?

DR. PAARLBERG. I would say, if we're not careful, GATT could turn into such a market sharing agreement. The first negotiating position that was put on the table by the European Community, when the Uruguay Round began was an explicit market sharing agreement for half a dozen crops, it would have been to their advantage if the United States had agreed with them not to compete in those markets. That's what a cartel is. It is an agreement not to compete. It is to the advantage of a high-cost producer in the European Community to secure an agreement from low-cost producers in the United States not to compete. Thank goodness, we didn't buy into that.

REPRESENTATIVE ARMEY. But if we buy into such an agreement, essentially what we're doing is making an agreement that we will trade off those industries in which we are relatively more efficient to be protected by somebody on that side, while we accept protections for those industries in which we are relatively less efficient. Isn't that really what it amounts to? In other words, we are not going to accept a restraint on our export of, say, wheat, unless they give us a restraint on their export of something that we don't want imported. These agreements are generally driven by people who wish to be protected from international competition. That's the bottom line. That's the people that you have to reckon up with. Am I correct in this?

MR. AVERY. I have a hard time viewing the GATT in that light. In my view, the GATT is one of the few times that the world's trading missions have gotten together and done something pro-competitive and con- tructive.

REPRESENTATIVE ARMEY. I understand that, but it is still an agreement; it is still similar to a cartel arrangement. I don't know why we have such a hard time accepting that. There are good cartels and there are bad cartels.

DR. PAARLBERG. I would liken it not to a cartel but to a convoy that can move only as fast as the slowest ship. The slowest ship is the most reluctant reformer, and the most reluctant reformer is the European Community.

REPRESENTATIVE ARMEY. Let me see if I can switch gears, I guess, the term cartel is just too pejorative for those of us who love the GATT to apply the term to it. I can appreciate that because I am and have been a big fan of the GATT. I think that you are basically correct.

Now, I am continuously told by my friends on the Agriculture Committee that we do not live in a world of free competition, and I accept that. The reason that we do not live in a world of free competition is that governments put in restraints on free trade. It is my position—and if they all agree on

this—that you have a cartel arrangement whether they call it that or not. I have to take myself back to the cartel notion because I have to get to Friedman's point that a cartel can only survive until somebody cheats. And if somebody cheats, then the whole arrangement breaks down.

Now, the question is, which party would be the most likely to cheat on a cartel arrangement? Well, the answer is the most efficient producer in the cartel.

Let me move on. I know where I'm going and you don't, so you have a lot of doubt about me.

[Laughter.]

Let me ask this question. Is there a nation in the world with a greater comparative advantage in the production of food than the United States?

MR. AVERY. I would suggest that Argentina comes close, except they still have some shortcomings in infrastructure that we don't have.

REPRESENTATIVE ARMEY. Which is an essential component, as you pointed out.

MR. AVERY. I think they could build up the required infrastructure, probably more quickly, than about any other competitor.

REPRESENTATIVE ARMEY. Assuming that we never put in a soybean as generous as our current program.

MR. AVERY. No one has. The package of comparative advantage—

REPRESENTATIVE ARMEY. Argentina is where it is today because we have had our programs in place and thereby raised the world price, allowing the Ricardian impact to come to Argentina where it would cut down rain forests to put in soybean crops.

MR. AVERY. I think you are underestimating the irrationality of the Argentine policy, Mr. Congressman.

REPRESENTATIVE ARMEY. Can we agree that, given the potential of Argentina, there's no nation today that has ,or has enjoyed, the comparative edge in agriculture that we have had, at least since World War II? Would you all agree with that?

DR. PAARLBERG. I wouldn't agree for some crops. I think sugar production would be more efficiently located in the tropics than in the European Community and in the United States. And you might have trouble competing with New Zealand's dairy farmers. But for our major export crops, I think you're on the right track.

REPRESENTATIVE ARMEY. You have to allow certain crops some places. Although, if I were you, I think you would go to Grand Forks, North Dakota and find out that it is that sugar crops should be grown in the Red River Valley, and that takes precedence over efficiency in making public policy, as you know.

[Laughter.]

Now, what I'm about to suggest is the reason we don't have a world free trade in agriculture. And when you cut to the bottom line, the only reason that we don't have free trade in agriculture is that the world's most productive country imposes trade restrictions, imposes mandatory reductions in production upon itself. We take 60 million agricultural acres out of production in this

country. I wrote that down. It's fascinating. It's the size of Ohio, Indiana and half of Illinois. And we just say that that land can't be used. Good land, as you pointed out. Good infrastructure. And then, of course, we maintain prices higher than the world markets.

If we unleash that productive capability of the 60 million acres and, in fact, unleash the full productive capability of American agricultural efficiency, I would suggest to you that there is not a nation in the world that could afford to maintain their import restrictions against that competitive surge, except, of course, with the right tariff structures. You would have to simply have a clear and open face denial of the rights of your consuming public to consume. It would be so visible that the public would not accept it.

I guess what I'm trying to get to, and I suppose maybe I was wrong to go off on the cartel thing, because I know everybody has a soft spot in their heart for GATT, but the point is, it is a shadow argument against reducing the insane American agricultural programs and trade restrictions, to argue that there is no world of free trade out there and that there can be none. Would you agree with that? Do you think that our productive capabilities are that significant?

MR. AVERY. Yes.

DR. PAARLBERG. I would agree, if we move in the direction you are suggesting, it would cost our competitors more to maintain the share that they now have. We would, at least, be pushing costs out to them that we now protect them from.

REPRESENTATIVE ARMEY. Mr. Chairman, if I can make this last observation and get their reaction——

Representative Hamilton. Take your time.

REPRESENTATIVE ARMEY. In the name of humanity, can you give me a rationale or justification for nations gathering together and agreeing on a system of trade restriction, acreage reduction, price support? A system which, once you get the price pushed up to the world market, then, of course, you have a perfect rationale for an export enhancement program. This fascinates me. Government can always manage to get on both sides of every issue. Can you tell me how a nation, or a group of nations, a group of world leaders, can possibly rationalize that it is good and acceptable policy to gang up on the hungry part of the world in this way? That's what it is to me. It is just a literal ganging up on starving children across the world.

MR. AVERY. Congressman, I can indeed conjure up a rationale. In fact, it is the one that is most frequently used by people who want to justify these programs; that is, national food security. Unfortunately, if you really want national food security, the way to do it is with stockpiles. It doesn't matter whether the food was grown in country or out. It would have made no difference to Germany or Japan in 1945 whether their agricultures had been twice as large at the beginning of the war or not.

I was in Finland in 1987 where they had spent 40 years trumpeting the virtues of food self-sufficiency. They had a wet summer. I saw combines harvesting wheat in the rain and standing water. They went out and bought out nearly a full year's supply of wheat abroad and then went back to trumpeting food self-sufficiency.

Unfortunately, the food security agreement has virtually always been turned into a thin disguise for buying the local domestic farm vote.

REPRESENTATIVE ARMEY. I consider this to be the most moral Nation in the history of the world, the most compassionate Nation in the history of the world. I'm very proud of the United States's record. It strikes me that we have an obligation to be, in almost heroic ways, the people who lead the GATT further than anybody dares to believe it can go. It seems to me that this Nation must take the GATT in the direction that we would all like to see it go in the most assertive and aggressive terms. And if, in fact, we were to use the threat of unilateral disarmament to bring people along, it would seem to me, in this case, it would be an honorable threat to make. Would it work if we were to tell the other nations, look, we are going to, if it becomes necessary, dismantle our farm programs and its restrictions on the 60 million acres and unleash that full agricultural productivity in the world market place if you all don't move more quickly in the direction of freeing the world's food supply for the world's hungry?

DR. HATHAWAY. It doesn't seem to me that there is a whole lot of evidence to suggest that such a policy is likely to move countries like the European Community, or the Nordic countries, or Japan, or Korea. However frustrating that may be, it seems to me that these countries have proven that their consumers are willing to pay substantially higher prices than they might otherwise have to pay in order to maintain a significant agricultural industry, for whatever the reason. They have elections too, and their farmers vote in their elections, and they know that they are high-cost producers in many cases and object to being exposed to greater competition. Their political leaders have been unwilling to take those steps.

A change by the United States would clearly make the cost of these programs more evident. But I do not think that merely saying that we are going to do away with our programs is, in fact, likely to very much change the internal politics of these other countries.

I think the leverage that we have in the current negotiations really rests outside of agriculture, and that in the absence of that leverage, the leverage within agriculture against other agricultural policies has been fairly limited.

MR. AVERY. If I could disagree in some part with Dr. Hathaway., I think it has become fairly clear that western Europe is not satisfied with their current agricultural policies. Once their consumer markets were saturated and the easy cost-effective dumping opportunities were cut off by our 1985 farm bill, the political cost-effectiveness of high-price farm supports has deteriorated in Europe. Norway has moved to small farmer income payments. The Swiss are doing the same. Sweden is in the buyout of its franchise values. And the Swedish labor movement says that this will eventually mean the equivalent of a 10 percent pay raise for their average Swedish worker without any reduction in the competitiveness of Volvos and Saabs.

The European Community itself has radically altered the nature of the Common Agricultural Policy in recent years. After our 1985 act went into effect, roughly a year and a half later, they put quotas on practically all of the products that their farmers produced. And farmers are much less grateful for a price support that comes with a shrinking quota attached.

[Laughter.]

DR. THOMPSON. They're going into all other parts of the food and agriculture industry, from basic biotechnology research to farm input supply, to farm credit supply, and all the way through the processing and export sectors. Agribusiness hires over half of our graduates.

REPRESENTATIVE HAMILTON. How about the rest of you? How would you advise a young person?

DR. HATHAWAY. I think Dean Thompson's answer is probably a pretty good one. It seems to me that both having the management ability and access to capital are crucial. It is not an industry that can be done on a low budget by entering people anymore.

DR. PAARLBERG. I would like to repeat a joke that I heard recently. It is still possible to make a small fortune in agriculture in this country. The trick is to start out with a large fortune. There is a point behind that joke.

REPRESENTATIVE HAMILTON. That wouldn't exactly persuade me to get into the business.

DR. PAARLBERG. Many people have access to inherited land, very good land. If it is owned free and clear, without any debts, and they don't have to borrow a lot of money to acquire those very expensive assets, then it is a very attractive business if you have the other ingredients, including the good Purdue education that Bob Thompson talked about.

REPRESENTATIVE HAMILTON. You seem to be saying to me that it just isn't possible for a young man or a young woman who doesn't have access to these assets to make a go of it as a successful farmer. In other words, they have to have a lot of advantages. And those advantages, which you were saying are critical, are access to these assets—land, principally, but equipment, too. A 25-year-old fellow who doesn't have access to those assets, but has energy, talent and intelligence, can't make a go of it. Is that what you're saying to me?

DR. PAARLBERG. I'm not sure that I would advise that person to borrow the money to buy the land that would get him into the on-farm portion of our agricultural sector. But the on-farm portion of our agricultural sector is a shrinking portion of the sector and it is not the only lucrative portion of the sector. It is not the only place where people can still make a very good living in rural America, working in agriculture.

MR. AVERY. Mr. Chairman, I think the situation is considerably worse than that. And I do get asked, not only by young people but by farmers who are considering selling, investing, expanding and so forth. The prospects for farmers in the world today are very good. The demand for farming resources for food and fiber, not for ethanol, not for resorting to low-cost industrial feed stocks, is very good.

The prospects of American farmers being able to share in that market growth are very difficult. I do not myself believe that we are going to manage to pull it off. And I do believe that our agriculture is more likely to shrivel in the next 15 years than to prosper.

REPRESENTATIVE HAMILTON. Do you agree with that, Dean Thompson?

DR. THOMPSON. I'm more optimistic that the GATT Round will provide greater market access overseas and that we have enough low-cost producers who can effectively compete so that we will see American agriculture grow.

I do believe that what the GATT Round is all about is growth. With freer and more open markets, we will be able to see American agriculture grow in the future, perhaps not as fast as in the 1970s, but we can see it grow. With subsidized export competition and large acreage reduction programs, American agriculture will continue to muddle through.

MR. AVERY. I'm afraid that even if we get a GATT Round agreement that it's going to be targeted against European export subsidies. And that's like fighting the last war. What we need is market access in Asia. I do not see anything being discussed in the current GATT Round that will offer much improvement in food import access in Asia. And I really doubt that American agriculture, however competitive it might be in the free market, is going to be allowed in. I think that we're going to be deliberately fenced out as Asian countries pursue the same kind of food self-sufficiency for the same political reasons that the rich countries have already done.

REPRESENTATIVE HAMILTON. Dr. Paarlberg and then Dr. Thompson.

DR. PAARLBERG. I think I share some of the pessimism on GATT, but not on the outcome of trade negotiations or on food self-sufficiency in Asia. We've had trouble with GATT, but we've made considerable progress in Asia with bilateral negotiations, and bilaterals with Japan, South Korea, Taiwan and Singapore. We have a bilateral with Canada and with Mexico coming up. We have used bilaterals to get some market access that has eluded us so far in the Uruguay Round.

I'm not sure that food self-sufficiency is the direction in which Asia is moving. It may be the direction in which Europe is moving, but the homegrown share of Japan's total calorie intake continues to fall, from an already low level. The homegrown share of calorie intake in Taiwan and Korea continues to fall. Taiwan used to be an exporter of food. Now, it is one of the largest importers. I don't see self-sufficiency as the direction those countries are going in.

It is possible to look at Latin America and Africa in the 1980s and conclude that, my gracious, there is a self-sufficiency trend underway. But those countries dropped out of the world market as importers not because they were producing more. They were actually producing less. They dropped out because they were consuming less under the weight of a world recession and debt burdens. That is not food self-sufficiency driven by supply-side success. That is food self-sufficiency driven by a cruel kind of demand-side failure. If we get income growth going in those regions, then there will be more market expansion. There will be better markets every year. It won't be like Finland or Switzerland or the European Community.

DR. THOMPSON. I agree with DR. PAARLBERG. International trade is the greatest engine of economic growth that exists. One of the most important things that this GATT Round can do is to ensure that the Third World developing countries have the opportunity to export so that they can enjoy faster economic growth. This is important from agriculture's perspective because, as per capita income rises, people attempt to upgrade the quality of their diets. As they upgrade the quality of their diets, this usually translates into more animal protein consumption, which, in turn, translates into more corn and soybean consumption to feed the poultry and livestock. That is exactly what the U.S. Midwest needs to expand corn and soybean exports.

One of the greatest long-term benefits of this GATT Round is likely to be the expansion in export opportunities, particularly for Midwestern agriculture in the Third World as they eat more meat. Also, faster economic growth in South America will reduce the competition from Brazil and Argentina in the soybean export market.

REPRESENTATIVE HAMILTON. Do I understand that Dr. Hathaway emphasized—I guess, all of you emphasized this—that the future growth is in the developing countries? Do you all agree with respect to that?

[Nods.]

REPRESENTATIVE HAMILTON. You see it in the developing countries, and that depends on purchasing power.

MR. AVERY. Absolutely.

REPRESENTATIVE HAMILTON. That is the key force. Of course, that is difficult for us to control.

MR. AVERY. That income picture is much better at this point. The outlook for income is better than the outlook for market access in the developing countries.

REPRESENTATIVE HAMILTON. All of you basically support the GATT agreement on the position of the Dunkel draft—on the U.S. position. Is that what you're thinking about when you say you support GATT? You're not thinking about that, Mr. Avery?

MR. AVERY. I'm thinking that we have to have a great deal more in the long-term than the Dunkel draft begins to conceive of. Frankly, I think the Dunkel draft, the whole discussion, has been keyed around Europe's export subsidies instead of accessing the Asian market.

REPRESENTATIVE HAMILTON. Would you buy the GATT agreement based on the Dunkel draft, Dr. Hathaway, or Dr. Thompson?

DR. HATHAWAY. My view is that it is better than the situation that exists now and not as good as you might hope for. I disagree with Dennis Avery to some extent, although I agree with him on one point. We have for the last several rounds been fixated on Europe and have not really paid much attention to what would be a real value in the rest of the world. Therefore, most of what we got in the rest of the world was primarily incidental to our fixation. I think that was a mistake. I think it is a mistake in the current Round.

Having said that, I still think that there are potential market gains in those developing countries, because the only real reforms that are in the document are on the import side. It moves to tariffs across-the-board, and over the long-run, I think that that would be significant in terms of improved access to these developing country markets.

REPRESENTATIVE HAMILTON. If this GATT agreement is signed, can I say to my Indiana farmers that your income is going to go up?

DR. HATHAWAY. I think that you can say that in the long-run they're better off with it than without it. Whether their income goes up or not may not be related to the GATT agreement.

REPRESENTATIVE HAMILTON. The farmers are getting to the point where they don't like the phrase, "in the long run." Dean Thompson, can I say that to the Indiana farmers that, if we sign the GATT agreement, their incomes are going to go up?

DR. THOMPSON. When I give talks out to our Indiana farmers myself, I encourage them to support the GATT agreement. I emphasize that the most efficient producers are going to thrive under free, more open markets. The higher cost farmers are going to have to work on getting the costs down to make sure that they are competitive.

REPRESENTATIVE HAMILTON. Do you think their income will go up, Dr. Paarlberg?

DR. PAARLBERG. I think you can say that, compared to where their income would be without the agreement.

REPRESENTATIVE HAMILTON. Farm sales would go up, you think so, Mr. Avery?

MR. AVERY. Mr. Chairman, I think I would have to say frankly to them—as I do—that I don't think it would be nearly enough. And that, as long as the primary concern of the American farmer is how to maximize payments from Washington, Europe and the rest of the world are going to play on that. They are going to count on it, as in fact they are counting on it at this moment. The strongest argument that the European Community has had at Geneva is to say, "your own farmers don't want this. Why are you pushing it?"

REPRESENTATIVE HAMILTON. Your position is that you would do away with all of the commodity support programs?

MR. AVERY. I don't think that we have a hope of getting access to the $60 billion a year gain as long as we have any shred of the present structure.

REPRESENTATIVE HAMILTON. You would take out all——

MR. AVERY. I'm not necessarily recommending that we yank it all out, cold turkey, and simply throw it at the rest of the world. I don't know how we get the transition made. I think it's going to take something a good deal more dramatic than the Uruguay Round. And I emphasize that there's a time fuse on this. If the investments to feed Asia get made in Asia, they stay there, and they keep producing.

REPRESENTATIVE HAMILTON. But if I understand your position, eventually you would like to end up with no commodity support program of any kind.

MR. AVERY. I don't see how a commodity exporter can win with a price support and a set-aside program.

REPRESENTATIVE HAMILTON. What about the rest of you?

MR. AVERY. It defies logic.

REPRESENTATIVE HAMILTON. How about the rest of you? Would you knock out the commodity support program?

DR. THOMPSON. I think the existing programs have done more harm than good. There are arguments that can be made for price stabilization measures. But if you stabilize prices around a higher average, you price your products out of the world market and that ends up doing more harm than good if a country aspires to be a large exporter. We are very dependent on exports.

REPRESENTATIVE HAMILTON. So our programs today do more harm than good?

DR. THOMPSON. Many of our programs have done more harm than good.

REPRESENTATIVE HAMILTON. Because the levels are set too high?

DR. THOMPSON. Because we priced ourselves out of the world market, and by setting aside too much land, we raised our cost structure and reduced our competitiveness. The benefits of those set-asides get capitalized into higher asset values, making it harder for the next generation to get into the farming business.

REPRESENTATIVE HAMILTON. Do you agree with that, Dr. Paarlberg?

DR. PAARLBERG. I do. I think the values are higher than without the programs. That's one reason that the young farmers who ask you questions are having trouble getting into the business. It is our farm programs. However, I would say that I think it would be imprudent and irresponsible for a government to remove overnight programs that have been in existence for several generations; programs that have been built into the expectations of those who live and work on farms and into inherited asset values. I think, having artificially inflated these values, the worse thing that we can do is to suddenly pull the rug out with a capricious act of sudden policy change. I think we should do whatever we do with these programs gradually rather than suddenly, and with plenty of advanced signals.

DR. HATHAWAY. Programs are in drastic need of reform to take away some of the aspects that cost us competitiveness. It seems to me that the other thing that does need to be done is to get the program effects out of farm-asset values. This shows up, of course, very clearly in some programs. But one of the costs of entering farming is the cost of assets that are driven up by the programs. If the programs are going to be organized to help producers, they ought to be aimed at people and less at maintaining the price of land.

Having said that, one needs to be careful as to how one goes through a transition period, because we've already seen a huge asset deflation in American agriculture in the 1980s, and it raised havoc with tax bases—everything across rural America. Therefore, there needs to be, if there's going to be a drastic change in these programs, a serious thought as to how this can be done and have the least adverse effect upon the communities in which farmers operate.

REPRESENTATIVE HAMILTON. I will go to Congressman Armey in just a moment. Dr. Thompson, you suggested that we're not doing enough on research. What is our research? Is it level or going down? What is the status of it?

DR. THOMPSON. Starting in the early 1970s, federal investments in agricultural research flattened out and declined in the early 1980s. In the years of Graham-Rudman, research took a hit like everything else. And it has only edged up a little bit in the last two years with the National Ag Research Initiative. At the time that our investments flattened out and declined, those in the rest of the world—the European Community, the Far East, Brazil, and even in the Soviet Union—have increased at a much more rapid rate.

REPRESENTATIVE HAMILTON. Is that something to be seriously concerned about?

DR. THOMPSON. I feel it has to be. If we want to just stay even on the international competitiveness treadmill, we have to keep investing in research. For one thing, pests mutate year-by-year, and you have to keep investing to find new pest-control strategies each year to control the same pests that you had effectively controlled by other means in the past.

REPRESENTATIVE HAMILTON. One other thing. When you talk to farmers, one of the things that they see as a market growth are the nonfood uses of agriculture production. None of you mentioned that. Why not?

MR. AVERY. Today, sir, the world has paid vastly higher prices for food and fiber than it has for any of the alternative products that farms can produce.

REPRESENTATIVE HAMILTON. Do you think the farmer is doing a little wishful thinking there?

MR. AVERY. I wouldn't even call it wishful thinking. If the demand for your basic product is going to triple, why do you want to diversify into something that is unprofitable?

REPRESENTATIVE HAMILTON. How about the rest of you? Why didn't you say something about nonfood uses?

DR. PAARLBERG. I think there is an inconsistency between demands for higher commodity prices, on the one hand, and for increased use of these commodities for other purposes, on the other hand. That inconsistency can only be squared with subsidies that cost the taxpayer too much money.

DR. HATHAWAY. My view is that, in the cases where these require hugh subsidies, you're starting down another path that may create difficulties of the type that you have now and that these get built into the system, into the product and line prices. To the extent that these are developed en route, without huge continuing subsidies, I think that these are excellent. It is just that so far most of them have been built upon subsidies of one type or another.

MR. AVERY. If I could re-emphasize, if I am half right about $60 billion in gains working out there in the export market for U.S. agriculture, there is plenty of gain to go around. If we are giving up $60 billion a year in earnings in order to hold onto $ 12 billion in federal subsidies, are our priorities in the right place?

REPRESENTATIVE HAMILTON. Congressman Armey.

REPRESENTATIVE ARMEY. Thank you, Mr. Chairman. Let me digress for a moment. I have had two good close, personal friends who went into farming in my generation from scratch. One fellow, having never been on a farm in his life, when he came out of the Navy, decided to go and farm under the family farm bill. The land was paid for. I said, Frank, how are you going to do this? And he said, well, I can do it because the programs are there. And he talked about all of the programs that they had.

Now, he farmed that land for about 25 years. About the time when he had a couple of kids in college, the Federal Government foreclosed on that land through their programs. They had managed to acquire every damn thing that the family owned. And Frank then went off at that age and tried to find a way to start a career. The programs, to me, were a seductive trap for a man who otherwise, without those programs, would have known better than to try to do it.

Now, the other fellow left a Ph.D. program in mathematics at the University of Oklahoma, had never lived on a farm in his life, and went out to West Texas—if you can imagine West Texas to start farming—and didn't own a bit of machinery; didn't know a grease gun from a monkey wrench. I said, how in the world are you going to do that? And he said, well, my new wife here has control of the family farm, and the family farm is endowed with a peanut

quota. He is doing very well today. He still doesn't know a whole lot about farming, but frankly, he doesn't need to know a great deal—just plants peanuts. So it makes a difference, doesn't it?

I imagine that, if you had a quarter of land without a peanut quota, it would sell for considerably less than a quarter of land with a peanut quota, don't you suppose?

I agree with you, Dr. Paarlberg, and have since I was a boy studying these things, that the most destructive and disruptive thing anybody can do would be to come in and, in one fell swoop, take out the farm programs. It would be as if you took a perfectly able person and taught them to walk only on crutches. Now, you may know and he may know that he can walk without those crutches. But if he has never done it, you take the crutches away at one time, he's going to fall down. So we should think of ways to pare away at the program.

Let me ask you about a couple of possibilities. There are two ways that you can do that. You can make gradualized, generalized umbrella reductions like maintaining the loan rates at lower rates and phase them down. Perhaps, loosen up some of the restrictions on acreage and put them on.

You might also target some particularly egregious programs, or you might do something that would make a fundamental and drastic change. But what damage do you suppose would be done to American agriculture if, for example, we reformed a couple of programs that I have in mind—the peanut program and the cartel arrangement in citrus. I know that that is not a cartel by common parlance in agriculture, but it is a cartel. What if we just discontinued the cartel in California citrus and discontinued the peanut program? Would that work a tremendous hardship on the agricultural programs of this Nation and the Nation's farmers? Would that be a very destructive thing?

MR. AVERY. Mr. Congressman, it would not send much of a signal, either to U.S. agriculture or to Europe or to the Asian markets that are going to be potential importers.

REPRESENTATIVE ARMEY. Are you suggesting that that would come under the general heading of the least that we could do? You are saying that this is not a meat ax to agricultural programs?

MR. AVERY. I am frightened that the investments to displace this are being considered right now in 40 countries.

REPRESENTATIVE ARMEY. I understand what you are saying.

MR. AVERY. If we do not do something that is highly visible and with major long-term implications, it might not be worth the political capital that you would have to spend.

REPRESENTATIVE ARMEY. Gentlemen, I think that what Mr. Avery is saying is that this would not be seen as a significant revision in American agricultural policies. Is that what you're saying?

MR. AVERY. Yes, sir.

REPRESENTATIVE ARMEY. It is nominal. Would you all agree with that? No big deal as these programs go? Would you agree?

DR. PAARLBERG. I think it would be a big deal from the vantage point of peanut producers.

REPRESENTATIVE ARMEY. Absolutely. I have no doubt about it. If you happen to be one of the favorite few who happens to get a right to produce and sell peanuts because your granddad did in 1947, this would probably be for you a very tragic situation. That is to say, your rent would be denied you in Ricardian terms; a rent that would never have been there had there not been a government program that said this person can plant and this one cannot. So, if you end the injustice, the person who benefitted from the injustice would have a hardship.

What if I said to you, you can open a clothing store and you cannot? Would that be just? How would I ever justify that under the law? Well, your daddy had one in 1947. Now, that should make all the difference in the world to you.

So you're saying that this is just a piddly little modification. What if we say, anybody with an adjusted gross income—I get to adjusted gross income, I think, when I turn my 1040 over and I get to the back side; that is all my expenses and all my adjustments are out of there—anyone with an adjusted gross income of $100,000 would not qualify to participate in agricultural support programs. Let me just tell you, from the IRS data, that is approximately 30,000 people. The average income that those 30,000 people take from agriculture is 4 percent of their total adjusted gross income.

We're not talking about farmers here. We're talking about what I call hobby joggers. So these 30,000 or so people, who have adjusted gross income of $100,000, we would say that they can no longer enjoy the average of $40,000 a year in farm income subsidies that they now enjoy; they simply can't participate. Would that be a drastic revision in the farm program of America? Would that be a meat ax taken to the programs? Would you all fear for the ability of the programs to continue, should that be enacted? Is it a defensible argument. Do you think that would argue against such a thing?

DR. THOMPSON. From an equity standpoint, no. The programs ought to be targeted to help people with low-family income, if the objective is to improve the well-being of rural Americans. The one problem is that, if you limit the benefits from the programs as they are now configured, to people with less than $100,000 adjusted gross income, you make it a lot easier for smaller farmers to compete the land away from the larger, more efficient producers. That is the biggest negative against capping the program payments as they are presently configured.

REPRESENTATIVE ARMEY. Does it make it possible for the full-time farmers to compete the land away from the part-time farmers who are only taking 4 percent on average from their income on farming? There may be some transference of resources as a consequence of that.

Let me ask you this——

MR. AVERY. Mr. Congressman, having worked in ASCS, I'm a little afraid that it would simply mean another set of ownership papers filed and no real change in the flow of income whatsoever.

REPRESENTATIVE ARMEY. I think that we have "done in" the Mississippi Christmas tree. I hope we have.

MR. AVERY. Those committees are administered by county elected committeemen.

REPRESENTATIVE ARMEY. I understand.

MR. AVERY. I have little faith that they are going to administer anything that will make them unpopular with their neighbors.

REPRESENTATIVE ARMEY. Let me ask you about one other program that has been in the news lately. The $200 million that we are now giving up between the captains of agribusiness such as Sunkist, Hershey's Corporation, Paul Newman—Paul Newman's share, by the way, is $40,000, which is less than he and his wife give away in political contributions every year. But at any rate, Archer Daniels Midland, which is one of the most successful farmers of American farm policy of any institution in America, probably does not receive in the market promotion program as much money as they give away in political contributions either. How in the world could we ever suggest that this program helps the Indiana farmer as opposed to agribusiness? Could the American farm program stand a little paring on that level as well?

You see, what I'm saying, gentlemen, you and I know the answer to that. You know what it is. It is bogus, and we don't have to talk about it. But the fact of the matter is, agricultural policy in the United States is a sacred cow that legislatively is considered to be the exclusive jurisdiction of only those people who are on the Agriculture Committee. So you all say that the farmers, in the long run, would be better off if they were weaned off of these programs, and that it shouldn't be done overnight and with drastic measures.

We have six program crops. The only crop program that I have gone off on with impunity—none of my colleagues have gotten irate with me—is potatoes. I have been after the potato program. But you know those potato farmers have not gone fence-row-to-fence-row. They haven't driven the price of potatoes out of sight. They haven't driven themselves off the land by glutting the market with potatoes because we didn't tell them they couldn't produce. Why is it that potato farmers are so much smarter than it is alleged that wheat farmers and corn farmers are? Is that what we're saying, that wheat farmers and corn farmers are not as smart as potato farmers?

I'm saying that we have built such a rationale of self-serving politics around these programs that, despite what harm they may do, you can't even crack the tiniest little crevice. Even my old friend Silvio Conte—God rest his soul—the ranking Republican on the Appropriations Committee, a man who had his hands on every bit of pork that goes through Congress, couldn't get the little honey program because it was going to devastate American Agriculture.

Now, unless we can ... I'm sorry. I've gotten on my soapbox, Mr. Chairman, and you are correct.

REPRESENTATIVE HAMILTON. You were doing pretty well, I thought.

[Laughter.]

REPRESENTATIVE ARMEY. Mr. Chairman, maybe you and I can do something to vindicate Conte's heroic efforts. Thank you again.

REPRESENTATIVE HAMILTON. Dr. Paarlberg, I notice your comments in your opening statement about the export program. I don't know if you all saw the article in the *New York Times* today. They had an article on the level of government assistance for American exporters. There was a paragraph in there which I will just read to you, to get your reaction, to it:

> The big winner in the current system, that is the system of export supports, has long been American agriculture. The General Accounting Office report found that food exports accounted for only one-tenth of the nation's exports but three-quarters of the government's $2.6 billion in export assistance outlays during the year ended September 30.

Dr. Paarlberg, why don't you take off on that? Obviously, American agriculture gets a huge share of the export assistance if this article is correct, and I assume that it is. We're not helping other exports very much. We're helping agriculture.

DR. PAARLBERG. I have a slightly different twist on that. A large share of our export programs are administered by the Department of Agriculture. But the benefits of those programs don't go to farmers. They don't even go to any exporting companies. They go to consumers abroad who would buy what they normally buy from us at a lower-than- normal price.

REPRESENTATIVE HAMILTON. They would buy it anyway?

DR. PAARLBERG. They would buy most of it anyway—in wheat, up to 90 percent of our EEP sales, depending upon market conditions. This is assistance to foreign consumers. It is not assistance to U.S. farmers.

It may, however, be a form of export assistance, assistance for U.S. exports of everything but agricultural products. If you make it cheaper for foreigners to buy the food that they were buying anyway, they save foreign exchange, which they can then spend to buy more of everything but food.

REPRESENTATIVE HAMILTON. It doesn't help the export companies either?

DR. PAARLBERG. Maybe, a little bit.

REPRESENTATIVE HAMILTON. Would all of you knock out the export enhancement program?

MR. AVERY. I would just emphasize——

REPRESENTATIVE HAMILTON. You would, Dr. Paarlberg?

DR. PAARLBERG. I would trade it away. I would have tried to trade it away early in the Uruguay Round in 1986-87, when budget pressures were intense in the European Community and they might have been in the mood to bargain.

MR. AVERY. We're talking about very small amounts of money compared to what we could earn if we had free trade and had no need for such things. We are fighting over nickels and ignoring $5 bills.

REPRESENTATIVE HAMILTON. Dr. Hathaway, Dr. Thompson?

DR. THOMPSON. I would put the export enhancement program at the top of my list of things that I would negotiate away in the GATT.

DR. HATHAWAY. It seems to me that you have two questions. One, there's not much evidence that it expands total exports. Our market share in most of these products has not benefitted all that much from it. Second, I inherently have problems with things like subsidizing the Saudi Arabian consumption levels of certain products. I really don't think it is needed all that much. So it seems to me that there are other ways to make our products competitive, where that money could be used better and probably improve the well-being of producers.

REPRESENTATIVE HAMILTON. Dr. Paarlberg, you would not count the acreage reduction program as well? Did I understand your comments correctly?

DR. PAARLBERG. Except for acreage reduction for legitimate conservation reserve purposes on highly erodible lands.

REPRESENTATIVE HAMILTON. Do the rest of you support that view?

REPRESENTATIVE ARMEY. Dr. Paarlberg, this is not something that you do overnight? Is it something that you would do on a gradual basis?

DR. PAARLBERG. I would do this more quickly than I would do some other things. These acreage reduction programs are unilateral disarmament. They weaken U.S. leverage in the Uruguay Round.

REPRESENTATIVE HAMILTON. How quickly could we do it?

DR. PAARLBERG. In current market conditions, we've done a lot already. We're down now to small acreage reduction programs because market conditions have changed radically in the last couple of years.

MR. AVERY. I would underscore that the next decade may not involve three American droughts as the last one has. I would offer the model of the Swedish deregulation, with a five-year quick general buyout of the franchise values. They are expecting about 20 percent of their cropland will go into ornamentals and/or back into forestry. And they think that those activities will provide roughly the same number of jobs that farming has.

REPRESENTATIVE HAMILTON. We have kept all of you here quite a while. I would like to ask you to address the classic question of the family farmer for a minute, and in the context those statistics that are familiar to you. Since 1930, the number of farms has declined from 6.3 million to 2.1 million. Less than 15 percent of these farms, about 300,000 farms, with more than $100,000 annually in sales, are full-time commercial operations. They are responsible for more than 75 percent of U.S. farm sales. Those statistics, I am sure, are very familiar to you.

So what is the future of the family farm? Ten to twenty years from now, are we going to see full-time family-owned and managed farms? Or are we just going to see units of production? Where are we tending here in American agriculture?

DR. THOMPSON. I think we are tending to a distribution of farms in the United States, where you have a lot of small part-time units, whose principal source of family income is from off the farm. But collectively, these farms won't account for much of our total output.

On the other hand, you will have about 15 percent of all of the units, which we count as farms, producing about 85 percent of the output. Most of them will still be family-owned and controlled farms. Most will be incorporated for estate and tax planning purposes. And they are the low-cost suppliers who are going to be supplying most of the exports of the United States.

The small part-time units will be there because people like living in the country, but they will be principally sustained by off-farm earnings of the family.

REPRESENTATIVE HAMILTON. You are not concerned that with all of the emphasis that you put on management and technology and the skills that are needed that business firms will be operating these farms and employing farmers?

DR. THOMPSON. At least, today, the low rate of return has not attracted much agribusiness investment, except in California.

REPRESENTATIVE HAMILTON. Any other comments on this?

MR. AVERY. I would suggest that the family farm is a success model for all of the world's agricultures. Those countries which have tried something different are rapidly going back to the family farm. It is not so much a question of whether family farms will be the pattern. In fact, there is no successful corporate agriculture around the world. It is not whether family farms will be the pattern, but whose family farms will be succeeding. Every other country looks at their family farm with as much admiration as we do and are just as willing, absent other pressures, to offer them the kinds of subsidies that Europe has offered. And this is what I worry about in Asia, which has far more family farms than we do.

DR. PAARLBERG. I would expect that consolidation and labor migrations out of farming will continue. I think it is a legitimate goal of public policy to slow those consolidations and migrations. Not to stop them, but to slow them. Where rural communities are at risk, I think, those migrations of labor out of farming should take place between generations rather than within generations. Unfortunately, our existing farm programs don't target farm populations; they support commodity markets, which are dominated by big producers rather than family farms and family farmers. So these programs don't necessarily slow those labor migrations. They may, in some cases, accelerate consolidation and speed those migrations.

REPRESENTATIVE ARMEY. May I interject here? It seems to me, I recall having seen your recent Department of Agriculture publication that argued that current farm policies actually do more to accelerate farm consolidation than they do to, as it were, save the family farm. If, in fact, our intention was to save the small family farm, we would be working against our current farm policies. Have you familiarized yourself with any of the studies, any of you? This seems to be a very graphic and clearly stated position by the Department.

MR. AVERY. I don't think that there's very much doubt that the existence of the support prices has made it possible for people to debt leverage themselves and buy out their neighbors in numbers and in ways that would not have been possible without the price supports. I don't think that there's any question about that.

REPRESENTATIVE ARMEY. And its perverse impact on land values and so forth. Let me say that I love the family farm in the same way that I love the GATT. And I do mean it, I do. I understand that it is a precious part of our heritage. To a large extent, I fear that we do it harm with our programs. I'm sorry, Mr. Chairman.

REPRESENTATIVE HAMILTON. That's good. I appreciate that. We have appreciated your comments. I have a good many more questions that I would like to ask you, but I know that your time is running short and so is mine. So let me just express my appreciation to you for an excellent hearing. Your expertise is impressive. I think that we've had a good session, and we stand adjourned.

[Whereupon, at 12:04 p.m., the Committee adjourned, subject to the call of the Chair.]

SUBMISSIONS FOR THE RECORD

PREPARED STATEMENT OF ROBERT L. THOMPSON

Good morning, Mr. Chairman and members of the Joint Economic Committee. My name is Robert L. Thompson, and I serve as Dean of Agriculture at Purdue University in West Lafayette, Indiana.

I am pleased to appear before you today to testify on U.S. agricultural competitiveness. This is an extremely important and timely issue. First, exports provide the market for over one-third of the output of American agriculture. Therefore the volume of exports is very important to the size and well-being of the U.S. farm sector. It is also important for the agribusiness sector, which employs seven people for every person on the farm. Second, the value of farm exports is important to the U.S. balance of payments. Over time we shall have to sustain a balance of payments surplus in order to pay down our international debt. American agriculture is our third most important export sector, ranking right behind aircraft and foreign tourism. Finally, American agriculture is likely to be dependent on the marketplace for a larger fraction of its revenue in the future. Federal budget realities caused a cut in the subsidies to American agriculture in the 1990 farm bill and the budget package that followed. Moreover, the GATT round of international trade negotiations is likely to bring about some across-the-board cuts in farm subsidies in all member countries, including the United States. For all of these reasons, the ability of American agriculture to compete on the world market is a very important issue.

There are two components of the competitiveness of American agriculture. One is the effect of government policy, and the other is the underlying cost competitiveness, which economists refer to as comparative advantage.

Government policies may mask or enhance the underlying competitiveness of a nation's agricultural sector. This is certainly true of macroeconomic policy, which influences competitiveness through the exchange rate. For example, in the late 1970s, U.S. macroeconomic policy led to a "weak" dollar, which made American goods cheap in price relative to other countries. This made it very easy to export and certainly contributed to the U.S. farm export boom of the late 1970s. In contrast, the very "strong" dollar of the early 1980s made all U.S. exports more expensive to foreign buyers. This certainly contributed to the 40 percent drop in U.S. farm exports in the first half of the 1980s, and in turn to the severe financial distress in the farm sector. The devalued dollar of the late 1980s helped get farm exports moving once again. In the future, U.S. macroeconomic policy will have to be carried out in such a manner as to keep the value of the U.S. dollar low enough on the foreign exchange markets to generate a balance of trade surplus to service and eventually pay down our international debt. This is good news for export dependent sectors, like American agriculture.

Agricultural policies also may either enhance or mask a country's underlying agricultural competitiveness. If one country sets its farm price supports above world market prices, it prices those products out of the world market. This happened with U.S. loan rates under the 1981 farm bill. When the high loan rates were combined with the strong dollar, U.S. farm exports were uncompetitive and fell by 40 percent in five years. In addition, the benefits of high prices supports, as well as marketing quotas and acreage reduction programs, also get capitalized into land values. This raises the capital cost of farm production and reduces that country's international competitiveness. Similarly, imposing tougher regulatory policies than exist in other countries can raise a country's costs relative to its international competitors. On the other hand, input subsidies and policies that stimulate larger production and lower market prices can artificially increase a country's ability to compete.

Export subsidies have been widely used to compensate for the artificial impediments to export competitiveness caused by a number of types of domestic farm policies. This creates a problem because domestic price support policies cause larger domestic production and smaller consumption than would otherwise occur. When that country subsidizes farm exports, it exports more than it would otherwise, displacing exports from countries with more efficient production. The most egregious abuser of this has been the European Community. The U.S. export enhancement program provides export subsidies to compensate for unfair competition from the EC. The

current U.S. marketing loans and our deficiency payments before we decoupled both yield and area planted from current production had the same effect as export subsidies when viewed from the vantage point of the rest of the world.

The conclusion of this section of my testimony is that domestic macroeconomic and agricultural policies may enhance or mask a country's underlying competitiveness. As long as a country's government has deep enough pockets and its farmers have enough political clout to access those funds, export subsidies can offset almost any underlying cost disadvantage or artificial disincentives caused by other policies. However, in the last few years, budgetary problems and declining political power of farmers have resulted in cuts in farm subsidies in the United States, the European Community, and several other countries. These cuts are likely to be more pronounced in the future.

The international trade negotiations now underway under the auspices of the GATT are likely to bring agreement to make across-the-board cuts in subsidies linked to the volume of farm production and exports. In addition, most, if not all, nontariff barriers to imports, like quotas and variable import levies, are likely to be converted to tariffs. By so leveling the playing field on which all countries' farmers compete, the underlying cost competitiveness of American agriculture will be an even more important determinant of our future export success. I now turn to discuss this critical issue.

One key determinant of a country's underlying cost competitiveness is its natural resource endowment, i.e. its soils and climatic conditions. The Midwest of the United States is blessed with an abundance of deep, black fertile soils. Favorable temperature and rainfall conditions make this one of the most potentially productive food producing regions of the world. Available water can supplement that provided by nature, but resorting to irrigation inevitably raises the cost of production and reduces competitiveness relative to naturally watered areas.

Another important factor in a country's international cost competitiveness is its transportation infrastructure. Water provides the cheapest form of transportation, and the United States has one of the greatest river transportation systems of the world for transporting farm products to markets--the Mississippi River system. This lowers the cost of getting U.S. products on board ships for export relative to most other countries. One problem throughout rural America is the extent to which railroad abandonment and inadequate maintenance of rural roads and bridges is raising the cost of getting our products from the farm to river transport or to the port of exportation.

The endowment of natural resources is a fundamental determinant of a country's underlying cost competitiveness. However, we must keep in mind that as recently as the 1930s, despite our superior natural resource endowment there was no significant difference in grain yields between the U.S., England, Argentina, or India. The observed difference was accounted for by technology--the product of research and technology transfer. Investments in agricultural research and development are the most important shifters of the locus of international competitiveness in agriculture.

Starting in the late 19th century, the United States led the world in public investments in agricultural research. This was justified because individual farmers were too small to support such research and because, ultimately, consumers would be the greatest beneficiaries of the research through lowering the cost of producing food. The large public and private investments in agricultural research gave American agriculture a faster rate of growth in productivity than in other sectors of the U.S. economy and gave American agriculture a faster rate of growth in productivity than in agricultural sectors of other countries.

By the mid-20th century other countries had caught on to the source of our agricultural productivity and competitiveness and began increasing their investments in agricultural R&D. Unfortunately, soon after this began, the U.S. did the opposite and began to let its investments slide. Our investments flattened out and declined at the very time that several other regions of the world were significantly expanding theirs. To a very real extent we are on a global agricultural technology treadmill today. We have to keep investing just to keep up. Any country that lets its agricultural research investments slide will slip backwards in its international agricultural competitiveness.

This is particularly unfortunate in light of the wide range of powerful research tools at our disposal such as biotechnology, electronic sensors, information processing, and robotics. These have the power to permit us to continue producing the world's safest, most nutritious supply of

food in an environmentally sensitive manner as possible, while still ensuring our international competitiveness. The most encouraging recent development on this front was the National Agricultural Research Initiative that was authorized in the 1990 farm bill at the $500 million per year level. Annual appropriations have risen to about $100 million per year, and there has been an accompanying modest increase in other Federal appropriations for agricultural research. It is essential to the future competitiveness of American agriculture that the National Agricultural Research Initiative be funded at $500 million per annum level.

When the Federal commitment to agricultural research fell behind in the 1970s, the private sector took up a lot of the slack, especially after issues concerning the patenting of biological materials were resolved to protect the investor's interest in the resulting intellectual property. However, in the last decade or more, with the increasing concern in the corporate sector about the next quarter's bottom line, there has been an unfortunate tendency for companies to deemphasize investments in R&D, which have such a long and uncertain payback. It is important that the private sector also maintain its commitment to investing in agricultural R&D. To the extent that public policies create disincentives to private sector investments in agricultural R&D, these need to be reviewed in the interest of international competitiveness.

When discussing agricultural competitiveness, it is important to recognize that there is wide variation in the cost competitiveness of different farmers. Farms have different soil types and climatic conditions. Some farmers are more skillful managers than others. And there are wide variations in the technologies in use among farms even in relatively narrow geographic areas. The most efficient and low cost producers in each country, by definition, the most competitive, will benefit from the greater market opportunities created by trade liberalization. High cost and inefficient producers in each country, with less protection from farm programs and subsidies to offset their high costs, will be less well off. To survive, the highest cost producers will have to adopt cost reducing technologies to permit them to compete with lower cost producers here and abroad. The inescapable conclusion is that efficient, low cost producers everywhere would benefit from the market growth potential that would result from a successful GATT round. In most commodities, the United States has numerous highly competitive producers. The U.S. Government can help ensure that the greatest number are competitive by investing adequately in agricultural research, rural infrastructure, including education, and technology transfer to farmers.

PREPARED STATEMENT OF DALE E. HATHAWAY

Executive Summary

U.S. agricultural exports are most competitive during periods of rapid growth in world consumption and trade. The 1970s was such a period, whereas the 1980s brought a slowdown in market and trade growth. During the 1980s, U.S. export market share of many products fell. Thus, a major issue for U.S. competitiveness is the growth of world markets.

The 1970s was unique in several regards. The growth in consumption was especially rapid in developing countries, Eastern Europe, and the USSR. The expansion in the consumption was unusually dependent upon imports. The consumption growth and imports were supported by inflation, external borrowing, and rising prices for non-agricultural commodities. By the end of the 1970s, imports by LDC's and the USSR dominated the trade in grains.

The 1980s brought a sharp slowdown in growth in the USSR, Eastern Europe, and in many developing countries. Consumption growth slowed and trade growth slowed or ended for many products. In this climate the U.S. lost market share.

Now the question is the period ahead. Market growth in most industrial countries is slow so one must look outside them for positive prospects. The situation in developing countries becomes crucial. A replay of the 1970s appears highly unlikely. Instead, their consumption growth is likely to depend upon domestic income growth and their imports will depend upon export earnings.

The most uncertain is the changes in the former Soviet Union. It is highly probable that in this decade they will follow the pattern of Eastern European countries—lower consumption and declining imports. If this occurs it will have a major adverse effect upon world commodity markets or some period and intensify the competition for export market share.

Thus, with or without trade liberalization, the decade ahead is likely to be a period of uncertainty and instability. A trade agreement which rolled back export subsidies would help the U.S. if we do not offset our advantages by other policies.

AGRICULTURAL COMPETITIVENESS IN A CHANGING WORLD MARKET STRUCTURE

by

Dale E. Hathaway*

This analysis will attempt to link competitiveness with changes in world market conditions, and to the extent possible, examine the questions of what kind of government policies are appropriate in different market situations. The hypothesis underlying this approach is that the appropriate government policies vary depending upon world market conditions. In some periods, the best government export policies might be no policy at all. On the other hand, there are times and market conditions in which an active U.S. government policy would be desirable and perhaps necessary in order to maintain the U.S. agricultural position in world markets.

For many U.S. agricultural producers and associated agribusinesses, the 1970s marks the highlight of U.S. agricultural export performance and is the base mark by which all subsequent happenings have been judged. Given the fact that this period is so important in the history of U.S. agricultural exports, it is useful to examine what drove the export demand during the period of the 1970s, and then to look at some factors in the 1980s to see how they might move in the 1990s and beyond.

Experience has taught us some things. The U.S. is in general more competitive during periods of market growth and world trade expansion. The flexibility of our production and exporting system allows us to capture a rising share of expanding trade. Conversely, our system performs less well in periods of market stagnation or decline, in part because our government policies are often concerned with factors other than market share.

Therefore, it appears useful to examine world markets in some key products to see what has happened and where the current trends might take us. Special attention is given the current and prospective situation in East Europe and the former Soviet Union.

WHAT HAPPENED IN THE 70S AND 80S?

To a large extent, the export boom that is remembered so fondly by U.S. agricultural interests in the 1970s was a boom in the export demand for a relatively few commodities. Wheat, corn, and soybeans were the major commodities affected, therefore it is useful to look at what happened to world consumption and trade patterns in these commodities during the period of the 1970s and 80s.

Chart 1 shows the changes in world wheat consumption and trade over three decades starting in 1960 and ending in 1990. It shows that the world consumption of wheat in the decade of the 60s increased by about 100 million tons. In the 1970s, the growth in consumption was slightly higher at 114 million tons. In the 1980s, changes in world wheat consumption over the decade was almost exactly the same as it had been in the 1970s.

While there were modest increases in the world consumption of wheat from decade to decade over the last three decades, there were major changes in the source of supplies for the increased consumption. In the 1960s, the expansion in consumption occurred largely from internal production as expanded world trade only accounted for some 14% of the expanded consumption in wheat. In the 1970s this relationship changed dramatically. The slightly higher growth in consumption was heavily dependent upon a marked increase in world trade and thus at the end of the 1970s, almost 40% of the increase in world wheat consumption was coming from increased world trade. The 1980s again saw a marked shift in patterns. In this case, even though the world consumption levels increased by about the same amount in the decade in the 1980s, the proportion of increased consumption coming from increased trade fell over the decade. In other words, expanded world use in the 1980s did not expand world trade since most of it came from expansion in domestic production in the country where it was consumed.

Charts 2 and 3 looks at the trends in some major areas the world, and we find that that different countries had varying impacts upon the shift in consumption and trade. For instance, in the 1960s, over 40% of the increase in world wheat consumption occurred in the Soviet Union and it

* Visiting Fellow, National Center for Food and Agricultural Policy, Resources for the Future. Statement presented before the Joint Economic Committee on U.S. Agricultural Competitiveness. March 4,1992

occurred without additional imports. In other words, in the 1960s a very high proportion of increased world wheat consumption occurred in the Soviet Union and occurred as a result of expanded domestic production. In the 1970s the increase in Soviet consumption slowed appreciably and at the end of the 1970s wheat consumption was only slightly higher than it had been at the beginning of the decade. However, in order to maintain a modestly expanding level of total consumption of wheat in the 1970s, the Soviet Union had expanded its imports significantly and on the average was importing more than 20 million tons of wheat per year. This pattern reversed in the 1980s and at the end of the decade wheat consumption was generally below a decade earlier. The growth in consumption slowed down markedly or reversed, and moreover the absolute level of imports fell; thus the proportion of consumption contributed by trade was negative. Thus, the USSR was one of the major forces in expanding wheat trade in the 1970s. But, the increase in Soviet consumption and the huge increase in imports which accounted for half the increase in world wheat trade in the 1970s ended with the decade of the 70s. In the 1980s Soviet wheat consumption began to decline and their imports stopped growing.

The Eastern European countries also had interesting changes in consumption and trade patterns. In the decade in the 1960s, the Eastern European countries expanded their consumption fairly significantly and one- quarter of that expansion was based upon increased imports. In the decade of the 1970s, East Europe was able to continue to expand their consumption of wheat at about the same rate as in the previous decade but they did it increasingly from domestic production and as a result they were able to actually reduce imports. The 1980s continued the downward trend in imports in Eastern Europe that had begun in the 1970s. Their increases in wheat consumption slowed appreciably in the 1980s, to half of the rate of the earlier decade, and it came entirely from increases in domestic production, so that their net imports actually declined.

One of the most import changes in the world wheat market shows up in the statistics for the developing countries. Developing countries expanded their wheat consumption at a modest rate during the decade of the 1960s and about one-quarter of the expansion came as a result of increased imports. In the 1970s, the developing countries expanded their consumption levels fairly rapidly. Again however, about three quarters of that expansion was dependent upon expanded domestic production rather than upon increased imports. In the 1980s, developing countries, unlike East Europe and the Soviet Union continued to expand their wheat consumption and they did it with the same level of expansion of imports as they had had in the previous decade. Thus, the developing countries accounted for more than a quarter of total expansion of wheat consumption in the 60s and for half of the increase in imports during that period. In the 1970s, the developing countries accounted for almost half of the expanded world consumption, but they only accounted for a little more than a quarter of the expansion in world trade as the USSR dominated the trade picture. In the 1980s the developing countries again accounted for almost half of the expansion in world consumption but their contribution to world trade has become large and growing because many other parts of the world were reducing their imports of wheat.

POULTRY AND BEEF

The demand for poultry, dairy, and livestock products is an important driver of world feed demand. As incomes increase there is a switch from plant protein to poultry and animal protein sources. The demand for these products in turn drives the demand for feed grains and vegetable protein supplements.

Chart 4 shows the growth in world poultry consumption has been phenomenal over the past three decades. Moreover, unlike many other products, the world consumption growth continues. However, imports of poultry are a declining source of increased consumption and have been for the past decade. Increasingly, expanded poultry consumption is coming from domestic production.

Poultry consumption has continued to grow in the U.S. after a decline in market growth in the late 1970s. In the EC the growth in poultry consumption slowed appreciably in the 1980's.

Charts 5 and 6 show three areas of the world which had especially rapid consumption growth in the 1970s—the Soviet Union, the Less Developed Countries, and the Newly Industrialized Countries.

However, in all three cases the growth in consumption peaked in the early to mid 1980s and growth rates fell since then. For instance, the growth in LDC poultry consumption fell by two-

thirds between 1983 and 1990 and all of the decline came from trade as these countries are able to meet lower growth in demand by expanding domestic production.

East Europe is especially interesting. Its growth rate slowed at the end of the 1970's and turned negative in the 1980's, so that by 1990 poultry consumption was actually lower than a decade earlier.

The other feature of poultry consumption is that trade is a small and declining factor in expanding consumption. Increased consumption of poultry will expand grain and oilseed use but does not expand trade in poultry very much.

The pattern for beef consumption is different in many ways and similar in some. First, on a world level shown in Chart 7, consumption growth peaked in the 1970s and has declined since but is still positive. In the U.S. and EC, consumption growth ceased and there was an absolute decline in the 1980s. This also was true for Eastern Europe.

In the Soviet Union (Chart 8), consumption growth continued in the 1980s but at a slower rate. However, trade has never been important to the growth of Soviet consumption (Chart 9).

Imports also have not been important to the growth of consumption in LDC's, and they have been declining in importance as the growth in consumption has declined.

Imports have played an important part in the growth in beef consumption in the NIC's. However, imports have declined as a source of consumption growth in recent years.

In summary, apart from a few countries, most of the growth in consumption of beef and poultry is translated into growth in demands for feed grains and oilseeds rather than increased trade in beef and poultry. Japan and the NIC's are notable exceptions to this rule.

Consumption growth has slackened appreciably for both products, especially as income growth has slowed. In East Europe the economic difficulties have led to an absolute decline in consumption of both meat and poultry.

COARSE GRAINS

The pattern of world market growth and of trade in coarse grains is different than for wheat because it is driven by demand for livestock and poultry products. World consumption of coarse grains rose by a striking 143 million tons in the 1960s and about 18% of that increase came as a result of increases in trade (Chart 10). These figures jumped appreciably in the 1970s. World consumption expanded by an amazing 164 million tons over the decade from 1970 to 1980, and world trade more than doubled to 60 million tons and provided for 37% of the expanded consumption of feed grains during the decade of the 1970s. The decade of the 1980s, however, was markedly different. The growth in world coarse grain consumption declined sharply from the previous decade to the lowest level since the 1950s. Moreover, world trade in course grains actually fell as all of the modest increase in consumption in the decade was met by increased domestic production in various parts of the world.

Behavior of the Soviet Union in the coarse grain market was also different than it was for wheat (Chart 11). The Soviet Union expanded its consumption of coarse grains by some 20 million tons in the decade of the 1960s and did it without increasing imports. Then in the 1970s, the Soviet Union underwent a drastic change in policy and in order to continue to expand the consumption of feed grains at about the same rate as the 1960s it depended upon outside suppliers for almost all of the expansion (Chart 12). In the 1980s, the Soviet policy appeared to be reversed again. The expansion in feed grain consumption continued at about the pace of the previous decade but it was achieved without expanding imports, so that the increased consumption came almost entirely from increased internal production. Thus, the Soviets were a major force in the export boom of the 1970's, but did not sustain their expanded imports in the 1980's.

Eastern Europe also shows an interesting change in pattern from its experience in wheat. Countries in East Europe expanded their consumption of coarse grains at a moderate pace during the 1960s and about half of the expansion that occurred came as a result of increased imports. In the 1970s the East European countries substantially increased the pace of consumption in coarse grains, but the proportion of the increase that came as a result of increased imports was lower although the imports themselves rose very drastically.

In the 1980s as the economies of East Europe got into increasing difficulty, we saw a marked change in the situation. The decade of the 1980's brought an absolute decline in coarse grain

utilization in Eastern Europe. This decline was significant and it came entirely as a result of a decline in imports. Thus, by 1990 the declining imports of coarse grains by Eastern Europe had essentially erased all of the gains in trade that had occurred in that region since 1970.

The developing countries have over time been increasing as a force in the consumption of coarse grains in the world. During the 1960s their consumption levels grew at a relatively stable pace but the growth occurred almost entirely as a result of expanded domestic production. In the 1970s, the developing countries expanded their consumption of coarse grains as their populations grew and their desire to eat more poultry and livestock products increased. This expanded level of consumption was met very significantly by increased imports which accounted for almost half of the expansion in consumption levels by developing countries. In the 1980s this pattern changed; the absolute increases in consumption declined from the 1970s, and most significantly, the increased consumption that did occur came as a result of expanded domestic production rather than larger imports.

SOYBEANS

Soybeans, like feed grains, are demanded to use for feed for animals or poultry. And, the expansion of world soybean consumption and trade followed the pattern of grains to a large extent.

World consumption expanded rapidly in the 1960s, but the consumption growth slowed beginning in 1979 (Chart 13). By the end of the 1980s, world consumption was flat and world trade was declining.

Charts 14 and 15 show the USSR was never a significant factor in the growth of either world consumption or trade in soybeans.

The LDC's and NIC's were important in the worldwide increase in consumption, and in the case of the LDC's their slow down in growth was a major contributor to the overall slowdown.

The rapid expansion in world consumption was heavily dependent upon imports in the early years. However, by the end of the 1980's the continued market expansion was not resulting in any increase in trade.

LOOKING AT THE FUTURE CHANGES IN WORLD MARKETS

Data clearly indicate that at present the growth in world market for grain are concentrated in the developing countries. They account for an increasing proportion of world consumption and are a rising factor in world trade.

In looking at the developing countries, one needs to consider what will allow them to continue to expand their consumption and encourage them to expand imports.

There would appear to be two prerequisites to meeting these conditions. First, the developing countries must have a continued sustained growth in per capita income, because it is growth in income that drives the improved food consumption and thus the demand for imports of grains. Secondly, if these countries are to import, they must have a source of foreign exchange which means they must have access to foreign markets for products they produce and export. This puts the issue of maintaining open trade for goods from developing countries directly in the interest of those concerned with future growth in world agricultural markets. Thus, trade policy vis-a-vis developing countries is probably one of the most significant aspects of expanding the world market for agricultural products and thus for agricultural exports from the United States.

The potential change in the markets in the former Soviet Union is of special interest. The Soviet market dominated the expansion of world grain trade in the 1970s and is a major factor in trade for grains today. Therefore, what happens to this market over the next few years and in the longer run is important in terms of the change in world markets.

There are three effects that need to be considered, in relation to possible changes in the former Soviet Union as a market for agricultural exports. The first effect is the impact that the economic changes will have upon the near-term internal consumption of food and agricultural products in the Soviet Union. The second effect is the changes that will improve the functioning of the present system. Third, and in the longer run, are the changes expected from a restructuring of the economy both within agriculture and outside it, in which the system becomes markedly more efficient and begins to grow.

PREPARED STATEMENT OF ROBERT L. PAARLBERG

Forecasting export prospects for U.S. agriculture is a risky business. Early in the decade of the 1970s, when we assumed that export growth would remain sluggish (as it had throughout the previous decade) we were badly wrong. The nominal value of U.S. aqricultural exports actually increased more than fivefold between 1971 and 1981, up to a record high level of $43 billion. We adjusted our expectations accordingly, and went into the decade of the 1980s expecting that this growth to continue. Again we were dead wrong; the value of U.S. farm exports actually fell by 40 percent between 1981 and 1986. As of 1991, exports still have not rebounded, even in nominal terms, back up to the 1981 level (the FY 1991 export total was $37.6 billion).

Given today's dizzy pace of political and economic change in crucial regions such as Europe and the former Soviet Union, forecasting has become even a riskier business. Still, we have at least developed a much better idea or what should count in our forecasts. What I propose to do this morning is to separate those variables that matter most in our farm export equation from those that matter the least.

Variables That Matter Least: Food Needs, Usda Program And Gatt

Starting with the variables that matter least, we first must acknowledge an unfortunate truth: human "food needs" abroad do not, by themselves, create lucrative commercial export markets. Large numbers of hungry people (in Africa, for example) do not constitute a commercial market. Without purchasing power, they are just large numbers of hungry people.

Sub-Saharan Africa has just come through a decade of widespread agricultural failure, against a backdrop of extremely rapid population growth. As a consequence, Africa's agricultural output per person today is actually 10 percent below the level of 15 years ago. Africa therefore has food needs galore. But this hungry continent is not yet an important commercial market for U.S. farm exports, because Africans lack the purchasing power needed to translate their food needs into commercial demand. Average income levels in Africa are only $300 per person per year; in South Korea, where development has been much more successful, income levels are already 15 times as high. This is why tiny little South Korea, by itself last year, purchased five times the value of farm products from the U.S. as all of the more populous and much "hungrier" nations of Sub-Saharan Africa combined. So lesson number one: food needs don't create markets; purchasing power creates markets.

A second variable I would rank as not very important to the future growth of commercial farm exports is the export promotion budget of the U.S. Department of Agriculture. The most heavily used USDA export promotion programs--including EEP, GSM export credit guarantees, and PL 480--are poor substitutes for purchasing power abroad, poor substitutes for real growth in foreign commercial demand. These programs don't build foreign commercial markets. At best, they simply "rent" those markets at the expense of the U.S. taxpayer. At worst, they cam actually reduce the size of our truly commercial markets, by sending out low-priced concessional goods in place of our normal, unsubsidized commercial sales.

USDA, which is forced by intense congressional pressure to operate these programs, does its best to claim they are successful, often by bragging about the high percentage of our foreign sales that have been made with subsidles or credit guarantees attached. What USDA doesn't like to admit is the small share of these sales that are truly additional to the normal commercial sales that would have been made anyway. Most of the subsidized commodity sales made under these programs (up to 90 percent in the case of U.S. wheat sales under the Export Enhancement Program) are simply replacing commercial sales to that would have been made anyway at a higher price.[1] This isn't export enhancement; it is more accurately be described as commercial export displacement. When big commercial exporters like the U.S. and the European Community get into an export subsidy war with each other, the only real winners are the importing countries--like Egypt, Morocco, China, or the former Soviet Union--who get to buy what they would have bought anyway, but without having to pay as much.

[1] Only about 10 percent of all U.S. wheat shipments going out under EEP, in 1987-88, were in addition to shipments that would have been made anyway, and at higher prices. If the purpose is dispose of surplus U.S. wheat, it would be cheaper for the CCC simply to acquire wheat at the loan rate and then destroy it, rather than pay the high cost of trying to create additional exports with subsidized sales to regular customers abroad . Robert L. Paarlberg, "The Mysterious Popularity of EEP," Choices, Second Quarter 1990, pp. 14-17.

As for the smaller share of sales made under these programs that are truly additional, and that would not have been made anyway, remember the high cost to taxpayers of making these additional sales (on a per-bushel basis, often more than the commodities themselves are worth), and remember that these sales will continue only so long as the subsidy continues. This isn't building foreign markets; it would more accurately be described as "renting" foreign markets, at our taxpayer's expense. Historically, USDA export subsidy programs have never been important to the growth of commercial U.S. farm sales abroad. When U.S. farm exports grew most rapidly, during the middle years of the 1970s, direct export subsidy programs were not even in operation.

Export credit guarantees pose their own problems and risks. They can create some additional sales when extended to customers that can't otherwise get commercial credits–for example Poland in the 1970s, or the former Soviet Union today. But guaranteeing credits to such non-creditworthy customers is, once again, just a temporary solution, and if and when the customer defaults–as in the case of Poland in the 1970s–it is the U.S. taxpayer that ends up paying for the sale.

Credit guarantees have a way of coming back to haunt us. When we extended several billion dollars in CCC export credit guarantees to Iraq two years ago (a policy that may have allowed Iraq to import more weapons as well as more farm goods), nobody anticipated that a war over Kuwait would soon produce a costly default. The billions that we are now extending to Yeltsin are probably a safer bet to be repaid, but who can say for sure, and the sales they are making possible will continue only so long as our willingness to incur this risk continues.

Concessional food aid hasn't done much better in building commercial markets abroad. Despite all the talk about good commercial customers that are food aid "graduates," the countries that have received most of our PS 480 assistance over the years–countries like India, Pakistan, Vietnam, Cambodia, and Egypt are not today our most important commercial customers.[2] Remember that when the USSR and the PRC first came to us in the 1970s as cash paying customers, neither had previously received PL 480. South Korea and Taiwan did, of course, become good commercial customers after first receiving PL 480; but what made the difference here was rapid industrial development, something for which the U.S. food aid program alone can't take credit.

A third variable in the farm export equation that I would have to rate today as "less than decisive" is the Uruguay Round of GATT negotiations. I support the U.S. objective in this negotiations, to open markets abroad, and to bring down EC farm subsidies in particular–but I have never been persuaded that there was much chance for these negotiations to succeed. The cumbersome 100 nation GATT negotiating format creates too many opportunities for the EC to evade accountability, posture, and delay. Nearly six years have passed since this "mother of all trade negotiations" began, the end is not yet in sight, and most of the reforms now being talked about are either reforms that have already been taken anyway (for which "credit" will be given), or reforms already scheduled to be taken anyway, due to independent factors such as internal budget pressures.[3]

To the extent that the draft GATT agreement now under discussion goes beyond reforms already expected to be taken, it has been rejected by nearly all concerned. France has said "no" to the projected volume reduction in EC subsidized exports, other important European countries have said "no" to the projected restrictions on partly de-coupled cash payments to farmers, and Japan, Korea, and even Canada are saying no to tariffication. Meanwhile, here in the U.S., while the Administration is saying yes to most of the Dunkel draft, a strong collection of dairy, sugar, cotton, and peanut farmers are saying no. The risks posed by GATT to these import-competing U.S. farm groups seem, at the moment, to be getting much more attention than the possible benefits to exporters. I see that the Chairman of the Senate Agriculture Committee has recently advised the Administration that it would be a "bad mistake" to bring this particular package to the Congress for approval in 1992.[4]

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[2] Egypt is a significant commercial market today only because of the purchasing power artificially created there by our other assistance programs, including EEP, export credit guarantees, and billions every year in non-USDA economic and military aid (including most recently a cancellation of $7 billion in FMS debts).

[3] Robert L. Paarlberg, "How Agriculture Blocked the Uruguay Round," SAIS Review (forthcoming), March 1992.

[4] "Senate Panel Members Urge Administration Not to Submit GATT Draft in 1992," Inside U.S. Trade,

The Uruguay Round, therefore, has been adding remarkably little to the slow pace of farm policy reform in the industrial world.[5] However, I don't want to be a pessimist on all agricultural trade negotiations. In fact, I am quite positive about what various bilateral negotiations have been able to gain, especially in recent years, for U.S. farmers. Think of the gains for U.S. exporters that were secured four years ego, when Japan--under intense bilateral pressure from the U.S. Administration and Congress--finally agreed to convert its remaining beef and citrus quotas into tariffs. And think of the gains that were secured from the EC two years before that, when a protracted bilateral negotiation (punctuated by credible threats of U.S. retaliation) finally produced at least sole partial compensation for the damage soon to be done to U.S. farm sales by Spanish and Portuguese entry into the Community. In the years ahead, these kinds of country-specific (and often commodity-specific) bilateral negotiations are more likely than the Uruguay Round to produce market-opening results for export-oriented U.S. farmers. Bilateral talks (for example, the talks currently underway with Mexico) can succeed because the number of issues to be resolved (not to mention the number of countries involved) can be kept under better control, and because it is more difficult in these negotiations to escape accountability for failure.

Variables That Matter More: Macroeconomics, Macropolitics, Macrodevelopment

What, then, are the variables that can strongly affect the future growth of U.S. farm sales abroad? The most important of these are what I would call the "macro" variables: macroeconomic variable (economic growth cycles abroad, exchange-rate fluctuations, debt-service burdens, etc.); macropolitical variables (dramatic events such as last year's war in the Gulf, or the collapse of central political and economic authority in the former Soviet Union, or what will soon probably be a further expansion of membership in European Community); and also macrodevelopmental variables (the success or failure of long term economic development efforts in Asia, Africa, and Latin America).

In the past decade or so, U.S. farm exports have been negatively effected by some powerful macroeconomic shocks (for example, high dollar exchange rates early in the 1980s, a deep recession in the mid-1980s, and third world debt burdens). Our exports have also been negatively effected by some severe macoropolitical shocks (for example last year's Gulf war, which contributed to a 30 percent single-year reduction of U.S. farm sales to the Middle East). Fortunately, though, our exports have been positively affected by the macrodevelopmental variable, and this is a positive effect that I would expect to continue. When poor countries succeed in developing abroad, U.S. farm exporters are usually among the first beneficiaries.

Personal income gains in poor countries usually lead directly to larger food purchases. We don't see this result as clearly in the wealthy industrial countries, because diets here are already rich and diverse. In the poor countries, however, often as much as 50 percent of all gains to income will go directly into the purchase or more food, better food, or a wider variety of foods--including, quite often, foods imported from the U.S.

It is this process of rapid macrodevelopment that has recently been building good export markets for U.S. agriculture in countries such as Taiwan, South Korea, Thailand, Malaysia, and Indonesia. Taiwan and Korea, together, imported roughly $3.9 billion worth of U.S. farm products in FY 1991. They were able to do so because of a continuing pattern of internal dietary enrichment driven by rapid income growth, a dynamic process which is now also underway in neighboring countries like Thailand, Malaysia, and Indonesia. In another 10 years, if recent rates of growth continue, the economy of Thailand will be as large as the economy of Korea today. In

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February 21, 1992, p.9

[6] The Round may have even slowed this pace of reform. Since last summer, the EC Farm Commissioner has been pushing a plan (the MacSharry Plan) that would reduce cereals prices inside the Community by much more than the modest reductions now being considered in GATT. Opponents of that plan have recently been arguing that this reform shouldn't go forward until after the outcome of the GATT negotiation is known.

In the U.S., the Uruguay Round now actually threatens to reverse the pace of reform. Our 1990 budget reconciliation bill contains a "GATT trigger" provision which would oblige the Secretary of Agriculture, as of June 1992, to begin spending an additional $1 billion on export subsidies, waive all planting restrictions, and adopt a marketing loan for wheat and feed grains, in the event of failed GATT negotiation. If the failure persists until June 1993, a reversal of the 1990 domestic farm subsidy budget cuts would then be permitted.

another 13 years, the Indonesian economy will be as large as today's Korean economy. As income growth continues in these countries, diets will diversify and food purchases--including purchases from the U.S. will increase.

Looking beyond East Asia, one of the most promising "Pacific Rim" developing country markets for U.S. farm exporters in the years ahead will probably be our own neighbor to the South--Mexico. Even without a free trade agreement (but with the anticipation of such an agreement), Mexico purchased $2.87 billion worth of U.S. farm products in 1991, roughly twice the level of five years ago. A free trade agreement would push these numbers even higher, first by knocking down some of the tariff and import licensing requirements that still get in the way of U.S. farm sales to Mexico, and second by stimulating continued investment and income growth in Mexico, which would lead directly to higher Mexican demands for food products imported from the U.S.

The potential for future U.S. farm market growth in Mexico is now extremely high. Already the average Mexican consumer spends about $300 per capita every year on imported American goods (farm and non-farm goods), compared to just $265 per capita for the average EC consumer. Imagine how much more these Mexican customers would buy from us if their income level were to start rising up toward today's much higher European standard. Mexico is an arid and mountainous country, with little potential to compete in the production of temperate zone farm commodities. A rapid enrichment and diversification of the Mexican diet can only be achieved efficiently through much larger farm product imports from the U.S.

A Neglected Micro Variable: Adequate Exportable Supplies

One frustrating feature of these important "macro" variables is that they are often beyond our policy control. U.S. farm and trade policy officials can hope for development success abroad, or for peace in the Middle East, or for the avoidance of another world recession, but their ability to influence such outcomes may only be marginal.

Fortunately, however, we do have more than just marginal control over one final variable that I would include as vital to the future success of U.S. farm exports. This is an important "micro" variable, one that I would label maintaining adequate exportable supplies.

Our longstanding fears of agricultural "surplus" are blinding us, at least a bit, to the opposite danger of not having adequate supplies on hand in today's fiercely competitive world market, to seize sales opportunities when they become available. Consider, for example, our dismal record in responding to world wheat markets. Fifteen years ago (1973/74), the U.S. enjoyed a 53 percent share of world wheat exports. This year (1991/92), our export share will be down to just 32 percent.[6] The problem is not that we have been losing shares in a stagnant world market; world imports of wheat actually expanded by 70 percent during this period. The problem is, U.S. wheat production has scarcely expanded at all over this period (by just 15 percent). U.S. production was constrained during the decade of the 1980s, in particular, by our own unilateral acreage reduction programs. The U.S. was the only country in the world, in the 1980s, to make a policy out of removing its own good farmland from production. The chief effect of our unilateral acreage reduction programs was to open up foreign marketing opportunities for our competitors in the European Community and Canada.

Between 1978 and 1986 overall, the U.S. took a total of 109.8 million acres of its own wheat land out of production, more than the total acreage planted in France, in effect reducing our wheat production by about 89 million tons. This policy naturally firmed up prices for our foreign competitors, and the French in particular, during this period, expanded their production by about 70.5 million tons, nearly wiping out the effects of our unilateral restraint.[7]

Currently our wheat exporters find themselves at a somewhat related disadvantage. Weather problems around the world are helping push wheat prices up to near record levels, nearly a dollar a bushel higher than the prices of a year ago. But U.S. wheat farmers are caught with recent domestic production and stocks so low--even smaller than Canadian wheat stocks, and only about half the level of EC stocks--that most of the new, highly lucrative international sales will again be going to our foreign competition.

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[6] Wheat Letter, February 21, 1992, p.2.

[7] Robert Paarlberg, Fixing Farm Trade, Cambridge: Ballinger, 1988, p.82

at about $6.5 billion per year in those first few years. We project these trade expansion gains would average at least $22 billion per year over the first decade.

U.S. farmers' other big advantage is their unmatched agricultural infrastructure. Their farms are already served by the world's finest net of rural roads, rails and river transport. Their competitors in other countries (including Argentina) would have to build or expand their infrastructures.

America's big problem in seizing the world trade expansion oppor-

tunity is the stalled GATT reform process. We have invested seven years in the process and may get nothing from it. The European Community is blocking farm trade liberalization in a vain hope that it can save its already-moribund far subsidies--which are drowning 12 countries in surpluses, pollution and deficits.

Unless the U.S. breaks through the EC blocking position, we will lose another 7-10 years in the farm trade reform process.

Despite these heavy stakes, the U.S. government has made little effort to communicate any major shift in its farm policy—either to the European Community, to its own farmers or to the public.

Thus U.S. agriculture may well see its major comparativeadvantage in agriculture displaced by cloned palm oil seedlings in Indonesia, genetically-engineered pork growth hormone in China, desert oilseed crops in the Middle East and high-cost tropical wheat around the equator.

Introduction

My name is Dennis Avery, and I am Director of Global Food Issues for the Hudson Institute of Indianapolis, IN. I have some 30 years of experience in agricultural policy analysis at the U.S. Department of Agriculture, the Commodity Futures Trading Commission, with President Johnson's National Advisory Commission on Food and Fiber and at the U.S. Department of State. Through most of the 1980s, I was the senior agricultural analyst for the State Department. I won the National Intelligence Medal of Achievement for my work there in 1983.

For the past dozen years, I have been the only analyst in the world reading ALL of the post reports from America's agricultural attaches in 150 countries. These reports contain an enormous amount of information on long-term trends and new developments in technology, national policy and consumer demand. Essentially, the testimony I will give today derives directly from the U.S. government's own early-warning system for agriculture.

Of necessity, I also follow agricultural research reports from both public and corporate organizations in the United States and overseas.

Armed with this data base, I specialize in projecting long-term trends in global food supply and demand. My expertise is in the interplay of global supply and demand, and the linkages among agricultures and commodities.

Critical Moment To Review Competitiveness

I commend the committee for reviewing the competitiveness of American agriculture at this critical moment in time.

— HUGE CHANGES ARE TAKING PLACE IN THE WORLD'S GOVERNMENTAL SYSTEMS. Until 1950, a country which built a better mousetrap got hit with a protective tariff when it tried to export the product. But after 1950, the GATT virtually INVITED countries to export. Japan was the first country to try the GATT opportunity—and to become an Asian Tiger. The Asian Tiger list now includes Taiwan, South Korea, Malaysia, and Thailand. China is probably a legitimate Tiger, and Indonesia is close. I believe it was the GATT which truly brought down walls of the Kremlin and ended the Cold War. Government-dominated economies have not been able to handle change as effectively as market economies. Thus the shift away from statist policies is stimulating growth—and world food demand.

— THE WORLD ECONOMY IS BECOMING INCREASINGLY COMPETITIVE, as the committee knows. Even affluent countries like the U.S. are being driven to make fuller use of their comparative advantages. The U.S. has traditionally had a strong comparative advantage in agriculture. Do we still have it? Are we making full use of it?

— THE WORLD IS ABOUT TO TRIPLE ITS DEMANDS ON ITS AGRICULTURAL RESOURCES. The world population will redouble again in the next few decades before it levels off. And many Third World countries are experiencing a surge in per capita incomes. More people with more income translate into a strong increase in food demand. It makes enormous good sense to provide the additional farm products from the lowest-cost and environmentally-safest resources. Do U.S. farms fit in that category?

— THE WORLD SEEMS TO BE AT A BREAK POINT IN FARM POLICY HISTORY. For at least 100 years, world farm policy has been dominated by price supports and trade barriers in the affluent countries. There is now a strong trend now away from those policies and mechanisms among OECD countries. In fact, the U.S. is the only OECD nation NOT making a major move away from the old price-support concept. It is particularly important to examine the reasons why price supports and trade barriers are losing favor in the countries which have used them, and how the trend might affect the future of the U.S. and its agriculture.

— TECHNOLOGY IS FLOWING INTO AGRICULTURE SO RAPIDLY FROM THE RESEARCH PROCESS, AND MOVING SO BROADLY AROUND THE WORLD, THAT MANY COMPARATIVE ADVANTAGES ARE CHANGING. From high-protein corn to salt-tolerant oilseeds, from bovine growth hormone to tissue-cultured tree seedlings, from Kansas to Kenya and Sweden to Senegal, research and technology are the most dynamic forces reshaping agriculture.

THE CHANGING FACTORS OF FARM PRODUCTION

LAND

U.S. farmers have long thought that their comparative advantage was in their land. This is not strictly true any longer, and it is becoming less true by the year. Technology and national policy are radically changing the real value of farmland in the U.S. and other countries.

— The average acre of Japanese rice land is now worth $53,000. An acre of Illinois' richest loam is worth only $2000. That Japanese land is closer to higher-value markets, and inside the Japanese trade barriers. Good rice land in Thailand may be worth only about $500 per acre. With the current pattern of national farm subsidies, land value depends primarily on the country's willingness to subsidize it. Unfortunately, most farmers see land value as a store of value, instead of as a cost of

production.

— God may not be making more farmland, but research and investments ARE creating lots of it. Research has tripled the yields on most of the world's good cropland. New acid-tolerant corn, rice and forage varieties for hitherto-useless acid savannahs may effectively create a BILLION acres of new farmland in Latin America, southern Africa and southeast Asia. Turkish dams are creating a new replica of California's famed Central Valley in the Upper Euphrates Valley. Africa has 500 million acres of inland wetlands capable of growing high-yield wet rice—hardly any of them being used.

LABOR

American farmers may feel more insecure about their labor and management inputs than about any other aspect of their competitiveness. It is hard for them to understand how they can compete with Chinese peasants and Brazilian campesinos who make only a few cents per day.

The key, of course, is productivity.

— In corn, the U.S. farmer spends only about 7 minutes producing each bushel of corn. Corn farmers in more primitive agricultures may well spend two or three hours per bushel.

— Our cotton farmers spend 5 hours per bale, compared with perhaps 200 man-hours per bale on labor-intensive farms.

— In dairying, U.S. farmers spend about 2 minutes per hundred pounds of milk, compared with perhaps 3 hours in India.

INFRASTRUCTURE

Infrastructure is even more critical than land to farm competitiveness in most of the world today. Zaire, Sudan and Brazil have hundreds of millions of acres of arable land. But if you farm 750 miles southwest of Khartoum, or 750 kilometers west of Brasilia, you will not get fertilizer, or get your crop to market.

A new road is associated with a 32 percent yield increase in Pakistan, according to recent research by the International Food Policy Research Institute.

Infrastructure is one of main competitive advantages for U.S. agriculture. Our farmland is already served by the world's best transport and communications net. In the OPEC boomlet of the late 1970s, thousands of investors put up billions of dollars to reballast railroads, build new barges, and expand export elevators.

There is not a usable two-lane highway in all of Kenya. In Argentina, the overstaffed government rail monopoly has not been able to afford repairs in decades.

Unfortunately, as U.S. cropland has been setaside under government programs, so has our agricultural infrastructure. Many of the hopper cars are rusting in disuse. The elevators are being shut down for lack of business. And other countries are being encouraged by the GATT rules and the U.S. price supports to expand their own farm support infrastructures.

WORLD FARM POLICY TRENDS

THE TREND AWAY FROM PRICE SUPPORTS — in Affluent Countries

There is a little-noticed but highly important trend away from price supports in the affluent countries of the world. The reasons for the trend:

— Technology has overwhelmed most of the world's farm price supports with surpluses. Potent seeds, fertilizer and fungicides can double yields with high price incentives.

— Price supports quickly lose their political utility once a country's food and fiber markets are fully saturated. Farmers are much less grateful for price supports that come with shrinking quotas attached.

— The environmental impacts of high price supports have been much more serious than expected. Wetlands have been drained, centuries-old hedgerows torn out, woodlands cleared and droughty soils planted to high-risk crops. The subsidies have also produced mountains of manure around Europe's cities, and turned the Adriatic green with algae bloom.

— The high taxes needed to fund farm price supports have hampered the competitiveness of other industries. Sweden says that cutting its food prices to world market levels would give the average Swedish worker a 10 percent pay raise.

— Most of Western Europe's price supports are being converted to small farm payments and/or environmental payments.

— Even the EC's jealously-defended farm policy is clearly abandoning its commercial farmers to their fate. The EC just doesn't admit it.

— Sweden is in a five-year buy-out of farm land values, with 20 percent of its land going back to forest.

— Saudi Arabia is cutting the price support for big wheat farms.

—South Africa has cut its farm budget in half.

— Japan is, ironically, trying to create BIG farms that can survive without subsidy.

The spread of farm technology and investment around the world has turned America's 60-year-old farm policy of "supply management" into a bad joke. As the U.S. has set high price supports, diverted cropland and stored "surplus" crops, the farmers in other countries have been encouraged to expand. Annual world consumption of grain has increased more than a BILLION tons–without becoming "strong enough" to put our setaside cropland back into production.

THE TREND TOWARD PRICE SUPPORTS — in Emerging Countries

Unfortunately, the emerging Asian nations which are the major food growth markets of the 21st century are just learning about the attractions of farm subsidies. In every industrializing country, the farmers resent being left behind. And all countries admire farmers as hard-working, family-oriented, community builders. Every country uses the same two techniques—price supports and import barriers.

THE GLOBAL TREND TOWARD FOOD SELF-SUFFICIENCY

The strongest trend in global agriculture today is national food self-sufficiency.

Over the last decade:

— World consumption of grain has increased 235 million tons, while world grain trade has declined 1 million tons.

— World consumption of grain and oilseeds combined has grown 400 million tons (grain equivalent), and trade has increased only 30 million tons.

Usually this self-sufficiency is achieved at high cost. It is the product of traditional trade barriers, amplified by technology.

It is not a matter of U.S. farmers being beaten out by other exporters. There is no business growth to speak of for ANY exporters.

Moreover, the world is about the lose the former Soviet market which was taking 15 percent of the world's farm exports. There is no comparable market eager to take additional farm imports.

— Even the cost-effective expansion investments would be put on hold until the lower-cost farm resources in the U.S. and the rest of the world were fully in use. Of course, low-cost gains in production, such as higher-yielding or pest-resistant seeds, would continue to be adopted in importing countries.

— Exports have been providing only a small proportion of the world's farm product demand (10 percent in grain, 6 percent in meat) even though comparative advantages in agriculture are much greater than they are in manufacturing.

PRICES, IN REAL TERMS, SEEM LIKELY TO REMAIN ROUGHLY AT THE RECENT NORM (THOUGH HIGHER THAN DURING THE FIERCEST PARTS OF THE EXPORT SUBSIDY WARS). Even though demand will be rising more strongly, a broader group of resources will be permitted into the competition. Not the least of these will be America's setaside resources. (The USDA model projects a 10 percent rise in world farm prices with liberalization, so I may be too pessimistic.)

Assume:

— Exports do, indeed, provide half of the world's consumption increase, with annual increases totaling 30 million tons of grain, 10 million tons of oilseeds and 3.5 million tons of meat.

—Export prices at roughly $100 per ton for wheat and corn, $225 for soybeans and $2300 per ton for meat.

— Farm export earnings for these commodities would then rise annually by more than $13 billion, plus the gains for such

"incidentals" as cotton, wool, cheese, fruits and vegetables. Commodity export earnings should climb by more than $15 billion per year.

GAINS FOR THE U.S. AND ITS AGRICULTURE

The first and biggest gains from liberalization would go to farmers in the U.S. and Argentina, whose governments have been suppressing cost-effective production for policy reasons. They need fewer investments in farms and infrastructure than the other export agricultures.

The U.S. should gain the most of all. During the last period when import buyers were increasing their demand (the OPEC boomlet of the late 1970s) the U.S. got roughly 40 percent of the export expansion. The OPEC demand expansion was not sustained, but it offered a real-world test of agricultural competitiveness.

The U.S. gained the most because it had good land retired on the margins of each farm instead of on a frontier. And this land is already served by the world's best infrastructure. Both the land and the infrastructure were ready and able to come back into use almost instantaneously.

MOREOVER, THE U.S. HAS THE ONLY AGRICULTURE WHICH CAN CUT ITS PER-UNIT COSTS BY EXPANDING. We are currently diverting nearly 60 million acres (nearly one-fourth) of our good cropland under the conservation reserve and setaside programs. Most of this is good farmland by world standards, much of it on our finest farms.

If our farmers brought the setaside land back into production, they could either increase their production, or cut their production costs. Presumably, they would initially use it for cost-cutting. Much of it would be planted to rotation crops, many of them legumes. These rotation crops would not only have value in themselves but would also break pest cycles and add soil fertility without costing cash from the farmer's pocket. If the use of purchased inputs remained constant, they presumably would be spread at lower per-acre rates over more land, thus generating a somewhat larger response per unit. IT SEEMS REASONABLE TO EXPECT THAT IF FARMERS WERE ABLE TO USE ALL THEIR LAND FOR ITS MOST COST-EFFECTIVE PURPOSE, THEY WOULD BE ABLE TO PRODUCE 15 PERCENT MORE OUTPUT WITH NO INCREASE IN INPUTS—OR THE SAME AMOUNT AT 15-20 PERCENT LESS OUT-OF-POCKET COST. U.S. farm production costs recently have totaled $150 billion per year, so a 15 percent reduction would leave another $22 billion in farmers' pockets.

Our agricultural infrastructure would benefit similarly from full-volume use. Grain companies and food processors would think about extra shifts instead of closing facilities.

THUS THE U.S. WOULD BE ABLE TO REDUCE BOTH ITS PER-UNIT FARM PRODUCTION AND DELIVERY COSTS SIGNIFICANTLY IN A FARM TRADE

LIBERALIZATION. NO OTHER AGRICULTURE IN THE WORLD WOULD BE IN THIS FAVORABLE POSITION.

Farm trade liberalization would be even more favorable for the U.S. than the OPEC boomlet. During the 1970s, nearly 20 percent of the farm export gains went to the EC's subsidized exports. In this case, EC exports would be declining instead of rising.

NONE OF THE COMPETING AGRICULTURES COULD EXPAND RAPIDLY AND WITHOUT MAJOR INVESTMENTS.

Even Argentina would need to make two key investments in order to expand its farm output: (1) improved transport (both rural roads and modernization of its railroads); and (2) a distribution system for the high-yielding seeds, pesticides, fertilizers and other purchased inputs which Argentine farmers have largely done without during the past several decades. Argentine farmers' real costs per unit for an expanded output would be higher than they are today, though still competitive.

Thailand lacks adequate infrastructure for a high-tech agriculture. Its farm research institutions are still weak. And its farm managers do not yet have anywhere near the education and skills that typify American farm managers. Turkey will have to extend its transport infrastructure deep into southeastern Anatolia, where it has built a set of big dams to irrigate four million acres of dryland farms. Brazil will have to build railroads and a whole frontier infrastructure for its Cerrados Plateau.

We thus project the U.S. would gain 40-50 percent of the early export expansion—until its setaside land and infrastructure were fully returned to use. If farm exports were growing at $15 billion per year, the U.S. gains could be expected to mount at $6-$7.5 billion per year.

At that rate, it would take less than three years for export growth to fully offset the current subsidies from the Federal government and consumer food prices. It might take only four years for U.S. setaside resources to become fully utilized.

At that point:

— the Federal budget would be relieved of about $12 billion per year in farm payments and related price support costs, saving $120 billion in Federal outlays in the first decade.

— Farmers would be saving $22 billion per year in production costs, mainly through full use of the land they already own. This would more than offset the reductions in Federal payments and price support by itself.

— Agricultural exports would improve at the rate of $6.5 billion per year for four years, rising from the current level of about $40 billion per year to a new level of about $66 billion per year. The total U.S. farm export gains in the first decade would total $221 billion.

Farm trade reform would ALSO open up another opportunity which has never existed before—for volume exports of processed food products. U.S. exports of aged cheese, frozen orange juice and frozen french fries would not only add more earnings for U.S. farmers. They would also mean value-added jobs in food processing, most of them in rural areas.

Overall, it looks like the U.S. could quickly gain more than $60 billion a year if it ditched farm supply management and went for food export expansion. Most of the extra cash would go to farmers and rural communities. The Federal budget burden would be eased importantly. And the gains would presumably continue to grow, though at a slower rate, on through the next 50 years.

RELUCTANCE TO CHANGE POLICIES

Such a farm policy shift may present a potential problem for the Congress, however. The current farm programs have been laboriously constructed by the Congressional agriculture committees over many years, in close collaboration with farm leaders. Swapping subsidies for free trade would be a one-time decision. The agricultural policy establishment would lose their traditional roles overnight. There may thus be a bias against the reform within the policy establishment itself.

Nor do U.S. farmers have great confidence that exports represent their future. Many of them remember the collapse of the OPEC boomlet in 1981. Few of them are studying the economic growth trends in obscure Asian countries. Few of them recognize that U.S. farm resource demand

has already begun to shrink, and will shrink further as new productivity gains are made (such as pork growth hormone and hybrid wheat). Most of our farmers believe at least some of the myth that they can't compete overseas.

Without strong assistance from outside the farm policy establishment, the farm policy structure may not exchange government payments for export opportunity—until it is too late.

If mountainous China, arid India, waterlogged Bangladesh and tropical-forested Indonesia try for food self-sufficiency, their food costs will be higher, their economic growth will be slowed, their food security lessened, and their environmental resources wasted on a huge scale.

And U.S. agriculture will see a major comparative advantage displaced by cloned palm oil seedlings in Indonesia, genetically-engineered pork growth hormone in China, desert oilseed crops in the Middle East and high-cost tropical wheat around the equator.

APPROPRIATE POLICY RESPONSE

It has taken seven years to achieve the current stalemate in the farm trade reform talks at Geneva. It may take another ten years to get the GATT nations to a similar decision point if the Uruguay Round indeed fails to set the world on the course of farm trade liberalization.

The U.S. interest is huge and urgent. It includes more than $60 billion per year in economic growth potential, as well as the fate of our family farms and many of our rural communities. It includes the Federal budget's need for deficit reduction. It importantly involves the public's fierce interest in environmental sustainability for the globe.

And yet neither the Congress nor the executive branch has visibly intervened to convey this urgency to the GATT membership. We have not yet made it clear to the European Community that we are committed to GATT farm trade reform NOW, and that there is no hope for saving their failed Common Agricultural Policy by shifting its costs to other countries.

Unless we undertake some significant policy initiative very soon, one of America's major comparative advantages, and one of the world's great environmental opportunities, will be lost.

Dubious Crusade:
The Push for Agricultural Laissez Faire

Doug Gollin and David Seckler

Drive along any rural road in the United States. Take Arkansas Highway 9, for example, between the quiet villages of Williams Junction and Oppelo. As you wind through the cattle pastures, sod farms, and soybean fields, it is easy to feel that the land is bursting forth with natural fertility and abundance.

Now drive along a rural road in West Africa. To be more precise, start walking; many farms lie more than a day's walk from a vehicle-accessible road. As you wade through the first mudhole of your journey, you will notice that although soils are adequate and rainfall is plentiful the fields along the road seem to produce more weeds than crops. By the time you reach the second mudhole, you will have grasped an important truth about global agriculture: Productivity depends on more than the innate quality of the soil or the richness of the environment.

The proverbial amber waves of America's grain harvest have not just spontaneously sprouted forth from fruited plains and purple mountains. They have been nourished and enriched over time by the investments of government, farmers, and businesses. These investments in agriculture and the rest of the economy have helped to create markets, to connect supply and demand, to stabilize agricultural production, and to raise incomes. Without such investments, the land along Arkansas Highway 9 would look much more like its counterpart in West Africa, and the wheat fields of Kansas and Oklahoma would still be part of the Great American Desert.

In recent months, agricultural policy has occupied a prominent place in the headlines, dominating the July economic summit meetings. Unfortunately, most of these discussions of global agricultural policies and trade liberalization have focused on inefficiencies and distortions without considering the underlying causes of productivity or development. As a consequence, although the debate has grown increasingly heated, it still seems curiously empty.

Why Governments Intervene

Many Americans think of agriculture as a cardinal case of the irrationality of government programs and undue influence of special interests. Reading of vast subsidies to farmers, they are inclined to regard all farm policies as pay-offs. But though some subsidies are favors to groups of producers, there is a broader and more defensible logic to government intervention in agriculture.

Almost every country in the world has enacted some policies that intervene in agricultural markets. These policies

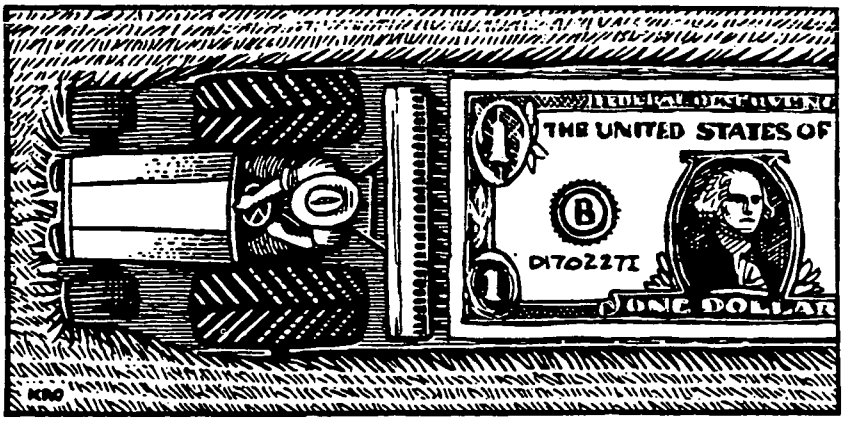
generally stem from a conviction that basic foodstuffs and fibers are inherently different commodities from television sets or plastic toys. Food represents the most fundamental item of human consumption—particularly for poor people. In an extreme case, India's poor spend 75-85 percent of their earnings on food—almost all on coarse grains and root crops. From the producers' point of view, agriculture involves great risk and unpredictability. Individual producers account for minute percentages of total market supply, and price swings for agricultural goods can be very large, with disastrous effects on both producers and consumers. Government intervention arises fundamentally from the need to control those disastrous effects and to make possible the long-run development investments on which agricultural productivity ultimately depends.

To address the particular problems of agricultural supply, countries around the world have adopted policies ranging from price supports to fertilizer subsidies; from cheap credit to food stamps; and from tax breaks to tariffs. Many governments pursue seemingly contradictory policies, such as guaranteeing high prices to farmers but subsidizing cheap food in urban areas. The United States, for example, operates an elaborate and confusing system to pay farmers high prices while simultaneously limiting production. In other countries, policies do not always benefit farmers; many developing countries tax their farmers heavily, while urging greater levels of output.

Taken together, the policies of different countries have undoubtedly had a significant effect on world agricultural production and trade. Some absurdities are apparent. The United States and Europe produce copious amounts of sugar from beets, at prices several times higher than world market levels for cane sugar. Japanese consumers view beef and oranges as luxury items, while Brazilian farmers struggle to find markets for the same goods.

Economists and policy analysts swell up with outrage over the inefficiency of such market "distortions." For a number of years, these academics have allied with political conservatives in calling for an end to agricultural market interventions in the United States and around the world. They have argued that the world would benefit from global "liberalization"—an end to all countries' market interventions in agriculture.

But this single-minded focus on the evils of government price supports and farm subsidies misses the point. Policies that stabilize the market for agricultural products have a less obvious yet crucial function: They encourage farmers and others to make long-term development investments.



Agricultural productivity reflects a broad range of factors, including a whole host of present and past policies, investments, subsidies, and market quirks. Yet policy analysts frequently ignore or misunderstand the importance of development investments in agriculture. Those investments, however, are central to agricultural development and crucial in understanding U.S. farm policy and international trade.

Agriculture's New Prominence in the Trade Debate

When the leaders of the major industrialized countries came to the United States in July for an economic summit, President Bush arranged to entertain them at a Texas barbecue and rodeo. The choice of festivities was presumably designed to add a Western flavor to the negotiations. But it also served as an appropriate introduction to the free-for-all and wrangling over agricultural trade that ensued during several days of summit meetings.

The attention to agriculture was surprising. In the past, agricultural policy has occupied a relatively minor position on the international economic agenda. Although farm programs and trade have occasionally surfaced as minor talking points, the summit meetings of industrial nations have previously focused on grander issues such as monetary and fiscal policy. So why, this year—with tumult in Eastern Europe, mounting concern over the environment, and looming recession in the U.S.—did the summit spotlight shine on the banal topic of agricultural trade liberalization?

The immediate reason is the impending deadline for negotiations in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT). The GATT was one of the three international structures developed after World War II to foster global economic stability and growth. (The other two were the International Bank for Reconstruction and Development, now part of the World Bank, and the International Monetary Fund.) The GATT is not an institution so much as an agreement: a series of rules designed to define and encourage free trade among member nations. From the original 23 signatory countries, the GATT has now expanded to 96 members. The General Agreement has been amended several times since 1948, usually in response to changes in the global economy.

The latest set of negotiations, known as the Uruguay Round, was initiated in 1986. These negotiations are due to expire in December; hence the last-minute rush to resolve issues such as agricultural trade liberalization.

Until the current round of negotiations, agriculture was effectively omitted from the GATT. Because the United States and other founding countries initially insisted on the need to maintain elaborate domestic farm supports, agriculture was not covered under some of the free-trade provisions of the original GATT document.

In more recent negotiations, however, the United States has begun to press forcefully for including agriculture on the GATT agenda. Not coincidentally, the U.S. fervor for adding agriculture to the GATT has grown particularly acute with the strengthening of the European Economic Community (EEC) and its Common Agricultural Policy (CAP). The European policy has made it more difficult for U.S. farmers to export agricultural goods to European markets. In fact, the EEC has emerged as a formidable export competitor for the U.S. agricultural sector.

The United States has taken an especially hard line on agriculture in current GATT negotiations. The U.S. proposal, initially put forward by the Reagan administration and now championed by the Bush administration, would call for the total elimination, over ten years' time, of global subsidies and trade protection for agricultural commodities, food, beverages, fish, and forest products. The proposal would

even extend to a standardization of all health and sanitary regulations. (See C. Ford Runge,"Environmental Risk and the World Economy," *TAP*, Spring 1990.)

The United States has particularly targeted the European Economic Community in the GATT negotiations, arguing that its Common Agricultural Policy is especially detrimental to free trade. U.S. negotiators contend that the CAP not only supports farmers, but effectively subsidizes exports. They maintain that the CAP's mechanisms—import quotas and "variable tariffs"—skew trade more seriously than the price supports and supply controls used as mechanisms of U.S. farm programs.

As expected, the U.S. proposal has encountered vehement opposition, from the Europeans and the Japanese in particular. The EEC has responded with a GATT proposal that would retain the status quo, while calling for producing countries to reduce commodity surpluses and trim back subsidies. Japan has called for eliminating export subsidies but insists that countries should be left free to pursue their own domestic programs, on the grounds that they constitute an integral element of national economic and social policy. A third proposal has been submitted by a coalition of fourteen agricultural exporting nations (Argentina, Australia, Brazil, Canada, Chile, Columbia, Fiji, Hungary, Indonesia, Malaysia, the Philippines, New Zealand, Thailand, and Uruguay), known as the Cairns Group. The Cairns approach would set out mechanisms and targets for reducing global subsidies, with the ultimate goal of eliminating all such trade-distorting policies.

The battle in the Uruguay Round has pitted the United States against the European Community and Japan. The U.S. has continued to stress agricultural trade liberalization in bilateral and multilateral discussions. If, as seems likely, no agreement is reached before the December deadline, agricultural trade will remain a divisive issue for years to come.

Indeed, some observers have gone so far as to speculate that the whole GATT structure will collapse if no agreement is reached on agricultural trade in the current round. Critics of the process would not mourn its demise; they contend that the GATT structure has never been particularly useful, and that it has served merely as a convenient way for rich countries to control the trade policies of poor nations.

An End-Run Around Congress?

In some respects, it is both ironic and puzzling that the United States has emerged as the strongest advocate of ending agricultural subsidies and trade distortions. The irony lies in the fact that the U.S. at present has perhaps the most elaborate and contorted system of agricultural protection of any country in the world.

The peculiarity of the U.S. position is that the administration's proposals for dismantling agricultural subsidies through GATT would almost certainly fail in the U.S. Congress. Both the House and the Senate recently rejected a move to cut sugar subsidies in the U.S. by two cents per pound, a small cut that would leave U.S. prices at nearly three times the world market level. It is extremely unlikely that Congress would support measures that would cost American farmers a great deal more.

One interpretation of the Bush administration's stance at GATT is that the trade negotiations offer an end-run approach to eliminating domestic agricultural programs—precisely because the administration cannot hope to persuade Congress to make deep cuts. The idea is that Congress would be more likely to accept a termination of farm supports if it came as a component of a global liberalization package.

Seen in this light, the U.S. position at GATT looks a bit like a "Trojan Horse" for a major change of domestic policy. By the time most Americans would notice the change (and how many people follow GATT negotiations closely?), the signatures would be dry on a treaty. Then the ad-

ministration would argue that it could not abandon the GATT without bringing down the whole structure of international trade.

A more generous view of administration reasoning is simply that Bush administration trade and agriculture officials genuinely believe that the U.S.—and the world—would benefit from a total liberalization of trade and a corresponding elimination of domestic farm programs.

Certainly there have been many outspoken advocates of this viewpoint, including President Bush himself. The typical argument holds that, although farmers in most of the rich countries would lose from trade and policy liberalization, society at large would gain from increased efficiency in allocation of resources. Proponents argue that expanded trade would lead to unspecified "dynamic" effects, such as greater economic growth.

A much-cited 1985 study, prepared by Australian researchers Rodney Tyers and Kym Anderson for the World Bank, argues that a global liberalization of agricultural policy and trade would bring net benefits of about $41 billion for the world as a whole, strictly through increased efficiency. The biggest share of this windfall would accrue to rich countries; but Tyers and Anderson argue that poor countries would also benefit.[1]

Advocates of liberalization argue that it will also result in a more rational allocation of production. Under a global free trade regime, agricultural commodities would be produced in those countries that are most efficient producers. Ian Goldin and Odin Knudsen, advocates of trade liberalization, call it "a vital step to the development of a more efficient and equitable international allocation of agricultural production."[2]

Within the U.S. farm policy debate, a core of free-market enthusiasts contends that free trade—and an end to domestic agricultural programs—is essential. Perhaps the most forceful (and surely the most vociferous) of these is James Bovard, an associate policy analyst with the Cato Institute and the Competitive Enterprise Institute. In his rhetorical tirade, *Farm Fiasco*, published last year by the Institute for Contemporary Studies, Bovard writes that "agriculture is a classic case of a brain-dead federal policy—of a zombie government agency that appears destined to repeat the same bumbling steps forever." Bovard calls for dismantling the U.S. Department of Agriculture and incinerating "a large pyre of wasteful government programs." In the process, he makes a pitch for global liberalization of agricultural trade:

> Free trade is the best hope for future world prosperity....Government agricultural policy today provides the largest impediment to reform of the General Agreement on Tariffs and Trade and one of the most inflammatory items on the agenda of world trade negotiations. The sooner we get rid of agricultural programs, the safer the world trading system will be.

There is clearly strong support within the Bush administration for this position (although it is couched in less strident terms). Free trade is a major component of the Bush administration farm policy. Indeed, if the U.S. proposals are accepted at GATT, free trade will replace other components of U.S. farm policy—at least within ten years' time. This makes it particularly important to subject the arguments for agricultural trade liberalization to some careful scrutiny.

Trade Theories, Agricultural Realities

The arguments for free trade are standard fare in Economics 101, and they are based on a well-understood area of trade

1. Rodney Tyers and Kym Anderson, "Distortions in World Markets: A Quantitative Assessment," background paper for *World Development Report 1986* (Washington, D.C.: The World Bank, 1986).

2. Ian Goldin and Odin Knudsen, "Introduction" in *Agricultural Trade Liberalization: Implications for Developing Countries* (Washington, D.C.: Organisation for Economic Cooperation and Development and the World Bank, 1990), 14.

theory that goes back to David Ricardo's work in the early nineteenth century. Under free-trade systems, countries (and regions within countries) specialize in production of those goods in which they have a "comparative advantage" in production. A country should export goods that it produces relatively efficiently, so as to import goods produced more efficiently elsewhere. The importance of "comparative advantage" is that this argument holds true even if a country does not have an *absolute* advantage in producing its export good at lower cost than other countries.

Trade theory holds that, in most cases, tariffs and other trade restrictions have negative effects for both the country that applies them and the world as a whole. Trade theorists can also demonstrate how other government policies—subsidies, taxes, and almost any other market intervention—distort trade and result in inefficient allocation of resources and welfare losses. In short, most such market interventions are very, very bad.

Theoretically, all this applies to agriculture. The problem is that no one knows what "free trade" means as it is applied to agriculture. It is impossible to produce a comprehensive list of policies and market interventions that affect agriculture. Some are obvious: Price supports and farm programs fall into this category. And it is equally clear that tariffs, quotas, and trade restrictions distort world agricultural trade.

Different policies affect trade in different ways. Tariffs, price supports, and import restrictions influence trade by altering prices. Direct income support for farmers can affect trade by changing the profitability of agricultural production and, consequently, the amount produced. Input subsidies and taxes, such as credit guarantees or fertilizer subsidies, alter farmers' costs of production and thereby affect supply. Marketing and transportation subsidies reduce the costs associated with selling goods. And long-term "structural" subsidies—such as agricultural research—will alter trade patterns in the long run by changing costs of production.

All these policies affect prices, production, and trade. But where do you draw the line? What about infrastructure investments? A government-funded irrigation system certainly affects agricultural production and markets. Rural electrification alters the production possibilities for farmers.

Go back, for a moment, to Highway 9 in Arkansas. As you look over the landscape now, examine it for the evidence of development investments. The highway itself comes into view first—a neat ribbon of asphalt that winds across twenty miles of farm and forest land, serving a relative handful of people (most of them in the county seat of Perryville, population 1,100).

Examine the small bridges and culverts that the road crosses—built over Cypress Creek, in 1938; Harris Creek, in 1939; the Fourche le Fave River, in 1938; Nowlin Creek, in 1948. Along the roadside runs a set of power lines, erected and maintained by the Perry County First Electric Cooperative—created through the Rural Electrification Act of 1936. Many of the houses scattered across the countryside were financed through the Farmers Home Administration. A few miles to the north of the road, the Arkansas River is kept within its banks (and made safe for barge traffic) by the McClellan-Kerr Navigation System, an elaborate chain of locks and dams.

Hidden from roadside view are some of the other investments that have shaped this Arkansas landscape. These have included massive government investments in education, research, farm extension services, market information, produce inspection, and veterinary health services. Investments in other parts of the country have also created markets for this produce—from food stamp programs to Social Security, from railroads to defense spending.

It is impossible to capture all of these policies in an assessment of overall agricultural protection, because the policies cannot be disentangled from fundamental national goals and priorities. And yet, to ignore these issues is to focus on a tiny subset of policies defined as affecting agriculture. The point is manifestly clear that agricultural production patterns in the United States and other countries have been determined by a huge range of past investments and market interventions.

Before the opening of the Erie Canal in 1816, for example, the American Midwest had a comparative advantage in production of furs—and little else. Between 1816 and 1840, the U.S. built more than 3,000 miles of canals; and over the following two decades, the country added nearly 30,000 miles of railroad track. These massive investments—and subsequent development expenditures by public and private sectors—transformed the center of the country into a grain-producing region, the "breadbasket" of the world.

Historical investments of this magnitude have not been adequately considered in the GATT discussions of agricultural trade. The present debate focuses on *current* policies and their effects. These are measured in terms of Producer Subsidy Equivalents (PSEs), which are said to calculate the net effects of countries' agricultural policies on producer earnings. PSEs sum up the effects of subsidies, taxes, tariffs, quotas, and direct interventions in agricultural markets. Some calculations also include indirect subsidies for transportation, credit, and research. Others do not, and considerable controversy has arisen over the alternate approaches to calculating PSEs.

In the final analysis, PSEs and similar measures of "net protection" provide a useful but flawed measure of policy effects. PSEs consider only a handful of the most obvious forms of farm support. They do not generally incorporate the effects of economy-wide policies (exchange rates, interest rates, fiscal policy) or of complex indirect subsidies (infrastructure, construction, technology spinoffs).

Moreover, the most important problem with PSEs is that they measure *flows* of subsidies, rather than *stocks*. Solutions based on PSEs, therefore, tend to penalize *current* subsidies and to reward *past* subsidies. Past subsidies have been capitalized into roads, bridges, and infrastructure; education, research, and extension services; buildings, tractors, and drainage systems. This system benefits the Iowa farmer who has already built his sheds with subsidized credit, terraced his corn fields when support prices were high, and studied for a degree at a land grant university. It tends to penalize the Thai peasant who lives five miles from a paved road, plows her rice paddies with a water buffalo, and threshes her grain by hand.

Thus, if the United States were to eliminate all its farm programs today, it would continue to reap the benefits of past subsidies for years to come. Hundreds of billions of dollars in past investments return a kind of "interest" today in the form of higher productivity and expanded economic activity.

Some Lessons for World Trade

Two clear lessons emerge from this discussion. First, in the current fascination with laissez-faire economics, both rich and poor countries should remember that trade liberalization is not a substitute for development investments. Although free trade is undoubtedly a stimulus to economic activity, so also are well-planned strategic investments. Historically, the public sector has provided many of these investments for agriculture, and government can continue to play a valuable role in the future. The public sector will continue to be the key actor in such areas as infrastructure development, environmental control, research, and extension.

The second lesson is that, even if successful, global agricultural trade liberalization will lead to a new kind of distortion in

world trade. Although Ian Goldin and Odin Knudsen have described the liberalization process as a chance to achieve a "levelling of the international playing field," liberalization will actually create vast advantages for countries that have historically invested in their agricultural economies. The world's poorest countries, in Africa and Asia, will not benefit from these reforms; in fact, they may find themselves handcuffed more tightly. With little money available for investment, and with prohibitions against direct or indirect supports for agriculture, they will have few opportunities to create comparative advantages.

Moreover, specific provisions of the liberalization package will have profoundly negative effects in poor countries. Elimination of fertilizer subsidies, for instance, will pose grave difficulties for countries in Sub-Saharan Africa that are seeking to expand food production to keep pace with population growth.

Here in the United States, although there might be some aggregate gains in efficiency from trade liberalization, there would be many dislocations—and possibly some hidden costs, as well. In California alone, terminating water subsidies would eliminate cotton production and generally decimate agriculture. And, without commodity price supports, many of the rural communities in the Midwest could wither and die. An end to farm programs would probably leave taxpayers and consumers with smaller bills, but the indirect effects of agricultural liberalization would be felt throughout the economy—in transportation, processing industries, rural retailing, and other sectors.

To defend the historic role of government in agriculture is not to defend every detail of current U.S. agricultural policy. It would take a strong stomach, as well as a weak mind, to rush into unquestioning acceptance of the whole crazy-quilt of U.S. agricultural policies. A few follies stand out; expensive tobacco subsidies, and archaic sugar and dairy programs are noteworthy examples.

But much of the seeming absurdity of U.S. farm policies stems from the multiple and mutually inconsistent goals that we ask these policies to achieve. We expect agricultural policies to guarantee steady and stable production, relatively cheap food, high export earnings, the continued viability of small-town economies, the preservation of farmland, the nourishment of the world's poor, and environmental safety, to name a few major goals. These are inherently contradictory goals, and we should not be surprised if they occasionally lead us to policies that appear nonsensical.

In the grand scheme, however, U.S. agricultural programs place a modest burden on taxpayers and consumers. Depending on how you count, the cost in taxes and food prices is perhaps $200-$400 per household per year. For this price, we have a safe and stable supply of food, good years and bad; and we achieve mixed success in our other goals. Consumers in the U.S. spend slightly more than 10 percent of their earnings on food, only about 2 percent on bread and food grains. These percentages rank among the lowest in the world. If our policies are occasionally absurd, most of us have the luxury of laughing with full stomachs.

Trade liberalization is, on balance, a worthy goal. But in the enthusiasm for economic rationality and free markets, we should guard against making them goals in themselves. After all, the $41 billion in estimated efficiency gains from liberalization is still a small number—less than half a percent of world agricultural production.

Nor should we forget the lessons of our past: Economic rationality and efficiency must be accompanied by thoughtful investments in development. These investments will take many forms in different countries, and the international system should include enough flexibility to accommodate varying approaches to development.

PREPARED STATEMENT OF OTTO DOERING

THE FULL COSTS OF FARM EXPORTS

By

Otto Doering, Andrew Schmitz and John Miranowski

In the last decade there has been a tremendous expansion of agricultural exports from the U. S. (Table 1). Generally, this has been viewed as a good thing for the nation as a whole. Expanded exports have improved incomes for farmers and have benefited consumers by providing foreign exchange for the purchase of more foreign goods, especially oil. The general belief in the benefits of expanded foreign trade is reflected in the current administration in its stress on export promotion to enhance farm incomes and help the national economy. However, the 1982 reality is one of large grain stocks, low commodity prices, stagnation of export demand, and the lowest expected farm incomes since the Great Depression.

Recent studies of U. S. agricultural production and export expansion have focused on physical resource use. One example is the comparison of energy resources required to produce grain with the petroleum resources that can be imported with the grain export earnings (1). In essence, these analyses establish an energy standard of value for judging whether such exports are in the nation's best interest. Other examples include studies of soil and water depletion linked to the expansion and intensification of agricultural production (2).

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Most of these resource-based studies implicitly or explicitly assume a declining efficiency of agricultural output. Farmers are viewed as being forced to expand crop production into less productive and more erosive land by economic circumstances that threaten their survival in farming. The implication is that farmer response to short-run economic phenomena do not reflect the long-run costs and benefits of resource use. In fact, there have been few attempts at economic analyses to parallel the physical studies of resource flow, depletion, and degradation. There have been even fewer economic analyses that cast these resource use decisions into a gains from trade framework, ensuring a broader look at societal costs and benefits from an agricultural export promotion policy.

Our objective is to provide an analytical framework beginning with an analysis of the private (individual firm's) cost of producing corn and wheat. These private costs will be compared with farm prices received and will provide one perspective for viewing resource use decisions at the firm level. This comparison is followed by the estimation of agricultural input subsidies, long-term social costs, tax advantages, and government program costs to arrive at a lower bound estimate of the social costs for corn and wheat production in the U. S. An analysis is then made of agricultural export policy to determine the net gains to U. S. and foreign consumers.

Costs of Production

For the most part, data limitations require the use of aggregate or average costs of production. However, it is most helpful if there is information about the marginal cost of production, the cost of producing one additional unit beyond the current level of production. Initially, the marginal cost of production is expected to decrease as a firm goes beyond its first unit of production and both start-up and fixed costs can be spread over more units. Ultimately, the marginal cost begins to level off and then increases as diminishing returns to one or

another limited resource sets in (3). The determination of where different levels of agricultural production are located along an aggregate marginal cost curve is especially important to the analysis of costs of production under an expansionist export policy.

Some analyses of the current agricultural situation see inflation and high interest rates as the primary cause of the current cost pressures that are expected to contribute to low levels of farm income in 1982 (4). Inflation is certainly a factor, but it only relates to the general price level by moving the whole set of cost curves upward. The focus here is not on general cost increases, but on changes in costs as the volume of agricultural production expands and bumps up against resource constraints causing diminishing returns to set in. This is what the physically based resource analyses focus on when they assume that there will be even higher costs for agricultural products if agricultural production is expanded further.

Cost of Production Data:

In 1974, the U. S. Department of Agriculture (USDA) carried out a nationwide cost of production survey on major agricultural commodities (5). Samples were taken in forty regions providing data from over four thousand farms. For a given commodity, farms were surveyed in those regions accounting for the bulk of the production of that commodity.

The cost reporting in this survey involved four major cost components: "total direct, overhead, management and alternative allocations to land. The total direct costs, shown in detail in the report, include labor, power and machinery costs, seed, fertilizer and chemicals, custom services, irrigation, interest on operating capital and other materials. Overhead costs include all costs that must be paid such as personal property taxes, electricity, sales taxes, insurance, and farm auto costs, but are not directly related to a specific crop's

production. A charge for management was computed at the rate of 7 percent of the gross farm sales allocated to a crop in proportion to value of production of one crop to total value of production on the farm. Land allocations have been computed by six alternative methods: 1. Owned land valued at current prices for agricultural purposes; 2. owned land valued at an average acquisition price; 3. net share rent; 4. cash rent; 5. composite basis reflecting actual combinations of cash rent, share rent and owner-operator arrangements with owned land valued at current land prices; and 6. composite as in 5 above except owned land valued at the average acquisition prices." (6)

The 1974 cost of production survey provided average cost information nationally and regionally according to the six different categories of costs. In addition, the average per unit costs of the sample producers were arrayed, and cumulative cost curves were constructed to indicate what proportion of the crop was produced below a given cost. Such cost curves were constructed for the total direct costs by themselves for all costs including land at current value on a composite basis (as in case 5 above) and for all costs, but including land at acquisition value on a composite basis (as in case 6 above). While these cost curves are not really marginal cost curves, they do give us something better than an aggregate industry average for total costs for a given commodity.

Three cost distributions have been constructed from the survey data for the purposes of this study. First is a 'Direct' cost distribution which includes the total direct, overhead and management costs. Second is a cost curve designated as 'Total 1' which includes Direct costs plus land costs at current value on a composite basis. Finally, there is a 'Total 2' cost curve which includes Direct costs plus land costs at acquisition value on a composite basis. These distributions are illustrated in Figure 1 for U. S. wheat production in 1974. This is done on a per bushel unit basis where a bushel of wheat weighs 27.2 Kg. (a bushel of corn weighs 25.4 Kg.).

Thus, there are two different forms of cost data which will be utilized here. One is the set of three per unit average costs of production for a given crop on a national aggregate or regional basis, and the other is the set of three per unit cost distributions for a given crop on a national basis. No comprehensive cost of production survey has been made for all the commodities since the original 1974 survey. The national and regional average cost figures for major crops have been updated annually by USDA using a budget generator and less comprehensive cost surveys. The Food and Agriculture Act of 1977 required the establishment of national average cost figures for major commodities in succeeding years because it linked government price supports to changes in production costs (excluding land). These annual average costs of production are given in Table 2 for wheat and corn.

The cost distributions have been updated by USDA occasionally for internal use and analysis. Because of their importance as some form of approximation for a total industry cost curve, the 1974 cost curves for wheat and corn have been updated for this study on the basis of the original distribution (7). The shape of the 1974 distribution was thus maintained for each commodity for succeeding years as the distribution was shifted to match the change in value of the average per unit cost of production from one year to the next and the scale of the distribution was proportionally adjusted to the changes in the value of the average. The general shape of the distributions of costs for wheat production from 1975 through 1980 is thus the same as that for 1974 (Figure 1).

Having constructed a set of cost distributions for wheat and corn, one can locate on each distribution the average price farmers received in a given year. As an example, this is done for wheat in 1974 by locating the seasonal average price for wheat for that year, $4.09, on the cost scale (Figure 1). The same thing can be done for both corn and wheat from 1974 through 1980. In each year the seasonal average price becomes a dividing point on each cost distribution of Direct, Total 1 and Total 2 costs and allows the estimation of that proportion

of the crop produced at a cost greater than the average seasonal price. This information is presented in Table 3 for wheat and corn. It indicates that at various times large proportions of the corn and wheat crops have been produced at costs that are higher than the seasonal average farm level prices.

Concerns About the 1974 Cost Base:

Before interpreting the information in Table 3, it is important to consider whether the shape of the 1974 cost distributions for corn and wheat makes sense for later years. Weather is a most important concern with respect to both the average cost figure and the shape of the distribution. The 1974 figures were based upon actual yields, and the cost projections made for later years were based upon projections of normal yields. In 1974 the weather was worse than normal for most crops and resulted in lower yields and higher per unit costs than would have been the case with normal or trend yields. The USDA estimates that national average Total 2 costs for a bushel of wheat in 1974 would have been $2.42 with normal yields as opposed to the $2.94 based upon actual reduced yields. This weather effect may also have made the distribution of costs broader and more skewed towards the high costs than otherwise. It is expected that this skewing effect would have been more severe for wheat than for corn given the greater proportion of wheat grown on marginal lands that are highly sensitive to weather. The average costs and the distributions presented here may be different from the actual situation because of weather impacts upon yield levels and the leverage that exerts upon costs.

In order to try and double check the Table 3 results of the 1974 distribution for a later year, a regional cumulative cost curve was compiled for winter wheat from the 1980 cost of production estimates, and this was then matched with the 1974 based distribution for 1980 in its estimation of the proportion of the wheat crop produced at a cost above the seasonal average farm level price (8). This is done in Figure 2, which represents the Total 2 (Direct plus land at acquisition

value on a composite basis) costs for winter wheat in 1980. The USDA cost of production estimates for each region were taken and assigned a percentage weight on the basis of the proportion of the total winter wheat crop produced in that region. In Table 3, which is based upon the 1974 distribution, 84 percent of the 1980 wheat crop was produced at a Total 2 cost greater than the seasonal average price of $3.88 a bushel. In Figure 2, the Central Plains was the low-cost region for producing winter wheat with an average cost of $4.02 per bushel in 1980. That region was also the largest producer, contributing 41 percent of the total winter wheat crop. Even assuming some broad distribution of Central Plains costs around the $4.02 average, it appears from Figure 2 that 80 percent or more of the winter wheat crop was produced at a cost greater than the seasonal average price of $3.88 a bushel. In this case the cumulation of the regional cost data for winter wheat tends to support the results given by the 1980 estimated cost curve based upon the 1974 distribution.

Using Total 2 Costs:

Total 2 costs will be used for our analysis and comparisons. The Direct costs do not include land, and this has become an increasing factor in total production costs given inflation of land values and higher interest costs. Total 1 costs, which include current land values, probably overstate the land cost component actually faced by most farmers as only 3 percent of U. S. farmland changes hands in any given year, so most farmers purchased the bulk of their land some years ago at lower prices. The Total 2 costs include Direct costs and land costs based upon acquisition value. In addition, the Total 2 costs used here are calculated with land cost on a composite basis reflecting the actual tenure status, cash lease, share rent, etc. Costs on the basis of actual tenure arrangements are lower than costs figured on the basis of current interest rates applied to land values. The Total 2 cost thus represents the lowest cost estimate in the USDA series that still includes land costs.

Costs Beyond the Firm

A number of production costs for corn and wheat are borne by others not involved in the actual production of the commodities. These social costs may take the form of transfer payments or commodity programs for producers whose cost is borne by taxpayers, tax concessions to producers with the needed tax revenue ultimately made up by other taxpayers, intertemporal costs of production not borne entirely by today's producers, and input subsidies that lower the cost of production or increase the price received by the farmer.

Input Subsidies:

Over the years, public and private investment in agricultural research has yielded high rates of return through increases in productivity. The primary beneficiaries of such research investment have been consumers, both domestic and international, and to a lesser extent early adopters of new technology who benefit from a period of reduced per unit production costs relative to price.

Ruttan estimates that public research performed by the USDA and the state agricultural experiment stations (SAES) totaled $1.2 billion in 1979 while private agricultural research expenditures exceeded $2 billion (9). Private research costs are assumed to be recovered in the marketplace and are reflected in farm input prices or other costs. In contrast, the expenditure on publicly supported research does not get included in private cost of production estimates.

Current Research Information System (CRIS) data, providing USDA and SAES research expenditures, are available from 1967 to 1979 and indicate that the public sector was spending over $55 million on corn and wheat research in fiscal 1979. To permit comparison with the cost of production data, these research costs can be expressed as an average cost per bushel of corn and wheat produced. Because there is delay between research outlays and the associated productivity impacts, a seven-year lag is used in calculating the average public research cost per bushel of corn and wheat for 1974 through 1980 (10). These estimates indicate

that the average annual expenditure per bushel was $.002 for corn and $.006 for wheat. These estimates understate the total public costs involved because similar estimates of public expenditures on extension and education are excluded, and public expenditures on basic management and marketing research may not have been included in the commodity estimates.

A more comprehensive accounting of research, extension and education expenditures might show substantially higher costs. If these costs are not much higher than our estimates, then critical questions should be raised concerning the relatively low funding of research, extension and education relative to our subsidization of other aspects of production.

Transportation is another area where there have been public subsidies that have either reduced the cost of inputs or increased the price of commodities at the farm level by reducing the price differential to market. A recent study of transportation subsidies for Canadian wheat indicates an average government subsidy of $0.27 per Canadian bushel of wheat for the period 1975 through 1979 (11). The most conservative estimate of U. S. transportation subsidies is based upon an examination of current and future operating cost subsidies for water transportation (12). This does not include anything for past capital subsidies and amounts to roughly $0.03 per bushel for the transportation of wheat and corn by water. The subsidies for truck and rail are slightly less.

Long-Term Societal Costs:

A national concern about the impact of export expansion on soil erosion has accompanied the increase in the volume of American farm exports. The impact of increasing soil erosion is felt in terms of decreasing soil productivity and declining environmental quality, especially water quality. The amount of land cropped in the U. S. has increased from under 300 million acres (121 million hectares) in 1970 to over 350 million acres (143 million hectares) in 1980. The increase in cropland acreage during the decade was due almost exclusively

to satisfying export demands. Much of the cropland expansion occurred on soils more prone to erosion.

Although data are not available to determine the specific contribution of farm exports to the soil erosion problem, the USDA's 1977 National Resource Inventory (NRI) quantifies the seriousness of soil erosion. Based on a 'tolerable rate of soil erosion' (T-value) of five tons per acre per year, which may overestimate or underestimate the actual rate of topsoil genesis in specific cases (13), 23 percent of U. S. cropland was suffering sheet and rill (water) erosion above this level. Disaggregating these numbers, 16 percent of the cropland was suffering moderate threats to long-run productivity (5 to 14 tons per acre per year) and 7 percent was suffering serious threats (greater than 14 tons). Similar estimates were reported for wind erosion. As these numbers indicate, a relatively small portion of cropland, which would not be needed under a more modest export scenario, suffers a serious erosion threat.

If we assume that export demand is the residual claimant for farm commodities and thus the source of excess cropland soil erosion (greater than 5 tons), excess sheet and rill erosion from corn and wheat production are 500 million and 100 million tons, respectively (NRI). This is about 4 million acre inches per year, or 3.33 and .73 million acre inches for corn and wheat, respectively. Although the implicit value of an acre inch of topsoil is highly variable, preliminary estimates indicate a value of $60 per acre inch for Iowa. Using this value for the nation, the annual soil productivity foregone in corn production would be about $200 million, or an average cost per bushel exported of $0.10. The estimates for wheat production are $44 million and $0.14 per bushel. Taking these costs against the total crop would give costs of $0.03 per bushel for corn and $0.02 for wheat.

Two qualifications of these estimates are in order. First, these estimates may overstate the productive value, and thus the erosion costs, of many of the

more erosive soils. Second, wind erosion was ignored in deriving these estimates; it may be an important factor in the productivity of cropland for wheat. Finally, even though the productivity costs of soil erosion are largely incurred by the private landowner, consumption of the soil capital stock is a long-term cost that will have to be borne by consumers as well and should be included in our total cost.

The externality costs of soil erosion, which are borne by the public through reduced water and air quality, are even more difficult to quantify. Again, because of the more nebulous impacts of wind erosion on environmental quality as well as on soil productivity, our attention is concentrated on the water quality impacts of sediment associated with water-caused soil erosion. These external costs include reduced reservoir capacity, impaired recreational opportunities, and increased potable water purification. Although a wide range of costs have been attributed to these and other water quality impacts (14), the cost estimates generally range from $1 to $5 per ton of sediment delivered to the stream. Not all eroded soil is deposited as sediment in the stream. Depending upon the soil type, topography, and watershed size, the soil delivered to the stream as sediment is typically estimated to range from 10 to 40 percent (15).

When considering external costs, all soil erosion (not only that portion above the T-value) has the potential to inflict environmental damage. The NRI data place total sheet and rill erosion from corn and wheat production at approximately 870 million tons per year, or about 90 to 350 million tons of sediment entering the nation's waters. Given the tenuous nature and range of estimates involved, further interpretations and conclusions are left to the reader. However, these external costs are significant, of greater magnitude than the productivity costs, and pertain to production for domestic consumption as well as for export.

Tax Advantages:

There has been enough discussion of tax advantages to certain kinds and

scales of farming that many regard these tax provisions as a kind of subsidy to agricultural production. However, they really are not the same as direct government expenditures upon commodity support programs, even though the benefits from the tax provisions can be substantial.

As an example, to get a rough estimate of the potential advantage to a farm firm, we can compare the tax-based advantage to farms using cash accounting compared with the accrual accounting required of most other businesses. Cash accounting gives the farmer more flexibility to choose when costs and profits will be accounted for and thus allows a balancing out of enterprise costs and profits resulting in a lower average tax obligation over the multi-year period than would otherwise be possible. Based upon a 5-year income and cost analysis of large Iowa farms (sales between $100,000 and $200,000 annually), the annual after-tax income advantage of cash over accrual accounting is almost $30,000 per farm or $0.30 per bushel of corn that might be raised on such a farm (16). There is also an increase in the value of the net worth amounting to almost $33,000, equivalent to $0.43 per bushel. It is critical to note that the magnitude of the advantage is dependent upon the tax rate which reflects the income level of the farm. A smaller farm with sales between $20,000 and $30,000 annually has an income advantage of cash over accrual accounting of only $0.14 per bushel of corn and an increase in net worth of only $0.13 per bushel. According to the 1978 Census of Agriculture, almost half of the grain from the nation's cash grain farms came from farms with sales in excess of $100,000. Thus, we might expect an average tax benefit for all grain production to be a bit less than that for the group with sales from $100,000 to $200,000.

No estimates were made for farms in regions where the bulk of the nation's wheat is produced. As wheat tends to be more extensively produced with a lower cash flow per acre, it was estimated that the per bushel tax advantage would be lower for wheat--about half of that for corn.

In situations where there was little or no profit from farming over a period of years, the provisions allowing farms to utilize cash accounting would be of substantially less value; perhaps on the average this would amount to a bit less than the advantage to small farms already at low income and tax rates.

When it is difficult to understand what keeps firms in farming because private costs appear to be higher than farm level returns, tax policy may provide a partial answer. This is especially true in cases where producers or outside investors may have income from other activities which can be enhanced on an after-tax basis with cash accounting. The tax advantage has the most impact during times of high commodity prices, which imply strong demand and little need for government intervention in the marketing of commodities. It would reward those already in agriculture, encouraging both additional investment and new entrants.

Costs of Government Commodity Programs:

Since 1933 there have been a number of federal programs aimed at influencing the supply and demand of wheat and corn in the U. S. During the chronic surpluses of the 1960s, such programs involved diversion or set-aside payments and storage programs with loans to reduce or even out the supply. Non-recourse loans, export subsidies and marketing certificates were used to enhance price or stimulate demand along with several domestic and foreign food assistance programs. In the 1970s, programs involved direct payments to farmers, crop disaster payments, and a grain reserve program in addition to some earlier mechanisms, such as diversion payments. The late 1970s did not include the large buildup of crop surpluses that occurred during the 1950s and 1960s. Increasing demands from export markets prevented the continuing accumulation of surpluses.

An analysis of the costs of support programs for wheat and corn from 1965 through 1969 indicates government costs of $0.26 per bushel for corn and $0.65 per bushel for wheat for all wheat and corn produced over that period (17). Adjusting these amounts by the increase in commodity prices from 1965-1969, as

compared with 1975-1979, gives subsidy costs of $0.25 per bushel of corn and $1.35 per bushel of wheat. These might be considered upper bounds of such subsidy costs during periods of surplus.

An analysis of the costs of the farmer-owned reserve program covering 1978 through 1980 gives a per bushel program cost of $0.04 per bushel for corn and $0.06 per bushel for wheat (18). These may be considered lower bound program costs during periods of good cyclical demand for these commodities. Actual total program costs for wheat for the 1975-1979 period amounted to $0.24 per bushel.

The Total Costs of Production:

The total costs of production are given in Table 4. The starting point is an average of private costs for 1978 through 1980 taken from Table 3. To this are added the additional costs discussed so far. Three sets of total costs are presented. The first two indicate the trade-off between tax advantages for farmers in years of strong demand for commodities as compared with the high costs of government programs during years of continuing surplus production. The third category under total costs includes private costs from some high-cost producing regions and adds to these the additional non-private costs. This is the closest we can come conceptually to the full marginal cost of producing for export, and it is much higher than the average farm level prices (19).

Analysis

Whatever the nature of those factors which have allowed farmers to produce at an apparent loss, they relate to a general policy decision taken many decades ago to provide relatively inexpensive food to the American public. This policy has been politically supported on progressive grounds and has resulted in tax revenues being utilized to encourage agricultural production at volumes above those that would be achieved on the basis of comparing only private costs with average prices received. Thus, some of the difference between private costs

and total costs acts to reduce the actual and perceived private costs of producers. One of the results has been a measure of overproduction and a reduction of commodity prices in the marketplace. This has made political sense given the lower prices that American consumers have paid for these agricultural commodities. Prior to the early 1970s there was no compelling political reason to analyze this public spending from tax revenues to enhance consumer welfare because most of the consumers were American. The issue changes when an increasingly high proportion of the consumers benefiting from commodities being marketed below private and total costs are Japanese, European, Chinese or Soviet. It also changes if resource constraints and a reduction in the rate of technological change result in increasing marginal costs for agricultural production.

Exports and Marginal Analysis:

What is the importance of the numbers in Table 4 with respect to the cost and value of U. S. exports of corn and wheat? The numbers show clearly that the price per bushel of the good sold in the export market is too low to cover the full production costs. For wheat, the price received from exports covers only 65 percent of the high cost of production.

Economic theory can help explain the above phenomenon that the value of exports is insufficient to cover production costs. Figure 3 uses the notion of an excess supply and excess demand framework for this purpose. The excess supply curve with full costs included is ES, which shows how much output would be produced for the export market at different prices. The excess demand curve is ED, which shows the demand for exports by importers at different prices. Thus, without government interference, Q* would be exported at a price P*. Input subsidies, such as transportation subsidies, lower the private costs of production to ES1, driving a wedge between ES and ES1. With only input subsidies in place, exports would be Q1 and price would be P1. If in addition, however, price supports are used (listed under program costs in Table 4), producers would receive price P* for exports Q2.

From Figure 3 it becomes clear that input subsidies and/or price supports create a divergence between the cost of exports and the average price received from their sale. In Figure 3, at the export amount Q2, a price of Pf is needed to cover the marginal cost of producing the last unit. However, the average price received for the last unit of exports is only Ps. Referring back to Table 4 and the high-cost producing region for wheat, an approximation for point A (price Pf) is between $5.17 and $5.96 per bushel, while an approximation for point B (price Ps) is $3.57 per bushel.

Now it may well be that at times producers receive prices which are adequate to cover their private costs but not full costs. In Table 4, the three-year average price for corn exceeds private costs; however, it does not cover full costs. Thus, importers in essence obtained an export subsidy (over $1.00 per bushel for corn and over $1.50 per bushel for wheat) even though prices received may have covered private production costs. These are the implicit export subsidies; explicit subsidies, such as PL 480 sales and credit subsidies for export sales, are not included here. If the prices that producers received had to cover both private and social costs, output would be less than it has been in past years, exports would be less, and the marginal acres in crop production would be returned to less intensive use. This is because the value of an additional unit of output sold on the export market does not cover the cost of producing it.

There is an important point to stress in Figure 3. The price Ps is an average price received for the amount of exports Q2. However, a more interesting economics question is: what is the value of the marginal export sale? This schedule is represented in Figure 3 by the marginal export revenue line, MER. This shows that the expansion of export sales (by the use of export subsidies and/or price supports) beyond Q1 may cause the value of total export sales to decrease. In other words, for exports Q2 as compared to Q1, the revenue generated by additional sales is negative (total revenue P1, Q1 exceeds Ps, Q2). Thus, the

prices received by farmers (Table 4) represent an upper bound of the revenue generated from trade since the value of exports at the margin is below the average price received by farmers and may well be negative! In other words, the marginal output cost to produce exports versus the marginal export revenue exceeds the distance AB in Figure 3 (point B in Figure 3 actually represents the average price from total export sales).

Concluding Observations

Upon examining the distributions of costs for producing corn and wheat in the U. S., there appears to be a trend of increasing costs relative to average prices received by farmers, and a large proportion of these crops is produced at private costs greater than the average price received by farmers. Even if there are problems with the data so that the proportion of farmers producing at private costs above prices received is only half as many as indicated, both the trend and the proportion of farmers in such a situation would be alarming. This is especially so given the current large stocks of corn and wheat, the high costs, and the crop and income projections for 1982.

Private costs are not the only ones that are important. The additional costs in the form of input subsidies, social costs, tax advantages, and various government programs are borne by a broader segment of society. These have been borne in the past because they resulted in lower food costs for domestic consumers when most of the nation's corn and wheat was consumed at home. The recent trend has been to export an increasing proportion of our corn and wheat. Under these circumstances it appears reasonable to view these quantities exported as the marginal units produced after domestic demand is satisfied. On this basis the gains from trade from further expansion of exports, or even the maintenance of the current high level of exports at current farm level prices, are marginal at best and may well be negative.

12. Communication with P. Baumel, Iowa State University, and J. Beaulieu, R. Hauser, P. Baumel, "Inland Water Way User Taxes: Their Impacts on Corn, Wheat and Soybean Flows and Transportation," unpublished paper, Economics Department, Iowa State University (Ames, IA, 1982).

13. K. Cook, J. Soil Water Conserv. 37, 89 (March/April 1982).

14. W. Boggess, J. Miranowski, K. Alt, North Central Journal of Agricultural Economics 2, 107 (1980); K. Frohberg and E. Swanson, "A Method for Determining the Optimal Rate of Soil Erosion," Illinois Agricultural Economics Staff Paper, No. 78-E-30 (University of Illinois, Urbana, 1978) and K. Harris and W. Seitz, "Sediment Damages in Water: A Literature Review," unpublished paper, Agricultural Economics Dept. (University of Illinois, Urbana).

15. L. Gianessi and H. Peskin, "Analysis of National Water Pollution Control Policies 2. Agricultural Sediment Control," Water Resources Research 17, 802 (1981), and K. Alt "An Economics Analysis of Field Crop Production, Insecticide Use and Soil Erosion in a Subbasin of the Iowa River," Ph.D. dissertation (Iowa State University, Ames, 1976).

16. C. Davenport, M. Boehlje, D. Martin, The Effects of Tax Policy on American Agriculture, Agricultural Economics Report No. 480 (ERS, USDA, Washington, D. C., 1982), Pp. 35-38.

17. C. Carter and M. Glenn, ibid.

18. J. Sharples, An Evaluation of U. S. Grain Policy, 1977-80, Agricultural Economic Report No. 481 (ERS, USDA, Washington, D. C., 1981).

19. We note that if, over the long run, subsidies become reflected in private costs (primarily through land price increases), then there should be a convergence between the total cost in Table 4 and the Total 1 cost in Table 3.

20. We wish to thank the staffs of the Food Research Institute at Stanford and the Agricultural Engineering Department at the University of California, Davis, who participated in seminars on this topic and made many helpful suggestions.

TABLE 1

EXPANSION OF FARM EXPORTS

(Index of Quantity of Grains and Feeds Exported)

(1967 = 100)

Year	Index	Year	Index
1950	30	1974	179
1955	28	1975	156
1960	60	1976	184
1965	92	1977	182
1970	97	1978	216
		1979	225

Note: Most of the expansion was in feed rather than in food grains.

Sources: USDA, Agricultural Statistics for 1972, 1976, 1980 and 1981 (USDA, Washington, D.C., 1973, 1977, 1981 and 1982), Tables 818, 772, 774 and 773 respectively.

TABLE 2

USDA COST OF PRODUCTION ESTIMATES

	CORN			WHEAT		
Year	Direct	Total 2	Total 1	Direct	Total 2	Total 1
1974	$1.62	$2.39	$2.65	$2.04	$2.95	$3.35
1975	$1.60	$2.23	$2.48	$2.36	$3.15	$3.50
1976	$1.62	$2.15	$2.46	$2.55	$3.37	$3.88
1977	$1.60	$2.12	$2.50	$2.43	$3.10	$3.67
1978	$1.49	$1.98	$2.35	$2.48	$3.29	$4.06
1979	$1.63	$2.12	$2.64	$2.79	$3.72	$4.47
1980	$2.36	$3.07	$3.94	$3.62	$4.82	$6.25

Sources:

Economic Research Service, USDA, Costs of Producing Selected Crops in the United States - 1974, Committee on Agriculture and Forestry, U.S. Senate, 94th Congress, 1st Session, Committee Print (Washington, D.C., 1976).

Economic Research Service, USDA, Costs of Producing Selected Crops in the United States - 1975, 1976, and Projections for 1977, Committee on Agriculture and Forestry, U.S. Senate, 95th Congress, 1st Session, Committee Print (Washington, D.C., 1977).

Economics, Statistics and Cooperatives Service, USDA, Costs of Producing Selected Crops in the United States - 1976, 1977, and Projections for 1978, Committee on Agriculture, Nutrition and Forestry, U.S. Senate, 95th Congress, 2nd Session, Committee Print (Washington, D.C., 1978).

Economics and Statistics Service, USDA, Costs of Producing Selected Crops in the United States - 1978, 1979, 1980, and Projections for 1981, Committee on Agriculture, Nutrition and Forestry, U.S. Senate, 97th Congress, 1st Session, Committee Print (Washington, D.C., 1981).

TABLE 3

PROPORTION OF WHEAT AND CORN PRODUCED AT A COST
GREATER THAN THE AVERAGE SELLING PRICE FOR THAT SEASON

	Wheat				Corn			
Year	Seasonal Average Price	Greater Than Direct	Greater Than Total 1	Greater Than Total 2	Seasonal Average Price	Greater Than Direct	Greater Than Total 1	Greater Than Total 2
1974	$4.09	4%	18%	11%	$3.02	4%	18%	11%
1975	$3.55	9%	34%	24%	$2.54	6%	32%	23%
1976	$2.73	29%	88%	70%	$2.15	11%	60%	41%
1977	$2.33	42%	93%	77%	$2.02	11%	73%	48%
1978	$2.97	20%	85%	53%	$2.25	8%	43%	24%
1979	$3.78	10%	80%	35%	$2.52	6%	45%	18%
1980	$3.96	24%	99%	81%	$3.27	6%	85%	28%

Source: Seasonal average price from USDA, Agricultural Statistics 1981 (USDA, Washington, D.C., 1982), Tables 2 and 39.

FIGURE 2

CUMULATIVE U.S. WINTER WHEAT PRODUCTION

BY REGIONAL TOTAL 2 COSTS FOR 1980

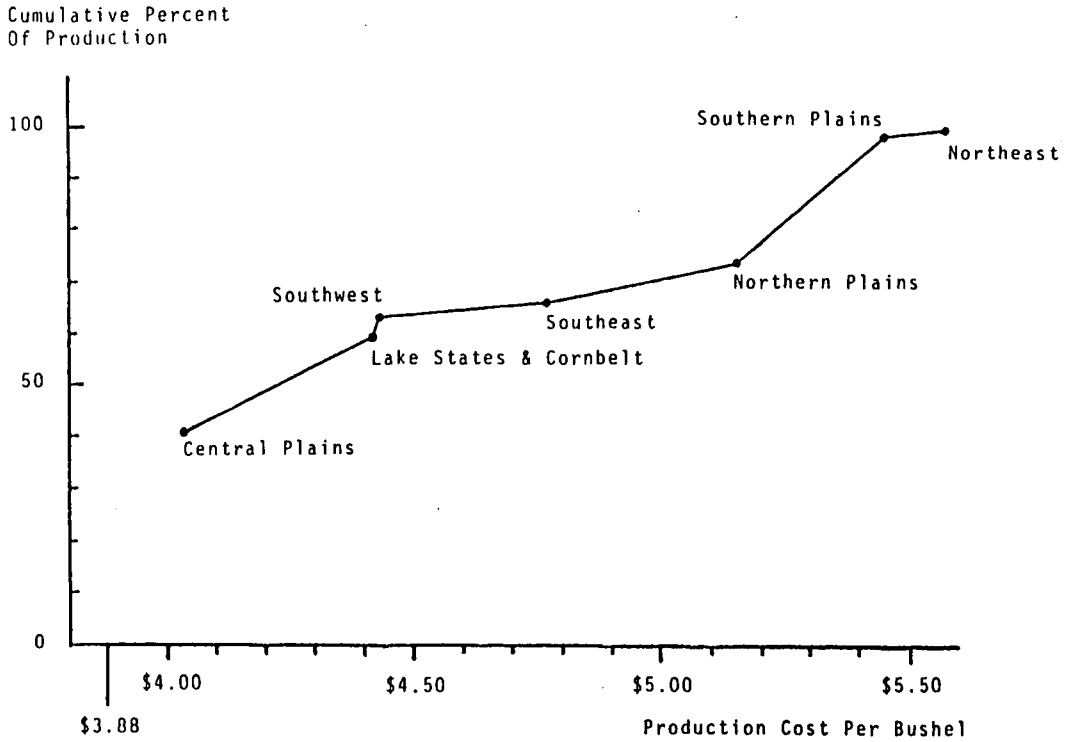
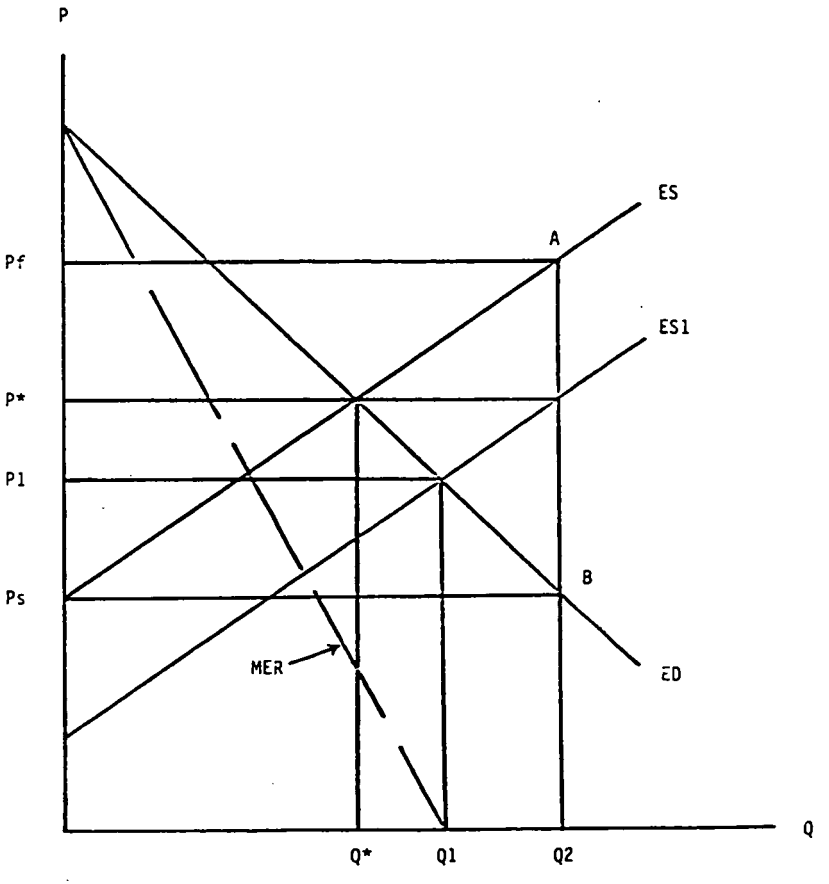


FIGURE 3

EXPORT ANALYSIS



THE INTERSECTION OF AGRICULTURE AND ENVIRONMENTAL INTERESTS: THE ROLE OF THE FEDERAL POLICY

THURSDAY, MAY 7, 1992

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, DC.

The Committee met, pursuant to notice, at 10:10 a.m., in room 2359, Rayburn House Office Building, Honorable Lee H. Hamilton (vice chairman of the Committee) presiding.

Present: Representative Hamilton.

Also present: Stewart Smith, professional staff member.

OPENING STATEMENT OF REPRESENTATIVE HAMILTON, VICE CHAIRMAN

REPRESENTATIVE HAMILTON. The Joint Economic Committee will come to order.

The hearing this morning is on the intersection of agricultural and environmental interests. Farming and the environment are two basic needs of American society. Without an efficient farming system, we would experience an erosion of our quality of life. But without protecting our environment, we would lose tomorrow's production capabilities.

So we clearly need to maintain a viable farming sector, while maintaining our natural resource base. This hearing will be searching for the problems of today and the solutions for tomorrow. It's the second of three hearings to find an agricultural policy that supports an agricultural system that is internationally competitive, environmentally benign, and promotes family farming. We'll be interested to learn how farmers perceive their environmental challenges, what environmental groups believe should be done, what agricultural systems are best for both the farm and environmental communities, what federal policies are needed to encourage those systems.

We're pleased to have with us several witnesses who deal with these issues on a daily basis, and who have written about them.

David Swaim operates Swaim and Associates, a management consulting firm specializing in farm production practices.

Justin Ward, senior resource specialist with the Natural Resources Defense Council, represents this major environmental organization on agricultural issues.

Karl Zinmeister is an adjunct scholar at the American Enterprise Institute, and has written widely on economic issues, including recent work on agriculture and the environment.

Before we begin, I would like to enter into the record a statement prepared by Paul Faeth of the World Resources Institute.

75-050 - 94 - 4

[The prepared statement of Paul Faeth starts on p. 169 of Submissions for the Record:]

We welcome you before the Committee this morning. We'll proceed with your statements and ask that you keep them reasonably brief.

Mr. Ward, I'll start with you and go across the table, from my left to right, if that's all right. Your statements, of course, will be entered into the record in full. After each of you has had an opportunity to make your opening statements, then we'll have some questions and discussion.

We're pleased to have you, Mr. Ward. You may begin, sir.

STATEMENT OF JUSTIN WARD, SENIOR RESOURCE SPECIALIST, NATURAL RESOURCES DEFENSE COUNCIL

MR. WARD. Thank you very much, Mr. Chairman. I appreciate the opportunity to testify today.

I believe this hearing provides a timely and valuable forum to explore long-term reform of agricultural policy. We hope the results of the Committee's inquiry will help set the stage for positive change in the 1995 farm bill and related legislation.

I would like to begin with the general observation that agricultural policy has become a very high priority for the environmental community. Many conservation and environmental organizations, including NRDC, were heavily involved in the last two farm bill debates. The rise of agriculture on the environmental agenda is a relatively new phenomenon, but one that I believe is likely to endure.

My brief remarks today will focus on long-term policy strategies needed to promote environmental protection within American agriculture.

Before turning to the policy issues, however, it's important to call attention to environmental problems confronting the farm sector. Our testimony describes threats from widespread soil erosion and sedimentation from this Nation's productive crop lands. Our statement also presents troubling findings concerning the scope of water contamination by agricultural nutrients and pesticides.

In this regard, for example, we've noted that the U.S. Geological Survey recently found widespread detections of herbicides in major Midwestern rivers and streams. One scientist from the agency remarked that, in his words:

> One of the significant findings of the study is that atrazine concentrations [he was referring to a widely used herbicide in the corn belt] were found to exceed EPA's maximum contaminant level continuously for several weeks in rivers as large as the Missouri and Mississippi.

He went on to say that these rivers drain areas of more than half a million square miles. So examples of pollution such as this one have very significant public-health implications for American farmers and the general public.

If there is cause for optimism, it is that preventive solutions are available today for wide adoption by farmers. The good news is that many alternative agricultural practices enable producers to save money while taking steps to protect the environment.

As noted in our statement, for instance, Iowa has had considerable success improving nitrogen management on farms in ways that dramatically reduce

input costs and preserve crop yields. A report entitled, "Harvest of Hope," issued last year by several of my colleagues at NRDC, documents significant potential for reduced pesticide inputs in production of major crops grown in California and Iowa.

So with that as background, I would like to turn to specific policies needed to promote alternative agriculture and environmental protection. Our statement addresses three principal areas.

One, commodity program reform. Two, budget priorities. And three, water pollution prevention. These three areas are interrelated.

Concerning the first, federal farm programs should eliminate barriers to crop rotation and diversification of agricultural operations. In recent decades, the USDA program structure has encouraged a shift toward highly specialized production of a few commodity crops and away from rotations that reduce or eliminate pesticide and fertilizer applications.

This program bias is well documented in the National Academy of Sciences 1989 landmark report, "Alternative Agriculture."

Our statement highlights the 1990 farm bill's *Integrated Farm Management Program Option*, which we believe constitutes a very positive step toward what can be thought of as a "greening" of the commodity programs. That new program provides financial and technical support to farmers wishing to make the multi-year transition to alternative production systems. It provides a useful model, we believe, for how federal farm programs should be changed to reward good land stewardship, rather than intensive production of select commodities.

We recommend strongly that the integrated farm management program be effectively implemented in the current farm bill cycle and expanded in the next one.

The second general area I want to address concerns agricultural budget priorities. There is currently a very large disjunction between federal spending and general commodity support and funding levels for sustainable agriculture and environmental protection. In particular, the 1990 farm bill has been justifiably praised for its unprecedented emphasis on natural resource and consumer health issues.

However, meager appropriations have turned some of those features into symbolic victories for the environment only.

Meanwhile, direct crop subsidy levels remain at high levels, in the $10 to $12 billion range each year. These payments are heavily skewed toward wealthy beneficiaries rather than medium-scale family farmers.

We believe payment limitation reforms are needed to make the farm programs more equitable and to redirect a significant portion of the USDA budget to environmental stewardship.

The third and final area addressed in our statement concerns protection of groundwater and surface water. We believe federal farm and environmental policy must adopt a strong source reduction mandate for agriculture, which currently ranks as the Nation's leading cause of unregulated water pollution.

As I mentioned earlier, there is clear evidence that many pollution prevention techniques can save farmers money.

The highest priority is to strengthen the pollution run-off provisions of the Clean Water Act. For the upcoming reauthorization of that major statute, we are proposing amendments directing the states to submit enforceable run-off management programs to EPA, specifically to attain water quality standards within threatened watersheds by the turn of the century. Farm-level measures to prevent pollution would be at the core of this strategy.

It is also critical that the federal agencies do more than they are currently doing to combat agricultural water pollution. For example, the new pollution prevention strategy being developed by EPA and the Soil Conservation Service must move away from the business-as-usual approach and begin to set specific environmental objectives with enforceable timetables and resource commitments.

The Administration's current programs, in particular, the $250 million per year water quality initiative, place very heavy emphasis on further study of the pollution problem, but give short shrift to source reduction and alternative agricultural measures.

In closing, no discussion of agriculture and the environment would be complete without some mention of the soil and wetland conservation provisions of the 1985 and 1990 farm bills. The laws' sodbuster, swampbuster and conservation compliance provisions reflect the indisputable principle that taxpayer money should not subsidize dust-bowl conditions or destruction of our remaining natural wetlands.

Unfortunately, as our statement describes, this principle is being seriously compromised by weak USDA enforcement of the farm bill's conservation mandate. Since enactment of the 1985 statute, department regulations have systematically weakened a nondegradation standard for cropland soils. Now, in a study released today by the Soil and Water Conservation Society, there is evidence of widespread lapses in enforcement of conservation compliance requirements on American farms.

If not corrected, this weak enforcement will subvert the public's multi-billion-dollar investment in erosion control under the conservation reserve program.

That concludes my prepared remarks, and I'd be happy to answer questions on our statement.

[The prepared statement of Mr. Ward starts on p. 119 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you very much, Mr. Ward.

Mr. Swaim, please proceed.

STATEMENT OF DAVID SWAIM,
SWAIM AND ASSOCIATES

MR. SWAIM. Thank you. I appreciate the opportunity to address this panel.

As an independent crop consultant, I help farmers reduce their input costs, while maintaining or improving yields and reducing soil erosion and risk to water quality. I encourage my clients to implement the concepts and techniques included in integrated crop management.

Over the past 15 years, I have provided professional services to a wide variety of operations, from 80 acres to 4,000 acres, from organic to full chemical.

It's not my responsibility to set the agenda for these individuals, but to help them clarify their goals, identify the limitations, and develop a plan to guide their efforts as effectively and ecologically as possible.

During the 1980s, I observed a dramatic increase in the environmental awareness of my clientele. Some have accepted new premises and others have not. Most have ended up with a mixture somewhat similar to what I listed in my statement.

Some have adopted conservation tillage and many have not. A few are concerned about well-water quality. But in the central part of Indiana, they have little evidence to take them beyond that.

They're concerned about pesticides, but they don't want to lose access to at least a balanced spectrum of tools. Nitrogen fertilizer, they acknowledge, is occasionally over-applied, but rates are declining in Indiana as more research is done as to optimum nitrogen levels and timing, and even the June nitrate test used in Iowa. They're concerned about misapplications of manures. They're concerned about preserving wetlands, but they feel there must be some tradeoffs. Soil compaction and crusting are perceived to be getting worse, but they don't know what to do about it.

Crop rotation is thought of as good. The lack of market and the problem with corn base are addressed by the farm program that you mentioned, but my clientele know nothing of the "integrated farm management program option," except what I have given to them. There's a very poor job of getting that message out.

And while antagonism toward organic farming has subsided, most people in our area don't feel that it's an option for them at this time.

Soil erosion—we're faced with several problems—but soil erosion is one of them. I have documented my position on that.

I would like to go to the end of my written statement. I have mentioned four concepts under "Technologies that Favor Both Farmer and the Environment"—conservation tillage, integrated crop management, intensive rotational grazing, and the use of cover crops and other soil-building practices. These all are applicable in many places and need to be promoted.

I would like to make a correction in my comments on genetic engineering.

I am not very concerned with risks from single-gene transfers to higher plants. I've listed some potential benefits. On the other hand, I do see that

there are some risks. I would like to change two words. They should be carefully regulated, and even with regulation, I am still concerned that there could be risks.

On many issues, there's a standoff between agriculturalists fearing too much change and the disruption of our production system, and the environmentalists fearing too little change and accelerating environmental degradation.

What is needed is a mutual concern for providing ample food supplies and preserving environmental quality. Effective policies will require that needs be demonstrated scientifically, that choices of alternatives be offered that are locally implementable and will maintain or increase profitability, and that a transition period be allowed.

What will be needed may often be a shift in management systems, but not just replacing one or two current practices with a government-sanctioned best management practice. Regulations will need to be combined with research, education and technology development aimed at system changes, not just new products or the elimination of a particular practice.

I would like to see four objectives incorporated into our federal policy and, to some extent, they are:

One, require demonstrated proof; two, promote systems research, not just product-oriented implementation; three, offer transition options rather than a single dictate; and four, reward conservation.

In many cases, those with the best crop rotations trying the most to conserve their soil have ended up being penalized through the past program.

We see a lot of opportunity, but we need the "policy environment" in which to develop the opportunities in the agricultural sector not just for the large operator, but also for the medium- and small-sized operators.

Thank you.

[The prepared statement of Mr. Swaim, together with an attachment, starts on p. 127 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you, Mr. Swaim.

Mr. Zinsmeister, please proceed.

STATEMENT OF KARL ZINSMEISTER, ADJUNCT SCHOLAR, AMERICAN ENTERPRISE INSTITUTE

MR. ZINSMEISTER. Thank you, Mr. Chairman, for having me this morning.

To summarize my testimony in a single sentence, let me begin by suggesting that better science and economics will be far more important than any regulatory strategy in improving the environmental effects of farming today.

Toward that end, I'd like to offer three specific recommendations.

Recommendation one is that we phase out or substantially reduce many of our farm subsidies. Current government price support programs and the production controls that go with them lead to narrow, over-intensive styles of farming. They discourage crop rotation. They penalize experimentation with alternative crops not covered by subsidies. They overpower incentives to conserve water, and have a whole host of other effects that I discuss in somewhat more detail in my written statement.

The National Academy of Sciences, as has been mentioned by an earlier witness, issued a major report back in 1989 that characterized subsidies as anti-ecological.

If subsidies were phased out, American agriculture would, I believe, shift to a lower input, environmentally gentler style of production, limited to the most appropriate and productive lands, as opposed to being spread to places where farming really isn't economic on a market basis, as it is today.

Another farm program that, aside from the commodity subsidies, encourages poor environmental effects is USDA disaster aid. Disaster aid is of a fairly recent vintage. It was begun in 1973. Disaster aid programs now disburse very significant expenditures, tens of billions of dollars each decade.

What this amounts to, really, is free-crop insurance. And what it encourages is riskier planting decisions, less care in management, and more exploitation of marginal land.

For example, corn is more susceptible to lack of water than grain sorghum. Otherwise, they often are grown in similar soils.

But if all goes well, corn is more profitable. With disaster aid guarantees behind them, assuming that if anything really bad happens, there will be a check in the mail, anyway, and with tempting corn subsidies dangling in front of them, a significant number of dryland farmers will gamble for the higher payoff of corn, instead of planting the crop that makes most sense for their area.

In this way, disaster aid actually works as an anti-conservation policy.

In any number of areas, subsidized agriculture frequently makes it uneconomic for farmers to conserve, experiment, and modify their environmental practices. A move toward more market-based agriculture would reduce many of these unhealthy incentives; indeed, would, in many cases, link environmental interests to farmers' economic interests, which, of course, is a powerful combination.

My second recommendation is that if environmental regulators hope to receive the badly needed cooperation of farmers in the future, they must be prepared to pay for their land use takings, as well as some of their mandates.

Uncompensated appropriation of the use of private land is a very contentious issue today, dividing farmers and environmentalists.

Federal Agriculture Department strictures sharply limit farmers' authority over things like field boundaries, crop rotation, and where your ditches and roads are located.

Wetlands regulations already dictate land use and drainage patterns, and are about to get much tighter.

Endangered Species Act measures can forbid productive use of enormous tracts of private farmland. And on the state and local level, too, there are all kinds of land-use restrictions popping up, increasingly preventing farmers from exercising productive control over their acreage.

My point here is not to argue over whether or not any given specific land-use regulation is justifiable, but merely to suggest that it's unfair to lay the full burden of their costs on the unlucky farmer who happens to own that piece of land.

Land is the major asset of a farmer, in many cases the only significant asset. That's his capital. It's also his kids' college fund. It's often his retirement plan. If the larger society wants to prevent a soggy patch from being tiled and then tilled, or wants to prevent a house from being built on a cornfield, well, that may be legitimate. But the rightful landowner ought to be compensated for his loss of value or permissible use.

This is not only fair, it is efficient. One will get a far higher rate of environmental compliance when the farmer has economic incentive to do so than when the environmentally desirable course carries a serious personal cost.

And this issue of compliance is a big one. As Mr. Ward suggested, you can pass all sorts of mandates and recommendations and dictates here, but if you don't have the grassroots-level cooperation of individual farmers, you'll be surprised how few of them will come to fruit.

As many of you know, Congressman Jimmy Hayes and four other Representatives have written a major wetlands bill—H.R. 1330— which stipulates that when private land is classified as a wetland, where no activity or disturbance is allowed, this will be recognized by the government as a taking, for which compensation must be made.

The bill allows the landowner, in this case, either to retain title to the wetland and abide by all the prohibitions or, at their discretion, they can transfer title to the government and receive fair market value, with negotiations to be adjudicated by the U.S. Court of Claims, as provided by the Constitution—the same way other sorts of public takings of private land are adjudicated.

H.R. 1330 currently has 176 cosponsors. I suggest it has a very interesting and useful mechanism that we ought to consider more widely.

There are other precedents in federal programs, by the way, for purchasing environmental easements from private landowners. The Water Bank and the Wetlands Reserve programs are two small USDA programs that use federal funds to purchase either permanent or long-term environmental easements from private landowners, rather than just telling them, "tough luck, you can't use it any more."

My third recommendation is that we encourage further advances in agricultural technology, which have enormous potential for improving ecological outcomes in farming.

I speak as someone who frankly is often a skeptic on the ability of technology to transform our lives. But on this particular issue, I must tell you, I believe a biotechnology cornucopia is about to open, offering some breathtaking improvements in the quality and variety of agricultural products, at the same time it makes them cheaper to produce and cheaper to buy, while simultaneously making it gentler on the environment to raise them.

It sounds almost too good to be true. It's a multiple win-win-win situation. But in this case, I think that's what the science has to offer us.

Some exciting things are on the near-horizon, including new plants, natural pesticides, new delivery systems for fertilizers and so forth.

I briefly mention some examples in my written statement.

But agricultural scientists are only going to be able to deliver these great gifts if they are insulated from excessive regulation and politicized fretfulness.

Take biological pesticides, for instance. As scientists have worked more actively to create nonchemical pest controls—which is supposedly what we're all after—they've often been attacked by environmentalists. Groups like the Environmental Defense Fund, the National Wildlife Federation, and the Audubon Society have tried to prevent field testing of important bio-engineered products. The group, Friends of the Earth, has labeled bio-engineering "Russian roulette."

Opposing bio-engineering will ultimately have anti-ecological effects, and it is very much at odds with good scientific judgment.

The National Academy of Sciences, for instance, looked carefully into the bio-engineering of field crops and concluded in a 1989 report that the process presents no unusual or unmanageable risks.

I suggest that environmentalists are often their own worst enemies in this particular area, opposing the new products and processes that are agriculture's best hope for a cleaner future. And I think if environmentalists want to steer farming onto a path towards more helpful output, with fewer unwanted by-products and ecological side effects, the environmental movement is going to have to get over its allergy to fresh technical and scientific advance.

Let me give you another example of the way some environmentalists are obstructing helpful new agricultural technology, which is food irradiation.

Irradiation is an efficient, scientifically noncontroversial method of preserving and sterilizing edible products, without the chemicals that are often employed at present, in a process that you might think of as somewhere between microwave cooking and the airport luggage x-ray.

Low-dosage, ionizing energy is used to kill harmful organisms, without leaving any radioactive residue behind.

All meat, poultry and fish products, for just one instance, could immediately be certified free of trichona, toxoplasmosis, salmonella, and other dangerous micro-organisms via irradiation. And I don't have to tell you, that's no small matter. Salmonella is the single biggest threat right now to the seafood and poultry industries. It's a very serious problem.

If anyone in this room has ever been pregnant or lived with a pregnant woman, you know that toxoplasmosis contracted from eating undercooked beef is a very scary thing.

These kinds of food threats could be eliminated tomorrow if we subjected meat products to food irradiation.

Food irradiation has been fully approved by the World Health Organization and by the U.S. Food and Drug Administration. We're not talking about an experimental technology. It's already used to sterilize the meals of hospital patients and astronauts, for instance. It's used to make consumer products like cosmetics and medical supplies.

Hardly any retail food, however, is so treated, because a small band of consumer and environmental groups have mobilized public dread against the process.

REPRESENTATIVE HAMILTON. I want to come back to that, but I'd like to get the impressions of the other two on this general question.

Mr. Swaim, you work on this on a daily basis. How big of a conflict do we have?

MR. SWAIM. It's a continual consideration. I'm working with a whole spectrum of people. Some perceive this as a terrible conflict and a major threat. Others are coming into line and just hope that they aren't required too much more.

The demands without compensation is a real point. On the wetlands issue, people have bought land and have to take it out of production and are not compensated, as far as I know.

REPRESENTATIVE HAMILTON. Do you find antagonism between the two groups—environmentalists and farmers?

MR. SWAIM. Particularly between the leadership, I find an antagonism, because the leadership tend to polarize the issues, and the people who come to the fore are often oversimplifying and overstating the situation.

So there's a lot of conflict in the airways. The farm magazines carry this all the time. The editorials in farm journals have had a lot of back and forth.

There is a tremendous amount of tension and some friction between the—

REPRESENTATIVE HAMILTON. Do you expect that to get worse?

MR. SWAIM. I could see it getting worse. It depends on the demands. It depends on coming up with intermediate technologies, as well as high technologies, to protect the environment.

REPRESENTATIVE HAMILTON. When we talk about the environmentalists and farmers, how many farmers do we have in the country? About three million or so? Is that a rough guess?

MR. ZINSMEISTER. Way less than that, full-time farmers. There would be about three million in farming in any way at all. But there's only about 250,000 full-time farmers in this country.

REPRESENTATIVE HAMILTON. 250,000 full-time farmers.

MR. ZINSMEISTER. That's right.

REPRESENTATIVE HAMILTON. Do you have any idea, Mr. Ward? Are you an environmentalist?

MR. WARD. Yes.

REPRESENTATIVE HAMILTON. How many of them are there?

MR. WARD. Well, measured in terms of memberships of major environmental organizations, we're talking millions. Groups like the National Wildlife Federation have millions of members.

REPRESENTATIVE HAMILTON. Those are people who join the organization, right?

MR. WARD. Yes.

REPRESENTATIVE HAMILTON. Let's try to sharpen it a little bit. Mr. Zinsmeister says that there are 250,000 full-time farmers. How many full-time, professional environmentalists are there? Would you have any idea?

MR. WARD. I really don't have an estimate.

REPRESENTATIVE HAMILTON. Would it be a lot more than 250,000?

MR. WARD. No, I don't think so.

MR. SWAIM. We're talking about a very small number of career environmentalists, compared to the number of full-time farms.

REPRESENTATIVE HAMILTON. Mr. Swaim, you work as a consultant to farmers. Right?

MR. SWAIM. Yes.

REPRESENTATIVE HAMILTON. So you're dealing with farmers. Try to sum up for me the attitude of your farmers towards the environmentalists.

MR. SWAIM. Again, I work with a wide range of operators.

REPRESENTATIVE HAMILTON. I understand.

MR. SWAIM. They fear that the environmentalists are going to push things farther than is practical. I think probably every one that—

REPRESENTATIVE HAMILTON. Well, what does that mean, push them farther than practical?

MR. SWAIM. To the point that if every suggestion were followed, the farmer would go out of business. He fears that if all environmental suggestions were followed, he'd be pushed out of business.

That's a gut feeling that I think is persistent, and that is that government policy is insensitive to the practicalities of farming, and this insensitivity poses a threat to the agricultural community.

REPRESENTATIVE HAMILTON. Mr. Ward, you're an environmentalist. What have you got to say about all of this?

MR. WARD. Well, there is clearly a clash and one that I think is misplaced, unhealthy and a real obstacle to development of positive, long-term program reforms that serve the mutual interests of farmers and the resource base.

I'm a bit more of an optimist on what I see for the future, because I think it's going to get better. It has to.

Indications of that, I think, can be found in increasing attention—a lot of it favorable—within the mainstream magazines and trade press for production agriculture, focusing an unprecedented level of attention on resource conservation, water quality, food safety, and related issues.

I'm optimistic partly because, in the 1990 farm bill, having been heavily involved in that process really for the first time, groups like my own were talking directly on a regular basis to key farm membership organizations and major commodity groups, often in disagreement, but in a civil way, and often leading to responsible compromise solutions.

REPRESENTATIVE HAMILTON. Do you think that dialogue between the environmental community, on the one hand, and, say, the farm or agricultural community, on the other hand, is increasing?

MR. WARD. From my standpoint, it is.

REPRESENTATIVE HAMILTON. Do you agree with that, Mr. Zinsmeister?

MR. ZINSMEISTER. I think they have to talk to each other a lot more, simply because they're rubbing noses together. But I don't see any evidence at all that the relationship has gotten any happier. I see evidence of the opposite, that there's more antagonism than there used to be.

MR. WARD. On the point that's been raised on the tension surrounding land use controls, I just want to make the point that, from the standpoint of my

organization and many others in the environmental community, we're very sensitive to that issue. We would want to point out that we've been leading advocates for sensible programs to provide farmers with reasonable compensation for conservation measures, and in particular, the wetland reserve program in the 1990 legislation is one that we worked hard to develop and have been working hard to get funded in the appropriations process.

I also think that it's a myth to suggest that it's part of the environmental agenda to drive farmers out of business.

As our testimony points out, we're interested in policy reforms and practices that enable farmers not only to stay in business, but to improve their profit margins, while at the same time protecting water quality and natural resources.

REPRESENTATIVE HAMILTON. You support the idea of compensating the landowner for any loss of land use, as a result of taking. Is that correct?

MR. WARD. Yes. We do not, however, support the wetlands legislation that Mr. Zinsmeister mentioned.

REPRESENTATIVE HAMILTON. H.R. 1330?

MR. WARD. Yes, H.R. 1330.

REPRESENTATIVE HAMILTON. Why not?

MR. WARD. Because it would weaken federal laws for wetland protection. I'm not familiar with the details of the bill. We are favoring an alternative proposal in H.R. 4255, which we believe has a better balanced approach to the wetlands' issue.

REPRESENTATIVE HAMILTON. Well, you're not here today to testify on those bills. But the concept of H.R. 1330, and perhaps some of the other bills, too, is to provide compensation for taking, right? And you support that concept.

MR. WARD. Yes, but not as proposed in H.R. 1330.

REPRESENTATIVE HAMILTON. I wanted to get a sense from you of how serious is the threat from environmental degradation of various kinds to productive agriculture?

Soil erosion threatens America's unparalleled food production capabilities. Numerous studies document widespread nutrient contamination of water supplies, traceable largely to agriculture.

You'll recognize I'm quoting from your statement here.

Water pollution by agricultural pesticides has been well documented.

Your view is that the productivity of American agriculture is being threatened seriously by environmental degradation?

MR. WARD. Yes.

REPRESENTATIVE HAMILTON. And if the farmer and the agricultural community and the politicians don't get to it and deal with these problems, then American agricultural production is going to go down.

MR. WARD. In the long term——

REPRESENTATIVE HAMILTON. What's the long term? I mean, are we talking about 2 years, 5 years, or 150 years?

MR. WARD. Well, I haven't——

MR. SWAIM. I think you're talking about many decades in a lot of areas.

MR. ZINSMEISTER. My own opinion, if I could offer it, is that it's an absurd thing to worry about, of all the worthy things we ought to be concerned with.

America's agricultural problem is overproduction, has been for about 100 years now. That is the justification for almost all the major farm programs—to prevent overproduction, to hold production down so that prices don't plummet to a very low level.

To suggest that we're at any risk of losing the ability to produce way more food than we will ever need is crazy. We already export one out of every three acres today.

REPRESENTATIVE HAMILTON. Do you worry about soil erosion?

MR. ZINSMEISTER. I do, in the right places, absolutely. But not as a macro-issue that's going to threaten American agricultural productivity.

There are obviously places where you ought not be farming simply because you're silting a river or because you're damaging the soil for any other use, like timber some day, or grasslands.

REPRESENTATIVE HAMILTON. Well, how do you react to some of this information? Data from the 1987 National Resources Inventory show that approximately one-fourth of the Nation's cropland acres was suffering from productivity-threatened rates of water erosion?

MR. ZINSMEISTER. There's just absolutely no evidence for that. Productivity per acre is higher than it's ever been. We already have something like 37 million acres locked up in the Conservation Reserve. Lots more million of acres locked up in other minor programs or held out of circulation voluntarily by farmers.

Again, we have a gross overabundance of productive farmland in this country. That's not the risk. That's not to say——

REPRESENTATIVE HAMILTON. Why did you make these statements, Mr. Ward, for which there is no evidence?

MR. WARD. I would take issue with that. I mean, this is a fact. It's not a question of no evidence. That's a statement of fact from the Department's own assessment of nationwide soil conditions, the most recent one available.

REPRESENTATIVE HAMILTON. That's the Department of Agriculture's assessment?

MR. WARD. Yes.

REPRESENTATIVE HAMILTON. You challenge that?

MR. ZINSMEISTER. It's a very simple thing to test. Productivity per acre is an easily demonstrated figure. And productivity per acre is not falling. It has not fallen. On the national level, it's in fact higher than it's ever been.

REPRESENTATIVE HAMILTON. Well, it's possible that both things could be true, isn't it? You could have productivity going up and still have a lot of cropland acres that were threatened from water erosion.

MR. ZINSMEISTER. But, again, erosion is another issue. We're talking here about productivity. That was the word that was used, that there is a threat to our ability to be able to produce food.

That's nonsense. The threat of erosion is a real one. The threat of siltification of rivers is a real one.

REPRESENTATIVE HAMILTON. Soil erosion threatens America's unparalleled food production capability. You don't buy that.

MR. ZINSMEISTER. I don't buy that.

REPRESENTATIVE HAMILTON. You think it's documented.

MR. WARD. Economists can and have applied evidence that our problem is overproduction of commodity crops. There's no question about that.

A lot of that has been achieved not by increasing the cropland base, but by increasing chemical inputs with associated environmental risk.

I agree that erosion presents environmental problems. In fact, I think our testimony makes this point, that the most serious threats from soil erosion are immediate threats away from the farm, notably sedimentation of rivers and streams.

Absolutely, I think that's the paramount concern.

But I do think it's short-sighted to regard erosion as not a problem, which degrades the long-term ability of the soil to produce food, because that assumption depends on our long-term ability to substitute for that exhaustible resource with improved technology, increased chemical inputs, and other kinds of technical fixes that may or may not live up to what some economists expect for the long-term potential.

I am not arguing that—and our statement does not argue—there is an immediate food production crisis on the horizon in this country. That's why we've emphasized the environmental pollution aspects of the erosion problem.

REPRESENTATIVE HAMILTON. Now, how about the water supply business? I'm trying to get a feel of the seriousness of these problems.

You indicate that a lot of studies report widespread nutrient contamination of water supplies.

> More than 20 percent of private wells tested recently in Kansas and South Dakota exceed the health standard for nitrates. ... Nitrate contamination presents significant public health implications.

In other words, there's quite a serious problem, in your view, in the quality of water from nutrient pollution of water supplies.

How about that, Mr. Zinsmeister? Do you think that's exaggerated in his statement?

MR. ZINSMEISTER. I'm not familiar with exactly what the statement says. I would object only to a one-size-fits-all kind of categorization. There are obviously places where well contamination and so forth is a problem, where the permeability of the soils makes heavy fertilization problematic.

That is not the case in most of American agriculture. I think we have to differentiate carefully between the places where, as I say, because of soil structure and so forth, you have to be very careful, versus most American lands, where it is not a significant problem.

I would certainly not deny that it happens in places. I don't think that it's a characteristic or chronic problem of American agriculture.

REPRESENTATIVE HAMILTON. And how about the pesticide problem? Do you find water pollution by agricultural pesticides a serious matter?

MR. ZINSMEISTER. Well, again, I think I would want to look at specific places. I don't want to make a sweeping statement: "U.S. Has A Pesticide Problem." Agronomists have demonstrated that most all of the chemical pesticides available today degrade within 90 days. Almost none of them penetrate more than 12 to 24 inches into the soil, and never even having a chance of getting to the water table.

Thanks to some very good scientists and very hard work by people like Mr. Swaim in the private sector and other people in the public sector, who are trying to get farmers to understand the ways to use these new chemicals and to take advantage of them, I think that the pesticide problem, in most cases, is not a serious one.

In places where it is serious, the land probably ought not be farmed. In many cases, what you have is a confluence of marginal land and a reliance on chemical inputs to get production out of an area that really shouldn't be farmed today.

And that, I think, is back to the economic problem. That land ought to be retired. It shouldn't be in circulation today. It's only in circulation today because you have these artificially elevated prices.

REPRESENTATIVE HAMILTON. Mr. Ward?

MR. WARD. Well, I don't agree that the primary solution to reducing nutrient and pesticide threats to groundwater and surface water is to retire crop land.

I think that there is strong evidence that management changes within today's production system, which are technically feasible and economically sensible, are the better way to go.

A widespread program of land retirement for that purpose, assuming that we would want to compensate that with federal support, would be a very expensive undertaking.

So our preference, as indicated in our testimony, is to look toward management changes on working farms, whereby farmers can scale back or adjust their nutrient and pesticide management practices in ways that are both economically and environmentally beneficial.

REPRESENTATIVE HAMILTON. And that's what I want to focus on here in a few minutes.

We have a vote, and I'm going to have to have a recess here for a few minutes while I go over to vote. I'm not sure what I'm confronted with on the floor, but I think it may be only one vote. I hope that's the case.

So we'll have a recess and come back and take up on some of these management changes and what can be done to alleviate some of these concerns.

[Recess.]

REPRESENTATIVE HAMILTON. Okay. The Committee will resume its sitting.

Let's go ahead with some suggestions. We hear a lot about sustainable agriculture and practical farming and those kinds of phrases.

Are those techniques going to result in environmental improvements and a lessening of the conflicts between the two groups that we've talked about?

Mr. Swaim?

MR. SWAIM. To some extent. Those farmers who are implementing those practices are doing so, sometimes at their own initial cost, because of their concern for the environment. So they are practicing stewardship and their attitude is one that the environmentalists can empathize with. And so I see the "sustainable ag" people providing a bridge in this controversy.

Most of the people in sustainable ag are pragmatists. They will use some pesticides if they need to. But their environmental concern is equal to their profit motivation.

REPRESENTATIVE HAMILTON. How many people are in this movement of sustainable agriculture? How many farmers are we talking about?

MR. SWAIM. I think we'd have to say probably less than a hundred per state, on an average.

REPRESENTATIVE HAMILTON. Less than a hundred per state?

MR. SWAIM. And that is a wild guess. But I know that the organizations in Ohio and Iowa have 300 to 400 participants. Not all of those are practicing farmers. I know in our state, we have over 100 participants, but maybe only 40 or 50 that are really accomplishing what they'd like to accomplish.

REPRESENTATIVE HAMILTON. Mr. Ward, how do you look on sustainable agriculture?

MR. WARD. We do, in fact, regard sustainable agriculture as having potential to reduce the conflict that we've been discussing here today. We think that what is critical is that federal policies be structured so that they at least do not stand in the way of farmers not currently practicing sustainable alternatives, who are interested in making a transition, but are hampered by the way the federal programs are set up.

REPRESENTATIVE HAMILTON. Mr. Zinsmeister, how do you look on it?

MR. ZINSMEISTER. It's almost impossible to be against sustainable agriculture. Certainly, everyone is for it. I think it depends on what you mean by it.

To the extent that it often has come to refer to a romantic throwback style of farming, where we're going to put up the fences again and have green manure and stuff, instead of using chemicals, I think it's never going to happen.

To the extent that we're willing to countenance a sustainable agriculture, based on what I would call a jump-forward style of farming instead of a throwback style of farming, I think it's very realistic.

This is why I've emphasized the technological aspect in my testimony. I really think we have new tools coming down the pike that are going to be able to allow us to solve simultaneously our economic problems in farming and our environmental problems.

I think that's a rare opportunity. I'm not normally Pollyannaish about these kinds of technological breaks, but I think in this particular area, we have that opportunity. And I think it's essential that we not block or interfere with that because it does allow us to become less dependent on chemicals. It could allow us to become environmentally benign in a lot of ways.

But if you're talking about going back to the 4600 pounds of milk per cow era instead of the 14,000 pounds of milk per cow era, or if you're talking about going back to what wheat yields were or corn yields were 25 years ago, forget it. Farmers aren't going there.

MR. SWAIM. Well, that was not sustainable agriculture.

REPRESENTATIVE HAMILTON. What's that?

MR. SWAIM. That was abusive agriculture. That was not sustainable. That was not conservation. That was poor management. There is a middle ground. A middle ground in which the newer technology can be implemented with some of these practices from the past that are conservation-oriented.

I think, too often, the technologists forget about the natural system that they're inserting these technologies into, and there's so little research available on how to make this wedding of the technology with the natural system, rather than just laying on a new practice.

REPRESENTATIVE HAMILTON. Well, is what you're saying counter to Mr. Zinsmeister's view?

MR. SWAIM. I feel that he's too eager.

REPRESENTATIVE HAMILTON. He seems to have a lot of confidence in technology.

MR. SWAIM. I feel that that he's too eager.

REPRESENTATIVE HAMILTON. Too eager?

MR. SWAIM. I don't disagree with his premise, but I feel that he's too eager.

MR. ZINSMEISTER. Well, you know, a lot of the stuff that I'm talking about, this is not gee-whiz stuff or Star Wars things. Some of it is very humble and homely.

We're talking about starch membranes that encapsulate fertilizer pellets so that they degrade slowly, as opposed to rapidly.

We're talking about incremental changes in many cases, small things. But the collective sum is really quite breathtaking.

Again, I challenge you to show me another industry that's tripled its productivity over that period of time. There are really very good things on the horizon. I don't think you have to be dewy-eyed about it.

REPRESENTATIVE HAMILTON. What are the obstacles in the way of a farmer adopting so-called sustainable agricultural practices? You list some of those, don't you?

MR. SWAIM. Yes. Well, there's a dozen or more. And there is not a commonly accepted ideal of "sustainability." It is a very subjective concept. A lot of the people that are members of sustainable ag organizations really are looking more towards "stewardship," because who can say what's going to be "sustainable?"

I think the term "sustainable" is becoming somewhat passé. But "full-spectrum" conservation is something that we're concerned about, not just soil and water, but resources of all kinds, particularly capital and people and various other inputs.

REPRESENTATIVE HAMILTON. But when we talk about sustainable agriculture, we're usually talking about substituting farm management, resource management, for chemicals, for fertilizers and pesticides.

MR. SWAIM. Or a portion of that, yes.

REPRESENTATIVE HAMILTON. Now what do we mean when we say, farm resource management? What kinds of things do you do on management to reduce the reliance on chemicals?

MR. SWAIM. Various conservation systems, such as ridge tillage, can reduce the amount of pesticides needed if they were banded. We're looking at more efficient pesticide delivery systems, only applying them when necessary through the integrated crop management program. The use of crop rotations where they are applicable, although there are some areas where they are not profitable at this time.

We need research and development to see how we can improve and fit those systems in; also, how we can utilize manure efficiently.

One of the problems with the large concentration of livestock and the concern by environmentalists really is a waste management problem. And it's not just environmentalists. It's anybody that can discern the odor problem.

Intensive grazing systems that are being brought in from New Zealand seem to be working quite well at this stage.

And so there are several different things that can be taken a step at a time, and I think we need to be looking backward as well as forward. We need to know the historical perspective, some of the things we left behind, as well as the things that we can reach out and grab and pull into various systems.

The potential for some of this genetic engineering is very good.

REPRESENTATIVE HAMILTON. What kind of a role do you see for government for encouraging better farm resource management?

MR. SWAIM. Providing funding for education and research, particularly the research first, and education of the systems approach, of a natural system. There's so little funding available for soil biology right now. These things come last because it's hard to get funding. The predator/parasite complex—the practical agricultural, ecological field studies—are almost nonfundable. And the assimilation of data is very limited. There's some of it, but it's limited.

REPRESENTATIVE HAMILTON. Has too much of our agricultural research budget gone into increasing the yields and not enough into sustainable agriculture?

MR. SWAIM. Yes, not enough into evaluating the environmental impacts and into understanding that if we put on more nitrogen, what system in the soil might we be shutting down; that is, feedback mechanisms, and the tradeoffs that are being made as we implement these technologies. We are not documenting the subtle side effects of some of our technologies.

REPRESENTATIVE HAMILTON. What about the 1985 farm legislation, and in 1990, which had these cross-compliance provisions? They were the centerpiece of some of the conservation programs. In order to get the benefits, the farmers had to conform to certain standards.

Is that an important, effective means of getting good conservation programs in place?

MR. SWAIM. I would see it as appropriate for anyone who receives a government subsidy to have filled out a conservation plan. Conservation plans need to be flexible and appropriate for the local area.

REPRESENTATIVE HAMILTON. You don't have any trouble with that, do you, Mr. Zinsmeister?

MR. ZINSMEISTER. I don't have any trouble with the idea of stipulating conservation measures to go with the subsidy checks.

However, I think that's, to some extent, a Band-Aid ameliorative effort after the fact.

What I suggest that we could do to improve conservation practice would be to quit encouraging corn to be grown in the Mississippi delta. Quit encouraging corn to be grown on irrigated land in Georgia, like we are today. Quit encouraging cotton to be grown on irrigated land in California, as we are today, through the subsidy program.

There is stuff being grown in places where it really oughtn't be grown, and the only reason it is is because you have a guaranteed price and a deficiency payment.

If you didn't have that, corn would migrate back to the corn belt. Cotton production would migrate back to the South.

We've distorted the regional patterns of agriculture and moved crops to less productive, more marginal lands, in many cases through subsidies. And I think that that would be a giant step that could be taken to—

REPRESENTATIVE HAMILTON. But if we knocked out a lot of those commodity programs, you'd have a better environmental result?

MR. ZINSMEISTER. You would, yes.

REPRESENTATIVE HAMILTON. And better production?

MR. ZINSMEISTER. You would have to return production to land that had soil fertility and rainfall to support it at market prices. That would be the most efficient use. Whereas, right now, you can produce corn in places that really don't have the rainfall and don't have the soil fertility simply because you have this guaranteed price.

REPRESENTATIVE HAMILTON. Do you agree with that, Mr. Ward?

MR. WARD. I think that, as indicated in our testimony, reform of the current subsidy rules would address problems such as growing the wrong crops in the wrong places.

I don't agree necessarily that the solution is to phase out the income support programs altogether. I think that that could produce economic dislocation and potentially harmful environmental results.

However, we definitely believe that commodity program reform to remove a lot of the bias for environmentally inappropriate production of a handful of commodity crops is badly needed.

REPRESENTATIVE HAMILTON. You like this integrated farm management program option, right?

MR. WARD. Yes.

REPRESENTATIVE HAMILTON. You like it, Mr. Swaim?

MR. SWAIM. I would like to see more of it.

REPRESENTATIVE HAMILTON. Like to see more of it. How extensive is it?

MR. SWAIM. It is not extensive in our area. It's virtually unknown at this time. There are still complications in the transition there, too.

It's a very interesting concept.

MR. WARD. The point from Mr. Swaim's opening statement was correct, the USDA has not done a good job in the first two years that that program has existed in getting the word out to the county field offices, so that can be

conveyed to farmers as to what their options are. That situation needs to be corrected.

As a whole, the program under the statute has a ceiling of 25 million acres for enrollment over the farm bill cycle. But so far, only approximately 50,000 acres, I believe, were enrolled in the 1991 sign-up, and I don't know what this year's sign-up has produced.

REPRESENTATIVE HAMILTON. Has the USDA pushed this idea at all?

MR. SWAIM. We haven't sensed much push.

MR. WARD. I want to say not sufficiently, but I think it's almost fair to say that they haven't pushed it at all.

REPRESENTATIVE HAMILTON. Are they opposed to it?

MR. WARD. Well, I think that they are coming around.

MR. SWAIM. There is resistance. There's psychological resistance.

MR. WARD. There was clear resistance in the rules that the Department issued last year.

REPRESENTATIVE HAMILTON. Why do they resist it?

MR. WARD. I don't understand that, frankly, because there are a lot of features of the program that are consistent with proposals the Administration was making in its own farm bill proposal in 1990.

REPRESENTATIVE HAMILTON. Why do you think they resist it, Mr. Swaim?

MR. SWAIM. I think it's just low in their priorities. I think their orientation is elsewhere. Water quality issues are now the name of the game, and this is just something they don't really think that people are going to respond to very much, and it may not be worth the effort.

REPRESENTATIVE HAMILTON. Let me ask you a few questions about regulations. Farmers complain a lot about regulations. I'm sure you hear that a lot. When you talk about the environment, it's hard to talk about improving the environment the way we do things now without regulation.

Can you get environmental protection today without regulation? Are there better ways to do it than regulating?

MR. SWAIM. I feel we have to have a three-fold approach or a three-pronged approach. The first has to be incentive and the second has to be education. And the third is a base of regulation for those obvious problems.

If there's nothing——

REPRESENTATIVE HAMILTON. What are you talking about, incentive?

MR. SWAIM. Well, the farm management option allows you to keep your corn base and still rotate. That's an incentive. Not being able to participate in the commodities program without a conservation plan is an incentive to have a conservation plan.

Those are incentives.

REPRESENTATIVE HAMILTON. Do you find farmers complain to you a lot about regulations?

MR. SWAIM. I've been asked the question by farms about how many hundred dollars would it take for me to go sit in the ASC office for them. They resent the continual infringement by ASC and SCS. They just feel like they have a loose binding of red tape on them sometimes.

There is that resentment. But there's also the appreciation, because with things the way they are, that ASC payment has gotten them through some pretty tough times.

REPRESENTATIVE HAMILTON. Well, how do you feel generally about all these regulations? Do you think it's just gotten to the point where it's enormously burdensome on the farmer? Or do you feel that the regulations are necessary?

How would you deal with the problem?

MR. SWAIM. This is not my primary area. My gut feeling is that we need a transition. I don't want to see a lot more regulation. I would like to see education. I'd like to see good options. I'd like to see the opportunities obvious enough that we didn't have to regulate people, that the education and technology development didn't have to go out with all sorts of penalties.

REPRESENTATIVE HAMILTON. Is that achievable?

MR. SWAIM. In reality, to some extent, it is, but there will always be those people who, for one reason or another, are resistant to change.

REPRESENTATIVE HAMILTON. I find it very difficult to talk with farmers about this and give them any sense that things are going to improve.

What do you tell them? What should policy be here to reduce the amount of regulation for the farmer, the amount of paperwork, the amount of time that they have to spend at their local agriculture office? What should we do to reduce all of that?

MR. ZINSMEISTER. In general, I think there's just far too much micromanagement. I'm not sure how many congressmen realize the extent of intrusion. When you go to the ASC office, they get out huge maps that show where every creek and every fence is, and the detail of control is really mindboggling.

I can't think of a single other place in the American economy where there's any analogy to anything like the centralized control we have in agriculture.

I interviewed Robert Thompson, who is the dean of the Purdue Ag School, a year or so ago, and he said that in his estimation, there's only one other government agency anywhere in the world that has anything like the micromanagement mandate that the U.S. Agriculture Department does today, and that's GOSPLAN in the Soviet Union, which is, of course, now gone the way of the passenger pigeon.

I think we have to do much less micro-management in this area, more of the education Mr. Swaim is calling for, more of the extension services, more of the research, more of helping and friendly assistance to farmers, and then trust them as competent economic agents.

I think that they operate like any other business on decent incentives. They recognize what's in their long-term interest. It's their families who drink water from those wells, not us. It's they who drive the spray rigs, not us.

I think most farmers are capable of making good judgments. There is obviously, like in any industry, a 10-percent-of-outlaws who are going to fall through the cracks, who you need to have some regulatory enforcement for.

But I think, in general, we have to treat agriculture more like we treat other industries. Liberate individual economic factors, and then oversee rather than control them.

MR. SWAIM. The individual farmer has this sense that he's almost lost control of his farm. Somebody else is running it for him. And it's pretty discouraging.

REPRESENTATIVE HAMILTON. Do you think that that's true?

MR. SWAIM. Well, if you project the current situation, to some extent, it is. He cannot set up his fields the way he wants to and stay in the farm program. He has areas of fields that are three or four years continuous beans because that's the way he has to divide his fields to stay in the program.

And the restriction of the program has been very intrusive. There's a lot of frustration about that. There's this mixture of dependency with frustration.

REPRESENTATIVE HAMILTON. Mr. Ward, do you have any comment on this, this extreme regulation of the farmer and how it ties him up in knots, due in part, I guess, to environmental regulation?

MR. WARD. I basically agree with Mr. Swaim's three-part approach, that a combination of incentives, extension programs, with a base of regulation, is what makes sense.

You asked originally the question of whether nonregulatory approaches can result in environmental improvement, and I think the answer to that is emphatically, yes.

In our statement, we give the Iowa example. Their recent estimate from an ambitious program of on-farm demonstration programs that show what practical alternatives can do in terms of improved nitrogen management, produced reductions, by their estimates, of 440 million to 540 million pounds of nitrogen inputs, with savings in the tens of millions of dollars to producers in the area.

So that's an example, I think, of the kind of success story that can be found from an incentive-based approach, or one that transfers practical information to neighboring farmers.

I also think that there's a large need and a lot of value in more research and extension in this area. Back to your earlier question as to whether USDA research programs devote sufficient attention to this, they do not. Our testimony mentions the sustainable agriculture research and extension program which was modified and reauthorized in the 1990 farm bill.

This is really the only program within USDA's overall research budget that aims at systems research on working farms; that is, it fills a gap that was first identified by a Department study back in 1980, showing that the Department was looking in piecemeal fashion at a range of practices that arguably could be construed as alternative agriculture, but didn't have any program focused specifically at the kind of research that would help farmers find information and techniques that would be transferable to their own operations.

Now, this program, the so-called LISA program, has only been funded at levels less than 1 percent of USDA's overall research budget. We've argued for years now that those levels ought to be substantially increased. And in fact, the farm bill increased the authorization to $40 million, but the last couple of years' appropriations have been significantly below that.

I think that's the kind of program that Mr. Swaim seems to be arguing for, that sustainable agriculture research needs to be a much greater priority in federal policy in the years ahead.

MR. SWAIM. Much of this type of research is included in the strategic research initiative, and could be done if there were adequate funds to go around and enough emphasis.

So often, this kind of work seems to get lost in the wash.

One thing I would like to clarify.

REPRESENTATIVE HAMILTON. Go right ahead.

MR. SWAIM. It touched me off a while ago. The comment about the reserve acreage and all this acreage that's ready to come into production.

In my area, the acres that are not in production at this time are those that are not very productive—the ponded areas, the gravel knobs, their regular fields with trees all around the perimeter. The actual amount of productivity from the acres that are set aside in Central Indiana is pretty nominal. And farming those acres would not be very profitable, either.

Basically, the set-aside has given us a mandate to conserve these very weak-producing areas.

I don't sense that, without a lot of additional input, we have a lot of extra productivity now that we're at a low level of set-aside acreage.

REPRESENTATIVE HAMILTON. Mr. Zinsmeister, I wanted to talk to you about this irradiation. What's holding that up?

MR. ZINSMEISTER. It's consumer fear. People are just afraid to try it. They're afraid to try to put the stuff in grocery stores and sell it, because there has been this, not accidental, but orchestrated campaign against it. The one commercial plant that—I think it's in Florida—is able to start processing stuff is facing a statewide radio blitz. One guy has spent a lot of money to buy radio ads, saying, "you are going to glow if you eat some irradiated fruits and vegetables."

It's just simple irresponsible playing on public fears.

REPRESENTATIVE HAMILTON. Do you agree with that, Mr. Ward?

MR. WARD. I simply don't know the issue.

REPRESENTATIVE HAMILTON. Mr. Swaim?

MR. SWAIM. I feel that part of this problem is due to a dichotomy within the environmental community. You have mediators, on one hand, and sensationalizers, on the other hand. And agriculturalists respect those environmentalists who will dialogue with them, but they are fearful of those that inflame the public.

REPRESENTATIVE HAMILTON. And in this case, is your impression that irradiation is efficient and safe?

Do you know anything about it?

MR. SWAIM. Only a little. I think the risks are being way overplayed.

MR. ZINSMEISTER. It's FDA-approved.

REPRESENTATIVE HAMILTON. So, just for my own curiosity, your proposal would be to subject all of the American food supply basically to this process, and that would sterilize and purify it?

MR. ZINSMEISTER. There's only a small number of products that even need that sort of processing. But I'm saying it's one additional tool. It's only one example among many a tool that we're throwing away. You put a lot of tools together and you get a fair amount of potential output.

REPRESENTATIVE HAMILTON. But you're suggesting that all meat and poultry and fish products be put through this.

MR. ZINSMEISTER. It certainly could be. About a year ago, you may remember, 60 Minutes did a program on the poultry industry and the salmonella scare, the eggs. The state that I live in now has a law that makes it illegal to sell sunny-side up eggs in a public cafe because of salmonella fears.

More people die of salmonella every year—it's in the dozens of people—than almost any of these chemical exposure problems we're talking about.

It's a real public-health problem, and it could be solved almost overnight.

REPRESENTATIVE HAMILTON. Okay. I have a statement from Congressman Armey here to put into the record.

Without objection, that will be made part of the record.

[The written opening statement of Representative Armey starts on p. 148 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. I'm going to conclude the hearing. Do any of you have any comments that you'd like to make for the record as we conclude the hearing?

[No response.]

Thank you very much. We're delighted to have you, and we appreciate your contributions.

[Subsequent material by Justin Ward supplied for the record starts on p. 149 of Submissions for the Record:]

The Committee stands adjourned.

[Whereupon, at 11:47 a.m., the Committee adjourned, subject to the call of the Chair.]

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SUBMISSIONS FOR THE RECORD

PREPARED STATEMENT OF JUSTIN WARD

I. INTRODUCTION

The Natural Resources Defense Council (NRDC) appreciates the opportunity to testify on federal policy concerning agriculture and the environment.[1] Our organization has maintained a longstanding involvement in agricultural issues, including the conservation and environmental provisions of the 1985 and 1990 farm bills.

We commend this hearing's focus on agricultural policies to promote international competitiveness, environmental quality and family farming. We believe it is possible, and indeed imperative, to develop reforms that serve these objectives. Our testimony examines current threats to agricultural soil and water resources, and recommends policy strategies for a farming system that profitably sustains food production and protects natural resources.

II. AGRICULTURAL THREATS TO SOIL AND WATER RESOURCES

The economic success of American farming depends on careful land stewardship and a healthy rural environment. Notwithstanding important recent progress in conservation policy and a reawakening of interest in alternative farming techniques, serious environmental problems confront this country's agricultural sector. Among the most serious threats include excessive soil erosion, and chemical contamination of ground water and surface water.

A. Erosion and Sedimentation

Soil erosion threatens America's unparalleled food production capability. Data from the 1987 National Resources Inventory showed that approximately one-fourth of the nation's cropland acres were suffering from productivity-threatening rates of water erosion. Research in Illinois has shown that corn yields on severely eroded croplands can be more than one-third lower than comparable yields on moderately eroded fields.[2] U.S. Department of Agriculture (USDA) economists have estimated that erosion-related yield reductions and added fertilizer expenses cost Corn Belt farmers more than $400 million annually.[3]

Excessive soil erosion degrades water quality in major agricultural regions such as the Midwest. A recent assessment in Iowa conducted pursuant to the Clean Water Act, for example, estimated that 84 percent of the stream miles throughout the state were impaired by sediment, principally from agriculture.[4] Economic estimates have ascribed more than $3 billion annually in off-site damages from cropland soil erosion.[5]

The conservation title of the 1985 Food Security Act instituted strong sodbuster, conservation compliance and conservation reserve provisions to combat cropland soil erosion. As discussed in Section III.C below, however, weak USDA implementation has compromised the effectiveness of these landmark reforms.

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[1] NRDC is a national, non-profit environmental organization with more than 165,000 members, dedicated to the protection of natural resources, public health and environmental quality in the United States and worldwide. Through various program activities, including those devoted to agricultural policy, pesticide safety, clean water, western water pricing and the international environment, NRDC promotes adoption of farming systems that protect and enhance natural resources.

[2] K. Olson and S. Carmer, "Corn Yield and Plant Population Differences Between Eroded Phases of Illinois Soils," 45 Journal of Soil and Water Conservation, p. 564 (Sept.-Oct. 1990).

[3] D. Colacicco et al., "Economic Damage From Soil Erosion," 44 Journal of Soil and Water Conservation, p. 38 (Jan.-Feb. 1989).

[4] Iowa Department of Natural Resources, State Nonpoint Source Assessment Report – Iowa 1988, p. 2-12 (July 1988).

[5] P. Faeth et al., Paying the Farm Bill: U.S. Agricultural Policy and the Transition to Sustainable Agriculture, p. 3 (World Resources Institute, March 1991). See also M. Ribaudo, Water Quality Benefits From the Conservation Reserve Program (USDA Economic Research Service Ag. Economic Rept. No. 606, Feb. 1989).

B. Nutrient Pollution of Water Supplies

Numerous studies have documented widespread nutrient contamination of water supplies, traceable largely to agriculture. One-half to three-fourths of the nutrients (predominantly nitrogen and phosphorus) reaching the nation's surface waters derive from agricultural fertilizers and livestock waste.[6] Nutrient pollution accelerates the process of eutrophication, whereby water is robbed of the oxygen necessary to sustain aquatic life.

With respect to ground water, a 1985 study from the U.S. Geological Survey (USGS) found nitrates above natural background levels in well samples taken in every state.[7] A 1987 USDA report estimated that more than one-third of all counties nationwide -- and a much higher fraction of counties in agricultural regions such as the Midwestern grain belt -- are highly vulnerable to ground water nitrate pollution.[8] National surveys by the Environmental Protection Agency (EPA) in 1990 and 1992 detected nitrates in over half the rural domestic and community drinking water wells tested.[9]

Ground water surveys conducted in various farm states have found nitrate contamination in levels that threaten human health.[10] For example, more than 20 percent of private wells tested recently in Kansas and South Dakota exceeded the health standard for nitrates.[11] A 1988-89 statewide survey of rural water quality throughout Iowa found that more than 18 percent of private wells exceeded the standard.[12] Water samples from Iowa's agricultural Big Spring Basin from the 1960s to the 1980s indicated a strong correlation between increases in cropland applications of nitrogen fertilizer and nitrate concentrations in ground water.[13] Nebraska's 1990 analysis of well water samples collected in areas of suspected pollution showed nitrate levels that exceeded the federal health standard in 21 percent of all wells, and 31 percent of the irrigation wells tested.[14]

Nitrate contamination presents significant public health implications, in that ground water provides drinking water for approximately 40 percent of this country's overall population and for nearly 100 percent of rural residents. In high concentrations, nitrates can cause infant methemoglobinemia, commonly known as "blue-baby syndrome." This condition impedes oxygen transport in infants' bloodstreams and has led to at least one reported death.[15] Other public health concerns surrounding nitrate contamination of ground water include a link between nitrates and certain cancers, birth defects, high blood pressure, and developmental problems in children.[16] Within the human digestive process, nitrates can form potent carcinogens known as nitrosamines.

Nitrate pollution can be prevented through more efficient nutrient management and precise fertilizer applications.[17] Greater efficiency can often be accomplished through testing of soils and

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[6] National Research Council, Alternative Agriculture, p. 99 (National Academy Press, Washington, D.C., 1989) (citing findings from the U.S. Department of Agriculture and Resources for the Future). Nitrogen fertilizer use in U.S. agriculture increased nearly fourfold from 1960 to 1990.

[7] USGS, National Water Summary 1984 (Water Supply Paper 2275, 1985).

[8] E. Nielsen and L. Lee, The Magnitude and Costs of Groundwater Contamination from Agricultural Chemicals, p. 14 (USDA Economic Research Service, Agricultural Economic Report No. 576, October 1987).

[9] U.S. Environmental Protection Agency, National Pesticide Survey: Phase I Report (Fall 1990); National Pesticide Survey: Phase II Report (January 11, 1992).

[10] EPA has set a drinking water health standard for nitrates of 10 milligrams per liter. This level is primarily designed to prevent "blue-baby syndrome," and does not reflect cancer risks or other chronic health effects that may result from nitrate exposure.

[11] J. Fedkiw, Nitrate Occurrence in U.S. Waters (and Related Questions): A Reference Summary of Published Sources from an Agricultural Perspective, pp. 24-25, 27 (USDA, Sept. 1991).

[12] Iowa Department of Natural Resources, Geological Survey Bureau, Iowa State-Wide Rural Well-Water Survey, Summary of Results: Nitrate and Bacteria, p. 35 (1990).

[13] G. Hallberg, "Nitrate in Ground Water in the United States," in Nitrogen Management and Groundwater Protection, p. 54 (Elsevier Science Publishers, Amsterdam, 1989).

[14] Fedkiw, supra note 11, pp. 11-12.

[15] C. Johnson and P. Bonrud, "Methemoglobinemia: Is It Coming Back to Haunt Us?" 1 Health and Environment Digest, pp. 3-4 (Jan. 1988).

[16] Nielsen and Lee, supra note 8, p. 22.

[17] See, e.g., Recommendations of the Nitrogen Fertilizer Task Force on the Nitrogen Fertilizer Management

preparation of nutrient "budgets" to prevent excessive synthetic fertilizer inputs, and by adjusting the timing and placement of nitrogen applications on farm fields. During 1989 and 1990, alternative agriculture initiatives achieved nitrogen input reductions on Iowa farms in the estimated range of 440 million to 540 million pounds from 1985 levels, with corresponding cost savings in the range of $65 million to $80 million for the two year period.[18]

In many agricultural settings, farmers can cut their nitrogen use without loss of crop yields. According to recent estimates reported in Successful Farming, more than half the cropland acres within Nebraska's Central Platte Natural Resource District received nitrogen inputs 40 percent higher than necessary to meet producers' yield goals.[19] Serious ground water pollution has prompted officials in that District to place restrictions on nitrogen applications.

C. Pesticide Contamination of Streams, Lakes and Wells

Water pollution by agricultural pesticides has been well documented. Recent USGS findings revealed widespread herbicide contamination of rivers and streams throughout the Mississippi River Basin.[20] The agency conducted sampling during the spring of 1991, a period of intensive herbicide use in production of corn and other crops within the region. All of the water samples in this USGS survey revealed detections of atrazine, one of the most widely used herbicides in American agriculture. One-fourth of the samples exceeded federal health levels for atrazine.[21] The results of the 1991 study were consistent with previous USGS research that measured the concentration of herbicides in streams throughout the Midwest. Most municipal drinking water systems lack pesticide-removal technology to treat water that reaches household taps.

Pesticides present additional threats to ground water quality. In the late 1980s, EPA compiled a database of individual state monitoring results for pesticides in ground water. This compilation documented a total of 46 pesticides in the ground water of 26 states from normal agricultural use.[22] For example, the herbicide alachlor, a potential human carcinogen that has been banned in Canada but remains in wide use in the U.S., has been found in the ground water of 12 states.[23]

Significant pesticide use reductions are currently within reach for the American farming system. Based on an extensive review of alternative pest control strategies from published scientific literature, results of research in progress, and the experiences of individual farmers, NRDC's 1991 report Harvest of Hope documented potential for much lower pesticide applications in production of key crops grown in California and Iowa. For example, the study estimated that herbicide inputs for Iowa corn and soybean production could be cut by half through ridge tillage, strip intercropping, planting crops in narrow rows, and applying chemicals in bands on farm fields.[24]

III. NEEDED SHIFTS IN FEDERAL POLICY

Because of rising public concern surrounding food safety, clean water and natural resource conservation, the 1985 and 1990 farm bills devoted unprecedented attention to environmental issues. The challenge for this decade is to protect and expand the gains enacted in those laws, and to place environmental objectives at the core of U.S. farm policy. This section recommends policies in the areas of commodity program reform, budget priorities, and pollution prevention.

Plan to the Minnesota Commissioner of Agriculture (Minnesota Department of Agriculture, Aug. 1990).

[18] G. Hallberg et al., A Progress Review of Iowa's Agricultural-Energy-Environmental Initiatives: Nitrogen Management in Iowa, p. 2 (Iowa Department of Natural Resources, Dec. 1991).

[19] R. Fee, "You'll Face More Limits on Nitrogen," Successful Farming (Mid-Feb. 1990).

[20] D. Goolsby et al., Distribution of Selected Herbicides and Nitrate in the Mississippi River and its Major Tributaries, April Through June 1991 (USGS Water-Resources Investigations Report 91-4163, 1991).

[21] EPA has classified atrazine a "Group C" possible human carcinogen and has set a "maximum contaminant level" (mcl) of three parts per billion based on the risk of liver and kidney damage.

[22] U.S. EPA, Pesticides in Groundwater Data Base - 1988 Interim Report (Dec. 1988).

[23] Id.

[24] J. Curtis et al., Harvest of Hope: The Potential of Alternative Agriculture to Reduce Pesticide Use, pp. 85-96 (NRDC, May 1991).

A. Elimination of Commodity Program Barriers to Crop Rotation and Diversification

Diversified crop rotations often produce environmental benefits. Rotations that interrupt pest cycles enable farmers to reduce or eliminate pesticide use. A shift from continuous corn production to a rotation, for example, can obviate use of soil insecticides for rootworm control.[25] Rotations involving leguminous crops can increase the nitrogen content of the soil, and substitute for chemical fertilizer applications. Inclusion of small grains in a rotation can improve soil structure in ways that boost infiltration capacity and mitigate erosion and polluted runoff.

Historically, the USDA commodity programs have handicapped multi-year crop rotations. In its landmark 1989 report, Alternative Agriculture, the National Research Council concluded that "[t]hrough provisions governing allowable uses of base acres, [federal commodity programs] promote specialization in one or two crops, rather than more varied rotations."[26] Marty Strange, Director of the Nebraska-based Center for Rural Affairs, has described the commodity programs' substantial contribution to "a steady erosion of diversified crop and livestock farming and a growth of large-scale, specialized grain farming," especially in the Midwest.[27]

Indeed, the Administration's proposal for the 1990 farm bill noted "a consensus that existing commodity program provisions tend to discourage adoption of sustainable systems, even in cases where such systems seem likely to prove economically beneficial."[28] In its farm bill report, the Senate Agriculture Committee cited the prospect of lost commodity program benefits as "the principal impediment to more widespread adoption of integrated crop management systems."[29]

The 1990 farm bill's primary response to these shortcomings resides in the Integrated Farm Management Program Option (IFMPO).[30] Congress enacted this provision specifically to reduce "farm program barriers to resource stewardship practices and systems."[31] The program represents an attractive option for producers who wish to undertake a long-term transition from conventional practices to alternatives that reduce chemical inputs and protect natural resources.

Farmers who choose the IFMPO option must develop and implement "integrated ... site-specific farm management plans" of three to five years duration, which require that "resource-conserving crops" be planted on at least 20 percent of cropland base acreage enrolled in the commodity programs.[32] Other key plan specifications include measures to prevent water pollution and soil degradation. The law provides for annual enrollments of up to five million acres during the period 1991-1995, for a total of 25 million acres throughout the current farm bill cycle.

Through adherence to the plan, producers obtain protection against loss of income support ("deficiency") payments; IFMPO participants are also immune from attrition in commodity base acreage and established crop yields that may be used in future calculation of farm program benefits. As an additional incentive for participation, the program permits harvesting and sale of some alternative small grain crops, as well as limited hay production and livestock grazing on the portions of farm fields set aside from crop production.

Properly implemented, the IFMPO could be especially beneficial in agricultural regions where highly specialized, chemical-intensive cropping systems are prevalent. Throughout the midwestern states of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, South Dakota and Wisconsin, for instance, approximately 14 million acres of cropland are

[25] Id., pp. 85-86.

[26] Alternative Agriculture, supra note 6, p. 10.

[27] M. Strange, Family Farming: A New Economic Vision, pp. 131-132 (U. of Nebraska Press, 1988).

[28] USDA, Proposal of the Administration: 1990 Farm Bill, p. 47 (Feb. 1990).

[29] S. Rpt. 101-357, 101st Cong., 2d Sess. 227 (Committee Report accompanying the Food, Agriculture, Conservation and Trade Act of 1990).

[30] The Food, Agriculture, Conservation and Trade Act (hereafter "1990 Farm Act"), Pub. L. No. 101-624, sec. 1451, 104 Stat. 3607-11 (1990).

[31] H. Rpt. 101-916, 101st Cong., 2d Sess. 949 (Conference Report accompanying the Food, Agriculture, Conservation, and Trade Act of 1990).

[32] For purposes of farm bill implementation, "resource-conserving crops" include forage legumes such as clover, alfalfa, vetch or medic; legumes grown for forage or green manure; legumes and small grains such as oats/clover or rye/vetch; legumes and grasses in combination; and legume/grass/small grain mixtures. Sustainable Agriculture Working Group, Sustainable Options Guide to Farm and Conservation Programs in the 1990 Farm Bill, p.4 (Feb. 1992).

currently devoted to continuous corn production.[33] Continuous corn producers, particularly those which relatively high established program "bases" for this commodity, could welcome the IFMPO and other commodity program reforms that reduce barriers to crop rotation.[34]

Strong implementation by USDA is essential to achieve the IFMPO program's environmental potential. Weak, delayed rules contributed to disappointingly low IFMPO participation by farmers in 1991, the first year the option was available. The Department has also been slow to issue rules implementing technical corrections legislation that clarified key features of the IFMPO program; this may have hampered IFMPO enrollment during the recently completed 1992 signup period for federal farm programs. Although many problems have been corrected in the national rules and guidelines, reports persist that USDA county field offices are not informing farmers sufficiently of their options under the IFMPO program.

The IFMPO provides a valuable model for reconfiguration of the overall farm subsidy framework. Future legislation should expand this and related options beyond the statutory ceiling of 25 million acres which, although significant, is dwarfed by conventional payment allocations based on undiversified production of specific commodity crops. Congress should also supplement the economic incentives for IFMPO participation, for example through more liberal haying and grazing opportunities, or allowances for farmers to count acres planted to resource-conserving crops toward their cropland set aside requirements.[35]

As a general matter, future farm policy should provide greater planting flexibility to encourage shifts away from intensive production of a few "program" commodities. One starting point is to replace farmers' commodity-specific bases with "normal crop acreage." Under this approach, for example, a producer who elects to devote all or part of a corn field to alfalfa in a given year would not lose a valuable increment of corn base acreage for future calculation of support payments.[36]

Any move toward greater base flexibility must be coupled with an explicit directive that cropping shifts produce environmental improvements, rather than injury. General flexibility provisions in the 1990 farm bill, which allow unpenalized production of alternative crops on up to one-fourth of a producer's base acreage, regrettably contain no requirement for shifts that reduce pollution or improve soil and water conservation.

As a consequence of this indiscriminate approach, the current flexibility provisions are probably a net loss for the environment. Based on an analysis of last year's cropping patterns, the Center for Resource Economics concluded:

> Overall, it would appear that the use of flexed acres in 1991 represented a shift away from certain extensively grown, relatively low-input crops such as wheat, oats, barley, and sorghum, and toward more erosive crops like cotton and soybeans that use large amounts of pesticides. Flexed acres, then, probably presented a negative net effect on the environment: soil erosion on cropland probably increased, as did pesticide use, while fertilizer use may have declined only slightly.[37]

Future changes to flexibility rules should seek to reverse these harmful outcomes.

Additional commodity program reforms should remove price support features that bias production decisions in favor of crops with high input requirements. For example, oat production typically requires low chemical applications and provides good soil protection; however, oat price supports are very low relative to corn. This is the case notwithstanding language in the 1990

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[33] S. Daberkow and M. Gill, "Common Crop Rotations Among Major Field Crops," Agricultural Resources: Inputs, Situation and Outlook, p. 35 (USDA-Economic Research Service, Aug. 1989).

[34] See S. Frerichs, "Rotations: Influence and Constraint from Commodity Programs," 5 American Journal of Alternative Agriculture, p. 138 (1990).

[35] Sustainable Options Guide...to the 1990 Farm Bill, supra note 32, p. 9. See also J. Williams and P. Diebel, "Resource Conserving Crop Rotations and the 1990 Farm Bill," 47 Journal of Soil and Water Conservation, pp. 145-151 (March-April 1991).

[36] Economists have shown how a normal crop acreage approach would favor adoption of low-input, "green manure" rotations in Washington state. D. Young and K. Painter, "Farm Program Impacts on Incentives for Green Manure Rotations," 5 American Journal of Alternative Agriculture, pp. 99-105 (1990).

[37] Center for Resource Economics, Farm Bill 1990 Revisited, p. 5 (Washington, D.C., March 1992). See also USDA Economic Research Service, Situation and Outlook Report (Sept. 1991).

farm bill that requires the oats target price to be "fair and reasonable" in relation to corn.[38] The imbalance in the price support structure partially explains why the U.S. has imported large quantities of oats in recent years.

B. Realignment of Budget Priorities

Farm bill commodity programs represent an enormous expenditure of public funds. Net FY 92 outlays by USDA's Commodity Credit Corporation, the primary vehicle for farm subsidy disbursements, approached $12 billion.[39] Projections for FY 93 are only slightly below this level.

The high commodity program entitlements contrast with chronically low funding levels for environmental and sustainable agriculture initiatives. For example, FY 92 appropriations for the Sustainable Agriculture Research and Extension (formerly "LISA") research program totaled $6.7 million, less than one-fourth the level authorized by the farm bill and less than one percent of the federal research budget devoted to agriculture.[40]

Moreover, funding has been wholly inadequate for successful implementation of the 1990 farm bill's Water Quality Incentives Program (WQIP). This innovative program provides financial and technical assistance to farmers who implement source reduction plans in areas vulnerable to ground water and surface water pollution. Senator Leahy summed up environmentalists' frustration over insufficient funding for these and related programs when he said, "we cannot talk about a green farm bill when we are unwilling to put our money where our mouths are."[41]

Federal farm payments are heavily skewed toward upper-income recipients. In 1988, for example, 42 percent of the $14.5 billion in direct farm payments went to producers with net incomes averaging close to $100,000 and net worths averaging nearly $750,000; these wealthy beneficiaries constitute a very small fraction of the nation's overall farming population.[42] The current distribution of USDA program benefits strongly suggests that farm policy has deviated from its original aim to provide reasonable support to family farming operations.

Unfortunately, agricultural spending cuts enacted in the 1990 farm bill and budget legislation fall hardest on small- and medium-scale producers. For instance, the farm bill's "triple base" provisions will reduce many family farmers' support payments by 15 percent, but have no impact on subsidies received by producers with very large commodity crop bases.[43]

Payment limitation reforms could liberate badly needed funds to support environmental protection programs and to make farm spending more equitable. For example, existing loopholes make a mockery of the $50,000 per-farmer ceiling in commodity program payments. By OMB estimates, pending legislation to close these loopholes (H.R. 4019 – Penny/Johnson) would save at least one billion dollars over five years. Those savings should explicitly be redirected to sustainable agriculture and environmental initiatives, and to reduce the impact of spending cuts on small-and medium-scale producers.

Before leaving the budgetary issue, it is important to address the need for limits on western water subsidies. In the western states, below-cost irrigation water from federal reclamation projects drives production of surplus crops that receive additional support through the USDA commodity programs. This "double subsidy," which costs taxpayers hundreds of millions of dollars annually, creates artificial demand for unnecessary water development projects and discourages efficient use of scarce water supplies. The environmental consequences include destructive dam construction on free-flowing streams, chemical-intensive farming on marginal lands, discharges of highly polluted agricultural drainage water, and loss of habitat for fish and wildlife. Congress should promptly enact legislation (Gejdenson) passed by the House in H.R. 429 to phase out price subsidies for water used to grow surplus crops eligible for USDA support payments.

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[38] 1990 Farm Act, supra note 30, sec. 401(c)(1)(B)(iii)(I), 104 Stat. 3404.

[39] USDA, 1993 Budget Summary, pp. 38-40.

[40] NRDC has proposed a federal excise tax on pesticides and fertilizers to boost funding for sustainable agriculture research and extension. J. Ward et al., Reaping the Revenue Code: Why We Need Sensible Tax Reform for Sustainable Agriculture, pp. 47-55 (NRDC, 1989).

[41] 137 Cong. Rec. S 11295, July 30, 1991.

[42] Faeth et al., supra note 5, pp. 1-2.

[43] P. Klintberg, "Big Guys Finish First: Largest Farmers Breeze Through Budget Cuts," Top Producer, p. 12 (December 1990).

Congress should also enact a related, House-passed provision to withhold water price subsidies from farms that exceed 960 acres, consistent with the intent of federal reclamation policy.

C. Agricultural Water Pollution Control

Strong water quality safeguards must be central to the next generation of agricultural and environmental policy. First, runoff pollution prevention represents an urgent priority in the pending reauthorization of the Clean Water Act. The law's "Section 319" provisions have been ineffective in controlling runoff from agriculture and other "nonpoint" sources.

Amendments are needed to direct the states to submit enforceable runoff management programs to EPA, specifically to attain water quality standards within threatened watersheds by the turn of the century. These state programs should require that farmers develop and implement effective plans to stop runoff pollution at its source. Our organization, as part of a Clean Water Network comprising more than 250 national and grassroots organizations, has developed model polluted runoff legislation. We would be happy to work with members of this committee on further development of our proposal.

Second, federal agencies should pursue a water quality strategy that is substantially more aggressive than the status quo. With a $250 million annual price tag, the President's Water Quality Initiative relies heavily on further study of pollution problems and information transfer to producers, but contains few provisions to ensure wide adoption of alternative agricultural practices on the nation's farms. Moreover, the 1991 EPA Pesticides and Ground-Water Strategy lacks a strong federal leadership role that was recommended in comments by NRDC and other environmental organizations.

Notwithstanding agency findings documenting widespread nitrate contamination of ground water, EPA has not issued for public comment any national strategy to address this problem.

It is critical that an agricultural pollution prevention strategy being developed by EPA and the Soil Conservation Service (SCS) contain a detailed action plan that sets specific environmental objectives, with enforceable timetables and resource commitments. The strategy must not merely repackage business-as-usual approaches that have been insufficient to abate ground water and surface water contamination.

Third, the federal government must vigorously enforce the 1985 and 1990 farm bills' mandate for highly erodible land and wetland protection. Unfortunately, serious lapses have plagued USDA implementation of the law's sodbuster, swampbuster and conservation compliance provisions.[44] During the late 1980s, a series of rules and guidelines issued by SCS systematically weakened the erosion control mandate enacted in 1985; current rules often permit erosion far in excess of productivity-threatening rates.[45]

The results of weak implementation are becoming apparent in the field. A new study from the Soil and Water Conservation Society reports that, contrary to USDA assertions of near-total compliance, more than 40 percent of farms sampled were failing to implement required conservation compliance measures during the period 1989-1991.[46] The Society's assessment found inadequate erosion control treatment on many newly-plowed grassland fields subject to sodbuster requirements, contrary to the nondegradation standard required for such lands.[47] Lax enforcement of swampbuster requirements is continuing to allow widespread drainage of wetlands for agricultural purposes, without loss of farm subsidies.[48]

This enforcement track record, if not corrected, will violate the common sense underlying the farm bill that taxpayer money should not subsidize Dust Bowl conditions or destruction of our remaining natural wetlands. Looking ahead, continued weak implementation of conservation compliance will eventually erase the enormous erosion control benefits that have been achieved under the Conservation Reserve Program (CRP).

[44] NRDC is addressing these issues in separate testimony today before the House Agriculture Subcommittee on Conservation, presented on our behalf by the Center for Resource Economics.

[45] See, e.g., J. Ward and K. Cook, "'Sodbuster' Law is Good, So Why is USDA Fixing It?," The Des Moines Register, p. 13A (Jan. 14, 1988).

[46] Soil and Water Conservation Society, Implementing the Conservation Title of the Food Security Act, p. 9 (Final Report, 1992).

[47] Id., p. 11.

[48] Farm Bill 1990 Revisited, supra note 37, p. 9.

The multi-billion dollar CRP has enabled restoration of more than 35 million acres of severely eroding cropland; most of the 10-year program contracts, however, are scheduled to expire in the late 1990s. It will be an economic travesty and an environmental disaster if the fragile lands currently in the CRP are returned to intensive production under weak conservation compliance rules and enforcement. Such a result is inevitable without a fundamental shift in current USDA policy.

IV. CONCLUSION

Congress and the Administration hold the key to promoting natural resource protection through sensible agricultural policy. Good results will require stronger implementation of existing laws, as well as reforms in the Clean Water Act, future budget legislation, and the 1995 farm bill. If the federal government seizes these and related opportunities, the farm policies of the 1990s could produce watershed gains for the environment.

PREPARED STATEMENT DAVID SWAIM

Personal Perspective

As an independent crop consultant, I help farmers reduce their input costs while maintaining or improving yields and reducing soil erosion and risk to water quality. I encourage my clients to implement the concepts and techniques included in ICM (integrated crop management) which combines integrated pest management with nutrient management.

Over the past fifteen years, I have provided professional services to over three hundred commercial farm operators. Some farm over 4,000 acres; others less than 80. some are of national reputation; others, barely known within their community. some use all the large equipment and chemical technology available; others have chosen ridge-till or no-till using minimal chemical inputs; and a few are working toward farming organically.

It is not my responsibility to set the agenda for these individuals. I do help clarify goals, identify limitations, and then develop a plan to guide them in accomplishing their goals as effectively and ecologically as possible. Since I am employed by the farmer on a voluntary basis, my success depends on understanding just how much change each individual can accept and implement. If their perspective is too divergent from mine, we eventually go our separate ways. But this does give me an opportunity to learn the various rationales farm operators use to either avoid or effect change. Following are the personal observations and "gut reactions" that I've been asked to share.

Attitude Toward Change

The farmers I work with are diverse in their perceptions and attitudes. Several remain unaware of the effectiveness and variety of alternatives available, and some are quite set in their ways; but as a group i would describe them as responsible, capable, and reasonable with considerable knowledge and personal experience.

How much resistance to change do I observe? A few individuals are self-isolated, others are aware but unconcerned, many are concerned but unconvinced, or convinced but delaying change, several are in the process of changing, and a few have accomplished significant changes.

Whether a farmer adopts "pro-environment" technologies may depend on a variety of factors:

1. government requirements
2. observed problems in his fields
3. projected profit potential
4. experiences of neighbors and acquaintances
5. effectiveness of available technical information
6. local availability of products and technical support
7. financial position
8. trade-in value of current equipment
9. attitude of landlords and lenders
10. perceptions within the community
11. personal level of idealism
12. psychological resistance to change

Do farmers farm by evaluation and decision or by habit and convention? Some are decisive businessmen while others hold fast to the familiar. After sustaining as many as five droughts in the last twelve years, the typical farm operator in our area is so tenuous financially that he must be very cautious – he can't afford to learn by trial and error. To make changes, he must do his own personal research, be willing to take risk, go against convention and be prepared to withstand ridicule from the community.

Of the various alternatives being promoted, my experience is that conservation tillage and rotational grazing are the closest to widespread implementation, but continue to meet considerable resistance. Operators who have invested heavily in large-scale conventional systems will

understandably be slow to shift directions and sacrifice their investment. Also, in areas where innovators have failed, the potential early adopters will be reluctant to take the chance.

Not only must farmers be concerned with the possibility of success, but the repeatability of that success. In the Eastern cornbelt, weather patterns vary greatly from year to year and some management practices that succeed one year may have disastrous results the next if the weather pattern is opposite. The sustainability of agriculture depends on management practices that are appropriate for the full gamut of weather conditions.

Attitudes Toward The Environment

During the 80s, I observed a dramatic increase in the environmental awareness of my clientele. Some accepted new premises while others did not and most ended up with a mixture similar to the opinions listed below. These are typical opinions of respected farm operators in our community.

a. At least some forms of conservation tillage are now operationally feasible and may offer some economic advantage once the equipment conversion is made.

b. The quality of well water is a real concern out West and contamination has occurred in our state, but not around here.

c. While pesticides should be handled carefully, some are too dangerous for a farmer to want to handle himself. Regulation of insecticides is not much of a problem as long as they don't restrict our most dependable herbicides.

d. Nitrogen fertilizer may be over-applied at times, but on the average, rates per acre are declining in Indiana.

e. Misapplication of manures can cause fish-kills and may contaminate streams with nitrates.

f. Preserving wetlands is OK, but there have to be some tradeoffs. Some of these seasonal wetlands are too small and inconvenient to save.

g. Soil compaction and crusting are probably getting worse but there's not much to do about it except occasionally subsoil.

h. Crop rotation would be good if there were adequate markets and prices for the alternate crops and we didn't need to keep our "corn base."

i. Organic farming isn't too bad for those with the right situation and a guaranteed premium market, but it's not really an option for cash grain farmers in our area.

Environmental Challenges

Soil and Water Conservation

Soil erosion remains a problem, though in some areas positive steps have been made. Many steep fields in the southern part of our state have been returned to woodland or seeded to fescue pasture, but in the central and northern counties the removal of fence rows has increased field size and lengthened the effective slope. Without sod crops in the rotation and with more wet tillage the soils' ability to absorb rainfall decreases, thus increasing runoff and erosion.

While gully erosion can occasionally be serious after heavy rains in no-till fields, it's especially severe in fields with clean-tilled seedbeds. Considerable tonnage of soils is lost each year from fields that are not classified as highly erodible. Wind erosion is also a problem, particularly on fall plowed fields. Both water and wind erosion are highly visible and relatively easy to reduce, though many farmers tend to underestimate the actual amount of soil lost.

I strongly favor Soil Conservation Service's emphasis on residue management. In our area the SCS is a strong positive influence for resource conservation, though in the past their goals exceeded the effective technology.

Water quality

Surface water contamination by herbicides could be significantly reduced by conservation tillage which would increase rainfall infiltration and reduce surface runoff and the use of less water soluble compounds. Runoff of excess manure and chemical spills are monitored by state government and are controllable. Vegetative filter strips -- grass, shrubs and trees -- need to be re-established among many streams for run-off reduction and stream-bank stabilization.

Chemical contamination of groundwater is not visible to the arm operator but is of increasing concern since he and his family depend on their farm wells. While there are serious problems in some parts of the country, extensive groundwater testing, especially rural wells, has shown little problem on the loams in the central part of Indiana. The few problems that have been identified are generally associated with occasional fertilizer or chemical spills, or over-application of nitrogen or manure on sandy river terraces in the central and south part of the state and the sandy lowlands of the northern part of the state. The State Department of Environmental Management is already addressing this water quality problem.

Habitat restoration

Destruction of wildlife habitat and scenic trees and woodlots is also visible but a more complex problem. Seasonal wetlands are on the verge of over-regulation in some cases and the question of what is practical does need to be addressed.

Noxious weeds

The continuos spread of Johnson grass, wild cane, Canadian thistle, and hemp dogbane is a serious threat requiring more expensive chemical control and/or more tillage. Some farmers are quite negligent in noxious weed control. In no-till even dandelions, ragwort, mulberry, and trumpet creeper have become formidable enemies.

Soil Quality

A subtle problem that concerns me as an agronomist is that of declining soil quality. The lack of surface residue in moldboard plowed fields, the use of some soil insecticides, and the lack of crop rotation, often coupled with heavy nitrogen use, has led to a suspected decline in soil aggregate stability, earthworm activity and rainfall infiltration. The result is a lack of soil tilth -- crusted and compacted top soil that lacks air spaces and cannot rapidly absorb rainfall. Thus, we experience increasing runoff and more erosion in the winter and spring, and more potential drought stress in the summer. the solution to this is managing for maximum surface residue, rotation with legumes, and discretion in chemical usage.

Pesticide Alternatives

There is a perception that there is a shortage of applied research of cultural methods of crop protection. Research dollars are still targeted toward products offering good payback. Although in this state several environmental concerns to agriculture are addressed by the Crossroads 1990 state funding bill, on a national basis, LISA is underfunded and the Strategic Research Initiative has not had time to prove that it can fill the gaps. We must constantly be looking for funding for "non-product" applied research to make low-external-input and sustainable systems more feasible. While studying environmental contamination is a high priority in this state, demonstrating alternative techniques has very low priority with virtually no funding through the State Department of Natural Resources or the Indiana Commission for Agriculture and Rural Development.

My clients receive most of their technical information from advertising and articles in the popular farm magazines and from discussions with their dealers. The public educational materials available also focus on short-run economics and chemical and to some extent, mechanical control, rather than biological interactions and ecology.

Publicly funded research and extension must necessarily focus on the perceived needs of the majority first, even though innovations in technology start with concerned individuals, a tiny minority. During what I view as the "heyday" of ag research -- the '50s and '60s, pesticides and high-analysis fertilizers gave more consistent and dramatic responses than the typical alternatives, so researchers knew that acceptance was more likely. Environmental impact was seldom considered. also in past years, the practice of relying on industry grants for "co-funding" may have focused more resources on increasing the effectiveness of chemical inputs than on the uncertain proposition of exploring for biological alternatives.

Now that environmental concerns are more pressing and "chemical salesmen" are considering becoming "biological salesmen" the focus is changing, but there remains a strong product orientation. Thus current emphasis on the development of biotech products is so strong that research on cultural systems is often put on the back burner. When cultural system work is conducted, it usually is focused on complementing a new product. This is not wrong, but it cannot be purely objective.

Reduced inputs

LISA[1] has had considerable influence on academic thinking, providing legitimacy to university studies of "alternative agriculture." But it has stirred antagonism and derision in the farm community because its name is something of a simplistic misnomer that equate low-input levels with sustainability, implying that all other levels of input are unsustainable. Some detractors equate the term sustainable with subsistence farming. Historically, low total input approaches have not been sustainable but have resulted in either neglect or abuse. A more accurate though unwieldy acronym would be something like SREIAPS -- sustainable, reduced-external-input agricultural production systems.

In the sustainable agriculture movement in Indiana, we start with soil and water conservation and with providing wildlife habitat and then proceed to consider full-spectrum resource conservation -- including fuel, capital, rural communities, even rural landscape. We value quality as well as quantity.

> Continued effort is needed to increase our ecological understanding and develop more effective Integrated Biological Production Systems which combine emerging technologies and production efficiency with time-honored pest control and soil-building practices. The farmers I work with are increasingly concerned about optimizing conditions for earthworms and the natural biological control organisms--more concerned about the biology of the system. They want more answers about what would make their soil "healthier."

No-chem vs No-till

As mentioned above, my clientele are divided between conventionalists, conservationists, and regenerationists. A major point of controversy is the fact that zero spray is generally incompatible with no-till because tillage is in most cases the only functional alternative to spraying for weed control. How do we avoid erosion when relying on tillage? We can farm small contour strips of hilly ground or long strips of flat ground without significant water or wind without chemicals ... and without fences and cattle. Then how do we avoid environmental degradation when using herbicides? We can use "softer" chemicals in no-till on the larger fields and adopt more precise, reduced-rate, low carrier application systems.

Organic marketing

Though I am not yet convinced of all the tenants of the organic philosophy, I do appreciate transitional and organic farmers for their resourcefulness and their concern for the quality of our food and our environment. Their emphasis on optimizing the biological and physical characteristics of the soil and the recycling of nutrient, rather than concentrating exclusively on regular applications of N-P-K plant foods, is a major impetus toward more effective soil management. while I do not yet see much scientific proof of superior nutritional value of their products, their efforts as pioneers and stewards alone should deserve the reward of premium prices.

On the other hand, the larger cash grain farmers in the Eastern cornbelt are reluctant to restrict themselves to organic methods considering their present scale of operation, particularly on their rented acreage. Crop rotation is limited to corn-soybeans or corn-soybeans-wheat since they have no fences or ruminant livestock to consume the forages normally included in western rotations. The conversion cost and time commitment of returning to livestock farming, especially when dietary trends are away from animal products, is significant as is the opportunity cost of taking high-value land out of corn production. Reducing the size of individual operations would be tantamount to agrarian reform of a revolutionary nature and would lead to higher food prices which would appear to be contrary to current national policy and could hinder economic recovery.

Genetic engineering

I am not categorically opposed to bio-technology and genetic engineering, but my feelings are ambivalent. Incorporating the Bt (Bascillus thuringiensis) gene for insect control or IR (imazaquin resistance) or the Round-up tolerance genes will hardly provide a total answer but may be useful in transition systems without creating a serious environmental threat. On the other hand, bio-tech would have to be stringently regulated to avoid opening the proverbial "Pandora's box," and even then, I'm afraid there still would be risks.

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[1] LISA has officially been updated to SARE -- Sustainable Agriculture Research and Extension.

There is a rush to fund development of bio-tech products before the ecological systems into which this new technology will be inserted are fully understood. Technicians could be prone to be biased as to the value of their project and a limited viewpoint of the ecological system and its inter-relationships and responses.

The Role Of The Federal Policy

Policy's role

My greatest concern is that there is far more incentive for either discovering a marketable product or for gaining national attention to bolster fund-raising campaigns than there is for understanding how to optimize the natural system for the physical, emotional, and spiritual welfare of mankind.

I want to see America's farmers increase in understanding of the ecology of their farmland and in concern for our rural environment, but I hate to see America's farmers hog-tied in red tape.

In principle many worthwhile goals were accomplished by the environmental sections of the 1985 Farm Bill .... even though my clients chafe at several of the administrative details and feel some environmentalists have unrealistic expectations.

Policy's basis

What should be the basis of national policy? while individuals' decisions often have to be made on the basis of personal philosophy or intuition, in fairness, those crafting national legislation have a responsibility to give priority to what scientific evidence is available. There is also the need for careful analysis.

As an agronomic consultant, I spend a lot of time qualifying the claims that salesmen make to farmers. In my experience the more outspoken the salesman, the more he tends to oversimplify the facts for clarity and over-state his conclusions for impact. Seldom is the truth of the matter quite that simple or quite that clear. In selecting new technologies for the farm, we have to distinguish between philosophy and science, discuss values and priorities, and evaluate both the pros and cons -- the probable benefits compared to the probable risks. In the legislative arena there are salesmen too. Though lobbyists consider themselves to simply be "advocates," this same principle could apply.

Fair decisions are not based on the comparative might of the advocates, but on the evidence. Is this regulation based on conclusive evidence? Will this regulation yield a significant improvement in environmental quality? Will the environmental benefit be worth the potential loss of productivity? What are the hidden costs?

Knee-jerk legislation or a shoort-first-ask-questions-later approach need to be guarded against. As the proverb goes, "Don't answer a matter before you hear it." This means beware of the intuitively obvious. Intuitive conclusions don't always correlate with first-hand experience. But first-hand experience alone may not be enough for those who don't see a problem with what they're doing and may not know what to look for or don't want to see.

Policy administration

In reference to the old adage about external motivation, it still takes both the carrot and the stick but the carrots must be real and accessible and most individuals need only see the stick. The threat of legislation often does as much good as the legislation itself and may cause less harm and obviously costs less than enforcement. If obvious problems continue, legislating against worst case situations (such as erosion control plans for Highly Erodible Land) will also lead to some voluntary correction of less severe situations.

Also, industry must be given time to see and respond to the "handwriting on the wall." Without major adjustments on behalf of equipment and herbicide manufacturers and marketers, we would not see the progress we see today in conservation tillage -- especially no-till drilled soybeans.

Change can be promoted through ... industry education, government education, federal regulations, threatened legislation, government cost-sharing and commodities programs. Balance, moderation, and continuity are essential for effective programs.

Summary:

Our system is based on checks and balances and a difference in perspectives can be healthy. However, on many issues there is a standoff between agriculturalists fearing too much change

and disruption of production and environmentalists fearing too little change and accelerating environmental degradation. What is needed is a mutual concern for providing ample food supplies and preserving environmental quality.

Effective policies will require that needs be demonstrated scientifically; that choices of alternatives be offered which are locally implementable and will maintain or increase profitability and that a transition period be provided.

What will be need may often be a shift in management systems, not just replacing one or two current practices with a government sanctioned BMP. Regulations will need to be combined with research, education and technology development aimed at system changes, not just new products or the elimination of a particular practice.

TECHNOLOGIES THAT FAVOR BOTH FARMER AND ENVIRONMENT

David R. Swaim, Crop Consultant
Crawfordsville, Indiana

Conservation Tillage

The refinement of several methods of conservation tillage this past decade is tremendously encouraging. Many of my clients have switched first from mold-board plowing to chiseling and then to ridge-tilling, zone-tilling, or slot-tilling, better known as no-till.

There have been many obstacles to overcome -- several problems our conservationists did not anticipate. A major part of my consulting efforts have gone toward networking innovative farmers so they could share their experiences and techniques. We are now using close to a dozen variations of conservation tillage in Western Indiana. The choice depends on the soil types, field sizes, and the preferences of the farmer.

The benefits are many. Less erosion, more water retention, less ponding and denitrification, fewer manhours during planting season, often less equipment cost and, with some systems, reduced chemical cost. The residue cover over winter provides improved cover for wildlife and great increases in nightcrawlers, redworms, and beneficial soil insects which perform a natural tillage operation over time. My estimate of the probability of satisfaction for a beginning no-tiller has increased from 1 out of 3 to 9 out of 10 in the past fifteen years. The system does require a higher level of management and making a whole series of adjustments in a farming operation.

Integrated Crop Management

Integrated pest management, from which the ICM concept developed, incorporates all effective means of control -- mechanical, cultural, genetic, biological and chemical -- even though information on the non-chemical alternatives is often limited. Treatments are only applied when pest populations reach economic thresholds, thereby avoiding ineffective or wasted treatments and reducing environmental risk.

ICM is a cost-effective method for organizing a crop production and pest management program. It is very profitable to both the grower and the consultant on high-value crops that are normally fertilized heavily and sprayed frequently such as potatoes, cotton, tree fruits, and veg corps. ICM is also consistently cost-effective on irrigated, continuous corn and on commercial alfalfa. for corn, soybeans, and small grain in rotation, where no insecticides are normally used, the field scouting portion may not always break even ... only the soil testing paying its way. On farms with heavy livestock concentrations, the fertilizer saved will more than pay for the cost of a manure management/nutrient management program. Larger field size and high density of scouted crops are important to profitability for the consultant.

Intensive Rotational Grazing

In New Zeal, the "mob-grazing" concept has been quite popular for years, especially since the development of new techniques in fencing. This past winter I had the opportunity to talk with dairymen from several states who have tried intensive rotational grazing the past two or three years. I was impressed with their reports that they were harvesting as much as 50% more forage per acre, feeding much less grain, reducing cost of silage making and manure handling dramatically, and reducing capital investment. This was accompanied by visible improvements in herd health. The consensus was that these dairymen were enjoying farming more as they were spending more time with their pastures and livestock and less time repairing equipment

Soil Building

The use of covercrops, crop rotations, composting, and manuring are time-honored methods of improving soil tilth or physical structure. These practices complement the effects of shallow incorporation of crop residues as in conservation tillage. Good tilth improves the efficiency of moisture and nutrient utilization and improves the stress tolerance of growing crops. Improved physical structure also reduces surface crusting that can keep seedlings from emerging from the ground.

the use of cover crops in late summer following small grains or over winter between row crops should be a high priority for research. Cover crops are sometimes difficult to manage and may not be profitable in some years or locations, but they offer several benefits.

In the southern part of our state, both hairy vetch and rye can be used very successfully to hold soil in place over winter and to utilize the winter sunlight in producing carbohydrates that contribute to the soil system. the legumes like vetch or clover produce nitrogen for the next crop while the small grains like rye can be used to capture nitrogen left over from the previous crop that might otherwise be wasted. Also, the fine root systems of these crops leave the soil more mellow and often encourage a rapid increase in earthworms. Cover crops can also break disease cycles and inhibit the germination of weeds.

While obviously practical in the south, cover crops can be fit into northern systems. Wheat is used successfully as a winter cover on sandy northern fields to stop wind erosion following seed corn production. Several studies are underway evaluating other species including the medicagos, lupines, and brassicas for use in the North and West.

PREPARED STATEMENT OF KARL ZINSMEISTER

As this committee considers ways to make agriculture more ecologically benign without damaging the financial health of American farmers I'd like to offer this summary recommendation: Better science and better economics will be far more important than any regulatory strategy in improving the environmental effects of farming today. Toward that end, I have three specific suggestions:

Suggestion one is that we phase out or substantially reduce many of our farm subsidies. Current price support programs encourage narrow, over-intensive styles of production. Market-based agriculture would be more varied, and environmentally gentler. It would also be in the long-range financial interests of farmers.

Suggestion two is that if environmental regulators hope to receive the (badly needed) cooperation of farmers in the future, they must be prepared to pay for their land-use takings, as well as some of their mandates.

Suggestion three is that we encourage further advances in agricultural technology -- which have enormous potential for improving ecological outcomes in farming. While federal agricultural research remains important, private companies are now doing much of the most useful R&D. What biological scientists working in both the public and private sector need most of all today is protection from over-regulation and politicized fretfulness.

Before I turn to each of these suggestions in more detail, let me say that while environmental improvement often comes at the cost of economic efficiency, in agriculture today we have a rare opportunity to improve environmental and economic outcomes simultaneously. If Congress will allow the dramatic new bio-agricultural technologies now on the horizon to come to full fruit without political interference, and ratchet down price subsidies and production controls so that farmers have economic incentives to pursue new styles of agriculture, many of the environmental problems currently associated with farming will literally solve themselves over the next decade.

FARM SUBSIDIES AND ENVIRONMENTAL GOALS AT CROSS-PURPOSES

There are basically two components to the most important farm programs. One is price supports, which encourage farmers to produce. The other is land-idling requirements, which demand that farmers set aside a certain portion of their acreage and leave it unused. Working together, these factors are supposed to guarantee farmers attractive prices without allowing them to overproduce massive surpluses.

But puffing up commodities prices and then forcing farmers to hold a big chunk of their land out of circulation has one other effect: it encourages over-intensive cultivation of the acreage that remains in use. On the land they are allowed to plant, farmers emphasize chemical inputs and tractor time and fuel, because maximizing yield per acre is the only way they can increase their income. The strange result, in this country where we have more rich earth than we know what to do with, is that much land sits idle while some of the rest is tilled as frantically, and harshly, as if we were some soil-shy rocky island.

If subsidies were phased out, American agriculture would shift to a lower-input style of production limited to the most appropriate and productive lands. Needless to say this less- souped-up agriculture would be environmentally gentler. Regional cropping patterns would also be more varied and flexible, with benefits to local consumers. (Incidentally, deregulation of American agriculture would also be a long-term boon to U.S. farm exports.)

Artificially elevated farm prices and the government-mandated production controls that go with them have other untoward environmental effects as well. They discourage crop rotation and lead to unhealthy mono-cropping, year after year. They discourage experimentation with alternative crops not covered by subsidy programs. They overpower incentives to conserve irrigation water. (The National Academy of Sciences made many of these same points in a September 1989 report.)

Another farm program that encourages poor environmental effects is U.S.D.A."disaster aid." First begun in 1973, disaster programs now disburse tens of billions of dollars each decade. What this amounts to is free crop insurance, and what it encourages is riskier planting decisions, less care in management, and more exploitation of marginal land. For example: corn is more susceptible to lack of water than grain sorghum, but if all goes well, corn is more profitable. With disaster

aid guarantees behind them (and tempting corn subsidies dangling in front of them) dryland farmers will often gamble on the bigger payoff instead of planting the crop that makes most sense for their area. The sensible old arid-region practice of leaving land fallow every few years in order to let subsoil moisture build up has fallen off for the same reason. In this way, disaster aid works as an anti-conservation policy.

Another multi-billion dollar program with anti-conservation effects is one that, ironically, was promoted as an environmental measure when it was first set up in the 1980s. The Conservation Reserve makes payments to farmers who take marginal land out of production for an extended period of time. It has encouraged some farmers, however, to sod-bust unproductive, highly erodible grasslands, farm them for a few years until they give out, then retire them into the Reserve and collect government rent checks for ten years.

Subsidized agriculture frequently makes it uneconomic for farmers to conserve, experiment, and modify their environmental practices. Many of these unhealthy incentives would be reduced by a move toward more market-based agriculture.

TAKING LAND USE WITHOUT COMPENSATION WILL MAKE FARMERS OPPONENTS OF ENVIRONMENTAL EFFORTS

While we are putting agriculture on more of a market footing, it would be a good idea for environmental regulators to start treating farmers' private assets with more respect.

Uncompensated appropriation of the use of private land is one of the most contentious issues dividing farmers and environmentalists at present. Federal Agriculture Department strictures sharply limit farmers' authority over things like field boundaries and crop rotation choices. Wetlands regulations already dictate land use and drainage patterns and are about to get much tighter. There are controls on ditch and road maintenance. On the state and local level, land-use restrictions increasingly forbid changes in farm patterns, limit the utilization of parcels that front a water body, prohibit conversion of farm land to other purposes, or otherwise prevent farmers from exercising productive control over their acreage. In places, the Endangered Species Act can take the use of large pieces of continuously farmed land away from its owners.

When I was in Fort Bend County, Texas a couple years ago area farmers were stunned to discover that the local sighting of six to eight specimens of the Attwater's Greater Prairie Chicken in some thickets on private land was going to result in most farm activity being effectively forbidden in a massive pie-shaped area amounting to an incredible 250,000 acres of private land, or approximately one-quarter of that heavily agricultural county.

My point here is not to argue over whether these specific land-use appropriations are justifiable, but merely to suggest that it is unfair to lay the full burden of their costs on the unlucky farmer who owns the land. Land is the major asset, in many cases the only significant asset, of a farmer. That is his capital. It is also his kid's college fund, his savings account, his pension and retirement plan. If the larger society, wants to prevent a soggy patch from being tiled and tilled, or a hilly field from being plowed, or a house from being built on a cornfield, that may be legitimate. But the rightful land owner ought to be compensated for his loss of value or permissible use.

This is not only fair, it is efficient. One will get a far higher rate of environmental compliance when the farmer has economic incentive to do so than when the environmentally desirable course carries a serious personal cost.

There are already precedents for federal compensation to landowners for environmental easements (on 10-year, 30-year, or permanent bases) in two current U.S.D.A. programs: the Wetlands Reserve Program, and the Water Bank Program. Congressman Jimmy Hayes and four other Representatives have written a major wetlands bill (H.R. 1330) which would take the principle further.

Their bill stipulates that when private land is classified as a wetland where no activity or disturbance is allowed, this will be recognized as a "taking" for which just compensation must be made. The bill allows the landowner either to retain title and abide by all prohibitions or transfer title to the government and receive fair market value, with negotiations to be adjudicated by the U.S. Court of Claims as provided by the Constitution. H.R. 1330 currently has 176 co-sponsors.

A final reason that environmental regulators should start thinking of land use as something they need to purchase from farmers and other owners is that it's very possible the Supreme Court

is going to require such compensation in the future, on the grounds that certain regulatory measures comprise "takings" of property as defined in the Constitution's Fifth Amendment.

DON'T INTERFERE WITH THE BIO-RESEARCH REVOLUTION

A biotechnology cornucopia is about to open in this country, offering breathtaking improvements in the quality and variety of agricultural products at the same time that it makes them cheaper to produce and buy, while simultaneously making it gentler on the environment to raise them. Not all the innovations will be of the gee-whiz variety -- many are rather homely, for instance membranes that encapsulate fertilizers so they're absorbed slowly into the soil, electrostatic spray rigs that target chemical use much more accurately, and so forth. But collectively, innovations like these will produce big ecological and economic gains.

Many of the most dramatic successes in agriculture come from an accumulation of small improvements. Take the broiler industry: In 1950 it took 84 days to raise a 4-pound broiler chicken, and 3.25 pounds of feed for every pound of meat produced. Today, thanks to poultry inoculation, scientific breeding, controlled diets and other factors it takes just 42 days, and the feed conversion ratio is 1.9:1. Good management combined with agricultural science has produced the same amount of product, of higher quality, in half the time, using less barn space, less land, less electricity, less propane heat, and close to half as much food, while producing smaller amounts of manure, dead birds and other unwanted byproducts to dispose of.

Even more revolutionary changes are on the way: plants that fix their own nitrogen from the atmosphere (reducing the need for artificial fertilizers), meat genetically engineered to contain less cholesterol, plants that produce their own natural pesticides internally. There is nothing new or unproven about the basic techniques. The first microbial pesticide, for instance, a bacteria that infects Japanese beetles, was initially distributed back in 1939, and can be bought in any good hardware store under the name Milky Spore Disease.

But as scientists have worked more actively to create things like non-chemical pest controls they've often been attacked by environmentalists. Organizations such as the Environmental Defense Fund, the National Wildlife Federation, and the Audubon Society have tried to prevent field-testing of important bio-engineered products. The group Friends of the Earth has labeled bio-engineering "Russian Roulette."

I suggest that scientific obstruction of this sort is shortsighted and dramatically anti-ecological. All biological pesticides currently under development are variants of naturally occurring organisms -- viruses that stop the digestive tracts of pests, for instance. Before these agents can be approved, manufacturers have to demonstrate that they won't kill beneficial insects, and that they can't spread to neighboring weeds, giving them unwanted predator immunity. When the National Academy of Science's Committee on Scientific Evaluation of the Introduction of Genetically Modified Microorganisms and Plants into the Environment looked at bio-engineering of field crops it concluded, in a September 1989 report, that the process presents no unusual or unmanageable risks.

Plant disease research may be thought of as at a threshold similar to when the new process of vaccination began to be used to protect humans. But rather than treating this as an exciting scientific refinement that requires normal laboratory precautions, many environmentalists insist biotechnology is a dangerous leap into wholly new territory. It is not.

Environmentalists are often their own worst enemies in this area -- opposing the new products and processes that are agriculture's best hope for a cleaner future. If farming is to be steered onto a path toward more healthful output with fewer unwanted byproducts and ecological side-effects, then the environmental movement is going to have to get over its allergy to fresh technical and scientific advance.

As another example of the way some environmentalists are obstructing healthful new agricultural technology, consider food irradiation. Irradiation is an efficient, scientifically uncontroversial method of preserving and sterilizing edible products without the chemicals that are often employed at present. In a process that might be thought of as somewhere between microwave cooking and the airport luggage x-ray, low- dosage ionizing energy is used to kill harmful organisms without leaving any radioactive residue behind. All meat, poultry and fish products, for just one instance, could immediately be certified free of trichona, toxoplasmosis, salmonella, and other dangerous microorganisms via irradiation.

Food irradiation has been fully approved by the World Health Organization and the U.S. Food and Drug Administration. It is already used to sterilize the meals of hospital patients and astronauts, as well as to make consumer products like cosmetics and medical supplies. Hardly any retail food is so treated, however, because a small band of consumer and environmental groups have mobilized public dread against the process. An advance that is both healthful and economic, that could replace inferior sterilization processes that have known environmental drawbacks, is being wasted.

An agricultural scientist once suggested to me that we are at the beginning of a new era which will increasingly see the substitution of botanical for mineral resources -- plants being engineered to produced new chemical compounds and pharmaceuticals, biologically-derived plastics replacing the petrochemical varieties, animal "factories" synthesizing a growing range of drugs, greater reliance on cultivated energy sources, and so forth. Some of the procedures involved in this process -- genetic engineering, hormone therapy, cloning -- are very new and still make some people nervous. There is little question, though, that making progress in the future will require more, not less, expertise in biological exploitation and management. Undue fretfulness and stifling regulation in this area will mean lost opportunities for progress and/or surrender of our current leadership on this newest science frontier to better-prepared competitors.

HOW BAD ECONOMICS AND BAD SCIENCE CAN COMBINE TO HURT THE ENVIRONMENT, FARMERS AND CONSUMERS ALIKE

As a final example of the way exaggerated anti-technology impulses can combine with farm program controls to produce results that hurt consumers, farmers and the environmental alike, è

consider dairy production. In 1945, there were 25 million dairy cows in the United States, and they each produced 4,600 pounds of milk a year, on average. Today, we have just 10 million animals, but they put out 14,000 pounds each. A remarkable success story: we're making 22 percent more milk while using only two-fifths as many animals. A lot less expensive and environment-affecting feed is being consumed, and a lot less animal waste has to be disposed of.

That progressive trendline could take another sharp jolt upward in the next few years -- except that some subsidy- dependent farmers and their environmentalist allies may succeed in preventing it. The next big improvement on the milk horizon will come from the use of bovine somatotropin (BST), a natural growth hormone that could boost milk production per cow by another 15 to 20 percent. The U.S. Food and Drug Administration has already given the go-ahead to sales of milk from cows getting BST (it is indistinguishable from other milk). But opponents are now organizing a scare and boycott campaign, and in this case they have allies among dairy farmers, who have their own reasons for opposing BST.

The dairy program is one of the most rigidly controlled of all the farm subsidies. The federal government supports milk prices at strictly enforced levels by buying up tons of surplus dairy products. If BST suddenly boosted milk output, keeping prices right where the dairy lobby has convinced Congress to set them could become very expensive -- possibly a couple billion dollars a year beyond the similar figure already budgeted.

The obvious solution is to let milk prices fall, but dairy farmers used to their cartel would fight that strongly. By cartel logic it's better to continue using yesterday's production methods. So in this instance, an efficient, bounty-inducing new technology is being resisted, on trumped-up environmental grounds, largely because the U.S. farm program makes it impossible for prices to adjust to changes in supply. Not only BST but any other breakthrough that would increase productivity in the ways we have come to think of as synonymous with modern progress becomes anathema under this warped set of incentives.

And the position of environmentalists is particularly perverse. In addition to the large amounts of energy-intensive grain and forage that cows consume, and their solid wastes that must be disposed of, cows produce significant amounts of methane in their gut -- about 12 percent of all methane released into the atmosphere comes from cattle. And methane is one of the major so-called "greenhouse" gases.

Indeed some of you may have heard the news conference or seen the full-page ads purchased in the New York Times last month by a group of environmentalists who want to stop the raising of cattle because of their alleged contributions to global warming. That may or may not be a useful cause. What was interesting to me was that the head of the effort was Jeremy Rifkin, who of

course has distinguished himself by his ferocious opposition to all forms of biological engineering, including BST. It seems not to have occurred to Mr. Rifkin and his allies that if BST could make one dairy cow in five superfluous, that would be an environmentally useful thing.

If we allow technophobes to block the door to scientific progress, and subsidizers to block the door to economic reason, there is no telling how many multiply-beneficial innovations will fail to appear in agriculture. And those foregone opportunities will hurt farmers, cost consumers, and come at a cost to the environment.

Technology, Ecology, and the American Farmer

Scientific advances promise more bountiful harvests and a cleaner environment. But farm subsidies and technophobia could block the way.

BY KARL ZINSMEISTER

"In the 1950s," recalls farm consultant Eldon Hans, running his hand through his white hair, "we were canning peas and sweetcorn and pumpkins in East Iowa. Lots of other vegetables and many fruits were grown locally. Most farms had a few livestock and poultry. The field crops were mixed, and rotated from year to year. It was the kind of balanced, varied production that many agricultural experts now just yearn for."

But fat federal field corn subsidies came along and did away with all that. Corn requires a week or two of hard work at each end of the summer and then nothing but a little casual watching; specialized crops can be a lot more painstaking. Corn prices are set high, and guaranteed, by the government; other crops vary in price like most things vary. It's little wonder, then, that farmers in East Iowa, and in lots of other places across the country, quit growing mixed crops.

All those canneries that Eldon Hans remembers have moved to Minnesota, where the short growing season prevents corn from pushing out competing production. And like most of the rest of the country, Iowans get the bulk of their fresh vegetables from the vast corporate operations based in Florida and California. There's not a reason in the world that dirt-rich Iowans should be eating trucked-in strawberries and stringbeans picked seven days earlier during the summer, but they are. Because most of the state has become monocropped in corn. As you crisscross the endless rolling hills, king corn—sponsored by federal payments that have nearly doubled the market price in some years—stretches from horizon to horizon, farm after farm, season after season.

Agriculture this unbalanced can reduce the quality of output available to consumers—there is no fully adequate substitute for fresh local produce. It has made farming more cyclical and insecure, as a grower's fortunes often rise and fall on one crop price. It can be very hard on local economies that have lost much of their diversity, becoming truly one-horse towns. And it has brought real problems environmentally.

The traditional route to high farm productivity was to rotate various crops to keep humus and soil-nutrient levels in balance. But very high subsidies for a handful of "program crops" have made them so unnaturally lucrative and secure, compared to alternatives, that rotation is falling off. As a result, many farm counties are characterized by excessive concentration on a narrow range of agricultural output. From his extensive studies of various cropping regimens, Iowa State Cooperative Extension agent Mike Duffy concludes that "all the financial rewards currently favor the most environmentally damaging practices."

In addition to the overconcentration on favored crops that subsidies bring, there are more-specific problems with current federal programs. For one thing, payments are made to farmers on the basis of the total acreage they devote to a program crop over a period of years. If a corn farmer rotates his fields with soybeans, oats, or pasture for conservation purposes, his "base" for corn falls, reducing the area he is eligible to harvest in future years. "Government programs kick you in the teeth if you try to follow a rotation-based system," says Duffy.

To save their teeth, most growers of corn and the other supported farm products have taken to monocropping—the same kind of plants on the same land, year after year—and pouring on fertilizers and pesticides to try to maintain soil fertility. That is costly, and it can have untoward environmental effects, including increased insect immunity to pesticides, excessive leaching of fertilizers into watersheds and aquifers, and possible buildups of chemicals in the soil, water, and food chain.

In September, the National Academy of Sciences released a major study concluding that federal farm subsidies encourage overuse of fertilizer and pesticides by rewarding maximum yields per acre rather than maximum overall return in the marketplace. The NAS also pointed out that farm policy discourages diversification into other crops not covered by government programs. The chairman of the research committee that wrote the report said the finding of government culpability was the most important conclusion of the study. "It is these programs that really restrict experimentation, the changing...to alternative crops" and other conservation practices, explained John Pesek.

The over-intensification problem is aggravated not only by subsidies but also by other provisions of U.S. farm programs. In an attempt to contain the unwanted agricultural surpluses that subsidies inexorably bring, lawmakers have increasingly relied on a strategy of land-idling. The 1985 farm bill included measures to take tens of millions of acres of U.S. farmland out of production for periods ranging from 1 to 10 years. To keep farm income up while this was taking place, direct payments to farmers were increased.

> Without subsidized water, California would be relatively unimportant agriculturally. But its cheap drinks have lured crops from elsewhere.

These measures had a very perverse combined effect. On the one hand, the supply of available farmland was constricted. On the other, payments for each bushel actually grown were very generous. Farmers responded exactly as you would expect—they poured chemicals and tractor time onto those acres that remained in circulation and got higher yields that nearly canceled out the lower acreage. That defeated the lawmakers' intent of cutting output. It also souped up agricultural intensity to unnatural levels—the last thing to be desired from an environmental point of view.

So long as politicians insist on handling the surplus dilemma by reducing the supply of agricultural land instead of attacking the problem at its root—by cutting subsidies—farmers will continue to substitute chemical and energy inputs for acreage. The strange result is that in this country, where we have more rich earth than we know what to do with, much of it is tilled as frantically, and harshly, as if we were some soil-shy rocky island.

Another effect of high farm subsidies combined with mandatory land "set-asides" is to encourage sod-breaking on fragile lands. For instance, the sagebrush lands of West Texas and the sandy prairies of Colorado, Nebraska, and Wyoming had for most of this century been considered too frail for tillage. Under market conditions, they would rarely have been used for anything but grazing. But thanks largely to federal incentives in the late 1970s and early 1980s more than 10 million acres of this highly erodable land were plowed under for wheat and corn.

Much of it gave out within a few years, but a safety net yawned below: In 1985 the Department of Agriculture set up a "Conservation Reserve" program to buy out of production up to 45 million acres of "fragile" lands—three-quarters of them planted in program crops—for a 10-year period. Most of the sodbusters jumped on board. In that way they extended their economic bounty another decade, proving they were right to bet the feds would make their environmentally and otherwise imprudent decision economically lucrative.

Tarkio, Missouri, farmer Blake Hurst notes the perversity he observed in his county: "What programs like the...Conservation Reserve really do is remove the risk from farming highly erodible, unproductive land....When times are good, plow it up and let it blow or wash away. Don't worry about the bad times; you can always rent it to Uncle Sam."

Similar whackings to Mother Earth have been administered by another portion of the U.S. farm program: the disaster aid regimen. Established in 1973, federal disaster aid allows growers whose harvests are stunted or who are prevented from planting by "conditions beyond the control of the producer" to collect payments that frequently total many hundreds of millions of dollars. (In the 1988 doozy, nearly $4 billion in drought aid was handed out.) In addition, the government farm credit agencies routinely make billions of dollars in "loans" (many of which go delinquent) available to farmers in areas hit by flood, dryness, or similar inclemency.

The problem is, the easy availability of free insurance encourages more exploitation of dicey lands, riskier planting decisions, and less care in management. Agricultural economist Bruce Gardner points out that "corn is more susceptible to lack of water than is grain sorghum; but if all goes well, corn is a more profitable crop." With disaster aid guarantees

chemical doses, and, on the whole, there is no question but that America's current food supply is safer and more wholesome than it has ever been. That fact is not reflected, however, in most environmentalist reports.

The recent case of Alar and apples was representative of the kind of harm done to both farming and the public interest by environmental extremism. Based on some grossly distorted science, and heedless of the near disappearance of the Alar preservative due to voluntary measures by apple growers, a group called the Natural Resources Defense Council panicked parents all across the country with claims that normal apple consumption could threaten children with cancer. Apples were removed from schools, and apple sales plummeted, doing grave damage to growers. A great many youngsters who had been eating wholesome snacks and desserts switched to something gummier. Forced to choose between strident negative claims and complicated rebuttals, "the public banned Alar," as one congressman put it. The politicians and EPA bureaucrats will soon follow suit.

> "It's a lot easier to be an environmentalist when you don't have to worry about worms in your pickles," says farmer Blake Hurst.

There are numerous other instances where calculated incitement of public hysteria by environmentalists resulted in over-hasty banishment of chemical compounds important to agriculture. Often, no thought at all is given to what might replace the compound in question, and in some cases the substitute has been considered even less healthful than the criticized target. Government certification of agricultural chemicals has become so involved, taking two to five years, that it increasingly does not pay manufacturers to keep their products on the market unless they are big sellers.

As a result, specialized compounds and bug controls for minor crops are disappearing, to the alarm of growers—not because they are unsafe but because sales aren't high enough to justify undertaking exhaustive environmental approval. Earlier this year, for instance, DuPont said it was discontinuing phosdrin, a vegetable insecticide, and azodrin, a cotton and sugar cane pesticide, because it wasn't cost-effective to spend the millions of dollars necessary to reregister them.

Another offshoot of unbalanced chemical alarmism has been the substitution of foreign-grown food for domestic production. When necessary chemicals become too costly or too hard to obtain, some crops cease being raised in the United States. The irony is, they are replaced by supplies grown in countries where monitoring of the safety of agricultural chemicals is far more lax. This is an important source of the increasing transplantation of American fruit and vegetable production to countries like Mexico and Chile.

Farmers themselves are pretty sensitive to the effects of agricultural chemicals. After all, in most cases they have to apply the chemicals themselves, and many farmers pointed out to me that it is their family drinking water that is affected if buildup becomes a problem. Since 1981, all farmers must pass a detailed test and be certified before they can buy and use restricted pesticides. Better, more selective chemicals that are used at rates just a fraction of what prevailed 10 years ago are now coming to market, and much more measured application is being practiced.

New techniques and technology promise further improvements. For instance, researchers have found that herbicides dissolved in vegetable oils are much more effective, allowing equivalent control with just one-fourth of current usage. Application equipment is now being designed. Forthcoming electrostatic sprayers will increase delivery efficiency even further—electrically charged droplets will wrap themselves around plants, allowing ultra-low-concentration solutions.

Since pesticide costs can total as much as 15 percent of a farmer's production expenses—billions of dollars a year nationwide—and only about 20 to 25 percent of conventional spray reaches its desired target, these improved practices can bring farmers dramatic cost savings while reducing environmental worries. The next stage, well underway, will be to attach cameras and other image sensors to the tool bars of tractors and set up a computer to digitize leaf outlines, turning herbicide nozzles on when it sees a weed and off when it doesn't.

Researchers at Purdue University have already developed color sensors that can assess the amount of organic matter in soil. Attached to fertilizer or herbicide rigs, they can calibrate the exact dosage of chemical to the earth being passed over. The technology is now being licensed and should be commercialized within about two years.

Other work by the Agricultural Research Service of the U.S. Department of Agriculture is examining ways to encapsulate fertilizer or pesticides in starch or water-resistant membranes, so a controlled amount applied directly to the soil will be released slowly, as plants need it, instead of in heavy conventional doses that can wash or leach away. More-fundamental research is aiming to give plants the ability to fix their own nitrogen—extracting it from the atmosphere where it is abundant, as legumes, vetches, and some other plants do naturally—so that no artificial fertilizer will even need to be applied. New technologies like these offer far more promise in solving environmental problems than any regulatory strategy.

Even absent bold new tools, farmers have begun to vastly improve their utilization of fertilizer and chemicals. Delaware vegetable farmer Charles West, for instance, makes four separate fertilizer applications on each crop of spinach, because multiple small applications are much more likely to actually reach the plant (and less likely to leach into the groundwater) than one big dose. Cover crops are also planted on almost all fields over the winter to help keep soil nutrient levels high. "If for no other reason than cost, you won't find anybody just dumping stuff on their fields anymore," says wheat grower David Magness.

And reducing use is usually all that is necessary. Agronomists have shown that most of today's farm chemicals are easily degraded by natural microbes present in the top four feet of soil. Provided they are not overapplied or too heavily watered in, modern chemicals could be used indefinitely in most places without threat of buildup.

Probably the single best way to get farmers to reduce their use of chemicals would be to free farm prices, so that growers would profit from paying more careful attention to their input costs. There is reason for hope on this increasingly fractious issue, if only environmentalists would acknowledge the new research on dosages and delivery systems and accept the confluence of economic and environmental interests when it comes to farm chemicals. Cost-driven conservation makes every farmer an antipollution force, but it only takes hold when farmers are exposed to the free market's powerful incentives to pinch pennies. One more voice on the side of subsidy reform could make a difference here.

> "If for no other reason than costs, you won't find anyone just dumping stuff on their fields anymore," says wheat grower David Magness.

Unfortunately, environmentalist sentiment seems increasingly unwilling to acknowledge the concept of an "acceptable" dose greater than none and ever more hostile to considerations of cost-effectiveness. Any discussion of the growing conflict between farming and environmentalism must ultimately look deeper than the subsidy problem and the economic divergences and consider the philosophical split. Modern environmentalism is slowly grinding its way toward a zero-tolerance standard which allows little room for compromise with productive goals. It frequently exploits, and feeds, what appears to be a rising antiscience, anti-material progress feeling among parts of the general public. In too many instances, critical agricultural advancement is being thwarted by environmentalism's opposition to new technology and sometimes even to research.

An example would be food irradiation, an efficient, scientifically uncontroversial method of preserving and sterilizing edible products without the use of chemicals. In a process that might be thought of as somewhere between microwave cooking and the airport luggage x-ray, low-dosage ionizing energy can be used to kill harmful organisms without leaving any radioactive residue behind. All meat products, for instance, could immediately be certified free of trichona, toxoplasmosis, salmonella, and other dangerous microorganisms via irradiation.

Irradiation is already used to sterilize food eaten by some hospital patients and by astronauts, as well as to make products like cosmetics and medical supplies. The United States Food and Drug Administration, the World Health Organization, and other regulatory groups have approved it for use on a range of commercial foods in countries around the globe. Hardly any food is so treated in the United States, however, because environmental and "consumer" groups have been able to mobilize public dread and opposition to any process with the word radiation in it, particularly since the Chernobyl panic.

One of the agricultural scientists I interviewed suggested we are at the beginning of a new era which will increasingly see the substitution of botanical for mineral resources—plastics supplanting metals, plant and animal "factories" synthesizing a growing range of chemical compounds, new reliance on biopharmaceuticals, cultivated energy sources, and so on. Some of the procedures involved—genetic engineering, hormone therapy, cloning—are very new and make people nervous. There is little question, however, that the future will require more, not less, expertise in biological exploitation and management. Undue fretfulness in this area will mean lost opportunities and surrender of leadership on the newest science frontier to better-prepared competitors.

Some optimism is in order—current developments in bioresearch are exciting on several fronts. Originally, most agricultural study was oriented toward making farmers more productive and giving them new products. Most of that work is now done commercially rather than publicly, although the government does continue basic production research.

The second big push in agricultural research was to find new uses for agricultural products. Researchers continue to come up with fresh applications—biodegradable plastics made from vegetable starches are gaining attention now, as are industrial oils derived from plants, printing inks and engine fuels made from soybeans, alcohol fuels distilled from grains, and so forth. An entirely new commercial crop—bamboo-like kenaf—is

now entering production as an annually harvestable paper source. Researchers are even beginning to talk about making plastic films that could be used, for instance, as floor coverings from the casein in milk.

But the biggest hunt in agricultural research today is for new answers to health and safety questions. The latest research offers something for everyone—better quality and wholesomeness for consumers, improved efficiency for farmers, more benign ecological effects for environmentalists. Scientists are on the verge of identifying plants that can "eat" toxic compounds out of the soil, plants that can fertilize themselves, even plants that produce their own natural insecticides internally. Farm animals are becoming healthier and more efficient. Insects are being combated naturally through use of sterilization and other processes.

Development of biological controls to replace inorganic pesticides is an area of particular emphasis. Biocontrol is not new. For 100 years, U.S. scientists have been collecting, studying, and then releasing natural predators that attack nuisance weeds or bugs. The first microbial pesticide, a bacteria that infects Japanese beetles, was first distributed back in 1939 and can be bought by home gardeners at any hardware store under the name Milky Spore Disease.

But as scientists have begun more active measures to find and create natural pesticides via genetic engineering, even biological control has begun to be attacked by environmentalists. Earlier this year, the EPA gave permission to Crop Genetics International, a Maryland biotechnology company, to plant corn seeds inoculated with a bacteria that will live within the plant and kill any caterpillars that try to eat it. The technique could make the U.S. crop resistant to a borer that does $400 million of damage every year, even after farmers apply $50 million of pesticides. If the system works, the pesticides can be scrapped, and scientists estimate that Nebraska alone will have a 25 percent increase in its corn yields.

The biological agents tested so far are all variants of naturally occurring organisms. Before they are approved, manufacturers have to demonstrate that the agents won't kill beneficial insects in addition to their targets and that they won't spread to neighboring weeds, giving them unwanted predator immunity. If allowed to develop, a clutch of these new measures could bring dramatic containment of insect and weed threats without heavy use of invasive chemicals.

Farmers are enthusiastic, sensing a solution to the triple squeeze of decreasing availability, increasing costs, and possible environmental effects of chemicals. "The chemical companies tell us that to put a new pesticide in the market costs so much that they have to pass it on to us. Five years ago it used to cost me $60 an acre to spray cotton. Now it costs $120 to $130," says one cotton farmer. "We urgently need a different approach," agrees another.

Environmental groups, however, including the Environmental Defense Fund, the National Wildlife Federation, and the Audubon Society, have tried to block commercialization of the Crop Genetics product. Other nonchemical systems that would cause natural viruses to break out among crop pests, or stop their digestive tracts from functioning so they starve to death, have also met resistance from environmentalists who believe much more regulatory control is called for. The group Friends of the Earth has labeled bio-engineering "Russian Roulette."

Kanuf (left) could replace trees as a paper source. Genetic engineering (below) promises riper tomatoes.

Plant disease research may be thought of as at a threshold similar to when the new process of vaccination began to be used to protect humans. But rather than treating this as an exciting scientific refinement that requires normal laboratory precautions, many environmentalists insist biotechnology is a dangerous leap into wholly new territory. It is not. The National Academy of Sciences' Committee on Scientific Evaluation of the Introduction of Genetically Modified Microorganisms and Plants into the Environment concluded in a major report released in September that the process presents no unusual or unmanageable risks.

The technological progress made in improving and supplanting farm chemicals has been mirrored by positive developments in animal husbandry. Over the last 30 years half the fat has been taken off U.S. pork. Loin pork is now equivalent in cholesterol and fat to chicken, a very healthful improve-

ment. Similar progress is being made with beef. If allowed to proceed, cloning, gene transfer, artificial insemination, and other biotechnology could improve leanness by another 50 percent.

Waste and costs in animal production are also coming down. In 1950 it took 84 days to raise a 4-pound broiler chicken, with a feed conversion rate of 3.25 pounds of feed for every pound of meat produced. Today, thanks to poultry inoculation, scientific breeding, controlled diets, and other factors, it takes 42 days, with a 1.9 feed conversion. Again, agricultural science has brought more efficiency, fewer unwanted byproducts.

Similarly, in 1945 there were 25 million dairy cows in the United States, and they produced 4,600 pounds of milk each. Today, we have just 10 million animals, but they put out an annual average of 14,000 pounds each. That can only be thought of as a boon for consumers, farmers, even cows (less competition for the most scenic grazing sites). Developments now underway could dramatically push that trend line upward again—except that environmentalists and some hidebound farmers may succeed in preventing it.

Scientists are exploring ways to find and create natural herbicides (right) and disease-resistant plants (above).

The biggest improvement on the milk horizon would come from use of bovine somatotropin (BST), a natural growth hormone that could boost milk output another 15 to 20 percent per cow. The U.S. Food and Drug Administration, which has already given the go-ahead to sales of milk from cows getting BST (it is indistinguishable from other milk) has concluded after careful study that BST is an entirely safe protein. Only some atavistic environmental groups continue to make the opposite case, and commercial approval is expected early in 1990.

But environmentalist opponents now organizing a scare and boycott campaign have allies in this case among dairy farmers, who have their own reasons for opposing BST. The dairy program is one of the most rigidly controlled of all the farm subsidies. The federal government supports milk prices at strictly controlled levels by buying up tons of surplus dairy products. If BST suddenly boosted milk output, keeping prices right where the dairy lobby has convinced Congress to set them could become very expensive—possibly a couple billion dollars a year beyond the similar figure already budgeted.

The obvious solution is to let prices fall, but dairy farmers used to their cozy cartel would consider that a calamity. Better to remain inefficient. So in this instance, bounty-inducing new technology is being resisted, on trumped-up environmental grounds, largely because the U.S. farm program makes it impossible for prices to adjust to changes in supply. Not only BST, but any other research that would increase efficiency in the ways that we have come to think of as synonymous with modern progress becomes anathema under this warped set of incentives.

What's the big loss, you say, not noticing any great milk shortage. Well, maybe none. But we don't know what benefits might accrue from cheap milk. There are always those floor coverings made from casein. And scientists think they may someday be able to extract rare medical proteins—such as the blood-clotting factor used to treat hemophilia—from milk. Progress can't be anticipated in advance, but we would definitely be foregoing something. And tactically, the timing of this case is bad. Because it is about to run up against the political might of one of the most venerable farm subsidies, biotechnology—in the BST case—is going to get a very black eye even before its potential has fully seated in the public consciousness. That could set a nasty precedent.

So we are back where we have ended up several times before in our tour of U.S. farming: concluding that without price reform—specifically, a return of market incentives—great opportunities will be lost. That, plus openness toward the new agricultural science, is essential to the future health of U.S. farming. A biotechnology cornucopia is about to open, offering riches on many fronts. Among other things, a flood of mutually beneficial innovations could heal the increasingly antagonistic relationship between farmers and environmentalists. But if that is to happen, both sides must be willing to embrace positive change. Stubborn insistence on blocking the door to progress could prevent a synthesis with truly rare potential to improve life for all Americans. ☐

Contributing Editor Karl Zinsmeister is a Washington, D.C.-based writer and an adjunct research associate at the American Enterprise Institute. This article is the third in a four-part series. Next: How to get out of the subsidy trap.

WRITTEN OPENING STATEMENT OF REPRESENTATIVE ARMEY

Good morning. I am pleased to welcome our panel of witnesses today to discuss the federal role in minimizing conflicts between the legitimate economic interests of American farmers and the concerns of environmentalists that current agricultural practices sometimes lead to the erosion of environmental quality. The 1990 Farm Bill contains a wide variety of conservation provisions; in the future we can expect more congressional efforts to regulate farm practices in order to protect the environment. Therefore, this is a timely issue that deserves this forum.

Responding to reasonable environmental concerns with yet more federal regulation of farming would be a mistake. What we really need is an aggressive program of deregulation, not more federal interference in private markets. The American farm sector is one of the most regulated, restricted, and subsidized markets in America. In a free, competitive market, farmers would have powerful incentive to minimize damage to the environment, and would adopt environment-friendly techniques because doing so would be plain good business. But our vast array of farm subsidies, set-asides, and other federal interferences in the efficient operation of the agricultural market encourage farmers to do just the opposite. We need to stop paying farmers to employ environment-damanging practices before we leap in with complicated new government environmental regulations.

Consumers would gain, economic growth would increase, and in the long-run even farmers would be better off if Congress would seize the opportunity to free American farmers from excessive government regulation and needless subsidies. It is encouraging that many within the environmentalist community have begun to criticize farm subsidy programs on ecological grounds. There is now the potential for a powerful coalition of pro-consumer, pro-economic growth, pro-environment forces that stands a good chance of achieving serious reform of our outmoded federal farm policies.

SUBSEQUENT MATERIAL SUPPLIED FOR THE RECORD

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May 26, 1992

The Honorable Lee H. Hamilton, Vice Chairman
Joint Economic Committee
U.S. Congress
Room SD-G01 Dirksen
Washington, D.C. 20510

Dear Congressman Hamilton:

Thank you for the opportunity to testify before the Joint Economic Committee on May 7 concerning agriculture and the environment. The hearing provided an important forum to explore future directions in federal policy.

During the hearing, I expressed NRDC's opposition to H.R. 1330, which we believe would fundamentally weaken federal laws for wetland protection. If agreeable, I would like to supplement the hearing record with the National Wildlife Federation's critique of H.R. 1330, which provides a more detailed basis for our position.

One of the bill's shortcomings is its extraordinarily broad construction of when government intervention constitutes a "taking" of private property; this issue arose at the May 7 hearing. Specifically, under H.R. 1330, all landowners whose wetlands are classified as "high value" and who request federal government compensation would automatically be entitled to receive the full fair market values for their properties within three months of their requests. This compensation must be paid whether or not the landowners suffer any economic losses due to the wetland designations.

This approach to compensation is inconsistent with the current Constitutional "takings" law and presents a serious threat to both Federal and State budgets. At a hearing last week by two House Merchant Marine and Fisheries Subcommittees, the Association of State Wetlands Managers expressed strong opposition to H.R. 1330. A copy of the Association's testimony is attached.

As I indicated in my testimony, we strongly support fair government compensation for foregone agricultural cropping rights on wetlands. This is why we have been longstanding advocates for the 1990 farm bill's Wetlands Reserve Program (WRP), which pays farmers to restore and protect natural wetlands under permanent conservation easements. The WRP is equitable to producers and

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taxpayers, and constitutes an effective tool in our national efforts to achieve "no net loss" of wetlands.

We are currently supporting more than a threefold increase in WRP appropriations over the very modest FY 1992 levels. Paradoxically, some of the agricultural interests that have pressed most aggressively for enactment of H.R. 1330 have virtually sat on the sidelines in the efforts to increase funding for the well-conceived wetland reserve. Unfortunately, H.R. 1330 would frustrate, rather than complement, the WRP and related farm bill conservation programs.

I hope these observations are useful to you and the Committee. We would be pleased to supply additional materials concerning wetland protection policies.

Sincerely,

Justin Ward

Justin Ward
Senior Resource Specialist

Attachments

Working for the Nature of Tomorrow

NATIONAL WILDLIFE FEDERATION

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Critique:
Comprehensive Wetlands Conservation and Management Act of 1991 (HR 1330)

Executive Summary

While professing to provide "balanced" wetlands protection, this legislation balances away all but the most highly valued wetlands and completely abandons any notion of a no overall net loss of wetlands goal. While professing to expand the coverage of wetlands regulation to protect against wetlands destruction from activities that may not involve the discharge of dredged or fill material, this legislation actually turns the entire Clean Water Act (CWA) §404 program into little more than regulatory window-dressing.

This bill favors development over protection at every possible turn. Not only does this bill require federal taxpayers to pay full market value to protect the most valuable of wetlands, but it allows developers to convert these most prized of wetlands *even after they become federal wildlife refuges!* This bill represents a major retreat from even the limited protection now provided by the §404 program, and tragically undercuts recent congressional initiatives to protect wetlands, including the 1989 North American Wetlands Conservation Act, the conservation provisions of the 1990 Farm Bill, and the 1990 Coastal Restoration Act.

This legislation repeals CWA §404 *in its entirety*, including the §404(b)(1) permitting standards, the Environmental Protection Agency's (EPA's) role in administering the §404 permit program, and the EPA §404(c) veto power. This legislation places all §404 regulatory authority with the Corps of Engineers (Corps). The alternatives test currently required in the §404(b)(1) guidelines is gutted, and mitigation requirements are loosened to the point that significant net wetland losses are assured. Section 404(e) general permit authority and §404(f) exemptions are significantly expanded.

In addition, this bill requires the classification of wetlands into high, medium, and low value wetlands. "Low value" wetlands receive *no* protection under the bill, protection for "mid-level" wetlands is substantially diluted, and protection for the "highest value" wetlands can only be secured through federal acquisition at full market value. Even then, protection for such high value wetlands is not secure. This classification system also promotes the piecemeal destruction of wetlands, virtually

Detailed Analysis

§404 (a) Prohibited Activities--

This subsection expands the activities covered by §404 to include drainage, channelization, or excavation of wetlands.

Critique: This section does not go far enough in that it does not include all significant wetland and aquatic habitat alteration activities, including inundation of wetlands.

(b) Authorized Activities--

This subsection authorizes the Corps to issue permits for these otherwise prohibited activities, and provides that Type C wetlands under §404(e)(5), activities authorized by general permit under §404(e) (6), any exempt activities under §404(f), and any other exemptions in the new §404, do not require any prior authorization from the Corps.

Critique: Here, and throughout this new §404, EPA is systematically excluded from the §404 permit review and enforcement process. This exclusion of EPA -- along with its veto power, the §404(b)(1) Guidelines, its role in defining program jurisdiction, and its enforcement powers -- virtually eliminates environmental protection from the §404 permitting program and eliminates any connection between §404 and the rest of the CWA. While there is certainly room to streamline and clarify the respective roles of EPA and the Corps in administering §404, the elimination of EPA involvement is unacceptable.

(c) Wetlands Classification--

This subsection requires *the Corps* to classify wetlands by function and value into high (Type A), medium (Type B), and low (Type C) upon the application of a person seeking to alter wetlands, and to do so *within 90 days* of receipt of the application to classify.

Alternatively, if a wetland has already been classified by the *FWS* pursuant to subsection (h), below, the applicant can ask the *Corps to review that classification de novo* and to modify it.

Critique: At base, the classification approach, i.e., that wetlands can and should be categorized into high, medium, and low value classes, and regulated in accordance with that categorization is fundamentally flawed. The existing §404(b)(1) guidelines and the EPA/Corps Mitigation Memorandum of Agreement (MOA) already allow for tailoring the degree of regulation to the functions and

ignoring the cumulative effects of destroying one "non-significant" wetland after another.

Simply stated, American taxpayers would secure more wetlands protection per dollar spent by simply authorizing the U.S. Fish and Wildlife Service (FWS) to increase its purchase of wetlands for inclusion in the National Wildlife Refuge System (NWRS) under existing authority.

For more information, contact:

Steve Moyer (797-6877)

values of wetlands through the use of EPA's advanced identification process and other comprehensive planning processes, and through the application of *practicable* alternatives and mitigation requirements. Clearly, one factor in the practicability of an alternative can be the wetland values and functions actually being preserved as a result of choosing an alternative project location or design. Moreover, compensatory mitigation is required to offset the wetland values and functions lost. Hence, mitigation requirements are higher for larger wetland acreages and greater wetland functions.

Second, to assign wetlands to a high, medium, or low category is a subjective value judgment that will weight some wetland functions over others. Consequently, some very important wetland values, such as flood control and groundwater recharge, may be undervalued through this classification process.

Most importantly, to make these assignments in a manner that is scientifically defensible will require studies and inventories that will consume enormous amounts of agency staff time and program funds. Depending upon the complexity and size of the wetland and agency resources available, wetland functional assessments could take thousands of dollars and many months to complete. To add this requirement to that of wetland delineation before any determination of permit requirements will simply exacerbate the program delays and inefficiencies the regulated community complains of now.

Consequently, while we recognize that "not all wetlands are created equal" and that this premise must be recognized in the §404 regulatory program, any such "valuation" process should continue to be conducted through the use of comprehensive planning at the watershed level consistent with §404, and the continued recognition of relative wetland function and value in the §404(b)(1) guidelines' alternatives analysis and mitigation process.

In addition to the technical inadvisability of the classification concept, the process proposed in this legislation is patently calculated to minimize wetland protection. Given the complexity of the valuation process and the voluminous classification requests that will be sent to the Corps -- credible functional assessments intended to determine the degree of regulatory protection will often be difficult to produce within the statutorily-mandated 90-day time frame.

Second, this legislation sets up a dual classification process that is destined to be inefficient, confusing, and

ineffective in protecting wetlands. As proposed, the *Corps* conducts wetland classifications on a case-by-case basis, while, at the same time, *FWS* can conduct advance classifications under §404(h). However, if an applicant does not like the FWS valuation, he or she can ask the Corps to conduct a new review of the FWS classification. As a result, two different agencies establish classification bureaucracies, two different agencies establish procedures for wetland classification, two different agencies are likely to spend considerable resources classifying the same wetland. This dual system will not only waste scarce agency resources, but provide fertile ground for inconsistent determinations and additional decision-making delays. At the same time, this dual system provides the applicant at least two chances to downgrade wetlands protection on a given site.

Wetland functional assessment for purposes of §404 regulation should continue to be conducted by the Corps and EPA, with strong reliance upon the biological and ecological expertise of FWS and the National Marine Fisheries Service (NMFS).

Type A classification--

The bill directs the Corps to classify as Type A wetlands *only* those wetlands which meet *all* of the following conditions:

* the wetlands serve "critical wetland functions" including providing "critical" habitat for a "concentration" of avian, aquatic and terrestrial wildlife species;

* the wetlands consist of 10 or more contiguous acres and have an inlet or outlet (except for wetlands with prairie pothole features);

* there is a scarcity within the aquatic ecosystem of identified wetland functions such that the alteration of such wetlands would "seriously jeopardize" the availability of such functions;

* there is no "overriding public interest" in the use of the wetlands other than conservation;

* wetland functions and values cannot be conserved through minimizing wetlands alteration and compensating for wetlands losses.

Type B classification--

The bill directs the Corps to classify as Type B wetlands those that provide habitat for "a significant population of avian,

aquatic or wetland dependent wildlife," or provide other "significant wetlands functions."

Type C classification--

The bill directs the Corps to classify as Type C wetlands those that:

* serve "*limited*" wetlands functions; or

* serve "marginal" wetlands functions, but exist in such abundance that regulation of activities in such wetlands is not necessary to conserve "important" wetland values and functions; or

* are prior converted cropland; or

* are "fastlands"; or

* are wetlands located in "intensely developed areas" and, as a result, do not serve "significant wetlands functions."

Critique: These classification criteria demonstrate the subjectivity of wetlands valuation and reflect the authors' clear intent to protect only those wetlands with the highest and most demonstrable social value. For example, with the single exception of prairie pothole-type wetlands, isolated wetlands and wetlands under 10 acres -- regardless of their biological diversity, scarcity, or other ecological attributes -- cannot achieve the Type A level of protection under this bill. Hence, many bogs, fens, and wet prairies that often support a diversity of plant and animal life and provide important hydrological functions are ineligible for this Type A classification. Moreover, even wetlands which otherwise meet this narrow litmus test of ecological value can be eliminated from Type A protection because of some "overriding public interest."

This classification system also clearly promotes the piecemeal destruction of wetlands in that there is little protection afforded against the cumulative effects of destroying one "non-significant" wetland after another. Yet, the cumulative effect of altering hundreds of such "non-significant" wetlands within a watershed will almost always have an adverse effect on the local or downstream aquatic environment.

(d) Compensation for Landowners--

This subsection legislatively establishes the Type A classification as a "taking" of property by the United States

government and allows anyone with an interest in land classified as Type A to seek fair market value compensation, *plus attorneys' fees* for the wetland, disregarding any reduction in value attributable to wetlands regulation.

The FWS is required to make a good faith offer to the landowner *within 3 months* of the landowner's request. The landowner, on the other hand, has *six years* to consider the offer, and can then either accept the offer, file a claim with the U.S. Claims Court, or elect not to receive compensation at all.

Unless the landowner refuses compensation, the Type A wetland becomes federal land generally managed by the FWS as part of the National Wildlife Refuge System.

The Type A classification constitutes a *taking of surface interests in land only*, unless the *Corps* determines that oil and gas or mineral exploration or development are incompatible with wetlands conservation. If such incompatibility is determined, or access to subsurface interests is denied, such oil and gas or mineral interests will be compensated as a taking.

The bill purports to confer jurisdiction upon the United States Claims Court to determine value of interests "taken" under this bill and the fair compensation required pursuant to this bill and the Constitution. The bill also purports to confer jurisdiction to *require* the U.S government to provide access through wetlands which *may* be the subject of a taking for the purpose of exploration to determine value of interests taken, as well as to provide other appropriate equitable remedies.

The landowner has two years to execute the Claims Court judgment, and can, by agreement with the federal government, satisfy the judgment through such creative techniques as tax credits, acquisition of federal oil, gas, or mineral rights, and land exchanges.

This government purchase of Type A wetlands at fair market value *does not* include the purchase of rights to use water and does not alter or supersede water allocations under local law.

Critique: The Type A classification of a wetland as envisioned in this legislation is *not a taking of private property which requires compensation under the Fifth Amendment of the Constitution under existing Supreme Court precedent*, since according to §404(e), a permit to alter Type A wetlands can still be obtained from the Corps under some circumstances. The taking does not occur unless and until it can be established that virtually no economic use can be made of the wetland as a result of permit denial or restrictions. Consequently, this legislation imposes new

financial liabilities on the federal government which go far beyond what is required by the Constitution.

In addition, the requirement that compensation be at fair market value, with no discounting for the fact that it is subject to wetlands regulation, and with additional payment for attorneys' fees, completely ignores the public's interest in these "waters of the United States," and the responsibilities of all landowners to use their property only in a way that does not harm the public as a whole. Just as municipalities do not have to pay landowners to keep their land uses within the confines of local zoning ordinances, the government should not have to pay landowners to protect the water resources that flow over, through, and under their land.

This wetland compensation requirement shortchanges the public in that it pays private landowners too much for public resources, and at the same time, does not even fully protect those public resources. The federal government does not buy the water maintaining the wetland and does not buy the subsurface rights. In addition, even though these purchased Type A wetlands are purportedly federal property managed by FWS, this legislation authorizes their alteration through §404 permits. These same Type A wetlands would seem to have more and better protection if simply acquired by FWS for the NWRS under existing statutory authority.

Here, as elsewhere in this legislation, the landowner/applicant is given every advantage: the FWS and Corps must juggle thousands of compensation cases and make a good faith offer in each within 3 months; yet the landowner/applicant has a year to entertain the offer and two years after a court judgment to decide the currency in which he wants it satisfied. The provision that compensation might be made in ways to shelter the landowner's financial gain, such as purchases of government oil and gas interests and land exchanges raise their own questions about natural resource protection. Any such transfers of government interest should be subject to strict compliance with other environmental laws.

Finally, the §404(d)(6) expansion of Claims Court jurisdiction seems to run counter to the existing role of that court, as well as existing takings jurisprudence.

The takings issue should continue to be resolved under existing Constitutional takings jurisprudence. At the same time, federal and state land acquisition and easement programs should continue to be targeted and funded to

fully protect the most vulnerable and valuable wetlands. Similarly, local, state, and federal tax incentives to preserve wetlands should be encouraged. Through these measures, the burdens of wetlands protection can be equitably distributed between the public and private sectors.

(e) Requirements Applicable to Permitted Activity--

Type A Wetlands:

The Corps *shall deny* a permit authorizing activities in Type A wetlands unless:

* activities can be taken with *deminimus alteration; or*

* there are "overriding public interest concerns" other than conservation including:

  -- that "critical" wetlands functions and values can be protected through avoidance and minimization; or

  -- the project purpose can not practicably be accomplished at an alternative location; or

* the proposed use of the land will result in overall environmental benefits, taking into account mitigation.

Any permit authorizing activities in type A wetlands may contain the terms and conditions concerning mitigation necessary to "prevent the unacceptable loss or degradation of Type A wetlands."

Type B wetlands:

The Corps *may* issue a permit if:

* The watershed or aquatic ecosystem does not suffer a *significant loss or degradation of wetlands values and functions,* with consideration given to:

  -- quality and quantity of "ecologically significant functions" served by affected areas.

  -- opportunities to reduce impacts through cost-effective design to avoid or minimize impacts.

  -- cost of mitigation and social, economic, and other recreational and environmental benefits.

  -- availability of compensation to reduce the overall loss of wetland functions and values.

-- benefits of mitigation efforts.

-- the marginal impact of the proposed activity on the watershed.

Alternatives Test-- In considering activities on Type B wetlands, the Corps may require alternative site analyses only if:

* the application involves ten or more contiguous wetland acres; *and*

* there is a rebuttable presumption that the Corps must accept the project purpose as defined by the applicant in conducting the alternatives analysis; *and*

* the Corps *must* accept the project purpose as defined by public agencies for agency-sponsored projects in conducting the alternatives analysis.

Mitigation -- Generally, the Corps *shall* require mitigation where activities result in loss or degradation of Type B wetlands that is not "temporary" or "incidental."

The Corps must issue regulations for mitigation that allow for, among other things:

* minimization of impacts consistent with project purpose, compensatory mitigation, and "the public interest;" *and*

* *preservation or donation* of Type A or Type B wetlands as compensation for wetlands loss; *and*
* compensation through contribution to a mitigation banking program established by a State pursuant to §404(e)(3)(F); *and*

* offsite compensatory mitigation; *and*

* contribution of "in-kind value acceptable to the Secretary;" *and*

* construction of coastal protection and enhancement projects in areas of coastal erosion; *and*

* other mitigation measures "in the public interest."

The Corps can decide not to impose requirements for compensatory mitigation if:

* adverse impacts are "limited"; *or*

* the failure to do so is "compatible with maintaining wetlands functions and values" and no "practicable and reasonable" means of mitigation is available; *or*

* abundance of similar wetlands nearby to "serve the functions lost or degraded;" *or*

* temporal and minimized impacts make compensation unnecessary to protect "significant wetlands values;" *or*

* a waiver of such requirements "is necessary to prevent *special hardship.*"

Mitigation Banking--

The Corps, in consultation with FWS, *shall* establish in each state a mitigation banking program to "provide for" restoration, enhancement, or creation of "ecologically significant wetlands on an ecosystem basis." Such programs *shall*:

* generally provide a preference for larger scale projects;

* authorize banks sponsored by either private or public entities;

* provide for land, cash, or "in-kind" contributions;

* ensure effective maintenance for at least a 25 year period;

* authorize bonding requirements on private entities operating banks;

* authorize a credit for Type A and B wetlands permanently protected in "national conservation units" in states that have converted less than 10% of their historic wetlands base.

Six Month Permitting Deadline-- With only limited exceptions, the Corps must make a final permit decision within 6 months after the permit application is filed. Absent a decision within that time frame, the permit is *presumed* to have issued.

Appeal of Permit Denial-- This section sets up an administrative appeal of a Corps' permit denial. To uphold its decision on appeal, the *Corps* must prove by "clear and convincing evidence" that granting the permit would be inconsistent with the provisions of §404.

Type C wetlands:

Activities may be undertaken without Corps authorization.

No requirements for alternative site analyses or mitigation for Type C wetlands.

General Permits:

The Corps may issue general permits for activities in Type A or B wetlands if activities will not result in *significant loss of ecologically significant wetlands values and functions.*

Compensatory mitigation for such permits should be required only to the extent necessary to avoid *significant loss or degradation of significant wetlands values and functions where such impact is not "temporal" or "incidental."*

Current nationwide and other general permits are grandfathered.

Critique: These permitting requirements provide so little wetland protection, it is doubtful this permitting program is worth the cost of the bureaucracy required to run it. Type A wetlands -- the "highest" and most "sacrosanct" category of wetlands, most of which would be federal property through this legislation -- can still be altered upon a finding that project alternatives do not exist.

Type B wetlands can be altered as long as there is no "significant loss or degradation of wetland functions and values." This legislation employs a broad public interest balancing test to determine whether Type B wetlands are worth protecting. Our experience from the Corps' past use of such a test, without an ecological standard comparable to the §404(b)(1) Guidelines, is that virtually no permits will be denied and few wetlands protected under such a balancing standard.

The alternatives analysis now required by the §404(b)(1) guidelines is literally gutted in this subsection. As drafted, an alternatives analysis requirement applies only to very large acreages and the project proponent can eliminate most available alternatives by narrowly defining the project purpose.

Mitigation is not required for "temporary" or "incidental" loss or degradation. Even relatively long-term losses or degradation of wetlands resulting from such activities as filling wetlands for petroleum drill pads and roads, and forest roads might be deemed "temporary," since wetland conditions are likely to eventually return.

Therefore, such activities might not require mitigation. Similarly, almost any secondary or indirect loss resulting from an alteration activity might be deemed "incidental," and therefore not require mitigation.

In addition, applicants are exempted from mitigation for a range of reasons that include "special hardship."

Even in those limited instances when mitigation is required, the standards and options are so broad that mitigation becomes little more than a wetlands destruction dues payment. Replacement of the actual wetlands functions and values lost is barely suggested and very few safeguards are required to ensure that compensatory mitigation will work at all, much less on a long-term basis.

In addition to these deficiencies, the mitigation banking provision would allow for credits to be added to a state's mitigation bank for Type A and B wetlands that have been protected through federal acquisition. This provision will not only allow private entities in the state to destroy wetlands for private gain, but also facilitates wetlands destruction by allowing developers to avoid their mitigation responsibilities by relying upon the preservation investments of the Nation's taxpayers. This provision applies only in states which have converted less than 10% of their historic wetlands base. Still, this abuse of federal taxpayer investments is objectionable.

This subsection also provides for an administrative appeal of Corps permit denials, creating a new administrative decision-making layer which is expensive and time consuming. Moreover, this administrative appeal provision creates an unacceptable burden of proof which the government -- rather than the appellant -- must meet to sustain the permit denial.

This subsection eliminates all protection for Type C wetlands, significantly dilutes protections for Type B wetlands, and establishes a broad general permit program which further undercuts protection of Type A and B wetlands.

(f) Activities Not Requiring Permit--

This section adopts existing exemptions from §404 review and adds several additional exemptions:

* discharges for the construction and maintenance of aquaculture ponds.

* activities conducted on *farmed wetlands, except* for changes in land use to conduct activities not exempt under this subsection (i.e., activities other than farming, silviculture, and ranching, associated roads, and temporary mining roads).

* activities "consistent with a State or local land management plan which is approved by the Corps as being "consistent with the objectives and policies of this section." This subsection precludes judicial review of the Corps' approval or disapproval of such a plan.

* activities in connection with state-approved marsh management and conservation programs in Louisiana.

* activities or wetlands excluded from regulation under a state coastal zone management plan approved pursuant to the Coastal Zone Management Act of 1972.

* activities undertaken in "incidentally created wetlands" exhibiting wetland functions and values for 5 years or less.

* activities which are part of *expanding* an ongoing cranberry growing operation, except in Type A wetlands, as long as the expansion does not convert more than *10 wetland acres per operator per year*, and the converted wetlands (other than those converted for dikes and other necessary facilities) remain as wetlands or other waters of the U.S.

* activities which result from aggregate or clay mining in wetlands pursuant to a state or federal permit requiring reclamation.

In addition, §4 of this bill would have the Department of Agriculture's Cooperative Extension Service in each state, the land grant universities, and the agricultural industry decide what are "normal farming activities" exempt under §404(f).

This subsection eliminates the existing §404(f)(2) "recapture" provision which withholds the §404(f)(1) exemptions where such activities convert additional waters of the U.S. to new uses.

Critique: These new exemptions will dramatically reduce the already limited protection afforded by §404. Expanding "normal farming activities" will undoubtedly broaden the agricultural exemption and reduce wetland protection in agricultural areas. The local and state land use planning exemption allows for a back door delegation of wetlands regulation to states and local government. Elimination of the §404(f)(2) recapture

clause will provide a blank check for wetlands destruction from all of these exempted activities.

In sum, the permitting framework established in §404 (e) and (f) is considerably less stringent than even the existing §404 permit program and will result in little if any real protection of any but the most valuable (federally-owned) wetlands.

(g) Rules for Wetland Delineation--

The Corps is directed to publish regulations for wetland delineation which will be binding on all agencies conducting delineations pursuant to §404. The Corps shall consult with the FWS, EPA and SCS in promulgating such regulations.

These delineation rules must be consistent with the new definition of wetlands set out in §4, to be codified at 33 U.S.C.1362(21). This definition now requires, in addition to a prevalence of hydrophytic vegetation and prolonged inundation or saturation, a *predominance of hydric soils*.

In addition, this bill legislates the following specific criteria:

* wetland delineation must be based on clear evidence of wetlands hydrology, hydrophytic vegetation, and hydric soil *"present during the period in which delineation is made."*

* wetland vegetation cannot be classified as hydrophytic if "equally adapted to dry or wet soil conditions or is more typically adapted to dry soil conditions than to wet soil conditions."

* obligate wetland vegetation must be found to be present during the period of delineation.

* water must be present at the surface for at least 21 days during the growing season in which such delineation is made *and* 21 days in a majority of the years for which records are available.

* wetlands temporarily or unintentionally created as a result of adjacent development activity must not be delineated.

In addition, "normal circumstances" shall mean the "factual circumstances in existence at the time a classification is made."

Finally, no more than 20% of any county can be classified as Type A wetlands.

Critique: The clear intent of this subsection is to significantly reduce the geographic extent of §404 wetlands without regard to the scientific or ecological definition or functioning of wetlands. This subsection would effectively exclude from §404 jurisdiction all agricultural wetlands, since hydrophytic vegetation can be cleared and a wetland determination obtained which can not establish the presence of hydrophytic vegetation.

(h) FWS Wetlands Identification and Classification Project-

FWS, with the concurrence of SCS, shall identify and classify wetlands in the U.S. within 10 years of enactment. FWS and SCS must employ the Corps' delineation standards above.

This process must also include public notice and hearing in each affected county area, and the publication and recording of such identification and classification information.

Critique: The primary problem with this requirement is that it is wholely unrealistic to expect an accurate and workable §404 wetlands inventory to be completed within 10 years. This is particularly true because of the SCS concurrence, Corps delineation, and public participation standards. Even if FWS could overcome these hurdles, it would be a monumental waste of effort and limited resources, since the Corps can change the FWS determination upon the landowner's request.

FWS is already immersed in an ambitious National Wetlands Inventory Project which it should focus on completing and updating. The Corps and EPA, working from that NWI mapping, should conduct the detailed inventory of wetlands for §404 purposes contemplated by this subsection in the context of EPA's Advanced Identification process and other similar comprehensive planning approaches. These advanced planning approaches to §404 already emphasize public participation and publication and distribution of inventory information.

(i) Administrative Provisions--

This subsection directs the Corps to promulgate detailed regulations to implement the new §404 program, and limits judicial review of these final regulations.

The subsection also requires the immediate promulgation of interim final regulations locking in these legislative changes. However, the interim rules can be waived for "special hardship", inequity, or to "advance the purposes of this Section."

Finally, this subsection also dictates that the Corps "administers this Act" except as otherwise expressly provided. This language seems to substitute the Corps for the EPA as the lead agency on the Clean Water Act -- except as provided elsewhere. It clearly eliminates any role in §404 for EPA.

Critique: In the abstract, the promulgation of clear and comprehensive regulations for the §404 program would be an improvement. The problem with rulemaking during the 1980s has been the antipathy and outright hostility of the Administration for administering §404 in a manner that protects the ecological integrity of waters of the U.S. If strong aquatic ecosystem protection standards could be legislated into §404, a requirement for rulemaking might be welcomed.

The limitations on judicial review also appear broader than those employed for other regulations under the Clean Water Act. These must be revised or eliminated.

The interim final rule provision clearly is intended to immediately lock in liberal standards for wetlands destruction, even providing waivers to landowners who happen to be constrained by the interim rules. There is nothing in this interim rule standard to protect aquatic ecosystems.

Again, as indicated earlier, EPA is excluded from §404 program administration.

(j) Permit Violations--

This subsection provides guidance on the Corps' enforcement authority. While the Corps can issue administrative orders, this subsection severely restricts the Corps' administrative enforcement authority where a person disputes the Corps' regulatory determination in writing.
This subsection also provides for civil actions and civil penalties similar to the existing §404(s).

Critique: This provision significantly restricts the Corps' administrative enforcement authority. This provision, in combination with stripping EPA of its enforcement authority, will severely undermine whatever marginal wetland protection might otherwise be achieved through this legislation. While EPA and Corps enforcement procedures might be susceptible to refinement, this provision unacceptably weakens §404 enforcement capability.

(k) State Authority to Control Discharges--

This subsection contains the same language as the existing §404(t).

(l) State Regulation of Wetlands--

This provision is largely modeled after the existing §404 state program assumption provisions. The primary difference is that there is no standard of protection comparable to the §404(b)(1) guidelines which the states must meet, and the Corps, not EPA, would approve the state programs. The FWS consultation role on state assumption is eliminated. The limitation on the term of a permit, not to exceed 5 years, is removed.

In addition, the exclusion of traditionally navigable waters from state assumption is removed, so that states may assume §404 jurisdiction of all waters of the U.S within the state's jurisdiction.

Critique: This subsection is structured to facilitate state assumption of the §404 program. As the permitting agency, the Corps will be much more likely to encourage state assumption in order to reduce its workload. The lack of strong aquatic ecosystem protection standards and other procedural safeguards will encourage this process.

While we could support removing some of the obstacles, particularly financial obstacles, to state program assumption, we cannot support weakening the aquatic ecosystem protection standards presently in §404.

(p) Corps Permit Fees--

This section prohibits the Corps from increasing its permit fees without congressional direction.

Critique: At present, permit applicants pay a maximum $100 permit fee; and only if they actually are granted the permit. The actual cost of regulatory review is substantially more expensive and permit applicants should pay a fee which more closely approximates this actual cost.

PREPARED STATEMENT OF PAUL FAETH

AN ECONOMIC FRAMEWORK FOR EVALUATING AGRICULTURAL POLICY AND THE SUSTAINABILITY OF PRODUCTION SYSTEMS

Paul Faeth[1]

Introduction

In recent years, researchers and organizations have struggled to define "sustainable agriculture." Almost all definitions include maintaining productivity and farm profitability, while minimizing environmental impacts. However, these definitions have been qualitative, not quantitative, in nature. The productivity of the natural resource base, which is fundamental to sustainability, has not been successfully incorporated into definitions of agricultural productivity. The notion of agricultural sustainability has therefore been of but only limited operational use to policymakers and researchers attempting to determine the effects of various policies and technologies.

Sustainability means that economic activity should meet current needs without foreclosing future options; the resources required to provide the needs of the future must not be depleted to satisfy today's consumption (World Commission on Environment and Development, 1987). The standard definition of income found in economic and accounting textbooks encompasses this notion of sustainability (Hicks, 1946; Edwards and Bell, 1961). Income is defined as the maximum amount that can be consumed this year without reducing potential consumption in future years, that is, without consuming capital assets.

Accounting systems for both businesses and nations have included a capital consumption allowance, representing the depreciation of capital during the current year, which is subtracted from net revenues in calculating annual income. Historically, however, changes in the productivity of the natural resource base which, like other forms of capital provides a flow of economic benefits over time have not been included in these accounts.

Changes in man-made capital have become pre-eminent in accounting systems, implying that natural resource capital is of negligible value in current production systems. Nations, businesses, and farmers account for the depreciation of assets such as buildings and tractors as they wear out or become obsolete, but ignore changes in the productive capacity of natural resources such as soil or water.

Thus, soil can be eroded, groundwater contaminated, wildlife poisoned, and reservoirs filled with sediment, all in order to support current agricultural practices and income. No depreciation allowance is applied against current income for the degradation of these resources, even though the loss of asset productivity by jeopardizes future income. Current accounting practices can mask a decline in wealth as an increase in income.

For agriculture and other economic sectors that are fundamentally dependent upon the health of the natural resource base, the accounting of natural resource capital is extraordinarily important. When changes in natural resource assets are ignored, resource degradation is encouraged, if not guaranteed.

The methods of natural resource accounting provide a relatively simple way to arrive at quantitative measures of sustainability. Soil productivity, farm profitability, regional environmental impacts, and government fiscal costs can all be included within a natural resource accounting framework. In the study reported on here (Faeth et al, 1991), we used a natural resource accounting approach to rectify key omissions in past comparisons of conventional and alternative practices. Few previous studies compare profitability under alternative policy

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scenarios, and none compares the economics of conventional and alternative production systems when natural resources are accounted for.[2] These are critical omissions: if natural resource impacts are ignored, the primary justification for sustainable agriculture will have been overlooked. Additionally, any biases in current agricultural policy will also be reflected in the analysis.

The analytical methodology was designed to quantify economic, fiscal, and environmental costs and benefits of agricultural policy options and can be used to analyze the consequences of a wide range of policy interventions. Moreover, it can be used to analyze the environmental costs of farm policies in both physical and monetary terms, so that the benefits and costs of alternative policies can be compared.

At the core of two case studies in Pennsylvania and Nebraska are economic comparisons between commonly used conventional farming systems, which rely on heavy inputs of fertilizers and pesticides, and alternative systems, which rely on crop rotations and tillage practices for soil fertility and moisture and pest management. These comparisons cover not only farmers' receipts and production costs but also selected on- and off-farm resource and environmental costs.

Estimates of environmental costs are based on detailed physical, agronomic, and economic modeling of soil, water, and chemical transport from the field and the implications of these processes for water quality and soil fertility. Data from nine years of field experiments at the Rodale Research Center in Kutztown, Pennsylvania, and at the University of Nebraska at Mead were analyzed using the U.S. Department of Agriculture's (USDA) Erosion-Productivity Impact Calculator (EPIC) Model (Williams et al., 1989). Output from this model was used to estimate the on- and off-farm soil costs associated with conventional and alternative crop rotations. Other problems associated with agricultural production, such as groundwater contamination, loss of wildlife habitat, soil salinization or toxics build-up, human health problems due to the use of toxics were not addressed in this study. Hydrological models, for example, were inadequate, so economic losses associated with groundwater contamination could not be determined. The nature of the case study approach ruled out exploration of large-scale trade-offs in surface water quality, soil erosion, and groundwater quality, in which benefits in one area may be offset by costs in another due to widespread landuse changes (Hrubovcak et al, 1990). Future extensions of the method should begin to include these issues.

In both case studies, five policy options were modeled to represent their constraints on and incentives to farmers. For example, the implications of different cropping patterns on farmers' base acreage and government support payment receipts are built into each analysis. Each policy option's financial and economic value is analyzed. The financial value (Net Farm Income) of a production program to farmers takes into account current and future transfer receipts but ignores environmental costs borne by others. Net farm income is defined to include the value of changes in soil productivity, the farmer's principal natural asset. This definition is consistent with business and economic accounting practices, which incorporate asset formation and depreciation in their measures of income. By contrast, the same program's economic value to society (Net Economic Value) includes environmental costs that farmers' activities impose on others, such as damages related to water pollution, but ignores transfer payments. Because the most financially rewarding production system to farmers may not generate the greatest economic value, some policy options may induce significant economic losses.

A natural resource accounting framework. Tables 1 and 2 compare net farm income and net economic value per acre for Pennsylvania's best conventional corn-soybean rotation over five years, with and without allowances for natural resource depreciation. Table 1, column 1, shows a conventional financial analysis of net farm income. The gross operating margin, crop sales less variable production costs, is shown in the first row ($45). Because conventional analyses make no allowance for natural resource depletion, the gross margin and net farm operating income are the same. Government subsidies ($35) are added to obtain net income ($80).

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[2] See for example: Cacek and Langner, 1986; Dobbs, Leddy and Smolik, 1988; Domanico, Madden, and Partenheimer, 1986; Goldstein and Young, 1987; Helmers, Langemeier and Atwood, 1986; Lockeretz et al., 1984.

When natural resource accounts are included, the gross operating margin is reduced by a soil depreciation allowance ($25) to obtain net farm income ($20). (See Table 1, column 2 and Table 3, column 3) The depreciation allowance is an estimate of the present value of future income losses due to the impact of crop production on soil quality. The same government payment is added to determine net farm income ($55).

Table 1: Conventional and Natural Resource Accounting Economic Frameworks Compared: Net Farm Income ($/acre/year)

	w/o Natural Resource Accounting	w/ Natural Resource Accounting
Gross Operating Margin	45	45
- Soil Depreciation	--	25
Net Farm Operating Income	45	20
+ Government Commodity Subsidy	35	35
Net Farm Income	80	55

Table 2: Conventional and Natural Resource Accounting Economic Frameworks Compared: Net Economic Value ($/acre/year)

	w/o Natural Resource Accounting	w/ Natural Resource Accounting
Gross Operating Margin	45	45
- Soil Depreciation	--	25
Net Farm Operating Income	45	20
- Off-site Costs	--	46
Net Economic Value	--	(26)

Net economic value (See Table 2, column 2) subtracts $46 as an adjustment for off-site environmental costs (such as sedimentation, impacts on recreation and fisheries, and impacts on downstream water users). Net economic value also includes the on-site soil depreciation allowance, but excludes income support payments. Farmers do not bear the off-site costs directly, but they are nonetheless real economic costs attributable to agricultural production and should be considered in calculating net economic value to society. Subsidy payments, by contrast, are a transfer from taxpayers to farmers, not income generated by agricultural production, and are therefore excluded from net economic value calculations. In this example, when these adjustments are made, an $80 profit under conventional financial accounting becomes a $26 loss under more complete economic accounting.

Measuring Sustainability

The economic and resource accounting models used in this study integrate information at four levels, corresponding to the four-fold hierarchy of sustainability define by Lowrance (1988): field, farm, region, and nation. They represent in a consistent framework the farmer's financial perspective and wider environmental and economic perspectives.

At field level the USDA's Erosion-Productivity Impact Calculator (EPIC) model (Williams, et al., 1982) was used to simulate the physical changes in the soil that would result from different agronomic practices. EPIC, a comprehensive model developed to analyze the erosion-productivity problem, simulates erosion, plant growth, nutrient cycling, and related processes by modelling the underlying physical processes.

A simple farm-level programming model was developed to assess the impact of commodity programs -

- operating through changes in input and output prices, acreage constraints, and deficiency payments – on net farm income and net economic value. The EPIC and programming models were linked to calculate not only crop sales, production expenses, government deficiency payments, and net farm incomes for each cropping pattern, but also soil erosion, off-site damages, and a soil depreciation allowance.

At farm level, EPIC's estimates of soil productivity changes were used to calculate the economic depreciation of the soil resource. These estimates were combined with agronomic production data to determine the full on-farm production costs for each rotation and treatment. The farm level information on soil erosion was coupled with regional estimates of off-site damage per ton of eroded soil (Ribaudo, 1989) to derive estimates of off-farm damages resulting from each agronomic practice.

At the national level, agricultural sector models developed by the Food and Agricultural Policy Research Institute generated estimates of changes in crop prices under the various policies. (FAPRI, 1988; 1990) These prices were used in farm programming models to determine net farm income and net economic value. The farm-level model also generated estimates of government payments for the different crop production alternatives under the policy scenarios, which could then be generalized to compare the relative federal budgetary costs of different policy options.

Estimating a soil depreciation allowance. Estimates of the long-term soil productivity changes taken from the EPIC model for different farming practices were used in present-value calculations to compute the economic impacts of soil productivity changes due to soil erosion and changes in soil structure.

The prices used to calculate the value of the productivity changes were those projected by FAPRI for each policy scenario tested. The yield change for each rotation period was taken to be the total yield change for the 30-year simulation divided by the number of rotations in 30 years, thereby assuming a linear change in yields. In this way the productivity change for each rotation included only the change attributable to the rotation over one rotation period. Since input costs were invariant to yields, this change in yields was then multiplied by the crop price to determine the loss in net farm income for the period. The present value of all income losses over the next 30 years, using a 5-percent real (excluding inflation) discount rate, represents the loss in soil asset value.

The formula used to determine the soil depreciation allowance is as follows:

$$\text{Soil Depreciation Allowance} = [(Y_0 - Y_n)/(n/RL)] * P_c * \{[\,1 - 1/(1+i)^n]/i\},$$

where Y_0 is initial yield,
Y_n is final yield,
RL is rotation length,
n is period under consideration,
P_c is crop price, and
i is real interest rate.

For rotations that include more than one crop, each crop was weighted according to its acreage in the rotation, and these weighted crop depreciation allowances were added to determine the allowance for the rotation as a whole. When comparing rotations of different length, the rotation with the longest period was used to calculate the depreciation allowance for all rotations. The soil depreciation values are shown in Tables 3 and 4, column 3.

The off-farm costs of soil erosion. Ribaudo (1989), of USDA's Economic Research Service, has presented a comprehensive estimate of the widely varying off-site costs of soil erosion for different areas in the United States. In the Northeast, where many rivers drain into the densely populated seaboard and the economic value of water is high, damage per ton of erosion is $8.16 (1990 dollars). At the other extreme, in the sparsely populated, dry Northern Plains where the economic value of water is low, damage per ton of erosion is $0.66. These estimates were combined in this study with EPIC erosion estimates to calculate off-farm damages from

soil erosion the various rotations. The erosion rates were weighted by the crop set-aside requirements, where applicable, and multiplied by the regional per ton damage estimates. These values are shown as the off-farm costs in Tables 3 and 4, column 2.

Table 3. Rotation Characteristics, Pennsylvania

Tillage/Rotation	Soil Erosion (t/ac/yr)	Off-Farm Erosion Cost[3] ($/ac/yr)	Soil Depreciation ($/ac/yr)
Conv. Tillage			
Continuous Corn	9.26	69	24.8
Corn - Beans	6.07	47	24.6
Alt. Cash Grain	4.25	32	(2.8)[4]
ACG w/ Fodder	3.29	26	(8.4)
All Hay	0.66	5	(4.8)
Reduced Tillage			
Continuous Corn	7.15	53	24.4
Corn - Beans	5.29	41	23.8
Alt. Cash Grain	3.49	27	(3.6)
ACG w/ Fodder	2.49	20	(10.2)

Alternative Cash Grain -- Organic corn-corn-beans-wheat/clover-barley
Alternative Cash Grain w/ Fodder -- Organic corn-beans-wheat/clover-clover-corn silage

Table 4 - Rotation Characteristics - Nebraska

Rotation	Soil Erosion (t/ac/yr)	Off-Farm Erosion Cost ($/ac/yr)	Soil Depreciation ($/ac/yr)
Continuous Corn	6.5	4.0	7.8
Corn-Beans			
w/ Inorganic inputs	3.7	2.3	3.0
w/ Fertilizer only	3.7	2.3	2.8
w/ Organic treatment	3.1	2.0	(2.0)
Corn-Beans-Corn Oats/Clover			
w/ Inorganic inputs	3.1	2.0	(1.3)
w/ Fertilizer only	3.1	2.0	(1.0)
w/ Organic treatment	2.2	1.5	(4.0)

[3] Estimated using an damage cost of $8.16 per ton. Calculations weighted by crops and set-aside acreages.

[4] Parentheses indicate appreciation in soil asset values due to increased productivity.

Table 7: Summary Results - Pennsylvania - Transition Period
Plus Present Value of the Normal Period

Net Economic Value
($/acre/10 years)

	Policy	Conventional Tillage				Reduced Tillage				
		CC	CCBCB	ACG	ACGF	CC	CCBCB	ACG	ACGF	ALL HAY
Gross Operating Margin	Baseline	(47)	607	486	508	(75)	581	480	501	247
	SAAA	(118)	461	461	492	(146)	437	455	485	247
	NCA	(118)	461	235	294	(146)	437	229	287	247
	MLDC	631	959	734	639	603	934	728	632	247
	25% Tax	(168)	523	486	508	(196)	497	480	501	247
- Soil Depreciation	Baseline	231	230	(26)	(78)	228	222	(34)	(95)	(45)
	SAAA	222	215	(24)	(73)	218	207	(32)	(90)	(45)
	NCA	222	215	(24)	(73)	218	207	(32)	(90)	(45)
	MLDC	285	246	(28)	(77)	282	241	(37)	(93)	(45)
	25% Tax	231	230	(26)	(78)	228	222	(34)	(95)	(45)
Net Farm Operating Income	Baseline	(278)	377	512	587	(302)	359	514	596	292
	SAAA	(340)	247	485	565	(364)	230	487	574	292
	NCA	(340)	247	259	367	(364)	230	261	376	292
	MLDC	346	712	762	716	322	694	766	725	292
	25% Tax	(399)	293	512	587	(424)	275	514	596	292
- Off-Site Costs	Baseline	641	438	304	242	494	382	250	183	50
	SAAA	641	438	323	250	494	382	265	190	50
	NCA	641	438	295	231	494	382	244	175	50
	MLDC	705	462	323	250	543	403	265	190	50
	25% Tax	641	438	304	242	494	382	250	183	50
Net Economic Value	Baseline	(919)	(61)	208	345	(796)	(23)	264	413	243
	SAAA	(981)	(191)	162	315	(858)	(152)	222	384	243
	NCA	(981)	(191)	(37)	136	(858)	(152)	17	202	243
	MLDC	(359)	251	438	466	(222)	290	500	536	243
	25% Tax[5]	(919)	(61)	208	345	(796)	(23)	264	413	243

CC - Conventional continuous corn
CCBCB - Conventional corn-beans
ACG - Alternative Cash Grain -- Organic corn-corn-beans-wheat/clover-barley
ACGF - Alternative Cash Grain w/ Fodder -- Organic corn-beans-wheat/clover-clover-corn silage

SAAA - Sustainable Agriculture Adjustment Act
NCA - Normal Crop Acreage
MLDC - Multilateral Decoupling

[5] Columns will not add for the input tax, as the amount of tax has been added back to determine the Net Economic Value.

Table 8: Summary Results - Nebraska

Net Farm Income
($/acre/4 years)

	Policy	Rotation						
		CC	NFCB	FOCB	ORGCB	NFROT	FOROT	ORGROT
Gross Operating Margin	Baseline	119	501	503	473	351	348	334
	SAAA	99	445	449	422	341	338	325
	NCA	99	445	449	422	299	298	286
	MLDC	305	583	582	551	461	452	436
	25% Tax	83	485	495	473	332	336	334
- Soil Depreciation	Baseline	31	12	11	(8)	(5)	(4)	(12)
	SAAA	30	11	10	(8)	(5)	(4)	(11)
	NCA	30	11	10	(8)	(5)	(4)	(11)
	MLDC	38	13	12	(10)	(6)	(5)	(15)
	25% Tax	31	12	11	(8)	(5)	(4)	(12)
Net Farm Operating Income	Baseline	88	489	492	482	356	352	346
	SAAA	70	434	439	430	346	342	337
	NCA	70	434	439	430	304	302	297
	MLDC	267	571	570	561	467	457	451
	25% Tax	53	473	485	482	338	340	346
+ Government Commodity Subsidy	Baseline	199	100	100	100	100	100	100
	SAAA	222	111	111	111	185	185	185
	NCA	222	111	111	111	222	222	222
	MLDC	-	-	-	-	-	-	-
	25% Tax	199	100	100	100	100	100	100
Net Farm Income	Baseline	287	589	592	581	455	451	445
	SAAA	291	545	550	541	531	527	521
	NCA	291	545	550	541	526	524	519
	MLDC	267	571	570	561	467	457	451
	25% Tax	252	572	584	581	437	440	445

CC - Conventional continuous corn
NFCB - Conventional corn-beans, w/ herbicides and fertilizer
FOCB - Corn-beans w/ fertilizer but no herbicide
ORGCB - Organic corn-beans
NFROT - Corn-beans-corn-oats/clover w/ herbicides and fertilizer
FOROT - Corn-beans-corn-oats/clover w/ fertilizer but no herbicide
ORGROT - Organic corn-beans-corn-oats/clover

SAAA - Sustainable Agriculture Adjustment Act
NCA - Normal Crop Acreage
MLDC - Multilateral Decoupling

Table 8: Summary Results - Nebraska

Net Farm Income
($/acre/4 years)

	Policy	Rotation						
		CC	HFCB	FOCB	ORGCB	HFROT	FOROT	ORGROT
Gross Operating Margin	Baseline	119	501	503	473	351	348	334
	SAAA	99	445	449	422	341	338	325
	NCA	99	445	449	422	299	298	286
	MLDC	305	583	582	551	461	452	436
	25% Tax	83	485	495	473	332	336	334
- Soil Depreciation	Baseline	31	12	11	(8)	(5)	(4)	(12)
	SAAA	30	11	10	(8)	(5)	(4)	(11)
	NCA	30	11	10	(8)	(5)	(4)	(11)
	MLDC	38	13	12	(10)	(6)	(5)	(15)
	25% Tax	31	12	11	(8)	(5)	(4)	(12)
Net Farm Operating Income	Baseline	88	489	492	482	356	352	346
	SAAA	70	434	439	430	346	342	337
	NCA	70	434	439	430	304	302	297
	MLDC	267	571	570	561	467	457	451
	25% Tax	53	473	485	482	338	340	346
+ Government Commodity Subsidy	Baseline	199	100	100	100	100	100	100
	SAAA	222	111	111	111	185	185	185
	NCA	222	111	111	111	222	222	222
	MLDC	-	-	-	-	-	-	-
	25% Tax	199	100	100	100	100	100	100
Net Farm Income	Baseline	287	589	592	581	455	451	445
	SAAA	291	545	550	541	531	527	521
	NCA	291	545	550	541	526	524	519
	MLDC	267	571	570	561	467	457	451
	25% Tax	252	572	584	581	437	440	445

CC - Conventional continuous corn
HFCB - Conventional corn-beans, w/ herbicides and fertilizer
FOCB - Corn-beans w/ fertilizer but no herbicide
ORGCB - Organic corn-beans
HFROT - Corn-beans-corn-oats/clover w/ herbicides and fertilizer
FOROT - Corn-beans-corn-oats/clover w/ fertilizer but no herbicide
ORGROT - Organic corn-beans-corn-oats/clover

SAAA - Sustainable Agriculture Adjustment Act
NCA - Normal Crop Acreage
MLDC - Multilateral Decoupling

Table 9: Summary Results - Nebraska

Net Economic Value
($/acre/4 years)

	Policy	Rotation						
		CC	NFCB	FOCB	ORGCB	NFROT	FOROT	ORGROT
Gross Operating Margin	Baseline	119	501	503	473	351	348	334
	SAAA	99	445	449	422	341	338	325
	NCA	99	445	449	422	299	298	286
	MLDC	305	583	582	551	461	452	436
	25% Tax	83	485	495	473	332	336	334
- Soil Depreciation	Baseline	31	12	11	(8)	(5)	(4)	(12)
	SAAA	30	11	10	(8)	(5)	(4)	(11)
	NCA	30	11	10	(8)	(5)	(4)	(11)
	MLDC	38	13	12	(10)	(6)	(5)	(15)
	25% Tax	31	12	11	(8)	(5)	(4)	(12)
Net Farm Operating Income	Baseline	88	489	492	482	356	352	346
	SAAA	70	434	439	430	346	342	337
	NCA	70	434	439	430	304	302	297
	MLDC	267	571	570	561	467	457	451
	25% Tax	53	473	485	482	338	340	346
- Off-Site Costs	Baseline	16	9	9	8	8	8	6
	SAAA	16	9	9	8	8	8	6
	NCA	16	9	9	8	8	8	6
	MLDC	17	10	10	8	8	8	6
	25% Tax	16	9	9	8	8	8	6
Net Economic Value	Baseline	72	480	483	474	348	344	340
	SAAA	54	425	430	422	338	334	331
	NCA	54	425	430	422	296	294	292
	MLDC	250	561	561	553	458	449	445
	25% Tax[6]	72	480	483	474	348	344	340

CC - Conventional continuous corn
NFCB - Conventional corn-beans, w/ herbicides and fertilizer
FOCB - Corn-beans w/ fertilizer but no herbicide
ORGCB - Organic corn-beans
NFROT - Corn-beans-corn-oats/clover w/ herbicides and fertilizer
FOROT - Corn-beans-corn-oats/clover w/ fertilizer but no herbicide
ORGROT - Organic corn-beans-corn-oats/clover

SAAA - Sustainable Agriculture Adjustment Act
NCA - Normal Crop Acreage
MLDC - Multilateral Decoupling

[6] Columns will not add for the input tax, as the amount of tax has been added back to determine the Net Economic Value.

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AGRICULTURAL INDUSTRIALIZATION AND FAMILY FARMING: THE ROLE OF FEDERAL POLICY

WEDNESDAY, JULY 8, 1992

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, DC.

The Committee met, pursuant to notice, at 10:00 a.m., in room 2359, Rayburn House Office Building, Honorable Lee H. Hamilton (vice chairman of the Committee) presiding.

Present: Representative Hamilton.

Also present: Stewart Smith and Doug Koopman, professional staff members.

OPENING STATEMENT OF REPRESENTATIVE HAMILTON, VICE CHAIRMAN

REPRESENTATIVE HAMILTON. The hearing of the Joint Economic Committee will come to order.

I welcome you to the hearing this morning. This is the third of three hearings to define federal policy which will support an agricultural system that is internationally competitive, environmentally benign, and promotes family farming.

Family farming holds a special role in American history, but the viability of that role is now in doubt. Throughout this century, our food and agricultural system has become more industrialized with a larger role played by industries that provide farmers with goods and services—and others that market farm products—and a lesser role by farmers.

A cropping technique known as residue management was described in *Time* magazine recently as a cultural revolution, while others suggest much greater benefits are possible from more integrated cropping systems. We are interested to know if these systems stand up to scientific scrutiny. Are they as efficient as conventional systems, will they provide international competitiveness, are they compatible with environmental goals, do they promote family farming, and do current federal policies serve them well or are new policies needed?

We are pleased to have with us a panel today, Mr. Thomas Dobbs, who is Professor of Agricultural Economics in South Dakota State University, and recently completed comparative studies of farming systems in that state.

Chuck Hassebrook is at the Center for Rural Affairs in Nebraska, where he leads the Stewardship, Technology and World Agriculture Program.

Mr. Douglas Young is Professor of Agricultural Economics at Washington State University. Mr. Young has recently completed comparative farming studies in the Northwest and the Southeast.

We are pleased to have each of you gentlemen with us. Your statements, of course, will be entered into the record in full.

We will begin with you, Mr. Dobbs, and just move across the table, if that is all right with you. I suggest you keep your statements in summary form, and then we will turn to some questions.

Mr. Dobbs, please proceed.

STATEMENT OF THOMAS DOBBS, PROFESSOR, AGRICULTURAL ECONOMICS, SOUTH DAKOTA STATE UNIVERSITY

MR. DOBBS. Thank you, Mr. Chairman. I appreciate you and the staff inviting me to testify today on the potential implications of sustainable agriculture for the economic viability of family farms and rural communities.

Increasing numbers of people are beginning to view sustainable agriculture as an alternative to the current industrial agriculture model. The terms "conventional" and "sustainable" will be used in my remarks today to broadly define differing types of farming systems. I will use the term conventional to describe farming systems which make use of synthetic chemical fertilizers and pesticides in amounts which are representative of their respective areas; whereas, the term sustainable will be used to describe farming systems which either eliminate or greatly reduce the use of synthetic chemical fertilizers and pesticides.

These so-called sustainable systems emphasize crop rotation, diversity and so forth to take care of soil fertility, control pests, prevent soil erosion, and meet other environmental objectives.

In general, I will be talking about whole farm system changes rather than changes in particular practices. Research colleagues of mine and I at South Dakota State University have been involved since the mid-1980s in agronomic and economic studies of sustainable systems.

Since South Dakota covers both wheat-growing regions in the northern and western parts of the state and corn-soybean areas in the southeastern part of the state, it is a good microcosm to get some perspective on possible patterns across other parts of the country. My written testimony, however, does draw on research in other states as well.

My oral remarks will just touch on the highlights and conclusions of these studies. First, I would like to comment on the economic attractiveness or profitability of these sustainable systems relative to conventional systems.

Taken as a whole, our studies and the available literature tend to indicate that sustainable systems presently are likely to be competitive with conventional systems in the western, drier, wheat-growing areas of the United States, such as parts of Western South Dakota, and less likely to be presently competitive in the higher rainfall areas of the central and eastern corn-soybean belt, stretching from Southeastern South Dakota, across the States of Iowa, Illinois, Indiana, Ohio and so forth.

It must be emphasized, the profitability comparisons that we and others have done are based largely on product prices, input prices, and federal farm programs as they have existed through the late 1980s, up to the present time. Federal farm programs generally have enhanced the profitability of conventional systems relative to sustainable systems.

Although certain provisions of the 1990 farm bill reduce this imbalance in some respects, further changes are in order. I will come back to some of the policy issues in a couple of minutes.

Other factors, in addition to changes in policy, which would enhance the future profitability of sustainable systems relative to conventional systems, include such things as higher energy prices, which many expect will come about as we look further down the road; possible taxes on chemical inputs, if such were imposed to account for environmental effects; and research which enhances the technical productivity of sustainable systems.

I would like, before coming back to policy, to say just a few words about the implications of sustainable systems for the economic viability of rural communities, which is the central concern of your hearing today.

Critics of conventional agriculture often use a historical perspective in at least part of their argument. They describe the industrialization of American agriculture, in which machines and chemical inputs have increasingly replaced on-farm labor, resulting in ever larger farms. With larger and hence fewer farms, there is less need for local businesses to serve agriculture. Fewer farm families means less demand for local goods and services. We have all seen this.

An alternative perspective asks the question: What if we were to change now, given the present system, to convert from our conventional systems to sustainable systems? We in South Dakota, as well as fellow agriculture scientists in North Dakota, have studied that issue, taking a short-term perspective, and have analyzed some of the effects, short term, of wide-scale changes. We do indeed find there would be some negative effects on agriculture input suppliers, in particular. And on a net basis, some negative effects on rural communities, in the short run.

So we have these two seemingly conflicting views that are floating around. In my own view, they really are not in conflict. There is really a distinction between a short- and a long-run view. Any time there is significant change in technology, such as we would have if we were to have a widespread shift to sustainable systems, there are going to be some negative effects on the local and regional economies in the short run. In the long run, a number of us feel that the effects would likely be more positive.

Once there has been time for structural adjustments to take place, chemical dealers may become information input suppliers—suppliers of technical expertise for integrated pest management and for soil fertility, for example. There are likely to be a number of new demands that will spring up that will be stimulative for local communities.

So, on the whole, I think, if we give enough time for structural adjustments to work out, the effects are likely to be a net positive on rural areas.

Turning back to the policy implications, the report from South Dakota State University, which accompanies this testimony, details a number of policy options which we have analyzed, and there is not time to verbally comment on all of those. But I want to say just a word on the flexibility options which we have analyzed, since the current government trend is on increased flexibility, in one form or another.

Among the options analyzed was a Normal Crop Acreage Program— the so-called NCA program—which the Bush Administration proposed early in

the dialogue in the 1990 farm bill, but which was not ultimately adopted. We analyzed a couple of versions of that plan and found that in the wheat-growing areas where profitability is already close between sustainable and conventional systems, the NCA option may be viable, particularly if farmers do not lose payments for harvesting non-program crops and legumes. In the corn-soybean areas, however, it would take much more than that kind of a flexibility option to induce changeovers to sustainable systems.

We have also done some analysis of the pilot Integrated Farm Management Program Option—the so-called IFMPO. That, too, we found has some potential. Particularly in the wheat areas, where profitability may already be close, it could, in some cases, be enough to tip the balance in terms of economic attractiveness of sustainable systems.

In the corn-soybean areas, it is nowhere near enough to tip that balance, because the difference in profitability in many cases is quite substantial at the present time in favor of the conventional systems. It could ease the conversion for a corn-soybean farmer who wants to introduce conserving crops on a portion of his acreage. It could ease the penalty of doing that, and therefore is beneficial, but not sufficient to induce any kind of widespread change.

Just as a final remark, I would like to say that there are other measures that the Federal Government can take in addition to policy, per se, that I think are going to be critical to the viability of sustainable farming systems. The example I will cite here is the area of research.

I have been closely involved with the North-Central region's administration of the formerly called LISA program—presently, Sustainable Agriculture Research and Education program—and I have seen firsthand that that program has been tremendously beneficial as a catalyst for new expanded multidisciplinary efforts, both in universities and in nonprofit private institutions. However, this program is very much underfunded, and should be brought up to a much higher level of funding.

I think more attention needs to be given to making the National Research Initiative Competitive grants program of the USDA more focused on sustainable agriculture issues, as well.

I think Mr. Hassebrook will have more detailed comments on a number of research issues, so I will stop at this point.

Thank you.

[The prepared statement of Mr. Dobbs starts on p. 203 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you, Mr. Dobbs.

Mr. Hassebrook, please proceed.

STATEMENT OF CHUCK HASSEBROOK, PROGRAM LEADER, STEWARDSHIP, TECHNOLOGY AND WORLD AGRICULTURE PROGRAM, CENTER FOR RURAL AFFAIRS

MR. HASSEBROOK. Mr. Chairman, thank you for the opportunity to testify. I commend you for holding this hearing to bring congressional scrutiny to the future of family farm agriculture.

It seems today that American agriculture is at an historical, critical juncture, if you will. Today, roughly half of the nation's farmland is operated by

farmers over the age of 55 and likely to retire over the next 10 years. At the same time, the entry rate for beginning farmers has fallen. That coming turnover in farm assets, combined with low-farm entry rates, suggests we are facing a dramatic consolidation in agriculture and a permanent loss in a substantial share of the Nation's farm opportunities, unless the forces shaping agriculture are changed.

One of the most important of those forces, but frankly one of the most overlooked, is agriculture research policy. In a sense, agriculture research represents a form of social planning. By that I mean that the decisions we make about where we put our agricultural research dollars, about how we spend that $1-billion-plus that we spend annually on federal research, decisions we make about what types of research we prioritize, and what types of farming systems we develop really determine the options farmers have available to them, and ultimately go a long way toward shaping agriculture life in farm communities and the rural environment.

In the past, it seems to me, the public agriculture research system has emphasized pursuing efficiency by using increased amounts of capital, not only to increase total production levels in agriculture but also to replace the role of people in agriculture, so fewer people could produce the Nation's food. While the productivity gains of that approach have been impressive, it seems to me, some of its family-farm implications are quite ominous.

Essentially this approach has shifted the value-added process in agriculture and the income-earning opportunities in agriculture off of the farm and into the agriculture-input sector, such that today only about 5 percent of the value-added activity in agriculture occurs on the farm. As has been pointed out by Stewart Smith in *Choices* magazine, if the current trend line continues, the farm share of agriculture activity will be zero by the year 2020.

Is it possible to halt or reverse that trend? I think it is, but only if we change the way we pursue efficiency in our agriculture research activities.

Whereas, in the past, we tried to find ways to improve efficiency by maybe using one additional dollar of capital to replace two dollars worth of the farmer's time, we need to conduct agriculture research in the future to develop systems that allow farmers to use an extra dollar of their time in management and skilled labor to replace two dollars worth of capital inputs. We need to design farming systems that build on the principal strength of family farmers, the presence of a highly skilled and motivated work force in the field and barn that can exercise hands-on management and apply skills.

Recent research at the University of Missouri suggests that at least modest shifts in that direction have a significant potential to lower the cost of production in agriculture, and at the same time provide substantial environmental benefits.

The 1990 farm bill gave some boost to redirection of federally funded research towards these types of systems. It articulated the purposes to be served by federally funded agriculture research, and while it included traditional research objectives like increasing productivity, it also broadened the system's mission to include improving environmental quality and enhancing economic opportunity in rural communities and family farming.

The implementation has been mixed. I think there has been significant progress towards implementing those directives in the National Research

Initiative—the $100 million competitive grants program for agriculture research—although I think more work is needed in that regard.

Progress in other areas has been disappointing. I think that is particularly true in the case of the Agriculture Research Service—the in-house research service of the USDA. Late last year, they came out with a six-year plan for agricultural research, and made no mention whatsoever of enhancing rural community or family-farm opportunities, in direct contradiction of farm bill directives.

I would offer three policy suggestions in the area of agriculture research policy. First, USDA should fully implement the research purposes provision of the 1990 farm bill.

Second, Congress, in its annual appropriations process, needs to increase funding for the sustainable agriculture research program, and I would simply echo Tom Dobbs' comments in that regard.

Third, in the 1995 farm bill, Congress should strengthen the research purposes provisions by making them more explicit, particularly the family farm purposes, but also the implementation procedures that USDA should follow in making sure those purposes are truly reflected in the research program.

As is the case with agricultural research, I think the rules by which federal farm commodity program benefits have been distributed in the past have also contributed to the industrialization of agriculture. That is true for several reasons. One is the way in which the program has been biased towards specialized production of particular commodities with high input use, as Tom Dobbs has mentioned.

Second is that the farm program has a bias towards bigness and tends to give the biggest benefits to the biggest farms. That bias was worsened in the 1990 farm bill, which took no steps to reduce the benefits going to the large farms, but instead imposed cuts on medium farms to meet budgetary guidelines.

My recommendation would be that Congress take steps both in the 1994 Budget Act and in the 1995 farm bill to impose more effective limitations on farm program payments to very large farms, and use the money saved to protect moderate-sized farmers from the second round of cuts they will be facing in 1994 under the 1990 farm bill. I would also recommend using a portion of those savings for environmental programs to encourage practices that protect environmental quality.

Finally, I would like to address the area federal tax policy. If we had this hearing in 1985, I would have said federal tax policy was possibly the most important and powerful force encouraging the industrialization of agriculture. But, thankfully, we have seen significant progress in reducing the contribution of federal tax policy to industrialization, particularly in the 1986 Tax Reform Act, but also in a couple of tax bills in the late 1980s.

However, I fear that recent developments suggest that we may be about to repeat some of the mistakes of the past, with respect to federal tax policy. I refer particularly to the rural enterprise zone provisions of the long-term urban-aid package that recently passed the House of Representatives.

Specifically, the bill will provide a tax credit for wages paid to employees in rural enterprise zones. That provision has a strong anti-self-employment

bias. For example, if a corporate farm comes in and hires somebody, they get a tax credit for hiring somebody, but if a beginning farmer creates a job for him or herself by establishing a new farm, he/she gets no tax credit.

Second, the bill would provide a capital gains exemption for investments in rural enterprise zones. That favors high-bracket investors. Our analysis of the capital gains provisions, passed by the House in 1989, found in the hog industry that the provision would have provided benefits to the top-bracket hog producer, equal to a 69-cent-per- hundred-weight increase in the price of hogs, but for the low producer, a benefit equal to 17 cents. That simply shifts competitive advantage in the industry in favor of the high-income producer.

Finally, the bill would provide a special deduction for investments in certain corporate stock, if the proceeds are invested in depreciable property. That provision has a bias against sole proprietorships. Most family farms are sole proprietors, because they are simply not big enough to justify the legal cost and complexity of operating as a corporation.

Finally, that provision subsidizes capital to replace people. The impact of these provisions will be especially profound on the livestock industry. The net effect will be to shift the production of meat and milk off of family farms onto large corporations located in rural enterprise zones, and to increase poverty as we lose self-employment opportunities and replace them with low-paying jobs on corporate farms.

I would recommend the bill be amended so that those provisions do not apply to agriculture, and that instead some alternative provisions be created in rural enterprise zones to stimulate self-employment opportunities in agriculture, specifically that first-time farmers be allowed to make tax-free withdrawals from individual retirement accounts to finance beginning farm operations. And second, provide a capital gains break only to those landowners who sell land to qualified first-time beginning farmers.

That concludes my comments. Thank you.

[The prepared statement of Mr. Hassebrook starts on p. 216 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you.

Mr. Young, please proceed.

STATEMENT OF DOUGLAS L. YOUNG, PROFESSOR, AGRICULTURAL ECONOMICS, WASHINGTON STATE UNIVERSITY

MR. YOUNG. Thank you, Congressman Hamilton, for this opportunity to testify before the Joint Economic Committee.

My testimony will take a slightly different focus. It will report on research in two dissimilar production regions on tradeoffs between environmental and economic impacts of six agricultural policy proposals, ranging from the 1990 farm bill to no programs whatsoever.

The first part of my statement and much of the three appendices provide general background on the pros and cons of agricultural policy, as it has been conducted historically. It also traces the impact of these policies on general off-farm input use.

However, my oral statement will focus on the results of the two regional case studies of these six agricultural policies.

Looking at each section, small grains and edible pulses predominate in the Pacific Northwest Palouse study region. Tobacco dominates economically in the North Carolina Coastal Plan study region. Substantial acreage is also devoted to corn, soybeans and wheat. Livestock production, especially poultry and hogs, is important in the North Carolina study region, but little livestock is produced in the Palouse. Soil erosion is the major environmental problem in the Palouse, while nitrogen and pesticide leaching to groundwater is a major concern in the North Carolina Coastal Plain. A large rural population in North Carolina depends upon shallow wells which are threatened by agrichemical leaching. In contrast, there are relatively few people living in the rural Palouse region.

Six agricultural policies were examined, including: the 1990 Farm Bill; 40 percent unpaid base flexibility; the 1990 proposal by the Administration—on which Mr. Dobbs also commented; a decoupling policy, as originally formulated by former Senator Boschwitz; a recoupling policy with payments recoupled to environmental performance; and no programs or a free-market scenario are examined. The key features of these policies are described in the written statement.

A novel feature in this study was the aggregation of policy impacts on various groups—farm managers, landowners, taxpayers and users of environmental amenities—into a single social welfare index. We also report results separately for each of these groups.

The distribution of benefits and costs with policy reform varies greatly over the six options considered. For the all-rotations or all-technologies-available scenario, projected net returns to farm operators in short-run projections for the Palouse vary from minus $10 per acre under no programs, to plus $11 for the 1990 Administration proposal. In contrast, taxpayers incur no cost under no programs, and a sizable $36 per acre obligation under the recoupling policy.

In the Palouse, where land rents are typically based upon crop shares, the availability of low-input systems generally benefits farm operators but disfavors landlords, and less wheat is produced.

The 1990 Administration proposal, decoupling, recoupling, and no programs, all offer different versions of essentially 100 percent base flexibility. Producers are free to grow crops as they wish, in response to market prices, without considering base-acreage constraints.

However, under the assumed configuration of program provisions, for the first three of these options, taxpayer costs remain relatively high. In these three options, taxpayers bear the burden of any environmental gains, while in the no program option, farm operators shoulder this cost.

Table 2 reports similar results in the Palouse region under a high-grain-price scenario. Participation in wheat and barley programs becomes unprofitable, and growers are able to escape the 1985 Food Security Act Conservation Compliance provision. Taxpayer costs fall to zero for all policies except decoupling and recoupling, where payments are not linked to traditional commodity programs.

Under this high-grain-prices scenario in the Palouse, only recoupling, which pays farmers to reduce soil erosion and nitrogen use, succeeds in protecting the environment. It does so at a substantial cost to taxpayers. But

increased farm-operator profits and environmental gains more than offset the taxpayer expenditures.

Recoupling ranks number one in social welfare in the Palouse in the high-prices scenario. Table 3 provides similar results for the North Carolina Coastal Plains study region. As in the Palouse study, the no programs option benefits taxpayers, but at the expense of farm operators in these short-run projections. Under average grain prices, soybeans generally increase in acreage under the greater planting flexibility offered, which reduces nitrogen use and leaching.

Under a high-grain-prices scenario, North Carolina growers are projected to shift back to grain-intensive rotations which increases nitrogen leaching. In the North Carolina Coastal Plain, as in the Pacific Northwest Palouse, only recoupling protects the environment and sustains aggregate social welfare under the assumption of strong world grain markets.

Summing up, the durable performance of recoupling in protecting the environment and maintaining social welfare during periods of high- market grain prices provides an important choice for policymakers. If society wants to avoid losing environmental gains during periods of strong demand and high prices, farm program payments, based on environmental performance, not traditional program crop acreages and yields, should be considered.

However, the gains to farmers and society from recoupling comes at increased cost to taxpayers. In some regions, such as the Pacific Northwest Palouse, movement towards free markets, together with development of proven sustainable technology, yields good environmental results at much lower taxpayer cost under conditions of average market prices.

However, environmental protection seriously lags under free-market conditions when world grain prices are strong. In deciding between free markets versus recoupling, Congress will need to balance the importance of budgetary reductions and environmental protection.

One promising possibility is the design of cost-effective targeted recoupling policies which protect the environment at reasonable cost to taxpayers and farmers. Further research and development, as called for by the other witnesses, to perfect environmentally sound and profitable sustainable farming technologies, will help this effort.

Thank you.

[The prepared statement of Mr. Young, together with attachments, starts on p. 222 of Submissions for the Record:]

REPRESENTATIVE HAMILTON. Thank you, Mr. Young. We appreciate very much your testimony.

Let's turn now to some of the general questions, which I opened up with at the beginning of the hearing, just to get you on record in some of these areas. You are going to be repeating some of the things you have given in testimony, but I want to get it down clearly.

As a general rule, how good are these alternative systems? Are they as efficient as conventional systems? How do you answer that in a broad, general way?

MR. DOBBS. I will take a stab at the first. I want to distinguish, Congressman, between efficient and profitable. First of all, from a profitability

standpoint, as I have indicated, let's talk about whole system changes, in other words, changes in entire rotations, not just a particular practice like banding fertilizer or herbicide. Individual practices like that may very well have a potential for greater expansion and profitability throughout the whole corn belt. But if we are talking about going back to more small grains and legumes instead of corn and soybeans, our studies are saying, under the current energy-price scenario, the conventional systems are substantially more profitable, on average, than the sustainable systems.

The more we move into the dryer wheat regions, the closer together they are, even under the current policy and technology scenario.

REPRESENTATIVE HAMILTON. Do the other panelists agree with that conclusion?

MR. HASSEBROOK. I agree to a point. I think the results——

REPRESENTATIVE HAMILTON. I will come back to you, Mr. Dobbs, but I wanted to get their reaction.

MR. HASSEBROOK. I think, particularly when you look at more modest reductions in input use and more modest shifts in farming systems, they can actually be cost saving and more efficient.

I will say this: For major changes, I think, to realize the full economic potential of those, we need to address the imbalance in research between those types of farming systems and conventional systems. We have done very little work in research to learn how to farm that way effectively.

When we begin to address that research imbalance, I think those systems have much greater potential, but for the time being, modest shifts in that direction are very cost effective, but wholesale shifts in that direction, I think, await a bigger research investment.

REPRESENTATIVE HAMILTON. Go ahead, Mr. Dobbs.

MR. DOBBS. I agree with Chuck's supplementary comments.

The other thing I wanted to get on the record before Mr. Young comments is that I commented on profitability. Your question was efficiency. If I look at efficiency, from the standpoint of costs and benefits to society, as well—as Mr. Young's testimony dealt with in more detail—then the competitiveness of the sustainable systems perhaps comes much closer, even in the corn-soybean belt, when you take into account the social costs of erosion and silting up the waterways, the contamination of groundwater and so forth.

On-farm profitability studies do not take account of any of those costs, where social efficiency needs to. Studies are in much earlier stages on those so-called external costs, but if you bring those into account, I think they are closer in the corn-soybean belt as well. I don't know whether they are equal or not.

REPRESENTATIVE HAMILTON. So you conclude that alternative systems are more efficient?

MR. DOBBS. I can't say that they are, because the empirical work on those external costs has just been in too early a stage to make a generalization. There are people working on that, but I can't generalize.

REPRESENTATIVE HAMILTON. Mr. Young, do you want to get into this?

MR. YOUNG. I would, first of all, like to reiterate what Mr. Dobbs said, which is you have to distinguish between what I would call social efficiency, looking at social welfare, and profitability to the farm operator.

I think, in response to the first question on social efficiency, yes, the sustainable systems are very promising because they do tend to reduce social costs in terms of environmental problems.

In terms of profitability, it depends very largely upon questions of farm policy. We looked at six different farm policies. I could design farm policies which could make almost any system—conventional or sustainable—profitable to the farmer if taxpayer subsidies were strong enough in its favor.

In general, the past configuration of farm policies has favored conventional systems. Only 50 percent of the total value of agricultural produce in this country is subsidized—generally, feed grains, food grains, cotton, dairy, and a few other products. The other 50 percent is outside the safety net of farm programs—specialty crops like fruits and vegetables, hay, and most livestock products other than dairy. We have had a policy bias towards heavy chemical-using crops.

In the future, if society deems it appropriate to couple policies to environmental considerations, then we will see the profitability of sustainable systems increase.

REPRESENTATIVE HAMILTON. How do these alternative systems impact on our international competitiveness? Do we know enough about that?

MR. DOBBS. I think this also is going to get back to the profitability-efficiency distinction that we have just been talking about. If we were to unilaterally have much tougher environmental standards, either changes in policy or changes in standards which would induce widespread adoption of sustainable systems, which may be socially efficient but result in a situation in which we were not cost competitive with other countries that did not have the same standards, then we could find ourselves in an uncompetitive situation in some commodities. It depends on what other countries do, and that is why multilateral movement towards stronger environmental standards through world-trade negotiations is absolutely critical.

REPRESENTATIVE HAMILTON. In other countries, do you find the kind of sustainable agriculture that we are getting in this country today? Are we ahead or behind other countries? Or, can you generalize?

MR. DOBBS. We are much ahead, of course, of Eastern Europe, Russia, the Soviet bloc. They are behind us. I do not have a great deal of experience in the EEC countries; maybe, the other gentlemen want to comment on that.

I would guess that we are probably apace of Western Europe, if not ahead in some of these concerns about production practices. But we are so intertwined with the EEC, in particular, on some of these policies, and countries like Mexico and Canada. Canada is moving in a similar direction.

So I think all of these countries are tremendously concerned, the worldover is tremendously concerned with bringing agricultural production and environmental concerns into better balance. We all realize they have not been in balance for the last couple of decades.

The key thing is moving in concert, I think.

REPRESENTATIVE HAMILTON. Let me just ask you more broadly, is the family farm threatened today as an institution?

MR. HASSEBROOK. I think it is very much threatened. If we don't get a new generation of farmers started within the next 10 years, we will have lost close to half the farm opportunities that now exist throughout the country.

I think that reflects a combination of forces. It reflects the policies we have in place; it reflects the technologies we have developed; and frankly, wealth begets more wealth, unless policy compensates for that. And I frankly think that unless we change public policies and change the forces shaping agriculture, we are going to see a fairly dramatic consolidation in agriculture in the near term.

REPRESENTATIVE HAMILTON. Do the rest of you agree with that?

MR. DOBBS. Yes.

MR. YOUNG. I think it is very important that we pursue policies which are more even-handed; perhaps, even favor environmental and family farming considerations, if that is the objective of Congress.

REPRESENTATIVE HAMILTON. You are saying that today's agriculture policies that we have in the government are going to threaten the institution of the family farm if they are continued. Is that your view?

MR. HASSEBROOK. Yes.

MR. DOBBS. If you put it in the context of larger economic forces of policy, as well. But tax policy, as Mr. Hassebrook commented, is much better than it was prior to 1986. There is a real threat that we are going to reverse some of those gains. That is a very big concern of mine.

REPRESENTATIVE HAMILTON. But with the current law now on the books, you still think that that operates against the family farm?

MR. HASSEBROOK. I think doing away with those laws is not going to save the family farm, because neither the free market nor the existing policies we have in place tend to favor dispersed ownership, in my view. Both tend to concentrate ownership.

The issue is, are we going to reform those to consciously help family farms. When the majority of benefits go to the biggest farms, the farm program acts as a subsidy to farm enlargement——

REPRESENTATIVE HAMILTON. So the commodity programs today are encouraging this trend towards concentration and bigness in agriculture?

MR. HASSEBROOK. Yes.

REPRESENTATIVE HAMILTON. And working against the family farm, in your view?

MR. HASSEBROOK. I think so, yes.

REPRESENTATIVE HAMILTON. Do you also agree with that, Mr. Dobbs and Mr. Young?

MR. DOBBS. I do. Again, I don't want to overplay the commodity programs by themselves, but I think, yes, they contribute to it.

REPRESENTATIVE HAMILTON. Their weight is on the side of concentration and bigness and against the family farm?

MR. DOBBS. Yes.

REPRESENTATIVE HAMILTON. Are all three of you mainstream, or would most agricultural economists agree with your observation that the present commodity programs discourage the family farm and increase concentration?

MR. DOBBS. I think my views are stronger in that regard than mainstream agricultural economists. I wouldn't say I was at the center of the mainstream in that view.

MR. YOUNG. That may be true. But I think most agricultural economists and economists in general would agree that the commodity programs have perverted economic efficiency by favoring 50 percent of the agricultural products and leaving the other 50 percent out, by being complex and tending to be——

REPRESENTATIVE HAMILTON. What is the conclusion of that? We extend to the other 50 percent, or we cancel the 50 percent now covered by the commodity programs?

MR. YOUNG. I think the conclusion is that Congress needs to decide upon its objectives. If it is saving the family farm and protecting the environment, I would advocate a different set of programs than we have now, because the programs are not serving those purposes very well.

REPRESENTATIVE HAMILTON. What would you advocate to save the family farm?

MR. YOUNG. If we are really interested in saving the family farm, if that were your objective, we need to target the benefits to what we would call family farmers. That would be a big task, first of all, to define what the family farmer is.

Now, the benefits are pretty much proportional, subject to payment limitations to production of specific crops. If you are a family farmer with, let's say, a hog enterprise and some beans on your farm, you are not included in the farm programs. You are not being helped.

The second part of your question relates to other objectives such as environmental considerations. There we would need to recouple the benefits to preventing soil erosion and reducing use of agrichemicals which might leach to groundwater, maybe even targeting benefits towards preservation of wildlife habitat.

MR. HASSEBROOK. I would strongly agree with the comment that we need to target farm commodity benefits. We could save money on commodity programs and have them be more effective simply by reducing benefits to big farms.

REPRESENTATIVE HAMILTON. What do you mean by targeting?

MR. HASSEBROOK. If you are a farmer growing corn, we will provide price support protection—deficiency payments—maybe on your first 40,000 bushels of production, but beyond that, you are on your own. If you want to get bigger, you can, but you are going to do it on your own, you are going to do it without the benefit of deficiency payments.

I would take some of the money saved by doing that and use it to protect moderate-sized farmers from the cuts they are going to face in 1994. I would enhance programs to help young people get started in farming. It costs a lot of money to put together a commercial-sized farm. The land and capital requirements are really quite formidable. We need to redirect our research towards

the types of low-cost but yet efficient farming systems that work for beginning and moderate-sized farmers.

REPRESENTATIVE HAMILTON. We had the dean of the agriculture school of Purdue University here the other day, Bob Thompson. He was saying that unless you can control over a million dollars in assets, you can't really get into farming. Is that a fair statement?

That struck me as meaning that we are not really going to get very many new farmers into the business. Who can marshal a million dollars in assets?

MR. HASSEBROOK. Not many people. I don't think it is an entirely accurate statement. It is true if you assume conventional technology.

The way we are going in technology, the farm share gets smaller and smaller as you use more capital and off-farm inputs. So your total volume has to be much bigger as your share declines to make any kind of decent family living, but if we change the farming systems, change the technology, change the approach, so that more of the input is the farmer's management and skills and consequently more of the return goes to pay for the farmer's management and skills, I think he/she can make it on a lower volume, lower asset base, than a million dollars.

REPRESENTATIVE HAMILTON. How about our research policies? Are they tilted against the family farm also?

All of you emphasized the importance of the research agriculture research budget. What is the impact of the agricultural research budget with respect to the future of the family farm, and how should it be changed?

MR. DOBBS. I think there has been a tendency, and very often unconscious, but a by-product of specialization, perhaps, that has emphasized research on capital-intensive technology, whether in livestock confinement facilities or sprinkler irrigation, or various kinds of tractor mechanization. Research has tended too heavily to go in those areas. Not totally, by any means. Those are the kinds of things that are, as I say, capital intensive rather than labor intensive, and brought another form of imbalance.

REPRESENTATIVE HAMILTON. Give me an idea of how much of the present agriculture budget of the Federal Government goes into alternative farming methods.

MR. HASSEBROOK. In terms of——

REPRESENTATIVE HAMILTON. Is it a tiny percentage, and is it growing? What is the trend line on it?

MR. HASSEBROOK. The sustainable agricultural research program accounts for half of 1 percent of total Federal annual spending on agriculture research. That does not account for all sustainable agricultural research within the federal agriculture research program. But I do think it is a pretty small proportion. It is growing. It continues to be quite small. Too small.

REPRESENTATIVE HAMILTON. So we are spending less than 1 percent of a $1 billion budget, basically. You think it ought to be increased quite a bit? All of you agree with that, that it ought to be increased quite a bit?

MR. HASSEBROOK. Yes.

MR. YOUNG. I think there are reasons for expanding it, simply to expand the options.

There is one point, however, I would like to bring up at this point. We tend to be making family farming support and sustainable agriculture support equivalent. They are not the same thing. As Professor Dobbs indicated earlier, sustainable agriculture support is not necessarily going to result in 100 percent support for small farms, because some sustainable agriculture technologies can be used by large farms.

We would have to do more than just support sustainable agriculture to protect family farming, if that is our major objective. Especially, we would have to target support for family farmers.

REPRESENTATIVE HAMILTON. Is there a relationship between sustainable agriculture, as you use it, and small farms?

MR. YOUNG. In the Pacific Northwest, the relationship is not very close. We did a survey of what we called sustainable farmers in the Palouse region of Washington and Idaho. There are about 2,000 farms in the area we looked at. We found 24 which we would call progressive or sustainable farms by our criteria.

We had farms ranging from very small to very large in that group. In some cases, going to sustainable agriculture in an arid region means more extensive practices, harvesting fewer crops, maybe leaving one year as a green manure. In that situation, a farmer can stretch his or her machinery complement over more acres. So there is not necessarily a correlation between sustainable and smaller.

In areas where you have higher rainfall and opportunities for livestock diversification, that might be true, but not in all regions in the country.

MR. HASSEBROOK. We were involved in a study that covered five states in the north-central region—not all of them quite in the north-central region. I think it went from Montana across the northern tier over to Iowa. And in at least four of those states, we found a direct correlation, anyway, between farm size and the practice of sustainable agriculture. Farms practicing it tended to be smaller, tended to use more of the farmer's time and management per acre than did the conventional farms.

In several of those states, they were able to squeeze more income out per acre than the conventional farms, although given their smaller size, they didn't necessarily have larger total incomes.

REPRESENTATIVE HAMILTON. What is the trend line on these integrated cropping systems? Are they increasing in the country, or are they staying about the same?

MR. HASSEBROOK. I haven't seen good data on that. My firsthand experience is that they have been increasing some. They particularly increased, I think, a few years ago, when there was a big growth in interest.

We are finding greatest interest among the beginning farmer, because it is a way of getting started in farming with less capital. They have time, they don't have money. They see these sustainable agriculture strategies as a way to get started on less money. So there is particularly strong interest there.

REPRESENTATIVE HAMILTON. But it is a very minor part of American agriculture today. Is that a fair statement?

MR. HASSEBROOK. It depends on how you view it. On a continuum, agriculture has been moving in that direction. But if you take people who have gone

all the way to develop full farming systems which would call sustainable, it is still a minority, but a growing minority.

REPRESENTATIVE HAMILTON. And this sustainable agriculture is compatible with our environmental goals to a greater degree than conventional? Is that correct?

MR. YOUNG. I would say by definition. Most definitions of sustainable agriculture really correlate it more closely with agrichemical use, use of off-farm inputs, than they do with size of farm or some social characteristics. Perhaps the other witnesses would like to comment on that as well.

MR. HASSEBROOK. The cropping systems that sustainable farms are using have also tended to reduce soil erosion. I think that is an additional environmental benefit.

REPRESENTATIVE HAMILTON. Now, can the commodity programs that we now have in the current law, are they compatible with the integrated cropping systems?

MR. YOUNG. My response to that, since our research looked at it rather specifically, is that they can be under conditions which motivate participation. When you link participation with use of desirable systems, you can get farmers' behavior to change. But under conditions of high market prices, for example, which might follow from a collapse in the food production systems in Eastern Europe and if some of our competitors had production problems, we would see farmers exiting the farm programs and planting very agrichemical-intensive crops fence row to fence row, due simply to market conditions.

REPRESENTATIVE HAMILTON. When you talk about recoupling, what is the definition of recoupling?

MR. YOUNG. Most——

REPRESENTATIVE HAMILTON. It is tying the payments to the environmental——

MR. YOUNG. Precisely. Soil erosion and agrochemical use have been the two most widely advocated.

REPRESENTATIVE HAMILTON. Why haven't we had more utilization of this integrated farm management option that is in the law today?

MR. HASSEBROOK. I think for several reasons. One, I think the original proposal was amended so hastily before it became part of the law that much of the flexibility that it would have provided to practice sustainable agriculture was lost.

For example, one critical component of many sustainable crop rotations is including a forage legume in the crop rotation. In the waning moments of the Farm Bill, the option of haying and grazing those crops through the integrated farm management program was removed, and that made the program a lot less attractive. The various changes made it much more complex for farmers to use, and a particularly big problem was that the implementation of this program by USDA was simply awful, frankly, the first couple of years. There were a whole series of rules that distorted the program so badly that farmers were actually penalized, lost payments for going into the program. Just a whole series of those rules.

REPRESENTATIVE HAMILTON. Is 1991 when it first got under way?

MR. HASSEBROOK. Yes.

REPRESENTATIVE HAMILTON. Is the Department of Agriculture antagonistic toward this integrated farm management option program?

MR. HASSEBROOK. I think they certainly were.

REPRESENTATIVE HAMILTON. Are they today?

MR. HASSEBROOK. I think less so. I think they have made some significant changes in the program to make it better.

REPRESENTATIVE HAMILTON. Why do you think they have been antagonistic toward it?

MR. HASSEBROOK. I don't know. That is hard for me to judge. I am not sure.

REPRESENTATIVE HAMILTON. But they have been?

MR. HASSEBROOK. Yes.

REPRESENTATIVE HAMILTON. Do you agree with that, Mr. Young?

MR. YOUNG. Yes.

REPRESENTATIVE HAMILTON. And you also, Mr. Dobbs?

MR. DOBBS. I don't really know. I agree there were a great deal of implementation problems at the outset. That is one conclusion you could draw.

REPRESENTATIVE HAMILTON. It could be inertia, I suppose.

MR. DOBBS. At the field level, the directions came so late that it was just a tremendous burden for them in the first year, and not really having any idea how to operate it, I don't think there was hostility, but——

REPRESENTATIVE HAMILTON. Is it your idea that it should be promoted?

MR. HASSEBROOK. I think it should be. I think there are social benefits in encouraging farmers to use these farming systems, as Mr. Young and Mr. Dobbs have pointed out. And after all, why should we have a farm program that penalizes farmers for using environmentally sound practices? It doesn't make any sense.

This program was signed to remove penalties, and I think that certainly should be promoted. The program also needs to be improved, frankly, in the 1995 farm bill.

REPRESENTATIVE HAMILTON. Let me ask you about the impact of biotechnology on the family farm. What is the implication of biotechnology on the family farm?

One of the writers says that biotechnology will speed up the demise of the family farm. Is that your impression?

MR. HASSEBROOK. I think that would be the result of the predominant way that biotechnology is being used today. It is primarily being used to develop new products to sell the farmers, so we can move further down this continuum of shifting the value-added process off the farms.

Biotechnology doesn't need to be used exclusively that way. It could be used to develop the kinds of crop varieties, for example, that enhance the use of these low-input sustainable crop rotations. But it is not being used that way very extensively.

It could be used, for example, to help us create new uses for rotation crops. We could add crops to rotations in the corn belt without sacrificing income.

REPRESENTATIVE HAMILTON. But for the most part, as biotechnology is being used today, it is being used against the family farmer; is that correct?

MR. HASSEBROOK. I think it will, yes.

MR. YOUNG. I would like to draw the distinction between working against environmentally sustainable systems versus working against the family farmer. I think we can say that most biotechnology today has been fairly neutral; perhaps, with respect to size, but that it has not really explored its potential, in terms of being environmentally sustainable.

Let me provide an example. If wheat could be bred which fixed nitrogen from the air and could grow in clay sub-soils, it could be very environmentally sustainable. You decrease nitrogen applications, you have wheat production in some of the marginal areas that would not otherwise be permitted.

But, in fact, most of the biotechnology has been in the development of varieties that are more input responsive. That was what the green revolution was about. We bred rice and wheat, which responded very well to water and fertilizer. We haven't seen much biotechnology directed to the area of environmental sustainability.

REPRESENTATIVE HAMILTON. You suggest that multiple cropping options are superior to single-crop options, in most cases, in your testimony. Does that mean that the availability of cropping options are more important than the specific program options, in comparing social preferences?

MR. YOUNG. That is an excellent question. The question is, what do we need, more research and development or simply reform the policies? Our research shows that we need both.

Reforming the policies, if we don't have alternative systems for the policies to encourage us, is not going to help very much. We saw that in our research, especially in arid areas in the West. By the same token, developing the new technologies but maintaining a set of policies that are very narrow in their price and income supports; namely, for feed grains and food grains and cotton, is not going to help, either. The most progress can be made with the least expenditure of public money when research and technology development and policy reform proceed together.

REPRESENTATIVE HAMILTON. Let me try to get each of you to comment very specifically on the question of policy reform. I know it is a broad question, and you have been hitting at it frequently in your comments, but what would you do in agricultural programs today—policy reform—what major changes would you make? Across the board, in research, commodity programs, and all the rest, what are the most important things that we should do in order to change?

MR. DOBBS. I made a comment in my written statement that I think the move toward continued flexibility, coupled with continued refinement—I didn't necessarily say restriction—but refinement of environmental compliance, is heading us in the right direction. And in that sense, the Integrated Farm Management Program Option, although very complicated and somewhat convoluted, is at least a starting point for dialogue.

REPRESENTATIVE HAMILTON. What do you mean by flexibility?

MR. DOBBS. I mean not tilting the payments so much that it pretty much dictates what crops the farmer is going to grow. Past policy has led to the domination of corn, corn coupled with soybeans, and the heavy dominance of wheat, as opposed to other small grains and legumes.

But on the other hand, as some recent work by the Center for Resource Economics has indicated, flexibility by itself does not necessarily ensure more sustainability. For example, some of the flexibility provisions of the triple-base program has resulted in more soybean production, which everybody predicted it would. But while soybeans involve less application of nitrogen, they also involve planting more row crops on highly erosive soils, and in some cases more application of herbicides, at least as compared to small grains.

So that is why I say that flexibility, on the one hand, so we are not constantly de facto dictating exactly what crops are grown, but also stronger inducements, and in some cases requirements to get conserving and less chemical-intensive practices, to be part of the choice. I think the IMFPO starts to lead us in that direction.

I can mention one specific change, and I don't have a magic solution or formula on it. But, for example, the IMFPO—the key thing in that program is allowing a farmer not to have to sacrifice deficiency payments while introducing conserving crops into the rotation, in lieu of the standard program crops. But it is based on the deficiency payments.

It could be that very high-crop prices for the corn that the farmer doesn't grow wipes out most of the deficiency payment in a particular year, and leaves the farmer who participated in the IMFPO really worse off, because he doesn't get the high-crop price on that acreage, or any deficiency payments.

So, I think, while the deficiency payment has been a valuable tool over the last decade with the commodity-based programs, as we look to a more mixed, more flexibility program, we are going to have to look to some tool other than the deficiency payment to compensate for growing conserving crops, something that is more of an assured payment.

MR. HASSEBROOK. One of the things we might consider——

REPRESENTATIVE HAMILTON. An assured payment, what do you mean by that?

MR. DOBBS. A conservation payment or something else that assures the farmer, if I give up corn and beans to grow a legume or alfalfa or whatever, there is some equivalent to compensate me for doing that.

REPRESENTATIVE HAMILTON. What is going to be the impact of all that on the cost of the agricultural program?

MR. YOUNG. We addressed that in some of our earlier testimony. I think what Mr. Dobbs is referring to by equivalent payment would really be recoupled payments, payments based on reducing erosion, increasing wildlife habitat, or what have you, and our research showed that type of policy works. It is durable, unlike policies similar to base flexibility, which require you to elect to participate in the farm programs.

When market prices are high, people opt out of the programs. So high-market prices for corn and wheat can do as much as biased farm policies to pollute aquifers and erode the soil. To offset that, we need to recouple these payments to environmental objectives, if that is our goal.

REPRESENTATIVE HAMILTON. And looking at it in terms of cost to the federal budget, what is the impact?

MR. YOUNG. It is going to cost money.

REPRESENTATIVE HAMILTON. More than we are now spending?

MR. YOUNG. That depends upon the type of recoupling. For the specific programs we looked at, yes. In many cases the costs were comparable, and the reason is the following.

A process of recoupling would pay farmers year in and year out for following desirable environmental practices. The payments would be made in the low-price years when we currently have payments being made, and in the high-price years when deficiency payments commonly are not made. So you have a steady stream flow of taxpayer subsidies for recoupled programs.

MR. HASSEBROOK. I think you can do some things that don't need to cost money that can be pretty significant. One of the things, in the short term, we could do, I believe, is create a program where we pay farmers to adopt practices that protect the environment, but at the same time actually reduce reduction of surplus commodities.

For example, we can pay farmers to grow less corn and grow more conserving crops, or if they are in a critical watershed with severe problems with nitrate contamination of groundwater, we can pay them to reduce nitrogen use and accept reduced yield. Although we would have to pay them to do that, the fact that we would have reduced production of surplus commodities would actually reduce the amount of money we pay out in deficiency payments, because market prices would go higher and we would save money on our deficiency payments.

REPRESENTATIVE HAMILTON. Are you telling me that you think we can save money by moving to this recoupling?

MR. HASSEBROOK. Well, this is something——

REPRESENTATIVE HAMILTON. He is telling me that it is going to cost more. You are telling me that it is going to cost less if it is done right.

MR. HASSEBROOK. I am saying there are ways you can do it that it doesn't have to cost more, yes. We are spending a lot of money now on-farm programs. Mr. Young is right, you would want to do it year after year and not just in a year when crop prices are lower. But on the other hand, when crop prices are very low, as they were in the late 1980s, we were spending, at one point, $26 billion a year. I think we could have a great environmental program for a lesser amount, which might take out the peaks and valleys of farm spending.

REPRESENTATIVE HAMILTON. I want to give you, Mr. Hassebrook, and Mr. Young, the same option I gave to Mr. Dobbs. On the reform of present policy, do you want to add anything else to what Mr. Dobbs has said?

MR. YOUNG. I would like to add a brief comment. Following up Mr. Hassebrook, in our analysis, yes, taxpayer costs were up slightly, but farm operator profits were also up. Also, the environmental returns were up. And they more than offset the increased taxpayer cost.

So social welfare, aggregating all benefits and costs across groups, was actually higher with recoupling. That is an important point.

The second factor is that we looked at only one type of recoupling. We had a specific type of recoupling to agrichemical use and erosion reductions. I think we have been somewhat remiss in not spending more time in looking at

alternative designs of recoupling, as Mr. Hassebrook mentioned, and I certainly wouldn't want our research to be the last word on the taxpayer cost.

If we looked at targeting specific environmental problems, we could probably reduce the cost of recoupling.

REPRESENTATIVE HAMILTON. Mr. Hassebrook, do you have anything you would want to add, with respect to these reforms?

MR. HASSEBROOK. I think we can do some work in 1995 to expand these things and make them more——

REPRESENTATIVE HAMILTON. And in the research budget?

MR. HASSEBROOK. I think we need to provide much stronger directives to the USDA, to emphasize research that enhances family farms and the environment. I don't agree with Doug on this issue, I think there is linkage between reduced input use and family farm objectives. By reducing petrochemical applications, about which we have environmental concerns, we can enable farmers to capture a bigger share of the farm dollar, using more of their time and management, and capture a bigger income flow.

It may require more people in agriculture, but if we can reduce purchased inputs, we will have the money in agriculture to support more people. So I think there are family-farm benefits there, potentially, as well as environmental benefits.

MR. YOUNG. I think we are both right. I think this is regionally specific. I think there are some areas where climatic and other conditions permit diversification, where you can get by with smaller farms. In other areas, you might end up with larger farms or equally sized farms.

REPRESENTATIVE HAMILTON. What is the future in agriculture, with regard to this use of the chemical fertilizers, for example?

MR. DOBBS. I am very much convinced that the wave of the future, world over, is less chemical use——

REPRESENTATIVE HAMILTON. Worldwide?

MR. DOBBS. Worldwide, and more what we are calling sustainable systems, environmentally, for a variety of reasons. I alluded to them somewhat in my comments, but I think we are going to face higher fossil fuel prices the world over.

I think that even though some areas of the world may be abundant in fossil fuel for a long time, most of the world is not going to be, and I don't think we are going to continue to make ourselves vulnerable to those limited areas in the Middle East that do have abundant supplies.

I think high-energy costs are going to drive integrated farming. As the Rio Summit underscored, there is a worldwide concern with pollution costs, from both industry and agriculture, and I don't think this is simply a passing fad. So I think countries the world over are going to try to bring a better balance between ecology and material production.

I think tax policy is more in line now, if we don't reverse that trend. And I think we are going to find ourselves trying to find a number of ways to reduce environmental costs, which is going to induce more sustainable systems.

REPRESENTATIVE HAMILTON. Do you agree with that, with regard to the trends?

MR. HASSEBROOK. I agree with that, and I would also note that we see a growing interest in sustainable agriculture as a developmental strategy, as well as an environmental strategy.

MR. YOUNG. It does depend, though, on the outcome of the GATT talks. If we make progress there, it could promote crop selection flexibility and sustainability. On the other hand, if we return to a protectionist, isolated set of agricultural programs in each country, we could actually move against sustainability. We could see higher subsidies in individual countries.

REPRESENTATIVE HAMILTON. You have been talking about these cropping systems, but let me ask you one question, with respect to animal agriculture and the adoption of the bovine growth hormone.We have spent, I guess, a lot of money in the development of that. Is that correct? And yet we have done very little, with respect to grazing techniques, that would be used to increase production. Is that an example where our research is tilted?

MR. DOBBS. I alluded to that, in part, when I mentioned the tendency of specialization and focus on capital-intensive methods. I think it is not just growth stimulants and growth hormones, but the kinds of facilities that have been researched extensively.

A lot of the low-capital input kinds of systems have not been very well researched in the last three or four decades, and what limited research has been done is tending to show that those systems are probably just as economically efficient, and in many cases, perhaps, even as profitable for farmers, but they have really been shoved aside, with the emphasis on the large scale.

REPRESENTATIVE HAMILTON. So when you put research dollars into this BGH, does that have any impact then on the family farm?

MR. HASSEBROOK. I think it does. The research suggests pretty clearly that if we move in that direction and there is widespread adoption of BGH, it will contribute to a significant decline in family dairy farms.

Let me say a couple of things, with respect to BGH. Family farms would be adversely effected. There is questionable efficiency. One of the things about the dairy industry that has been very important, I think both economically and environmentally, has been that it has provided a very productive way to use some highly erodable land in the Midwest—in Minnesota and Wisconsin. It reflects the type of land they have.

If we go to BGH, what we are going to have to do is to replace that forage in the diets of dairy cows with corn and soybeans. So we will have given up the most productive way we have of using that land, and will create pressures for people to tear up that land and use it for corn and soybeans. I question the efficiency of that shift.

REPRESENTATIVE HAMILTON. I think that is. Gentlemen, we thank you very, very much for your participation this morning. I think you have contributed to our understanding. The Committee will stand adjourned.

[Whereupon, at 11:30 a.m., the Committee adjourned, subject to the call of the Chair.]

SUBMISSIONS FOR THE RECORD

PREPARED STATEMENT OF THOMAS DOBBS

Thank you for the invitation to testify today on the potential implications of "sustainable agriculture" for the economic viability of family farms and rural communities. Increasing numbers of people view "sustainable agriculture" as an alternative to the current "industrial agriculture" model. There is a great deal of interest at the present time in the potential for farming systems which appear to be sustainable from an environmental or ecological standpoint to offer sufficient profits to be attractive to farmers. Also, there is intense debate about the potential implications of sustainable farming systems for: (1) farm size and structure; and (2) the economic strength of rural communities. Moreover, it is critical that we gain deeper understanding of how public policies help shape the economic attractiveness of sustainable farming systems and, consequently, the structure of agriculture and rural communities.

The terms "conventional" and "sustainable" will be used in this testimony to describe broadly differing types of farming systems. The term **conventional** will be used to refer to farming systems which make use of synthetic chemical fertilizers and pesticides in amounts presently typical for their particular agro-climatic areas. **Sustainable** is the term that will be used to describe farming systems which either eliminate or greatly reduce the use of synthetic chemical fertilizers and pesticides; these systems emphasize crop rotations, crop diversity, legumes, tillage, sometimes a certain amount of hand-weeding (e.g., in soybeans), and cover crops as means of maintaining soil fertility, controlling weeds and other pests, and preventing soil erosion. In general, I refer to **whole-farm systems** in this testimony, rather than to changes only in particular **practices**. Although changes in particular farming practices--leaving the conventional whole-farm systems largely intact--may indeed often provide environmental benefits, the more fundamental policy issues evolve around whole-farm system changes.

Research in which colleagues and I at South Dakota State University (SDSU) have been involved since the mid-1980s is drawn upon for portions of this testimony. This research has been supported by the South Dakota Agricultural Experiment Station and by grants from the USDA's Sustainable Agriculture Research and Education (SARE) program (formerly referred to as the "LISA" program) and from the Northwest Area Foundation. Views expressed in these remarks are my own, however; they are not necessarily shared by the sponsoring institutions or by all of my research colleagues.

Portions of this testimony come from my October 1991 presentation at a U.S. National Academy of Sciences/Bulgarian Academy of Sciences workshop in Sofia, Bulgaria (Dobbs, 1991). In addition to my written testimony, I am submitting for the record a recently released SDSU report entitled **Farm, Rural Economy, and Policy Implications of Sustainable Agriculture in South Dakota** (Dobbs, et al., 1992), which summarizes our work supported by the Northwest Area Foundation.

Economic Attractiveness Of Sustainable Farming Systems

The economic attractiveness of sustainable farming systems will be reviewed by examining: (1) the economic organization of farms; (2) cost structure; (3) profitability; and (4) risk. The discussion will focus primarily on farms growing feed grains (e.g., corn, barley), food grains (e.g., wheat), oilseed crops (e.g., soybeans), and forage or green manure legumes (e.g., alfalfa, sweet clover, red clover). The relationship of livestock to crops in sustainable systems will be discussed some, but issues related to the use of antibiotics, growth hormones, etc. in livestock production will not be discussed. Also, the use of sustainable fruit and vegetable production systems will not be covered in this testimony.

Evidence from several research station and on-farm studies in South Dakota will be cited in this testimony. These studies are particularly relevant because they provide insights into possible patterns both for corn-soybean regions and for wheat regions of the U.S.

Economic Organization Of Farms

Sustainable farms are generally more diverse than conventional farms in their crop enterprise mix. **Crop rotations** are integral components of the pest control and fertility strategies of

sustainable farms. For the past 8 years, SDSU researchers have been studying two adjacent sustainable and conventional farms located in east-central South Dakota. In a typical year, the crop distribution for the **conventional** farm is as follows, with percent of acreage shown in parentheses for each crop: corn (42); soybeans (40); and cover crops on land idled under government "set-aside" programs (18) (Cole and Dobbs, 1990). The typical crop distribution on the sustainable farm is: corn (23); soybeans (24); oats (9); spring wheat (6); alfalfa hay (19); and cover crops on land idled under government "set-aside" programs (19) (Becker, et al., 1990). The conventional farm follows a 2-year corn-soybeans rotation, whereas the sustainable farm follows a 4-year corn-small grain (underseeded with alfalfa)-alfalfa hay-soybeans rotation. Both farms have cattle and hogs, in addition to the crop enterprises.

Partly because of the role of forage legumes in many sustainable farming systems and the use of livestock manure for part of the soil fertility, it is generally felt that livestock are more common on sustainable farms than on conventional farms. Surveys in South Dakota and other States directly east and south of South Dakota have indicated that 84 percent or more of sustainable farms have commercial livestock enterprises (Taylor, et al., 1989b). Recent surveys in Iowa and Minnesota reveal that higher proportions of sustainable farms than conventional farms have livestock (Miller, 1992).

Crop enterprise mix and crop yields are two critical factors influencing gross income on conventional and sustainable farms. There is a great deal of controversy about whether, and how much, yields per unit of land are lower on sustainable than conventional farms. It is very difficult to generalize about yield differences, because (1) there have been very few long-term yield comparisons of sustainable and conventional systems with modern cultivars and tillage equipment, and (2) yield differences are very much a function of the particular farming rotations and practices being compared and of the agro-climatic region in which they are located. Having said this, one might expect yield differences between sustainable and conventional systems -- across the major grain producing regions of the U.S. -- to be greatest for corn. Much of the corn grown in the U.S. is in regions with deep soils and relatively high rainfall. Corn cultivars have been bred to be highly yield responsive to combinations of this rainfall and chemical fertilizers and pesticides. Yield differences are expected to be less for soybeans, which fix nitrogen, and for wheat, which in much of the U.S. is grown in relatively low-rainfall areas and with relatively low rates of chemical application, even on conventional farms.

Some of our recent research in South Dakota supports that generalization, but there are exceptions. Smolik and Dobbs (1991) recently reported results of research trails at SDSU's agricultural research station in northeast South Dakota, in which sustainable systems were compared with conventional and reduced tillage systems. Two studies were initiated in 1985 and each study compared three crop rotation systems: sustainable (in which no synthetic chemical fertilizers or pesticides were applied), conventional, and reduced-tillage. Study 1 **emphasizes** row crops (corn and soybeans) and Study 2 **emphasizes** small grains and soybeans. The sustainable system in Study 1 includes a forage legume (alfalfa) as part of the rotation and the sustainable system in Study 2 includes a green manure legume mix (a red clover-sweet clover combination). Over the 5-year (1985-1989) period reported, **corn** yields were generally significantly higher in the Study 1 conventional and reduced- tillage systems than in the sustainable system; the drought year of 1988 was an exception, when corn yields were highest for the sustainable system. There was not a consistent difference in **soybean** yields between sustainable, conventional, and reduced-tillage systems in either Study 1 or Study 2. There was generally little difference in **spring wheat** yields between sustainable, conventional, and reduced-tillage systems in Study 2. Overall, rainfall, not farming system, was the dominant factor influencing yields.

SDSU researchers also have recently reported yield comparisons for the matched pair of conventional and sustainable farms in eastern South Dakota which were described previously. The sustainable farm in this comparison is mostly organic, whereas the conventional farm depends on synthetic chemical fertilizers and herbicides. In this particular 5-year (1985-1989) comparison, measured average **corn** yields were slightly (7 percent) higher on the sustainable farm than on the conventional farm, while average **soybean** yields were considerably (18 percent) higher on the conventional farm (Dobbs, et al., 1990b). The conventional soybean farmer, in this case, drills his soybeans, rather than planting in rows wide enough to mechanically cultivate, as does the sustainable farmer. The high plant population permitted by drilling, coupled with good rainfall in

the study area during the 1985-1989 time period, resulted in relatively high soybean yields on the conventional farm.

This pair of eastern South Dakota farms also can be used to illustrate how **gross income** depends on **both** crop mix and relative yields. Gross income per unit of land from crop production averaged 30 percent more on the conventional than on the sustainable farm over the 1985-1989 time period, when organic price premiums received by the sustainable farmer were ignored (Dobbs, et al., 1991). Although average corn yields were slightly higher on the sustainable farm, the heavy concentration of corn and soybeans in the conventional farm's rotation, together with higher soybean yields on that farm, caused the conventional farm's gross income to be higher. Favorable soybean prices and relatively generous government support payments for corn contributed to the relatively high gross income on the conventional farm. The sustainable farmer actually sells a portion of his production (mainly soybeans) in markets for organically produced products that bring premium prices ("organic premiums"). However, those premiums **generally** have not been high enough to raise gross income of the sustainable farm to the level of the conventional farm (Dobbs, et al., 1991).

Cost Structure

The structure of production costs differs between conventional and sustainable farms in some generally predictable ways, as well as in some ways that are situation-specific. To illustrate, evidence is taken from studies of five case pairs of sustainable and conventional South Dakota farms that SDSU has recently studied: (1) a pair of **east-central** case farms in a corn-soybean area (already referred to in the previous section); (2) a pair of **south-central** South Dakota case farms in another corn-soybean area; (3) a pair of **northeast** South Dakota case farms in a spring wheat growing area; (4) a pair of **northwest** South Dakota case farms in another (lower rainfall) spring wheat growing area; and (5) a pair of farms in a **southwest** South Dakota (also relatively low rainfall) winter wheat growing area. All five sustainable farms **and** the east-central conventional farm are **actual** operations. The other four conventional farms are **"synthetic"** operations, developed with data and information from a variety of sources (Cole and Dobbs, 1990).

Direct (cash, operating) costs other than for labor, per unit of land, are consistently higher on the conventional than on the sustainable farms. Most of the case study sustainable farms purchase few or no chemical fertilizers and herbicides, so that is one major reason for the difference, of course. Differences in crop mix constitute another reason. In the south-central, east-central, and northeast areas, direct costs other than labor on sustainable farms -- per unit of total cropland -- run 49 to 57 percent of the costs on conventional farms. The difference is much less in the relatively dry, western South Dakota wheat areas, where direct costs other than labor on sustainable farms are 85 to 93 percent of cost levels on conventional farms (Dobbs, et al, 1990).

Fuel and lubrication costs for tractors and machinery (per unit of total cropland) are higher for the conventional farms than for the sustainable farms in all but the east-central area (Dobbs and Cole, 1991c). The differences range from 63 percent higher for the conventional farm in the northwest area to 30 percent lower for the conventional farm in the east-central area. Sustainable farms are often thought to use more tillage (for weed control) and, hence, perhaps more fuel. However, a variety of factors contribute to overall fuel use per unit of cropland, including the mix of crops grown and the management of set-aside and fallow cropland.

Labor use on the five pairs of case farms shows a pattern somewhat similar to fuel use (Dobbs and Cole, 1991c). Labor use for crop production is higher on the conventional farms than on the sustainable farms in the three wheat growing areas (the northeast, northwest, and southwest). It is higher on sustainable farms in the two corn-soybean areas (the south-central and east-central areas). The principal use of labor for crop production on South Dakota farms is in operation of machinery. Thus, differences in crop mix and in machine operations for individual crops are the primary influence on labor use differentials between sustainable and conventional farms in South Dakota and in most major U.S. grain producing areas. This ignores livestock production, however. To the extent sustainable farms have more livestock than conventional farms, that adds to the relative labor intensity of sustainable farms.

Interim results of a 5-State study in the north-central and northwestern U.S. indicate that sustainable farming systems appear to require more labor per acre than do conventional systems (Miller, 1992).

Profitability

There have been few detailed analyses of the relative profitability of sustainable and conventional farming systems until quite recently [other than for Integrated Pest Management (IPM), which generally does not involve **whole-system** changes]. A review of literature by Cacek and Langner (1986), prior to initiation of the USDA's LISA research and education program, revealed mixed results. Profitability studies they reviewed were based upon a variety of research methods and measures of profitability, making generalizations difficult. Profits were found to be greater for conventional systems in some instances and for organic (one type of sustainable) systems in others. They concluded that "the direct comparisons and the plot data suggest that organic farming can compete with conventional farming, at least in certain geographical areas and for certain farming enterprises" (Cacek and Langner, 1986, p. 26).

Madden and Dobbs (1990) reviewed literature on the economics of sustainable farming in preparation for a 1988 conference. They found IPM systems to hold considerable economic promise, though such systems do not **always** result in decreased use of chemical pesticides. In reviewing several other comparisons of sustainable and conventional systems across the U.S., they concluded that "U.S. farming systems that emphasize legumes in the rotation and minimize or eliminate the use of synthetic chemicals for fertility and pest control .. offer encouraging farm-level profitability prospects" (Madden and Dobbs, 1990, p. 471).

Crosson and Ekey-Ostrov's recent review of the literature drew more negative conclusions about the profitability of sustainable systems, however. Except for the studies by Lockeretz and associates comparing organic and conventional "corn-belt" farms in the 1970s (e.g., Lockeretz, et al., 1981), the studies they reviewed found sustainable farming systems to be less profitable than conventional systems. They stated that alternative (sustainable) agriculture "is less profitable because what it saves in fertilizer and pesticide costs is not enough to compensate for the additional labor required and for the yield penalty it suffers..." (Crosson and Ekey-Ostrov, 1990, p. 36). They attributed the "yield penalty" to "the necessary rotation of main crops with low-value legumes and the difficulty of controlling weeds without herbicides" (Crosson and Ekey-Ostrov, 1990, p. 36).

Fox, et al. (1991) also have recently reviewed North American literature which compares profitability of organic, other sustainable (what they call alternative), and conventional farming systems. They found that neither organic nor conventional systems have consistently outperformed the other, economically. Results also were mixed for the studies they reviewed comparing alternative (sustainable but not organic) and conventional systems. Some alternative systems were found to be competitive, in terms of farm-level profits, with conventional systems. Overall, Fox, et al. found that comparative profitability results in studies of conventional, organic, and other sustainable production systems "have depended on variations in the production system studied, crops produced, year-to-year variations in weather, soil type, and assumptions of price and cost structures" (Fox, et al., 1991, p. 136).

Results of several studies sponsored by the USDA's LISA program and other sustainable agriculture research programs had not been released when the above reviews were conducted. As results of these other studies are published and become widely read over the next few years, more clear **patterns** of relative profitability are likely to emerge. Some of these studies, conducted at SDSU and elsewhere, will be cited here.

Profitability results of recent and on-going sustainable agriculture studies at SDSU are summarized in Table 1. These studies have already been mentioned in conjunction with the discussions of gross income and cost structure. **Direct costs other than labor** and **gross income** per acre for each study and comparison are shown in the first two columns of data. Two measures of **profitability** are shown in the last two columns. The first measure of profit or net income is computed by subtracting all costs **except** those for labor (both family and hired), management, and land from gross income. The second measure differs from the first only in that costs of family and hired labor also are subtracted. No distinction is made between actual money expenditures and opportunity costs in the cost calculations for labor and other production inputs. Since some of the comparisons of direct costs and gross income have been discussed already, attention is focused now on the net income comparisons.

The sustainable system in Study 1 at SDSU's northeast research station has been more profitable, on average, over the past 7 years than either the conventional or the reduced-tillage system.

It has been more profitable by **either** the first or the second measure of net income. In Study 2 at the northeast station, the conventional system has been just slightly ($1/acre) more profitable than the sustainable system according to either net income measure. The sustainable system in Study 2 is not high in labor use, because an unharvested green manure legume (a sweet clover-red clover mix) is used, rather than a harvested forage legume. The reduced-tillage systems (both of which involve use of chemical fertilizers and herbicides) were least profitable in **both** studies, on average, during the 1985-1991 period. The reduced-tillage systems involve relatively high rates of chemical herbicide application, resulting in high direct costs other than labor.

Profitability measures in the longitudinal study of two east-central South Dakota farms show the conventional farm to have been more profitable than the sustainable farm, on average, over the 1985-1991 time period. Direct costs were much lower on the sustainable farm, but not low enough to offset the higher gross income on the conventional farm. Also, labor (including operator and family labor) costs were higher on the sustainable farm, causing the net income difference between the two farms to widen when labor costs were subtracted (a $21/acre difference by the first net income measure, compared to a $24/acre difference by the second measure).

Case studies in other parts of South Dakota (the lower portion of Table 1) show the conventional farm to be more profitable in a "typical" year in the late 1980's than the sustainable farm in the south-central corn-soybeans area, but show little difference in profitability between conventional and sustainable farms in some of the wheat growing areas. In fact, when organic premiums are included for the sustainable farms in the three wheat growing areas, those farms are slightly more profitable than their respective conventional counterparts. Organic premiums are not factored into any of the gross or net income calculations shown in Table 1, but we have shown the results of such calculations elsewhere (Dobbs, et al., 1990 and 1992; Smolik and Dobbs, 1991).

Recent research supported by the Northwest Area Foundation found that in North Dakota, a major wheat growing State, sustainable farmers reported net incomes which averaged $3-4/acre more than conventional farmers reported (Miller, 1992). Those results are consistent with the net income comparison results for farms in South Dakota's wheat growing regions when organic premiums are factored into the South Dakota comparisons.

Three recent studies in other grain producing States deserve mention here. Recent work by Duffy (1990) found **lower** average net returns over the period 1978-1989 for a sustainable corn-oats-meadow (alfalfa-grass mixture) system than for a conventional (with standard chemical inputs) corn-soybean system in Iowa. Purdue University researchers recently reported that adding alfalfa to the crop mix of conventional corn-soybean systems, in order to reduce the quantities of inorganic nitrogen fertilizer applications, adversely affects farm profitability in Indiana (Lee et al., 1991). A statistical analysis of farm records data in Ohio indicated that crop farmers in that State are **not** spending "too much", from a profit maximization standpoint, on synthetic fertilizers and other chemicals. Also, the Ohio study found that profitability "is not significantly improved on crop farms with legume based rotations" (Diallo, et al., 1990, p. 7).

Taken as a whole, the available literature tends to indicate that sustainable systems presently are more likely to be competitive with conventional systems in the western, drier, wheat growing areas of the U.S. (including parts of South Dakota) than in higher rainfall areas of the central and eastern corn-soybean belt (e.g., in such States as Iowa, Indiana, and Ohio). However, there certainly are particular sustainable systems and practices which appear promising for the central and eastern corn-soybean belt.

It must be emphasized that the profitability comparisons cited in this paper were made largely on the basis of product prices, input prices, **and** Federal farm program provisions of the late 1980s. Federal farm programs generally have enhanced the profitability of conventional systems relative to sustainable systems (Dobbs, et al., 1988 and 1990; Goldstein and Young, 1987; Young, 1989; Young and Painter, 1990; Smolik and Dobbs, 1991). To illustrate, hypothetical whole farms with 540 acres of cropland, using farming systems being analyzed at SDSU's northeast research station, would have received the following direct government payments ("deficiency payments"), on average, over the period 1985-1990; (1) Study 1 sustainable system -- $6,813/yr.; (2) Study 1 conventional and reduced-tillage systems -- $12,010/yr.; (3) Study 2 sustainable system -- $5,752/yr.; and (4) Study 2 conventional and reduced-tillage systems -- $8,024/yr (Dobbs and Mends, 1991). The sustainable system in Study 1 would have received 43 percent less in direct government payments than the comparable conventional and reduced-tillage systems, and

the sustainable system in Study 2 would have received 28 percent less. Although certain provisions of the 1990 Farm Bill reduce this imbalance in some situations, further changes are in order.

Other factors also could enhance the future profitability of sustainable systems relative to conventional systems. These factors include higher energy prices (Dobbs and Cole, 1991a), taxes on chemical inputs to account for negative externalities (Dobbs, et al., 1990; Smolik and Dobbs, 1991), and research which enhances the technical productivity of sustainable systems. Moreover, **if** widespread adoption of sustainable systems **were** to somewhat lower crop output, consequent market price increases could be sufficient to raise net incomes of both conventional and sustainable farmers.

Risk

There has been much discussion, but little comprehensive treatment in the literature, thus far, of the relative riskiness of sustainable and conventional farming systems. Tiong has conceptualized the various dimensions of **production, price (market)**, and **financial** risk associated with sustainable and conventional systems. She has used a decision tree method with preliminary production data to measure the relative riskiness of different systems (Tiong, 1990). Taylor, et al. (1989a) have attempted to assess farmers' perceptions about the relative riskiness of sustainable and conventional systems.

In some ways, sustainable systems can be **more** risky for farmers than conventional systems, especially during the transition to conventional systems, when weed control may be a special problem. In other ways, however, sustainable systems entail **less** risk. Lower expenditures on purchased inputs can mean less financial risk. A more diverse mix of crops can mean less production risk. The more diverse crop mix also can mean less price risk – depending in part on the structure of government farm programs. However, at present, government farm programs provide a certain amount of price protection for crops that predominate in conventional rotations (e.g., corn, soybeans, and wheat), but virtually no price protection for the forage legumes and certain grains (e.g., rye and buckwheat) which constitute portions of the crop mix in many sustainable rotations.

Implications Of Sustainable Agriculture For The Economic Viability Of Rural Communities

There are two alternative perspectives on the implications of sustainable farming systems for the economic viability of rural communities. One perspective starts with the question "What **have been** the impacts of what is now conventional farming on the structure of agriculture and the economic health of rural communities?" The alternative perspective poses the question "What **would be** the impacts on the structure of agriculture and the economic health of rural communities if sustainable farming systems were to **replace** conventional systems?" The first perspective involves a historical interpretation of how and why agriculture and rural communities have changed in the U.S. after widespread adoption of capital-intensive, high chemical-input systems. The second perspective starts from the present and involves attempts to predict the short and long term effects on rural areas of adoption of sustainable farming systems. It is useful here to briefly explore each of these perspectives.

Historical Perspective

Critics of conventional agriculture often use a historical perspective in at least part of their argument. One of the more articulate critiques of recent years is that by Strange (1988). Strange describes the "industrializing" of American agriculture, in which machines and chemical inputs have increasingly replaced on-farm labor, resulting in ever larger farms. With larger, and hence fewer, farms, there is need for fewer local businesses to serve agriculture. Operators of large farms may go outside the local community to take advantage of volume discounts. Fewer farms means fewer farm families, fewer children, the need for fewer schools, and longer travel distances to schools. Fewer families generally means less demand for a wide range of local goods and services, leading to economic declines in many small towns. Many other examples can be given of the negative effects Strange and others (e.g., Hassebrook, 1990) feel that conventional agriculture has had on rural communities in the U.S.

The historical perspective takes account of **dynamics** which work their way out over time. As with any historical process, however, many forces have been at work, making clear cause-and-effect relationships sometimes difficult to establish. Nonetheless, many thoughtful observers of

U.S. agriculture share much of the view summarized in the previous paragraph. Though conventional agriculture and associated government farm programs have brought relatively good incomes to many medium- to large-size **farmers** in the U.S., many small rural **communities** have suffered.

Present Perspective

The alternative perspective starts with the present and examines the "what if a change now" issue. Dobbs and Cole (1991b and 1991c) recently have taken such a perspective in examining potential short run effects on rural communities of conversions **from conventional to sustainable** farming systems in South Dakota. They estimated the rural area **personal income** effects of such conversions, breaking the effects into **on-farm effects** (on agricultural households, including both family and hired labor) and **off-farm effects** on (1) backward-linked businesses in the local community (e.g., fertilizer and machinery dealers, etc.), (2) forward-linked businesses (e.g., local grain handling businesses), and (3) local businesses which sell consumer goods. They used data from the case study conventional and sustainable farms in south-central, east-central, northeast, northwest, and southwest South Dakota which were described earlier.

Population densities are fairly low in rural South Dakota and agricultural processing (forward-linked) industries are not well developed. Hence, Dobbs and Cole's analysis showed that the largest personal income effects within rural areas of conversions to sustainable farming systems are those on the agricultural households themselves. Effects varied somewhat among the five local study areas, but off-farm personal income effects averaged $0.87 for each $1.00 of on-farm effect (Dobbs and Cole, 1991b, p. 9). Of the off-farm effects, backward linkage effects were found generally to be of much greater significance than forward linkage effects; again, this reflects, in part, the general lack of local value-added agricultural industries in South Dakota. Because **agricultural households** were estimated to have **less** personal income with sustainable systems (not counting organic price premiums) than with conventional systems in all case study areas of South Dakota except in the northwest area, and because most of the short run off-farm personal income effects on **non-agricultural households** were negative, **overall** personal income effects of the hypothesized change to sustainable systems were negative in all areas except the northwest. Negative off-farm personal income effects tended to be especially high in the retail trade subsector, which included agricultural chemical dealerships.

North Dakota researchers also recently estimated the short run economic impacts of conversions to sustainable farming systems. Using an aggregate economic model for the State of North Dakota, Dahl, et al. (1991) estimated that "gross business activity" in the State would decline by 2.8 percent if there were a widespread conversion to sustainable systems. Livestock business activity would increase, but crops activity would decrease. Business activity would decrease in the retail trade and agricultural processing sectors. Transportation and "business services", on the other hand, would experience increases in economic activity.

Reconciliation Of Perspectives

The North Dakota and South Dakota researchers have been careful to point out that **other**, longer term economic changes probably would take place after there has been time for **structural adjustments** to the spread of sustainable farming systems. "A shift to sustainable farming is likely to trigger substantial changes in the needs of farmers, and these new demands may trigger new infrastructures", state Dahl, et al. (1991, p. 20). Many of the economic changes may be more **positive** for local communities than are the estimated short run effects. Dobbs and Cole (1991b) point out (as I did in the section on profitability in this testimony) that a variety of forces could enhance the relative profitability of sustainable systems in the future; this enhanced relative profitability could be a major factor in reducing negative – or increasing positive – effects on rural area personal incomes of shifts to sustainable agriculture. A variety of other rural economy changes are likely to accompany conversions to sustainable systems, when structural adjustments have had time to take place. For example, some agricultural input suppliers may increasingly become providers of information services – such as integrated pest management, fertility management, specialty crop management, etc. This could replace some of the lost economic activity in chemical pesticides. Thus, as demands for some types of conventional agricultural inputs decline, demands for other, less conventional inputs may increase. Likewise, as farmers diversify into other

crops in the process of adopting sustainable rotations, the need for new and different types of local marketing facilities, machinery, and services is likely to expand.

In short, the "structure of agriculture" probably would change if there were widespread shifts by farmers to sustainable systems. This could have substantial implications for rural communities, especially if the viability of moderate-sized family farms were strengthened. How much the structure of agriculture would change and the full ramifications of such change for rural communities can not be analyzed completely with static, short run analytical frameworks. A more dynamic, historical perspective is necessary to gain insights into some of the probable long term effects. The two perspectives put forth at the beginning of this discussion are not inherently in conflict. Rather, they are potentially complementary. The **present perspective** is needed to gain insights about the rural economic adjustment difficulties that may be encountered in moving from conventional to sustainable systems. That perspective must be complemented, however, with a more dynamic view that is partially based on **historical perspective**, to gain fuller understanding of long run rural economy implications of conversions to sustainable systems.

Implications Of Farm And Environment Policies For The Economic Attractiveness Of Sustainable Farming Systems

I indicated previously in this testimony that Federal farm policies have a substantial impact on the relative profitability -- and, hence, economic attractiveness -- to farmers of different farming systems. As part of our research at SDSU, we have analyzed the economic implications of possible alternative farm and environmental policies. The report accompanying this testimony (Dobbs, et al., 1992) summarizes the results of research on the following policy alternatives: (1) a special tax on fertilizer and pesticides; (2) reduced target prices; (3) mandatory acreage controls; and (4) planting flexibility options. Since the current government emphasis is on increased planting flexibility, I will report briefly some of the results of our analysis of the fourth option.

Various proposals for increased planting "flexibility" were offered and discussed in debates leading up to passage of the 1990 Farm Bill (the 1990 Food, Agriculture, Conservation, and Trade Act). Although ultimately not adopted, a Normal Crop Acreage (NCA) program was the Bush administration's original proposal for the new 5-year farm program. We included in our analysis an NCA policy option patterned after that of the Bush administration.

In such an option, an NCA for a farm is established by summing the individual crop acreage bases and historical oilseed (i.e., soybeans, sunflowers, rapeseed, and canola) plantings for the farm. Any combination of program crops and oilseeds may be planted on the NCA. The planting and harvesting of non-program or non-oilseed crops on the NCA results in a reduction in deficiency payments. In our case study NCA calculations -- since none of the case farms grew sunflowers, rapeseed, or canola -- the only oilseed crop considered was soybeans.

Government deficiency payments in the NCA option just described are based on historical plantings and base yields -- i.e., they are essentially "decoupled" -- except for deductions based on any planting of harvested non-program or non-oilseed crops on the NCA. We also analyzed a second version of the NCA option, in which harvesting of legumes and other non-program crops (such as millet and buckwheat) planted on the NCA base was allowed without any deduction from deficiency payments. In both versions, set-aside requirements had to be met, meaning legumes or other crops could not be harvested on the set-aside acres.

The research results indicated that NCA proposals do offer some promise for encouraging more use of sustainable farming systems. Where conventional corn and soybean production is quite profitable, as in parts of eastern South Dakota, NCA options by themselves appear to be insufficient to induce changeovers from conventional to sustainable cropping systems. In wheat growing areas of northern and western South Dakota, however, where conventional and sustainable systems often may have nearly equal profits, NCA policies could significantly influence conversions from conventional to sustainable systems, particularly if deficiency payments are not reduced for harvesting legumes and other non-program crops on NCA base (the second NCA version analyzed). To achieve this positive effect on sustainable systems, it may be necessary for NCA policies to be structured and introduced gradually, in ways that limit adverse effects on the markets for legumes and other non-program crops which are important in the rotations of existing sustainable farmers.

A rather complex form of flexibility was approved as a pilot program in the final version of the 1990 Farm Bill. The pilot Integrated Farm Management Program Option (IFMPO) is a

voluntary commodity program designed to give farmers additional flexibility in developing more diverse, resource-conserving crop rotations. The IFMPO provides farm program payments for planting resource-conserving crops on acres eligible for deficiency payments and allows some harvesting of set-aside acres. To participate in the IFMPO, a farmer must plant at least 20% of his or her crop acreage base to resource-conserving crops.

The IFMPO does not appear to offer sufficient incentives for most conventional corn-soybean farmers to make an overall switch to sustainable systems (and associated crop rotations). It does lessen the economic penalty for some conventional corn-soybean farmers who might wish to work conserving crops into portions of their rotations. The program may be enough to tip the economic balance in favor of sustainable systems in some of the wheat growing areas, however. Although the IFMPO is extremely complex, and there have been many frustrations in the early stages of its implementation, the program does provide a valuable starting point for sustainable agriculture policy. Attention now needs to be focused on what refinements and changes would be needed to move such a program beyond the pilot phase.

Continuing to move farm policy in the direction of greater **flexibility** in planting decisions (without sacrificing farm income support) while refining **environmental compliance** provisions (in exchange for continued income support) has merit. However, this is a very difficult balancing act to pursue. A recent report by the Center for Resource Economics indicates that some of the flexibility provisions of the 1990 Farm Bill may actually be having a negative net effect on the environment. Authors of the report state:

> Overall, it would appear that the use of flexed acres in 1991 represented a shift away from certain extensively grown, relatively low-input crops such as wheat, oats, barley, and sorghum, and toward more erosive crops like cotton and soybeans that use large amounts of pesticides. (Cook, et al., 1992, p. 5)

Moreover, the move toward greater flexibility should not simply be a "cover" for gradually removing agricultural income supports. Market forces, by themselves, would likely continue to drain agriculture and to further empty out rural areas. It is legitimate national policy to channel economic support into rural areas in order to have a healthy balance between rural and urban areas. We must attempt to provide that support in ways that foster sustainable farming systems and economically viable rural communities.

Implications For Institutions Serving Agriculture

The Federal government can also help foster sustainable farming systems in ways other than by agricultural and environmental "policies". This can be done through appropriate support to particular institutions that are vital to agricultural sustainability. I will give two examples.

Sustainable farming systems frequently involve some crops which are not **major** feed or food grains. In the northern Great Plains, such crops include rye, buckwheat, and millet. Sometimes products from these crops are marketed through "organically certified" channels. Whether or not organic marketing is involved, markets and marketing institutions need to evolve if there is to be much expansion in acreage of these minor crops. Thus, financial support is needed for research institutions involved in developing new and expanded end-uses for the products of these crops. Also, with additional resources, the Cooperative Extension Service in many States could play a larger role in helping farmers form marketing cooperatives or other institutions that may be critical to diversification into non-traditional crops or markets. For more than a decade, Extension Services in most States have been faced with declining "real" (inflation-adjusted) budgets. This has made it extremely difficult to devote resources to technical assistance for production and marketing of new crop or livestock products -- without making significant cuts in valuable programs dealing with traditional products.

Another example of ways in which the Federal government can play a significant role in fostering agricultural sustainability is by expanding support for institutions which conduct research on sustainable farming systems. The USDA's SARE (formerly LISA) program has been a critical catalyst for sustainable agriculture research across the country. This program has enabled many universities and private non-profit institutions to launch or expand some very valuable and innovative research projects dealing with sustainability issues. However, thus far, appropriations for this program have been much too low in relation to total needs. Funding for the SARE program should be substantially increased. Moreover, the USDA's relatively new National Research

Initiative competitive grants program would benefit from greater emphasis on multidisciplinary research dealing with problems of agricultural sustainability.

In summary, there are major opportunities for an enhanced Federal government role in fostering sustainable farming systems and economically viable rural communities. These opportunities involve giving appropriate shape to public policies **and** providing adequate financial support for institutions serving agriculture. Sustainable agriculture and, more generally, sustainable development are receiving world-wide attention. Citizens and policy makers around the globe are recognizing the need to find development paths which reconcile material needs and ecological constraints. Finding these paths, for agriculture and for other sectors of the economy, will require substantial government attention and support. To be effective, that attention and support must be **sustained**, not episodic!

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Table 1. Summary Profitability Results of Recent Sustainable Agriculture Studies at South Dakota State University *

Study	Direct costs other than labor	Gross income	Net income after subtracting all costs except Land, labor and management	Net income after subtracting all costs except Land and management
	Dollars/acre			
Study 1 at Northeast Res. Station, 7-yr. (1985-1991) average comparison				
1.Sustainable system (oats-alfalfa-soybeans-corn)	45	145	68	56
2.Conventional system (corn-soybeans-spring wheat)	62	151	59	49
3.Reduced-tillage system (corn-soybeans-spring wheat)	67	144	48	39
Study 2 at Northeast Res. Station, 7-yr. (1985-1991) average comparison				
1.Sustainable system (oats-clover-soybeans-spring wheat)	30	99	44	34
2.Conventional system (soybeans-spring wheat-barley)	48	122	45	35
3.Reduced-tillage system (soybeans-spring wheat-barley)	56	113	30	21
7-yr. (1985-1991) average comparison of east-central S.D. corn-soybeans area case farms				
1.Actual sustainable farm	45	166	88	77
2.Actual conventional farm	87	224	109	101
Typical-year (late 1980s) comparisons of case farms				
A.South-central S.D. corn-soybean area:				
1. Actual sustainable farm	36	129	62	50
2. Typical conventional farm	63	174	77	65
B.Northeast S.D. spring wheat area:				
1. Actual sustainable farm	24	64	18	11
2. Typical conventional farm	46	96	23	15
C.Northwest S.D. spring wheat area:				
1. Actual sustainable farm	27	47	2	-2
2. Typical conventional farm	29	50	1	-6
D.Southwest S.D. winter wheat area:				
1. Actual sustainable farm	23	70	29	23
2. Typical conventional farm	27	78	32	25

Organic premiums ignored in this table. See Dobbs, et al. (1992) for the effect of organic premiums on profitability of some sustainable systems.

PREPARED STATEMENT OF CHUCK HASSEBROOK

Mr. Chairman and members of the Committee, I thank you for the opportunity to testify before you and commend you for holding this hearing to focus congressional scrutiny on the future of family farm agriculture.

This issue has been at the heart of the efforts of the Center for Rural Affairs since its founding nearly 20 years ago in the samll agricultural community of Walthill in Northeast, Nebraska. Since then, our research and advocacy efforts have addressed the impacts of a broad range of federal policies onthe structure of agriculture, including tax, credit, trade, commodity program and research and extension policy. In addition, we have worked directly with moderate sized and beginning family farmers in experimenting with sustainable farming systems and technologies, designed to ehance both their environmental performance and economic viability.

My own work of 15 years in theis field yields several general observations. First, American agriculture is at a critical juncture. Today, roughly h alf of the nation's farmland is operated by farmers over the age of 55 and likely to retire within the next ten years. We have fewer beginning farms. The farm entry rate fell by 29 percent between the periods of 1978-1982 and 1983-1987. the coming turnover in farm assets combined with the marked decline in farm entry suggests that we are facing a dramatic consolidation in agriculture in the near term, resulting in a permanent loss of substantial share of the nation's family farm opportunities unless the forces shaping agriculture are changed.

Second, increased opportunity in family farm agriculture is a necessary cornerstone of efforts to enhance the economic viability and quality of life of farm communities, particularly in the nation's most agriculturally dependent areas. The relationship between the structure of agriculture and rural community well-being is summarized well by Dean MacCannell of the University of California in a paper prepared for the Congressional Office of Technology Assessment, as follows:

> As farm size and absentee ownership increase, social conditions in the local community deteriorate. We have found depressed median family icomes, high levels of poverty, low education levels, social and econmic inequality betwen ethnic groups, etc., associated with land and capital concentration in agriculture . . .. Communities that are surrounded by farms that are larger than can be operated by a family unit have a bi-modal income distribution, with a few wealthy elites, a majority of poor laboreres, and virtually no middle class. The absence of a middle class at the communit level has a serious negative effect on both the quality and quantity of social and commercial service, public education, local governments, etc. (Mac Cannell, 1983).

Finally and perhaps most importantly, the decline of family farm agriculture is neither inevitable nor necessary to maintain a productive and efficient agriculture. Rather, it is the resul tof public policies and eocnomic forces that are subject to human intervention. As said former USDA chief economist Don Paarlberg, we can have whatever type of agriculture we want, if we put the policies in place to make it possible. This need not come at the cost of efficiency. USDA research suggests farms can reach full efficiencies at a relatively modest level of sales. In fact, subsequent analysis suggests that when farm size is measured by inputs rather than sales (outputs), middle-sized farms are more efficient than the largest farms. (See *Family Farming: A New Economic Visions* by Marty Strange.)

Nonethless, family farm decline has been fostered by public policy ,as well as forces inherent to capitalist economies. As pointed out by Dr. Harold Breimyer, Agricultural Economist and Professor Emeritus at the University of Missouri, wealth begets more wealth in a capitalist economy. Those with existing wealth can pyramid ever greater amounts of wealth upon their initial advantage until economic control rests in a few hands and free enterprise destroys itself -- absent countervailing policy to prevent excessive concentration of wealth.

U.S. farm policy has failed to provide that countervailing force. In many respects it has instead been biased in favor of bigness and has subsidized the use of capital to replace people beyond the degree necessary for an efficient agriculture. Consequently, it has fostered the industrialization of agriculture -- including the concentration of the ownership of agriculture assets into fewer and larger operations, reduced numbers of farms, reduced opportunities for new people to enter family farm agriculture and the growth of an industrial class structure in

agriculture, with increased separation between farm labor and the ownership and control of farm assets. It need not be that way.

Agricultural Research Policy

Agricultural research is a powerful force in shaping agriculture and, with roughly half of all agricultural research occurring in the public sector, a potent policy tool. In a sense, agricultural research is a form of social planning. Decisions made about how we use the one billion plus federal dollars invested annually in agricultural research, go far in determining the technological options that farmers have available to themand ultimately shaping agriculture, the rural environment and life in farm communities.

The public agricultural research systems supported by those funds has largely purused efficiency in agriculture through an industrial paradigm, by using capital not only to icnrease agricultural production,but also to reduce the role of people in agriculture to make it possible for fewer people to farm the nation's land and produce its food and fiber. While the resulting productivity gains have been impressive, the environmental costs are mounting and the family farm implications of the unaltered pursuit of this course are ominous.

By 1990, the farm share of the total value added in agriculture had falled to five percent, less than one fourth of its 1910 level, according to a recent *Choices* article by Stew Smith, Senior Economist of the Joint Economic Committee. A continuation of the existing trend line would reduce that share to zero by the year 2020. This trend largely reflects the use of purchased manufactured inputs to accomplish tasks that farmers formerly accomplished themselves. With this shift has come a shift in income and economic opportunities away from owner operated farms and farm communities and into industrial concerns.

Is it possible to halt or reverse this tmed without sacrificing efficiency and competitiveness? I believe it is, but only if we change the wqay that we puruse efficiency in our agricultural research. Where in the past we have pursued efficiency by seeking ways to use one dollar worth of capital to replace two dollars worth of farmers' time, we must in the future seek ways for farmers to use an additional one dollar worth of their management and skills to replace two dollars worth of capital expenditures and purchased inputs. We must design farming systems that build on the principal strength of owner operated farms, a highly skilled, experienced and motivated work force, by providing opportunities for them to earn economic returns by exercising management and applying skills in the field and in the barn.

While realization of the full potential of such approaches awaits a more significant research investment, analysis by University Mlssouri Agricultural Economist John Ikerd suggests that modest changes in that direction are economically and environmentally advantageous today. Ikerd found that a modest switch to "sustainable" practices could reduce production costs by 17 percent, while reducing soil erosion by 70 percent. In the corn and soybean production region, commercial herbicide use could be cut by 40 percent and nitrogen fertilizer use by 30 percent. Though total production costs would go down, Ikerd projects that farm labor would increase by sevem percent and increased management would be required.

Research on this approach to farming was given a boost by the Food, Agriculture, Conservation and Trade Act of 1990 (FACT), which took some modest but historic steps toward redirecting federally funded research toward enhancing environmental quality and family farmand rural opportunities. FACT articulates the purposes to be served by federally funded agricultural research, including increasing rural economic opportunities and enhancing the rural quality of life, defined in floor debate to include strengthening the family farm system of agriculture. Progress within USDA in implementing these historic new directives has been mixed.

Significant progress is being made in the USDA National Research Initiative Competitive Grants Program (NRI), which this year will provide nearly $100 million for agricultural research on a competitive basis. USDA has agreed to evaluate proposals to the NRI in part according to their relevance to the research purposes of FACT. That review could bestrengthed by language explicitly defining the rural community purpose to include family farm objectives, consistent with the definitionprovided during consideration on the floor of the House. Furthermore, it is critical that the NRI Request for Proposals (RFP), which describes the areas of research for which support is available, be revised to emphasize research that enhances family farm opportunities, as well as environmental quality. Last year's RFP clearly did not include such an emphasis. USDA

has received detailed recommendations in this regard from a group of twenty leading researchers in sustainable agriculture and we are hopeful that changes are forthcoming.

The one other positive development within USDA on implementation of the research purposes is formation of the Agricultural Science and Technology Review Board. The Board is authorized by FACT to evaluate alternative research direction and identify those with greatest potential toa dvance the research purposes.

Unfortunately, USDA's performance elsewhere in implementing this legislation has been disappointing. Though the Report of the Managers on FACT expresses the intent that USDA develop guidelines to ensure that research consistent with the purposes is emphasized and that the federal agricultural research program in its entirety advance each of the purposes, no such guidelines have come forth, with the single exception of the NRI guidelines. It is particularly troubling that the size year plan released late last year by USDA's in-house research arm, The Agricultural Research Service (ARS), includes no mention of increasing rural and family farm opportunities, in direct contradiction of farm bill directives.

Research Policy Reommendations

- USDA shouldfully implement the research purposes of FACT. The NRI RFP should be written to include an emphasis on research that increases family farm opportunities and environmental quality. Impacts on family farm opportunities should be made an explicit factor in review of NRI proposals. The ARS six year plan should be revised to address the full ranges of FACT's research purposes, including family farm and rural community opportunity objectives. Proposed guidelines implementing the research purposes across the entire USDA research program should be published in the Federal Register.
- Congress shoudl increase funding for sustainalbe agriculture research and earmark funds for technology assessment. Technology assessments are needed to evaluate the societal impacts of alternative research directions and identify those with potential to advance the researchpurposes, including increased opportunity in family farming and rural communities. We have proposed that four percent of NRI funds be allocated to technology assessment. In addition, we have urged Congress to increase appropriations for the Sustainable Agriculture Research and Education Program (SARE), which has been on the cutting edge of research to enable farmers to maintain production while cutting ack on use of purchased inputs. The current fudning level of $6.7 million, amounts to less than one-half of one percent of annual federal expenditures on agricultural research.
- Congress should strengthen the research purposes provisions in the 1995 farm bill. Family farm objectives and implementation procedures need to be more explicitly spelled out. Rewards and incentives should be provided to researchers who aim their research at fulfilling family farm objectives, together with the other social, econoimc and environmental objectives addressed by the research purposes.

Federal Farm Commodity Programs

The rules by which federal fram commodity program benefits have been distributed, have contributed to the industrialization of agriculture both by subsidizing farm enlargement and favoring specialized farms that rely heavily on use of purchased inputs to produce a single comodity.

For most farms, the signal sent by federal farm commodity programs can be summarized as "The bigger you grow, the more you get." Although there is a nominal $50,000 limitation on deficiency payments received by any one farm, farms are allowed to subdivide on paper into multiple legal entities, making the effective limit $100,000 per farm. Data presented in a recent U.S. General Accounting Office, suggests that even an effective limitation of $50,000 would be so high as to effeft less than one percent of deficiency payment recipients.

This big arm bias was worsened by FACT and the 1990 Budget Act. While no new limits were imposed on payments flowing to the biggest farms, two rounds of deficiency payments cuts were imposed. The first took affect in 1991 and the second was deferred until 1994. The cuts reduced payments per acre farmed, meaning that farms will have to be significantly bigger than under the 1985 farm bill to be affected by the payment limitation. Furthermore, the nation's biggest farms are taking no deificency payment cust as a result of the 1990 budget agreement, since their

extensive acreages allow them to continue to receive the $100,000 maximum payment. Meanwhile, moderate farmers will face their second round of cuts in 1994.

This is not the way to maintain a family farm system of agriculture. If the objective of federal farm commodity programs is to increase opportunities for moderate scale owner operated family farms, and I believe it should be, then farm programs should suppport a volume of production sufficient to allow fo efficient production and to provide a decent family income – but no more. So structured, the farmprogram would help small and beginning farmer compete for the land and resources they need to farm. Equally important, it would not subsidize big farms to grow and bid land away from moderate-sized farms.

Federal farm commodity programs are also biased toward intensive production of particular commodities, with heavy reliance on use of purchased pesticides and fertilizers. This bias was particularly severe under the 1985 farm bill. Under that legislation, a farmer who switched from continuous corn production on thes same land year after year, to a more diverse crop rotation of corn, soybeans, small grain and hay, did so at the cost of sacrificing up to three fourths of his/her deficiency payments.

The rotation penalty in federal farm programs, appropriately called the stewardship penalty for the disincentive ti provides for practices that reduce soil erosion and petrochemical use, stems from several sources. First, the commodity program is biased toward production of certain crops – chief among them corn, wheat, rice and cotton. In Northesatern Nebraska, the farm program's basic message has been "the more corn you grow, themore money you get." If farmers add soil building forage crops to their rotations to reduce soil erosion and petrochemical use, they get paid nothing for them.

Second, the farmprogram is biased toward reducing the amount of land involved in crop production and increasing the use of hield enhancing purhcased inputs. This bias stems from the way in which the farm program attempt to prevent over production of farm commodities – by requiring farm program participants to idel a portion of their acreage. Farmers are not allowed to instead make their contribution to supply control by reducing use of yield enhancing purchased inputs. This policy contributes to environmental damage, especially in areas vulnerable to water quality contamination by nitrogen fertilizer, and engenders inefficiency. We could get the same total production at lower cost by using all of our land and less manufactured inputs.

In 1990, FACT took some modest but important steps toward reducing the commodity probram bias toward incrased use of purchased inputs. The most significant of those steps was creation of the Integrated Farm management Program Option (IFMPO), under which farmers who implement resource conserving crop rotations that include forages and small grain/nitrogen fixing legume mixtures, are allowed certain options not otherwise available. First, they may plant certain resource conserving crops on land that would normally be planted to program crops (corn for example), harvest the crop and receive deficiency paments as if they had planted the program crop. In addition, they may harvest certain resource conserving crops from l and they would otherewise be required to idel, in recognition of the contribution of resource conserving rotations to reducing grain surpluses.

IFMPO has had its share of problems and limitations. The various rules on harvesting resource conserving crops are overly restrictive and complex. the most serious of these restrictions denies farmers the option of haying and grazing resource conserving crops planted to land that would otherwise be planted to a program crop, such as corn, without sacrificing their payments. There have been major problems with USDA's implementation of the program, though we are hlpeful that they have largely been worked out. However, many local USDA offices remain unaware of IFMPO or confused by its provisions and unable to adequately inform farmers of their options.

Farm Commodity Program Recommendations

- In the 1994 budget, reduce deficiency payments flowing to the largest farms, and use revenues saved for payments to moderate-sized farms and for environmental incentive payments. Toward that end, eliminate the "three entity rule that allows farms to subdivide on paper into multiple legal entities to avoid payment limitations. In addition, create a new limitaiton on the volume of production on which deficiency payments may be received. Thesavings should be applied inpart to exempting owner-operated farms from any

deficiency payment cuts scheduled for 1994 on a modest volume of production. A portion of the savings should be used to pay farmers for enfironmental protection practices that reduce production.

- In the 1995 farm bill, simplify the rules for participation in IFMPO and reduce restrictions on harvesting resource conserving crops, especially haying and grazing of forages. USDA should more activly inform farmers of their options under IFMPO and related provisions.
- In the 1995 bill, revise supply control provisions to encourage farmers to reduce production through measures that protect environmental quality and reduce the use of purchased inputs, rather than simply idling land. For example, farmers should be allowed to meet set aside requirements by reducing yield goals and nitrogen applications.

Federal Tax Policy

The adverse family farm impacts of federal tax policy were greatly reduced by tax reform legislation in 1986 and subsequent years, but the rural enterprise zone provisions included in long-term urban aid packages that recently passed the House of Representatives would move us backwards in this regard.

There are two central principles that determine the impact of tax sheltering opportunities on the structure and profitability of agriculture. First, the greater the tax sheltering opportunities in agriculture the lower the before-tax profitability. Tax shelters are like magnets for investment. The icnreased investment results in increased levels of produciton, particularly in the case of livestock, and lower prices paid to farmers for that production. Second and perhaps most important, tax shelters change the rules of competition in agriculture such that those who can use the tax shelters most effectively gain a comeptitive advantage while those who gain only a small tax break, or not tax break, lose their ability to compete as well as their profitability. The meager tax benefits they receive are not sufficient to overcome the reduced prices they receive for their products.

Application of these principals to the enterprise zone provisions suggests that they do not portend well for family farms. First, the provision providing a 15 percent employer tax credit on up to $20,000 of watges per employees is biased against self-employment. Beginning family farmers who create their own job opportunities by establishing farms and ranches get no subsidy.

Second, the provision providing a capital gains exemptionon certain investments in enterprise zones would encourage unproductive speculative investments and grant a competitive advantage to high bracket taxpayers who can most effectively explit the tax break. For example, capital tains realized by speculative investments in farmland in enterprise zones would be tax favored. Such investments create no new eocnomic opportunities and no new productive activity. They do change the ownership of assets, to the particular advantage of high bracket taxpayers able to effectively exploit the tax advantage. USDA research in the late 1970s indicated that the cpaital gains exemption enabled a top bracket taxpayer to bid nearly $3,200 per acre for land for which a 16 percent bracket taxpayer could justify a bid of only $2,200.

Likewise, our analysis of the capital gains exemption passed by the House of Representatives in 1989 indicated that its value ot livestock producres, who claim capital gains on breeding stock sales, was highly biased by tax bracket. For example, the top bracket owner of a farrow to finish hog operation would have realized benefits equal to a 62 cents per cwt. increase in the price of slaughter hogs, versus only 17 cents for the 15 percent bracket farmer.

Third, the enterprise zone legislation would grant a special deduction for investment in corporate stock in certain qualified businesses, if that stock is reinvested in depreciable property. This provision is biased against sole proporietoships, the predominant form of business organization for family farms. Most family farms are not of sufficient size to justify the legal costs and complexity of incorporation. Furthermore, this provision is simply a subsidy to invest capital in agriculture to replace people beyond the level justified by efficiency.

Taken together, these three provisions would have a marked negative effect on the social and economic well-being of agricultureal communities. They would subsidize the replacement of people by capital, favor high bracket taxpayers over family farmers of modest means and advantage corporate farming operations over family farms, particularly owner-operated sole proprietorships. The impacts would be most profound in the livestock industry, which would be moved off of family farms dispersed around the country onto large heavily subsidized corporate farms in

enterprise zones. Based on the MacCannell research cited earlier in this testimony, the likely result would be a deterioration of social conditions in farm communities, increased rural proverty and inequality and the shrinkage of the rural middle class.

Although our analysis and recommendations speak only to agriculture, it is likely that similar effects will occurin other sectors of rural business dominated by owner-operated proprietorships.

Tax Policy Recommendations

- The long-termurban aid package should be amended to provide that the three provisions cited above not apply to agriculture.
- Establishment of new family farms in rural enterprise zones should be encouraged by two alternative provisions. First, beginning farmers who meet the existing "first-time farmer" definition in the federal tax code, should be allosed to withdraw funds from Individual Retirement Accounts for investment in their farming operations without penalty. This would provide a subsidy for creating farm self-employment opportunities in enterprise zones, rather than corporate farms.
- Second, Congress should provide a capital gains exemption to landowners who sell land in enterprise zones to qualified first-time farmers. This provision would encourage land sellers to seek out beginning farmers as buyers, grant beginning farmers an advantage in competing for land and thereby stimulate the creation of new farm opportunities in rural enterprise zones.

Conclusion

If family farm agriculture is to survive in any meaningful sense, we must put in place public policies clearly directed toward that objective. The free market alone will not accomplish it. a continuation of existing policies and adoption of proposed policies that favor bigness and the replacement of people by capital inputs certainly will not accomplish it.

I commend you for calling this hearing to examine these issues and look forward to working with you in exploring policy options that support a family farm systemof agriculture that is environmentally sould and economically viable.

PREPARED STATEMENT OF DOUGLAS YOUNG[1]

Overview: Pros and Cons of Agricultural Commodity Programs

Economic theory predicts that free markets maximize the welfare of both producers and consumers in the absence of market failure. However, agricultural degradation of soil and water is a prima facie market failure. Production practices which dog streams with sediment or pollute aquifers which may be used for drinking water impose "externalities" on other people. Typically, the victims are not compensated by the farmer causing the damage. Also, consumers are not paying the full social cost--including environmental damage--of their food purchases.

Modern economics recognizes that a public role is essential in order to protect nonmarket goods like soil, water quality, and wildlife habitat. Free markets alone cannot be expected to allocate the optimal quantity of environmental amenities. The federal government has intervened to protect important environmental and other nonmarket goods for several decades. The work of the Soil Conservation Service (SCS) initiated in the Dust Bowl era of the 1930s is one example. Legislation to protect food safety and farm worker safety are others.

Government's dominating influence in American agriculture, however, has not been to abate environmental or other externalities. Government's most pervasive role has been to support and stabilize the income of farmers through a complex set of commodity programs. These programs have included such provisions as "paid diversion" which pays farmers proportional to the amount of land diverted from production, deficiency payments per unit of historical output which require farmers to "set aside" (leave idle) a specified percentage of their historical plantings or "crop base," and "nonrecourse loans" whereby farmers can sell their crop at harvest to the government for a specified "loan rate" and let the government keep the crop if they cannot sell it later on the market for a higher price.

Recently, an increasing number of policymakers and analysts have charged that U.S. commodity programs not only are expensive and distort market signals necessary for long-run efficiency, but that they encourage intensive farming methods and crops which accelerate the degradation of soil and water resources (Boschwitz, 1987; de la Garza, 1988; House of Representatives, 1988; Daberkow and Reichelderfer, 1988; Miranowski, 1975; Young, 1989; Faeth et al., 1991).

A better understanding of how historical farm programs could increase use of nitrogen, pesticides, and intensive tillage is assisted by examining the selectivity and structure of past programs.[2] The programs are selective. Historically, only about 50% of the annual value of crop and livestock products in the country is included in the government program safety net. The lion's share of the government payments go to feed grains (especially corn), food grains (wheat and rice), cotton, and dairy products. Growers of most livestock products, fruit, vegetables, hay, and nearly all specialty crops are excluded from government programs. The major program grain and row crops are particularly heavy consumers of agrichemicals. Corn, cotton, soybeans, and wheat received an estimated 65% of total agricultural pesticides and fertilizer in the mid-1980s (Fleming, 1987). Of course, many nonprogram vegetable and fruit crops also receive high agrichemical applications, but these crops occupy relatively small acreages on a national level. Reichelderfer (1985) also concluded that program crops were more soil eroding on average than nonprogram crops.

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[1] This testimony draws from articles by the witness published in the 1989 and 1990 volumes of the *American Journal of Alternative Agriculture* which are appended, from a draft by the witness of a subchapter of a forthcoming report by the Board on Agriculture-National Research Council (NRC) on long-run soil and water conservation policy, and from a 1992 Washington State University Ph.D. dissertation by Kathleen Painter. Painter's research was funded by a Northwest Area Foundation (NWAF) grant on which the witness served as principal investigator. The views reflected in this testimony, however, are uniquely those of the witness, and do not necessarily represent institutional positions of Washington State University, the institute of Alternative Agriculture, the NRC, or the NWAF.

[2] The appended article-Young, D. L "Policy Barriers to Sustainable Agriculture." *Amer. J. Alt. Agr.*, Vol. 4, Nos. 3 and 4(1989):135-43--provides a more complete historical account of the mechanisms by which U.S. farm programs have influenced both economic and environmental performance. A second appended article-Young, D. L, and K. M. Painter. "Farm Program Impacts on Incentives for Green Manure Rotations." *Amer. J. Alt. Agr.*, Vol. 5, No. 3(1990):99-105--examines in depth the impact of 1985 Farm Bill provisions on incentives to adopt a low agrichemical input rotation in a Pacific Northwest study region.

The structure, as well as the selectivity, of U.S. farm programs induces a theoretical bias toward intensive farming practices to boost yields, as well as to expand the acreage base, of program crops. Deficiency payments are directly proportional to a farmer's historical yield, called the established yield, and the historical or base acreage, for the crop. These features historically provided incentives for growers to boost yields and plantings in order to capture higher government payments in the future. The 1985 and 1990 Farm Bills, however, have moderated this bias by freezing established yields at 1986 levels and applying severe constraints on base expansion.

Historically, the need to maintain high plantings of program crops in order to retain future deficiency payments tied to base acreage has arguably been the biggest impediment to growers seeking more diversified cropping rotations (Young and Painter, 1990; Beus et al., 1990). The following criticisms of base acreage provisions by Washington-Idaho farmers are typical of those received during a 1989 survey (Beus et al., 1990, pp. 43-44):[3]

> The first change we have to make is this base-some type of base change. To me, that's the biggest part of the program, because farmers, like I said, all they do is plant wheat to maintain base...
>
> To seed grasses would be great if you could trust the program not to punish you. . . the ones that tried to do a good job and tried to have a conservation program and build up the soil like plowing under black peas or clover or anything, they always ended up being punished in the end.
>
> The people who had lots of clovers and alfalfas, they came out on the little end of the horn every time as far as the base acreage and government programs went.

In addition to the environmental shortcomings of commodity programs, economists have long criticized them on economic grounds. In a competitive market, subsidies which increase farm prices, increase supply, and thereby decrease consumer prices, can be shown to increase the welfare of farmers and food consumers less than the total costs imposed on taxpayers. The difference between taxpayer costs and farmer and consumer gains is the "deadweight loss" of the program for society. Furthermore, subsidies and other government intervention provide incorrect signals to farmers in response to emerging technological innovations, changing consumer preferences, and evolving pressures from international competition.

On the other side of the debate, proponents of historical commodity programs have vigorously defended them on both economic and environmental criteria. These arguments have apparently been effective, at least to policymakers, given the programs' durability. Some proponents justify commodity programs because they promote equity and fairness. They provide much needed income support to the nation's farmers who grow our food supply in a hostile world. Also, support is necessary to "level the playing field" as American farmers compete against highly subsidized farmers in Europe, Japan, and elsewhere. Farm programs are frequently supported as a means of "saving the family farm." This argument, however, has its limits. While many smaller family farmers have undoubtedly been assisted by commodity programs, the preponderant share of the benefits go to the largest farmers since payments are proportional to production.

Farm programs are also promoted because they stabilize agricultural markets and thereby assist both growers and consumers (Wallace, 1987). Promoting fewer wide price swings in agricultural commodities can cushion adjustments and permit improved long- term planning for both farmers and food buyers. Others argue that past farm programs have protected soil and water resources by precluding the boom and bust of free markets that oscillate between sod busting when market prices are high and abandonment of conservation investments when prices are low.

Others argue that the soil and water conserving contributions of the acreage reduction components of farm programs can outweigh the Intensification incentives in the programs (Miranowski, 1975; Carlson and Shui, 1991). When farmers Idle part of their farmland in response to farm programs, they generally reduce or eliminate fertilizer, pesticide, and tillage use on the set-aside acreage. Also, idling land makes available farm machinery and labor that might be used to substitute tillage, scouting, or other labor-intensive methods for agrichemical-based pest control.

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[3] A larger sample of statements by farmers on base acreage, set aside, proven yield, and deficiency payment provisions from this survey are included in the four page excerpt from Beus et al. (1990), which are appended to this testimony.

Furthermore, many farmers argue that the higher returns generated by the commodity programs permit them to afford conservation investments.

Recent Input Use Trends

Recent tillage and agrichemical use trends provide useful background in assessing the impacts of commodity programs on environmental quality and adoption of sustainable farming systems. Figures 1 and 2 show slight down trends In use of agrichemicals during most of the 1980s. Herbicides, especially, fell sharply after 1986. The results in Figure 1, measured in millions of pounds of pesticides, do not account for changes in either efficacy or toxicity per unit weight. Major acreage shifts such as the enrollment of 34 million cropland acres in the Conservation Reserve Program (CRP) over 1986-89 and the large-scale diversion of grain land in the 1983 Payment in Kind (PIK) Program are clearly major influences on agrichemical use.

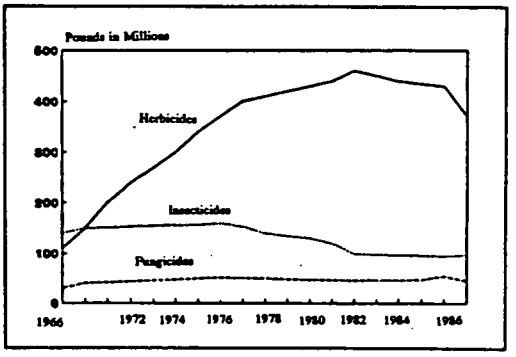

Figure 1. National Farm Use of Herbicide, Insecticide, and Fungicide.
Source: USDA, as cited in Tweeten.

Some analysts have analyzed the pesticide trend data with statistical models to conclude that land diversion effects have more than offset the intensification effects of farm programs (Carlson and Shui, 1991). An alternative explanation, which merits investigation, is that the modification in the farm programs themselves underlies these trends. The "gradual decoupling" of farm programs from base acreages and established yields beginning with the 1985 Farm Bill has diluted the incentives for expanding input use or increasing program crop acreage as a ticket for increasing future government payments (Young, 1989). The influence of the CRP program, a massive land diversion not coupled to deficiency payment eligibility, should be distinguished from that of annual set-aside programs.

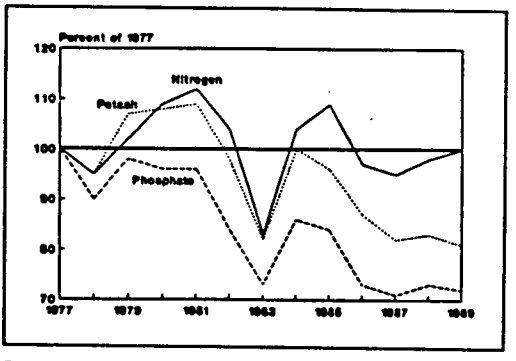

Figure 2. National Farm Use of Fertilizer.
Source: USDA, as cited in Tweeten.

Figures 3 and 4 show that conservation tillage growth is accompanied by a decrease in fuel usage. A number of factors unrelated to farm programs including increased fuel prices, increased conservation research and

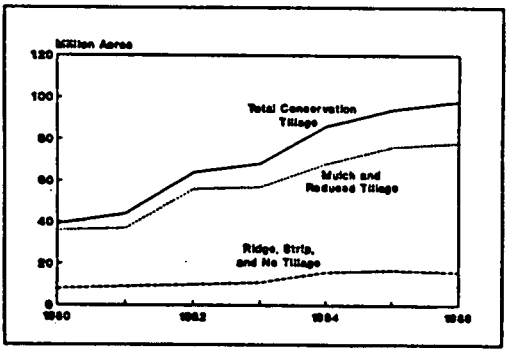

Figure 3. National Use of Conservation Tillage.
Source: USDA, as cited in Tweeten.

education, and government programs to support reduced tillage have probably contributed to the growth in conservation tillage acres.

Probably in response to the difficulty in disentangling the effects of farm programs from those of other factors in statistical analyses, economists have more frequently used controlled mathematical models of the national farm economy or of farms in particular regions to estimate the impacts of government programs on environmental quality. The following section summarizes results of projected farm-level economic and environmental impacts of six policy alternatives in two dissimilar regions of the country.

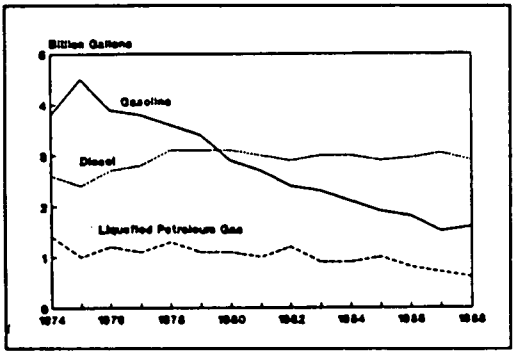

Figure 4. National Farm Use of Fuel.
Source: USDA, as cited in Tweeten.

Projected Impacts of Alternative Policies: Two Regional Case Studies

Single region case studies of the impacts of agricultural policies are rarely convincing. Cropping patterns, environmental vulnerabilities, and farm and community economic structure vary greatly from region to region. At the same time, national agricultural sector models provide limited understanding of environmental and economic impacts of alternative policies. These aggregate studies suffer from fundamental weaknesses related to the gross aggregation of production regions and to data inaccuracies.

As a compromise between these two approaches, recent research by Painter (1992) explored detailed distributional impacts of six current and proposed agricultural policies on two dissimilar production regions using a uniform methodology. The regions selected were the Washington-Idaho Palouse and the North Carolina Coastal Plain. Dryland small grains and edible pulses predominate in the Palouse with winter wheat being the major money-making crop. In the North Carolina Coastal Plain tobacco dominates economically, but substantial acreage is devoted to corn, soybeans, and wheat. livestock production, especially poultry and hogs, is very important in the North Carolina study region, but little livestock is produced in the Palouse. Soil erosion is the major environmental problem in the Palouse, while nitrogen and pesticide leaching to ground water is of major concern in the Coastal Plain. A large rural population in North Carolina depends upon shallow wells which are threatened by agrichemical leaching. In contrast, there are relatively few people living in the rural Palouse region. Six agricultural policies including the 1990 Farm Bill, two options with greater base acreage flexibility, decoupling, recoupling, and no programs were examined. The key features of each of these policies is described below (Painter, 1992):

1990 Farm Bill (Food, Agriculture, Conservation and Trade Act of 1990)

In the 1990 Farm Bill, farmers must forego deficiency payments on 15% of their crop acreage bases ("flex acres") for food grains, feed grains, and cotton. They may plant food grains, feed grains, cotton, and oilseeds on "flex acres" while preserving base and yield history.

Target prices for supported crops remain frozen at 1990 levels. Proven yields remain frozen at 1985 levels. Marketing loan rates for food and feed grains are restricted to no more than 85%

of *the* five-year average after discarding the highest and lowest years, with Secretarial discretion for an additional 10% reduction. For soybeans, the minimum price support loan rate was raised to $5.02 per bushel, from $4.50 in the 1985 Farm Bill. ARP (set-aside) rates are based on the previous year's stocks-to-use ratios, but may not exceed 20% for wheat and feed grains, and 25% for upland cotton. Various trade programs including the Export Enhancement Program and the export credit guarantee programs, are continued under the 1990 Farm Bill.

1990 Farm Bill With Unpaid Flex Acres Increased To 40%

This policy expands the 15% 15% unpaid flex acres described in the 1990 Farm Bill above to 40%. All other provisions remain the same.

Administration's Proposal For The 1990 Farm Bill

The Administration's original proposal for the 1990 Farm Bill provided for a whole farm base called the Normal Crop Acreage (NCA), which is the sum of the farm's program crop acreage bases for food and feed grains and cotton, plus historical oilseed plantings. (See *Proposal of the Administration: 1990 Farm Bill*, Office of the President, U.S. Dept. of Agr., 1990 ("The Green Book")). Deficiency payments are based on historical program crop bases and yields rather than current plantings. Deficiency payment values, not however, are based on current year differences between market and target prices. While crop-specific ARPs could still be required, participating farmers could plant and receive payments on any combination of program crops, oilseeds, and unharvested resource-conserving crops up to the NCA acreage limit less ARP requirements.

Decoupling Food Grain, Feed Grain, And Cotton Payments

With this policy, not farm income support payments are no longer tied to plantings of commodity program crops. The target price, loan rate, and annual acreage reduction program structure for food grains, feed grains, and cotton would be dismantled, as would the Export Enhancement Program. Farmers with base acreage for these crops would receive annual lump sum payments from the government equal to the historical average annual payments for their farm unit(s). Farmers could plant what they wished and sell it for prevailing market prices. The only exception is that quota-based programs (dairy, peanuts, tobacco, etc.) would remain as in the 1990 Farm Bill. Minimal conservation and food safety programs would be continued.

Subsidy levels for both study areas were set equal to the level of payments in the 1990 Farm Bill. Per acre values were calculated by dividing the total subsidy by the number of acres in the representative farm. These subsidies were received for any type of crop or land use.

Recoupling (Tying Payments To Environmental Requirements)

Recoupling, like decoupling above, would dismantle food grain, feed grain, and cotton payments and the Export Enhancement Program. Farmers could raise and sell what they wished for prevailing market prices, and collect a payment from the government. Unlike decoupling, this payment would be based on meeting specific environmental criteria. Quota programs (dairy, peanuts, tobacco, etc.) again remain as in the 1990 Farm Bill. Minimal conservation and food safety programs would be continued.

In the Palouse, the Recoupling payment is based on total soil loss and nitrogen leaching. For every ton of projected soil loss less than the average of 14 tons per acre for the Palouse River Basin, the farmer receives $3. In addition, a nitrogen leaching penalty of $0.67 per projected pound leached over an average of 10 pounds per acre for the entire farm is assigned.

For the North Carolina Coastal Plain, recoupling subsidies are tied to agrichemical leaching only. The goal for recoupling incentives here is to decrease use of high risk chemicals by 50% from the typical conventional levels. Farmers meeting this goal receive a subsidy equal to that for the 1990 Farm Bill. If they exceed the goal, the subsidy increases at the same rate. The subsidy was divided between the two chemicals in the high risk classification, nitrogen fertilizer and Banvel herbicide. Since nitrogen is considerably higher risk than Banvel, 80% of the subsidy is allocated to achieving 50% reduction in nitrogen use. The remaining 20% is used for subsidizing reduction in the use of Banvel. The actual penalties used were $0.43 per pound reduction of nitrogen below an average of 80 pounds of leachate per acre, and $431 per pint of Banvel reduction below an average of 0.02 pints per acre.

Unilateral Termination Of U.S. Grain And Cotton Programs

This is simply a free-market scenario, in which there would be no government feed grain, food grain, or cotton programs available to U.S. farmers. U.S. programs are assumed to be terminated unilaterally and not tied to similar actions by other countries. As for Decoupling and Recoupling above, however, quota programs (dairy, peanuts, tobacco, etc.) would be continued. In the North Carolina study area, elimination of the tobacco quota program caused large changes which obscured commodity program effects. In order to concentrate specifically on the food and feed grains and cotton commodity programs, quota programs were left intact. Minimal environmental protection and food safety programs would be continued.

Computerized farm optimization models were employed to determine the profit maximizing crop rotations and production practices for each policy in both regions. This procedure identified the profit maximizing combination of crop rotations subject to crop prices, production costs, farm program rules, resource endowments, and other economic and physical constraints. Crop yields, production costs, and resource constraints for typical farms in the two regions were determined by farm surveys, interviews with crop scientists and local agricultural agency personnel, and other primary sources (Painter, 1992). Industry-wide price predictions for major crops under each of the six policy options were elicited in a national survey of agricultural outlook and policy specialists. Environmental effects, including soil erosion, nitrogen leaching, and pesticide leaching, were determined by physical science models. Taxpayer costs associated with each policy were determined by the particular provisions of the policy and their interaction with the profit maximizing cropping pattern.

A novel feature in this study was the disaggregation of policy impacts on various groups-farm managers, land owners, taxpayers, consumers, and users of environmental amenities--into a single social welfare measure. Theoretically, Congress subjectively maximizes such an index of societal welfare in selecting one farm policy over another. Separation of impacts for farm managers and land owners is important as almost two- thirds of the land in the Palouse study region and over one-half in the North Carolina study region was rented. Many farm policies affect farm operators differently than they affect nonfarming landlords.

Tables 1-3 summarize the projected economic and environmental impacts for the six examined policies for both study regions under alternative crop price and technology availability scenarios. These tables list all results except impacts on consumers due to changes in retail food prices. The impacts on consumers are omitted because they were negligible for this study because crop price variation over these policy alternatives was relatively small and the impact on retail food prices of changes in these unprocessed agricultural products was also small (Painter, 1992).

Table 1 reveals that under average crop prices, the measure of aggregate social welfare varies relatively little over policies and technology availability scenarios. When a full range of conventional and sustainable technology ("all rotations") is available, social returns (column 6 in Table 1) range from $16-$21 per acre per year. On the other hand, the distribution of benefits and costs with policy reform varies greatly over the six options considered. For the "all rotations" scenario, projected net returns to farm operators in these short-run projections vary from -$9.23 per acre under the free market No Programs option to $11 .03 for the 1990 Administration Proposal. In contrast, taxpayers incur no cost under No Programs and a sizable $36 per acre obligation under the Recoupling policy. In the Palouse, where land rents are typically based upon crop shares, the availability of proven sustainable cropping systems under "all rotations" generally benefits farm operators but disfavors landlords. As less wheat is produced in the more extensive sustainable rotations, landlords receive a smaller crop share as rent. On the other hand, farm operators benefit from a wider choice of farming options, many of which have cost saving features due to the use of less fertilizer and pesticides.

Table 1. Projected Returns To Land And Management, Taxpayer Cost, And Environmental Damage By Rotation Availability And Policy, Average Grain Prices Scenario, Pacific Northwest Palouse, 1991-95.

Policy/Rotations Available	Economic Results ($/ac/yr)			Env. Results ($/ac/yr)		Total Returns Less Tax Cost, Env. Damage 1+2-3-4-5
	Returns to Management	Returns to Land	Taxpayer Cost	Total Erosion Damage	Nitrogen Leaching Penalty	
	(1)	(2)	(3)	(4)	(5)	(6)
1. 1990 Farm Bill						
All Rotations	5.73	53.32	22.92	15.12	3.19	17.82
No Alt. Rotations	-5.60	61.33	23.45	16.19	2.90	13.19
2. 1990 Farm Bill, 40% Flex						
All Rotations	1.69	45.87	15.33	10.86	1.67	19.70
No Alt. Rotations	-7.71	58.01	15.93	16.13	2.90	15.34
3. 1990 Admin. Proposal						
All Rotations	11.03	52.22	27.78	14.11	2.70	18.66
No Alt. Rotations	1.27	56.94	27.78	19.48	2.71	8.24
4. Decoupling						
All Rotations	4.97	42.84	22.50	5.73	0.00	19.58
No Alt. Rotations	-1.08	60.89	22.50	16.67	2.44	18.20
5. Recoupling						
All Rotations	14.75	42.87	35.73	5.73	0.00	16.16
No Alt. Rotations	-4.97	61.09	23.22	16.67	0.95	15.28
6. No Programs						
All Rotations	-9.23	35.75	0.00	5.65	0.00	20.87
No Alt. Rotations	-18.56	52.60	0.00	16.50	2.44	15.10

As expected, the availability of sustainable cropping systems generally reduces environmental damage. Under the average crop price conditions reported in Table 1, environmental damage is reduced most under Decoupling, Recoupling, and No Programs.

The 1990 Administration Proposal, Decoupling, Recoupling, and No Programs all offer different versions of 100% base flexibility. Producers are free to grow those crops they wish in response to market prices without considering base acreage constraints. However, under the assumed configuration of program provisions under the first three of these options, taxpayer costs remain relatively high (see Table 1). In these three options, taxpayers bear the burden for any environmental gains, while in the No Programs option farm operators shoulder this cost.

Table 2 reports similar results for the Palouse study region under a high grain prices scenario. Under conditions of booming world grain markets, participation in wheat and barley commodity programs is unprofitable and growers are also able to escape the 1985 Food Security Act Conservation Compliance provision. Taxpayer costs fall to zero for all policies except Decoupling and Recoupling where payments are not linked to traditional commodity program participation. Except for the Recoupling policy cropping patterns and cultural practices are insensitive to the availability of sustainable cropping systems. The high free market wheat prices motivate profit maximizing growers to utilize the same wheat intensive cropping systems over most policies.

Table 2. Projected Returns to Land and Management, Taxpayer Cost, and Environmental Impacts by Rotation Availability and Policy, High Grain Prices Scenario, Pacific Northwest Palouse, 1991-95.

Policy/Rotations Available	Economic Results ($/ac/yr)			Env. Results ($/ac/yr)		Total Returns Less Tax Cost, Env. Damage 1+2-3-4-5
	Returns to Management	Returns to Land	Taxpayer Cost	Total Erosion Damage	Nitrogen Leaching Penalty	
	(1)	(2)	(3)	(4)	(5)	(6)
1. 1990 Farm Bill						
All Alt. Rotations	25.55	48.08	0.00	28.12	3.14	42.37
No Alt. Rotations	25.55	48.08	0.00	28.12	3.14	42.37
2. 1990 Farm Bill, 40% Flex						
All Alt. Rotations	21.93	49.38	0.00	26.48	3.14	41.69
No Alt. Rotations	21.60	48.48	0.00	28.01	3.14	38.93
3. 1990 Admin. Proposal						
All Alt. Rotations	26.68	48.61	0.00	28.20	3.14	43.95
No Alt. Rotations	26.68	48.61	0.00	28.20	3.14	43.95
4. Decoupling						
All Alt. Rotations	30.12	64.20	22.50	15.37	3.12	53.33
No Alt. Rotations	10.99	60.89	22.50	16.67	2.44	30.27
5. Recoupling						
All Alt. Rotations	49.62	68.59	53.87	5.73	0.00	58.61
No Alt. Rotations	34.11	74.82	35.03	16.67	2.44	54.79
6. No Programs						
All Rotations	25.29	47.95	0.00	27.79	3.14	42.31
No Alt. Rotations	25.29	47.95	0.00	27.79	3.14	42.31

Under this high grain prices scenario, only Recoupling, which pays farmers to reduce soil erosion and nitrogen use, succeeds in protecting the environment. It does so at high cost to taxpayers, but the low environmental damage and increased farm operator profits more than offset the taxpayer expenditures. Recoupling ranks number one in social welfare in the Palouse in this high-priced scenario (see column 6 of Table 2).

Table 3 provides similar results for the North Carolina Coastal Plain study region with some differences. No varying technology availability scenarios are presented because all available cropping systems, including low input systems for growing corn with cover crops, are relatively well established in North Carolina and could be considered conventional practices. Furthermore, the most environmentally sound cropping system in terms of nitrogen leaching is single stand soybeans, which is generally considered a conventional crop. There is no column for erosion damage in Table 3 because it is negligible in the study region. Finally, land rents in the North Carolina Coastal Plain are typically based upon flat cash rates per acre which do not vary in the short run as cropping patterns change. Consequently, no variation occurs in Table 3 in the Returns to Land column.

Table 3. Projected Returns To Management And Land, Taxpayer Cost, And Environmental Damage By Policy And Grain Price Level, North Carolina Coastal Plain, 1991-95.

Policy/Rotations Available	Returns to Land and Management			Env. Damage	Total Econ. & Env. Results (1+2-3-4) ($/Ac/Yr)
	Returns to Management ($/Ac/Yr)	Returns to Land ($/Ac/Yr)	Taxpayer Cost ($/Ac/Yr)	Nitrogen Leaching Penalty ($/Ac/Yr)	
	(1)	(2)	(3)	(4)	(5)
1. 1990 Farm Bill					
Average Prices	35.58	109.70	21.54	26.91	96.84
High Prices	51.46	109.70	0.00	37.02	124.15
2. 1990 Farm Bill, 40% Flex					
Average Prices	30.64	109.70	13.71	25.58	101.06
High Prices	53.66	109.70	0.00	37.02	126.35
3. 1990 Admin. Proposal					
Average Prices	52.43	109.70	25.70	13.53	134.89
High Prices	51.55	109.70	0.00	38.64	122.61
4. Decoupling					
Average Prices	40.50	109.70	21.54	14.70	113.97
High Prices	66.97	109.70	21.54	37.02	118.11
5. Recoupling					
Average Prices	57.22	109.70	38.93	3.07	124.92
High Prices	58.72	109.70	19.36	14.70	134.37
6. No Programs					
Average Prices	14.68	109.70	0.00	14.70	109.69
High Prices	47.63	109.70	0.00	37.02	120.32

As in the Palouse study, the No Programs option is shown to benefit taxpayers but at the expense of farm operators in these short-run projections (see columns 1 and 3 in Table 3). Under average grain prices, soybeans generally increase in acreage under the greater planting flexibility offered in policies 3-6 which reduces nitrogen leaching. When grain prices are high, North Carolina growers are projected to shift back to grain intensive rotations which increases nitrogen leaching.

One of the most interesting policy results in Table 3 is that in the North Carolina Coastal Plain as in the Pacific Northwest Palouse, only Recoupling protects the environment and sustains aggregate social welfare under the assumption of strong world grain markets. Under policies 1-4 and 6, government intervention does not preclude near fence-row-to-fence-row grain farming when grain prices are high so nitrogen leaching soars. However, with modest taxpayer expenditures for agrichemical use reductions, Recoupling is able to substantially reduce environmental damage.

Limitations Of Research And Conclusions

The policy analysis reported in this testimony for *the* Pacific Northwest and North Carolina study regions has limitations. The exact dollar values reported in these projections are conditional upon the utilized data and the particular provisions assumed for each policy. The incentive schemes assumed for soil conservation and reduced nitrogen use under Recoupling are particularly sensitive to the results. Different incentive schemes could result in different outcomes. Furthermore, *the* projected changes in crop prices by policy also affect the outcomes. Despite these limitations, the general direction of changes under various policies and consistent patterns of response over the two dissimilar study regions should provide useful insights for policymakers.

The durable performance of Recoupling in protecting the environment and maintaining social welfare during periods of high market prices provides an important policy choice for policymakers. If society wants to avoid losing environmental gains during periods of strong demand and high prices, farm program payments based on environmental performance–not traditional program crop acreages and yields-should bee considered. However, the gains to farmers and society from Recoupling comes at increased cost to taxpayers. In some regions, such as the Pacific Northwest Palouse, movement toward free markets, together with development of proven sustainable technology, yields good environmental results at much lower taxpayer cost under

conditions of average market prices. However, environmental protection seriously lags under free market conditions when world grain markets are strong. Congress will need to balance the importance of budgetary reductions and environmental protection in deciding between free market versus Recoupling policies. One promising possibility is design of cost effective targeted Recoupling policies which protect the environment at reasonable cost to taxpayers and to farmers. Further research and development to perfect environmentally sound and profitable sustainable farming technologies will help this effort.

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SUPPLEMENTS TO MR. YOUNG'S PREPARED STATEMENT

Farm program impacts on incentives for green manure rotations

Douglas L. Young and Kathleen M. Painter

Abstract. *Farm programs influence the profitability of a crop rotation through five effects: (1) a deficiency payment (DP) effect, (2) an acreage reduction (ARP) effect, (3) a base effect, (4) a crop price effect, and (5) a risk reduction effect. This study initially examines ARP and DP effects of the 1985 Farm Bill on the relative profitability of a low-input rotation and a grain-intensive conventional rotation in Washington state over 1986-1990. In years of low deficiency payments or high foregone returns from ARP land, the low-input green manure rotation was competitive with the conventional rotation but lost its advantage in years of low ARP costs or high deficiency payments. Long-run incentives to maintain wheat base introduced a consistent bias against the low-input green manure rotation. Planting flexibility options proposed during the 1990 Farm Bill debate could reduce farm program barriers to green manure and other low-input rotations. The Bush Administration's Normal Crop Acreage (NCA) proposal, which was not accepted in the 1990 legislation, would have largely eliminated base erosion for the green manure rotation in this study. More importantly, non-ARP green manure acreage would have qualified for deficiency payments under the NCA, thereby sharply increasing the low-input rotation's relative profitability. Proposals like the NCA might receive further attention in the future due to environmental concerns, fiscal pressures, or possible trade agreements requiring multilateral phaseout of agricultural subsidies coupled to commodities.*

Key words: farm policy, sustainable agriculture, commodity programs, green manures, crop rotations

Introduction

A major criticism of the 1985 Food Security Act (FSA), perhaps second only to its record cost to taxpayers, was its encouragement of inflexible cropping patterns dominated by the major program crops (House of Representatives, 1988; Ek, 1989a, 1989b; Office of the President, 1990). Because the major supported grain and row crops tend to be heavy users of agrichemicals (Osteen and Szmedra, 1989), farm programs have also been cited for discouraging low-input sustainable agriculture (National Research Council, 1989; Ek, 1989a). Growers were sometimes discouraged from using rotations that include green manure crops, hays, edible legumes, and other crops that conserve soil and reduce the use of pesticides because they reduced valuable base acreage of program crops. Before the 1990 Farm Bill debate, the Chairman of the House Agriculture Committee stated that Congress must consider "...the rigid and confining nature of the current crop-specific base system.... Flexibility should be a major objective of the next Farm Bill.... [The current base system] discourages the crop rotation methods that are the foundation of sound conservation practices" (de la Garza, 1989).

The 1990 Farm Bill permits growers the flexibility to plant 15 to 25 percent of their base acreage to program or specified other crops without losing future base acreage. Deficiency payments are not received on the grower's flexible base acreage, regardless of what is planted. In some rejected proposals, including the Administration's Normal Crop Acreage (NCA) plan, a grower's entire base acreage would have been flexible. In addition, deficiency payments would have been paid for program crops and unharvested conserving crops grown on flexible acres. Although the limited 15 to 25 percent base flexibility in the 1990 Bill fell short of initial expectations, it promises more flexibility than the 1985 legislation.

Despite the widespread view that the 1985 Farm Bill strongly discouraged cropping rotations, Dobbs et al. (1988) have called attention to a possible exception. Specifically, they demonstrate that the relative profitability of a low-input rotation in South Dakota that included an unharvested green manure was enhanced by the 1987 farm program. This soybean-wheat-oat-sweet clover rotation was slightly less profitable than a conventional soybean-wheat-oat rotation without the program but was 30 percent more profitable under 1987 program provisions. The low-input rotation's 25 percent unharvested sweet clover easily satisfied acreage reduction program (ARP) requirements. In the conventional rotation, 11 percent of the cropped area had to be left fallow as ARP. The green manure did double duty in the presence of farm programs: it reduced fertilizer and pesticide costs, and it satisfied ARP requirements. To assess the generality of this potential "program advantage" for rotations with unharvested green manure crops, we examine the influence of the 1985 FSA and the 1990

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NCA proposal on the profitability of a green manure and a conventional rotation over the period 1986-1990 in a southeastern Washington study area. We also provide a more comprehensive theoretical separation of the impacts that farm programs have on the profitability of alternative crop rotations. The analytical framework introduced here might prove useful in assessing impacts of future farm program modifications, such as those arising from possible deficit reduction agreements, environmental protection initiatives, or international trade treaties.

Types of program effects

Theoretically, the influence of farm programs on the profitability of different crop rotations can be divided into five effects: (1) a deficiency payment (DP) effect, (2) an acreage reduction (ARP) effect, (3) a base effect, (4) a price effect, and (5) a risk reduction effect. The nonnegative DP effect per composite acre of rotation equals the sum of deficiency payments per acre for each crop, weighted by the proportion of acreage planted in each crop. The "composite acre of rotation" includes all crops, other land uses such as green manure or fallow, plus any required ARP land. The DP effect is proportional to the deficiency payment per bushel and to program yield because the payments are computed on a grower's historical or program yields. The DP effect is negatively correlated with the ARP rate because ARP land is excluded from deficiency payments.

The ARP effect per composite acre is composed of the weighted sum across program crops of the direct costs of maintaining each crop's ARP and the opportunity cost at market prices of foregoing net returns from production on each crop's ARP. The weights are the proportions of total rotational acreage in ARP for each crop.

The base effect measures the present value of expected changes in future program payments from changes in future base that result from this year's planting decisions. This effect can be either positive or negative, that is, planting decisions can either build or reduce the base. As an example, switching to a green manure rotation with less acreage in program crops could reduce future deficiency payments through shrinkage of base acreage.

The price effect measures changes in a rotation's profitability from changes in market prices brought about by farm programs. Programs could move prices in either direction, depending upon their effects on aggregate supply and demand. ARP's will reduce short-run aggregate supply, but incentives for long-run base building and other forms of slippage might increase aggregate supply. These supply effects will interact with aggregate demand to determine prices. Demand can also be altered by auxiliary programs like the FSA's Export Enhancement Program. Through substitution effects, farm programs can also influence prices of nonprogram crops. These program-induced price changes for program and nonprogram crops could either increase or decrease the relative profitability of low-input versus conventional rotations.

Finally, the risk reduction effect measures the value a risk averse decision maker assigns to any program-induced reduction in variability of net returns. Stabilizing farmers' incomes has been a major objective of commodity programs.

The possible "program advantage" for green manure rotations will depend on how program provisions affect green manure compared to conventional rotations. The inherent economic competitiveness of green manure versus conventional rotations in different parts of the country will also play an important role. Unlike previous studies that have considered only ARP or DP effects (Dobbs et al., 1988; Duffy, 1987; Goldstein and Young, 1987), the empirical analysis here will also address the base effect and will suggest possible approaches for considering the price and risk reduction effects.

Background data: Palouse case study

In 1987, Goldstein and Young published an agronomic and economic comparison of a conventional rotation and an experimental green manure low-input rotation for growing small grains in the eastern Palouse of Washington state. Despite its rudimentary economic analysis of program effects, including explicit omission of ARP costs, the study has been extensively cited as evidence of the economic bias of government programs against low-input rotations (e.g., National Research Council, 1989, pp. 233-239). Dobbs et al. (1988) later, more detailed analysis showed favorable impacts of farm programs on a particular green manure rotation in South Dakota. These results indicate the need for more thorough analysis of the Palouse case study. In this paper we extend that analysis to include DP, ARP, and base effects with the actual variations in market and program variables over time.

Goldstein and Young's low-input rotation is a three-year sequence of peas, winter wheat, and unharvested medic green manure. The rotation is known as PALS, an acronym for Perpetuating Alternative Legume System. Medic, a biennial legume commonly used as a forage and cover crop in Australia and Europe, fixes nitrogen and appears to retard root diseases in wheat. It is seeded with peas in the first cycle, then perpetuates itself by natural reseeding. Reestablishment of the medic stand is assumed to be required every nine years. Wheat, which follows two years of legumes, is grown in PALS without commercial fertilizer, herbicides, or fungicides. In experimental trials, wheat yields under PALS were similar to those in conventional rotations with typical agrichemical applications (Goldstein and Young, 1987). Table 1 summarizes yield and variable cost estimates for both PALS and the conventional comparison. Unlike wheat, peas in PALS required typical pesticide applications to control weeds and insects. Peas in PALS also yielded 10 percent less than peas in the conventional rotation because of competition from medic.

Goldstein and Young's four-year conventional rotation, winter wheat-spring barley-winter wheat-dry peas, included 75 percent government program crops compared to 33 percent for PALS. This conventional rotation is relatively grain intensive for the region but would be representative of farms that have expanded

wheat and barley bases in the past. Fertilizer, herbicide, and fungicide applications on conventional wheat reflect the increased fertility and pest control requirements of the intensive rotation. Total variable cost per rotational acre for PALS was $56.81, 44 percent as high as the $129.39 per acre cost of the conventional rotation (Table 1).

Table 2 reports market prices and program variables from 1986 through 1990. These years coincide with the 1985 FSA, thus providing a unified policy framework. This period offers the further advantage of large variations in market prices, deficiency payments, and ARP rates, thereby allowing an evaluation of whether the 1987 program advantage identified by Dobbs et al. (1988) persists under differing economic conditions. The endogenous adjustment of market prices and program variables over wide ranges (Table 2) underscores the importance of incorporating this joint variability when examining program effects on low-input rotations. A comparison of the profitability of conventional and low-input rotations for a single year, or a sensitivity analysis on just one variable as others are held constant, may fail to capture the full impact of the programs over time.

Table 3 reports acreage allocations for conventional and low-input (PALS) farmers with and without the FSA farm programs. The "with program" acreage allocations assume participation every year. This assumption reflects the high participation rate in the FSA wheat and barley programs during the study period. The conventional farm's initial wheat and barley bases are assumed to be strictly proportional to the representation of these crops in the conventional rotation, namely 50 and 25 percent, respectively. The conventional rotation completely uses available wheat and barley bases every year, thereby maintaining these bases at 50 and 25 percent. Because annual wheat and barley ARP rates change, the acreage planted to each crop varies over time rather than following a strict rotation (Table 3). Evidence from a recent survey of Palouse farmers indicates that maintaining base acreage often is dominant in farmers' planting decisions (Beus et al., 1990). Conventional farming permits easier alterations in actual crop proportions from year to year because increased or decreased fertility or pest control requirements can be accommodated by chemical applications.

Farmers using PALS are assumed to have "converted" from conventional histories, which means their inherited wheat and barley bases are 50 and 25 percent. Unlike their conventional neighbors who use more commercial fer-

Table 1. Crop Yields and Variable Costs for the Conventional and PALS Rotations.

Crop/ Rotation	Yield[a]	1986 Var. Costs ($/ac)[b]
Winter Wheat	—bu/ac—	
CONV	80.00	145.53[c]
PALS	80.00	47.46
Spring Barley	—bu/ac—	
CONV	83.34	101.58
PALS	NA	NA
Dry Peas	—cwt/ac—	
CONV	20.00	124.93
PALS	18.00	122.97[d]
Rotation		
CONV	NA	129.39
PALS	NA	56.81
ARP	NA	21.19

SOURCE: Goldstein and Young (1987)

[a] Goldstein and Young assumed equal yields for wheat in CONV and PALS based upon multi-year experimental trials. Yields were assumed constant over 1986–90 as they showed no discernible trend over this period.

[b] Costs for 1987–90 were inflated by the Index of Prices Paid by Farmers (1986 = 1.00) (USDA, 1989): 1.01 for 1987, 1.07 for 1988, 1.11 for 1989, and 1.15 for 1990 (est).

[c] The cost of winter wheat following ARP is $9.56/ac lower due to less preplanting tillage.

[d] Costs for PALS dry peas include the cost of medic seed once every nine years to renew the medic stand.

Table 2. Crop Prices and Program Variables, 1986–90.

	Wheat ($/bu)					Barley ($/bu)					Peas ($/cwt)
Year	Mkt. Price	Target Price	Defic. Pmt.	Find. Pmt.	ARP (%)	Mkt. Price	Target Price	Defic. Pmt.	Find. Pmt.	ARP (%)	Mkt. Price
1986	2.51	4.38	1.98	.58	22.5	1.67	2.60	.99	.36	17.5	9.00
1987	2.82	4.38	1.81	.28	27.5	1.87	2.60	.79	.05	20	7.60
1988	4.19	4.23	.69	0	27.5	2.45	2.51	0	0	20	8.70
1989	4.05	4.10	.32	0	10	2.30	2.43	0	0	10	8.10
1990	2.94*	4.00	1.38*	0	5	1.84*	2.36	.50*	0	10	10.05*

*Authors' projections.

SOURCES AND NOTES:

Market prices for 1986–89 are the Washington state marketing year averages as reported in Washington Department of Agriculture (1989) 1990 market prices for all crops are authors' projections based on August 1990 cash prices and futures quotations. Target prices and ARP rates for 1986–90 and deficiency payments for 1986–88 are from Harwood and Young (1989) and Ash and Hoffman (1989). Findly (Find.) supplemental deficiency payments were computed from data in the same two publications. Deficiency payments for 1989 are from ASCS, Colfax, WA and those for 1990 are authors' projections.

In the 1985 farm bill, deficiency payments nationwide equal the difference between the target price and the five-month *national* average market price (or loan rate if it is higher). Washington state average market prices generally exceed the national average because of transportation advantages. Averages for the entire marketing year can also differ from those for the first five months. These factors explain why the actual annual deficiency payments diverge from the difference between the listed target and (Washington state) market prices.

Table 3. Proportional Acreage Distribution by Rotation, Farm Program Available, and Year

Scenario	Year	Crop				
		Wheat	Barley	Peas	Unharv Medic	ARP
Conventional with programs	1986	388	206	250	0	156
	1987	363	200	250	0	188
	1988	363	200	250	0	188
	1989	450	225	250	0	075
	1990	475	225	350	0	050
Conventional without programs	1986–90	.500	.250	.250	0	0
PALS with or without programs	1986–90	334	0	333	.333	0[a]

NOTE: Initial wheat and barley bases are 50 and 25 percent, respectively, of farm acreage.
[a] The unharvested medic meets ARP (set-aside) requirements for the PALS rotation.

tilizers and pesticides, low-input farmers participating in the farm program are assumed to maintain the PALS rotation strictly. The fixed two-to-one ratio of legumes to wheat is required for fertility and pest control, given the minimal use of pesticides and fertilizer. The inherited wheat base level is sufficient to permit the PALS rotation with program participation to continue during 1986-90, but, as will be discussed later, this rotational strictness can impose a cost in the long run.

Analysis of FSA

Net returns over variable costs are computed in Table 4 for 1986-90 for the PALS and CONV rotations, both with and without farm programs. Several assumptions underlie these computations. First, only ARP and DP effects are considered at this stage. The average yields reported in Table 1 are used each year. This permits focusing on national program effects by excluding effects arising from local production variability. The average yields are also assumed to equal the producers' ASCS program yields. Returns to producers are the sum of crop sales at Washington state marketing year average prices listed in Table 2 and any applicable deficiency payments.

At this stage, the analysis ignores any market price effect that might result from the removal of the FSA in the "without programs" scenario. As in earlier studies (Duffy, 1987; Goldstein and Young, 1987; Dobbs et al., 1988), market prices are assumed to be identical whether or not a program is in effect. Following our quantitative analysis of ARP, DP, and base effects, we suggest an approach for relaxing this simplifying assumption when the necessary data are available.

As shown in Table 4, the net impact of the ARP and DP effects is mixed. In 1986, 1987, and 1990, the farm programs hurt the PALS rotation's relative profitability (PROFIT PALS/PROFIT CONV), but in 1988 and 1989 relative returns for PALS were boosted by the FSA. For example, in 1988 the FSA boosted PALS' relative profitability from .83 to 1.08, but in 1986 the program reduced it from 1.25 to .92. Clearly, the "program advantage" for green manure rotations does not occur in general. These results support Dobbs et al.'s (1988) observation that "...the form of [annual] program provisions and compliance requirements...will affect the relative competitiveness of low-input farming systems."

To show why the FSA favored PALS in some years but not others, Table 4 separates ARP and DP effects. The ARP effect is always negative for the conventional rotation because ARP occupies land that otherwise would be planted to a profitable wheat or barley crop. The ARP effect is always zero for PALS because the unharvested medic qualifies as ARP without any additional expense. ARP constitutes neither an opportunity cost nor a direct cost for the PALS farmer.

In 1986, 1987, and 1990, high DP effects dominate the net effect (Table 4). Because the conventional rotation has a higher proportion of land in program crops, it benefits more than PALS from the strong DP effect in those years. Fur-

Table 4. Annual Net Returns, ARP Effects, and DP Effects ($/acre of rotation) for PALS and Conventional Rotations due to 1985 Food Security Act (FSA).

Year	Rotation & Ratio[a]	Net Returns Over Variable Costs		DP Effect	ARP Effect	Net Effect[b]
		No FSA	With FSA			
1986	PALS	64	133	68	0	68
	CONV	51	144	103	−10	93
	Ratio	*1.25*	*.92*			
1987	PALS	64	119	56	0	56
	CONV	59	119	75	−16	59
	Ratio	*1.08*	*1.00*			
1988	PALS	103	122	18	0	18
	CONV	124	113	20	−32	−12
	Ratio	*.83*	*1.08*			
1989	PALS	94	102	8	0	8
	CONV	107	108	12	−11	1
	Ratio	*.88*	*.94*			
1990	PALS	73	110	37	0	37
	CONV	57	116	62	−2	60
	Ratio	*1.28*	*.95*			
1986–1990 Mean	PALS	80	117	37	0	37
	CONV	80	120	54	−14	40
	Ratio	*1.00*	*.98*			

[a] Ratio of net returns of PALS to the net returns of CONV for the year and program scenario.
[b] Because of rounding errors, net effect computed as the sum of the DP and ARP effect may differ slightly from the same effect computed as the difference between With FSA returns and No FSA returns.

thermore, the negative ARP effect is small for the conventional rotation in these years; in 1986 and 1987 depressed market prices kept ARP opportunity costs low, and in 1990 the minimal 5 percent ARP had the same effect. Consequently, a combination of generous deficiency payments and modest ARP costs in 1986, 1987, and 1990 underlie the "program disadvantage" for PALS in those years. The FSA reduced the relative profitability ratio of PALS versus CONV in each of these years. In contrast, modest deficiency payments and larger ARP costs reduced the conventional rotation's program payoff in 1988 and 1989, which generated a relative "program advantage" for PALS in those years. In general, the relative profitability of green manure rotations like PALS will be favored by large ARP costs and lower deficiency payments.

Based solely on the ARP and DP effects in Table 4, the results are mixed as to whether a "with programs" or "without programs" world would be better for PALS. PALS had equal or slightly favorable profitability ratios of 1.00 and 1.08 in two years out of five with the FSA and stronger advantages of 1.25, 1.08, and 1.28 in three years out of five without it. Over the five years, PALS annual net returns averaged about 2 percent less than CONV for the "with programs" scenario (Table 4). In the "without programs" scenario, the five-year average annual net returns for the two rotations were identical.

The FSA strongly raised the absolute profitability of both rotations by an annual average of 46 percent for PALS and 50 percent for CONV. Participation in farm programs would have been profitable every year except 1988 for the conventional rotation. Based solely on the analysis in Table 4, which excluded market price effects, both low-input and conventional Palouse wheat growers would likely have suffered financial stress during 1986-90 without the FSA.

Table 5 considers the dynamic "base effect" of farm programs on the PALS grower. Consistent with ASCS procedures, entering base is computed as the average acreage planted and considered planted (in ARP) over the past five years. Before 1986, it is assumed that wheat and barley bases had been maintained at 50 and 25 percent for both the conventional and low-input farms. The base effect is zero for the conventional farm, which was assumed to plant and use as ARP its full wheat and barley bases every year during 1986-90, thereby experiencing neither declines nor increases in future bases.

On the other hand, a farmer who switched to the PALS rotation would have suffered substantial base losses under the provisions of the FSA. Because PALS contains no barley, barley base vanishes after five years. The loss of wheat base is even more serious because wheat is the key moneymaking crop in PALS. Years of tight supply-demand balance and low ARP's like 1989 and 1990 accelerate the loss of base under PALS because it receives little credit for the unharvested medic as "considered planted" ARP land.

Wheat base erosion can seriously endanger the long-term economic sustainability of PALS. As shown in Table 5, under a continuation of the base calculation provisions of the 1985 Farm Bill (FSA), the PALS farmer's wheat base falls from .50 in 1986 to .41 by 1991. If stocks continue to accumulate and push ARP's in the early 1990's up to 1986-88 levels, the PALS grower would need a wheat base of .43 to .46 (which would exceed the .41 available) in order to maintain the one-third wheat, one-third peas, one-third medic rotation. Under a continuation of this policy, the low-input grower would be faced with the choice of abandoning PALS as a fixed rotation or withdrawing from the profitable wheat program.

It is impossible to compute the exact present value of this shrinkage of wheat base (the "base effect") because future ARP's, target prices, and market prices are unknown. It is clear from Table 5, however, that the method of base calculation in the 1985 FSA reduces the long-run profitability of green manure rotations in the Palouse. In a recent survey, low-input Palouse farmers mentioned base loss more often and more stridently than any other policy as a barrier to rotations using green manures or grasses (Beus et al., 1990). Later we examine the potential for one base flexibility proposal to dismantle this "base barrier" to green manure rotations.

Estimating the "price effect" of the FSA would require a set of hypothetical free market crop prices over the 1986-90 study period. One way of obtaining such estimates is to derive them from a national agricultural sector model. If a satisfactory set of price estimates for this scenario were available, we could isolate the price effect by computing the "without programs" scenario in Table 4 both with these estimates and with observed "with program" prices from Table 2. The accuracy of these estimates would, of course, depend on the validity of the model from which they were derived. Various models of this type now in use tend to give widely different estimates.

A review of the historical experience of U.S. commodity programs indicates that their market price effects have been complex. Although a long-standing ob-

Table 5. Wheat and Barley Annual History and Base Acreage for PALS Rotation Under Two Policy Scenarios

Item	Year					
	1986	1987	1988	1989	1990	1991
FSA	proportion of total acreage					
Wheat						
Entering Base	.50	.49	.48	.47	.44	.41
Annual History*	.43	.46	.46	.37	.35	-
Barley						
Entering Base	.25	.20	.15	.10	.05	0
Annual History*	0	0	0	0	0	—
NC4 Proposal						
Program Crops Plus Permitted Uses						
Entering Base	.75	.73	.72	.70	.69	.67
Annual History*	.67	.67	.67	.67	.67	—

* Planted and considered planted in current year

jective of the programs has been to control supply through ARP's and thereby increase market prices, the major program crops, including wheat, cotton, and feed grains, have been vulnerable to periodic surpluses that have depressed market prices. Clearly, the profit-enhancing and risk-reducing features of the programs appear occasionally to have increased supplies through base building and other forms of program slippage. During other periods, the programs appear to have been more effective in controlling supplies and raising prices of program crops. Consequently, it is difficult to generalize about the influence of price effects on the profitability of green manure rotations.

Although risk has not been considered in the analysis above, expected utility theory could be used to compare the risk-adjusted certainty equivalent of different cropping rotations and program scenarios. The change in the risk premium with the addition of farm programs would measure the "risk reduction effect" described earlier.

NCA base flexibility proposal

The Administration's Normal Crop Acreage (NCA) proposal for the 1990 Farm Bill would have expanded base acreage flexibility to the whole farm and paid deficiency payments on flexible acres under certain conditions (Office of the President, 1990). Policies like the NCA might receive further attention in the future because of environmental or budgetary concerns or if the trade negotiations lead to a multilateral phaseout of agricultural subsidies coupled to specific commodities. Consequently, analysis of the NCA's impacts on economic incentives for the conventional and low-input rotations in this study should be useful.

The NCA proposal pools the grower's base acreage over all program crops and also permits green manures or other "conserving crops" to be counted for future base acreage calculations. If the conserving crop is not harvested, the grower receives deficiency payments. For example, if medic is planted on wheat base acreage, the farmer is eligible for wheat deficiency payments on the medic land. Alternatively, conserving crops like medic could continue to be used to satisfy ARP requirements.

We apply the NCA proposal to the PALS-conventional comparison retroactively, assuming it had been law during 1986-90 instead of the FSA. The last two lines in Table 5 show that the NCA proposal would have been markedly more effective than the FSA in sheltering the base acreage of a PALS farmer. By 1991, total base under the FSA would shrink to 41 percent of the farm, but under the NCA it would stabilize at 67 percent. With the NCA, the full 33 percent of acreage in green manure medic counts as "considered planted" every year, either as wheat ARP or as a conserving crop on the "flexible" NCA base. Accordingly, the NCA considered planted (Annual History) in Table 5 remains at 67 percent every year, composed of 34 percent wheat and 33 percent medic.

Table 6 reports estimated annual net returns over variable costs for the PALS and CONV rotations for both the 1985 FSA and the Administration's NCA proposal. Lacking program-specific estimates, we use the annual deficiency payments listed in Table 2 for both policies. A limitation of this approach is its failure to incorporate any differential price effects between the FSA and NCA, which could also have altered deficiency payments. The conventional rotation's net returns remain unchanged from Table 4 because all NCA acreage is allocated to wheat, barley, peas, and ARP exactly as before, and market proceeds and deficiency payments are unchanged. Net returns would increase every year for PALS, however, because it now would receive deficiency payments on non-ARP medic acreage.

According to the analysis in Table 6, based on historical prices, the PALS rotation would benefit substantially with the NCA. Whereas PALS would lag behind the conventional rotation in three out of five years with the FSA, it would earn more than CONV in all but one year under the NCA. Over the five-year period, PALS averaged 2 percent less net returns than CONV with the FSA, assuming program participation. With the NCA, PALS returns averaged 11 percent higher than CONV. Although the estimates in Table 6 show that the NCA increases the private competitiveness of green manure rotations, the absolute profitability estimates should be interpreted cautiously. If the NCA had actually been in effect during 1986-90, it is likely that wheat acreage would have been reduced more promptly, leading to a quicker recovery of market wheat prices. However, one result of higher

Table 6. Net Returns and Difference in Deficiency Payments ($/acre of rotation) For Two Policies by Rotation.

Year	Rotation & Ratio*	Net Returns		Difference in DP (NCA - FSA)
		FSA	NCA	
1986	PALS	133	167	34
	CONV	144	144	0
	Ratio	*.92*	*1.16*	
1987	PALS	119	138	19
	CONV	119	119	0
	Ratio	*1.00*	*1.16*	
1988	PALS	122	123	1
	CONV	113	113	0
	Ratio	*1.08*	*1.09*	
1989	PALS	102	105	3
	CONV	108	108	0
	Ratio	*.94*	*.97*	
1990	PALS	110	134	24
	CONV	116	116	0
	Ratio	*.95*	*1.16*	
1986–1990 Mean	PALS	117	133	16
	CONV	120	120	0
	Ratio	*.98*	*1.11*	

* Ratio of net returns, PALS/CONV, for the year and program scenario.

market prices could be an increase in wheat production by competing nations, which would tend to moderate those price increases. A higher market price for wheat, if realized, would have reduced deficiency payments, possibly producing results closer to those in the 1989 scenario in Table 6. For that year, returns for CONV were 6 percent higher than PALS under the FSA and 3 percent higher than PALS under the NCA.

The Integrated Farm Management (IFM) plan provision of the 1990 Farm Bill offers some of the same advantages to participating growers as the NCA proposal. Growers who sign three- to five-year renewable contractual plans to meet specified soil and water nondegradation standards will be granted base protection, subject to certain restrictions, on base acreage planted to green manure or selected other crops. Furthermore, deficiency payments will be paid on this acreage, net of ARP and the standard 15 percent unpaid flexible base. The plans also permit some haying and grazing on ARP land. It is unclear so far how popular the IFM plans will be with growers.

Conclusions

Taking account of acreage reduction and deficiency payment effects, provisions of the 1985 FSA favored a low-input green manure (medic) rotation grown in southeastern Washington state in some years but penalized it in others. In years with lower deficiency payments or higher ARP costs, the case study green manure rotation became relatively more profitable. However, high deficiency payments coupled with modest ARP costs strongly favored the grain-intensive conventional rotation.

The mixed results for this study may apply only to other green manure rotations and not to fully harvested low-input rotations. Rotations that include low-input crops like hay rather than an unharvested green manure crop lose the option to use the low-input crop as ARP. These rotations are unlikely to be economically competitive with a conventional grain-intensive rotation under the government program provisions examined in this study. For example, Duffy (1987) reported monoculture corn in an Iowa study was 19 to 97 percent more profitable than four less intensive but fully harvested rotations, assuming government program participation. Without the FSA, all four rotations earned more than monoculture corn.

The incentive to maintain program crop base acreage levels to protect future government payments in the 1985 FSA represented a consistent program bias against the use of the green manure rotation in this analysis. Indeed, gradual loss of base could eventually force growers following this rotation out of the farm program.

This study's findings strongly support strengthening base flexibility in future farm policy legislation. It is crucial, however, that these proposals include soil building green manure crops in the list of specified alternative crops that can be grown on "flexible" base acres and on ARP acres, as in the Administration's 1990 NCA proposal. If it had been applied during 1986-90, NCA would have sheltered all the PALS green manure acreage as whole-farm base. Furthermore, the non-ARP green manure acreage would have qualified for deficiency payments under the NCA, thereby sharply increasing its profitability in comparison to the FSA and the conventional rotation.

This single region case study involving an experimental green manure rotation does not ensure widespread adoption of similar rotations with passage of the NCA or similar proposals. Such rotations may fail to be competitive in some regions because of physical or economic factors. Planting flexibility should also raise market prices of program crops and decrease prices of nonprogram crops, thereby improving the relative profitability of program crops. Nonetheless, these proposals represent an important step toward eliminating the penalties from farm programs for farmers considering adoption of more environmentally sound farming systems.

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Policy barriers to sustainable agriculture

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Abstract. *U.S. agriculture, which has developed in a mixed environment of private initiative and government support, is very successful by many measures. American farmers produce record levels of food and fiber per farm worker at very low budgetary cost to consumers. Recently, however, concern about resource depletion and agrichemical pollution has caused critics to question the environmental sustainability of the agricultural production system. Furthermore, pressures to trim the growing contribution of agricultural subsidies to the national budget deficit have led legislators and others to question the sustainability of the federal farm programs. Low agrichemical input or sustainable agricultural practices, such as nitrogen-fixing legumes in rotation with cereals, could reduce environmental damage. The selectivity and structure of historical farm programs, however, have economically favored conventional systems. Farm programs subsidize only about half the total value of agricultural products. Feed and food grains, cotton, and dairy products receive the lion's share of payments. Soil-building crops like forage legumes, most edible legumes, hay, and pasture are excluded. Secondly, the structure of commodity programs favors intensive production of program crops supported by high fertilizer and pesticide applications. This incentive emanates from the policy of computing the farm-wide deficiency payment for a program crop proportionately to the farm's historical "base" acreage and "established" yield for the crop. The leading farm program crops of corn, wheat, cotton, and soybeans occupied slightly over 60 percent of cropped acres and received at least 65 percent of all U.S. agricultural pesticides and fertilizer in the mid 1980's. Despite budget pressures and environmental concerns, near term termination of farm programs or decoupling them from production of particular commodities is unlikely. Fears about aggravating financial stress, reducing land values, and harming agrichemical supply businesses in program crop-growing regions will promote cautious incremental change. Recent promising signs of "creeping decoupling" include the 1986 freeze on established yields, the gradual reduction in target prices, the permitting of multi-year grass or legume plantings as set aside acreage, and the loosening of base acreage restrictions within the 1988 Drought Relief Bill.*

Key words: agricultural policy, sustainable agriculture, commodity programs, low-input agriculture, decoupling

Introduction

By most commonly accepted measures, modern U.S. agriculture is extremely productive. Each farm worker produces record levels of food and fiber at very low budgetary cost to consumers. Nonetheless, charges have been increasing that this agricultural system is ecologically and politically unsustainable. The former charge relates to socially unacceptable damage inflicted on soil, water, wildlife, and other natural resources by the intensive use of agrichemicals and tillage. Secondly, pressures to control the unprecedented growth in the federal deficit threaten to reduce annual public subsidies to agriculture. These peaked at $26 billion in 1986-87 and are estimated at 22 and 13 billion dollars for the following two fiscal years despite the relatively healthy current agricultural economy (USDA, 1989).

The ecological and fiscal problems described above are related. This paper will attempt to show that the structure of U.S. farm programs has not only contributed to high taxpayer costs and failed to curtail surpluses, but has also encouraged intensive cultivation of chemical-intensive crops. While improvements have recently been made, commodity policies remain a severe constraint to low agrichemical input or sustainable agriculture, which a recent Congressional report declared to "...hold great promise for preventing groundwater contamination and reducing farmers' costs by minimizing or eliminating pesticide and fertilizer use" (House of Representatives, 1988).

The objectives of this paper will be: 1) to describe the mechanisms by which United States farm commodity programs encourage conventional farming systems and discourage low-input systems, 2) to review empirical evidence on the impact of past commodity programs on cropping patterns and agrichemical use, 3) to review in broad terms some positive and negative impacts of reforming or terminating current commodity programs, and 4) to discuss promising recent, and potential future, changes in government farm programs as they affect incentives for low-input agriculture.

How commodity programs favor conventional agriculture: Theory and evidence

Not all commodities receive subsidies

Since their inception during the Great

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Depression, commodity programs have influenced the output mix and input use patterns of American agriculture through both their selectivity and their structure. Although the press sometimes gives the impression that all farmers receive subsidies, payments are restricted to specified agricultural products. Of the $148 billion average gross market value of U.S. crop and livestock production during 1980-85, only 51 percent was included in commodity programs (USDA, 1987). Corn and other feed grains, wheat, rice, cotton, soybeans, sugar, peanuts, wool, tobacco, and dairy products account for nearly all government farm subsidies (Womach, 1988). USDA (1988) estimated that 52 percent of 1986 farm subsidies went to corn and other grains, 28 percent to dairy, 3 percent to soybeans, and 17 percent to other supported commodities. Many farmers and ranchers never receive a government subsidy check. Growers outside the government circle include beef ranchers, hog producers, hay growers, potato farmers, egg and broiler growers, vegetable producers, and fruit orchardists, among others. Of course, government farm programs indirectly affect producers of non-supported commodities through market interactions. For example, feed grain programs which lead to surplus corn production can reduce feed costs for livestock feeders.

Microeconomic theory predicts that increasing the relative profitability of selected program crops will direct land and other resources to these crops at the expense of non-program crops. Land that might be used to produce vegetables will be used for corn or cotton instead. Wheat or barley that might be produced in rotation with forage legumes are produced in intensive rotations supported by high fertilizer and pesticide applications. Land that might otherwise be producing beef cattle is used for dairying.

Empirically, it is very difficult to disentangle the contribution of commodity programs alone to the growth in base acreage of major program crops such as corn, wheat, and cotton. Changes in relative prices driven by changing technology and other factors also contribute powerfully to these acreage shifts. Planted plus set aside acreage devoted to corn, cotton, and wheat rose from historic levels of 40-50 percent to over 50 percent of U.S. cropland during both the late 1960's and mid-1980's when large surpluses depressed crop prices and created strong incentives for program participation (USDA, 1987). Many might consider 50 percent of total cropland a high fraction for these three program crops which have often accumulated large surpluses in excess of demand.

Payments are based on historical production of program crops

The structure of farm support programs varies considerably from commodity to commodity. Tobacco and sugar programs, for example, rely strongly on acreage and import quotas, respectively, which transfer program costs to consumers. Government purchases of surplus manufactured dairy products support the price of fluid milk. Soybeans receive downside price protection with "non-recourse loans" but do not qualify for supplemental deficiency payments like grains and cotton.

The feed and food grain and cotton programs, which typically absorb the lion's share of taxpayer dollars, support income of participating farmers with "non-recourse loans" and "deficiency payments." Participants must withdraw (set aside) from production a specified fraction of their "base acreage" of a program crop. Participating growers may "loan" their crop to the government for the loan rate "floor price" at harvest. If market prices later exceed the loan rate, the grower may repay the loan and sell the crop on the market. If the market price remains below the loan rate, the grower may forfeit the crop to the government and keep the loan proceeds. The protection from downside price movements provided by non-recourse loans can make program crops more attractive.

A participating farmer's annual deficiency payment, subject to the $50,000 per farm limitation, equals the "deficiency payment per bushel" times the farm's "established yield" for the crop times the number of "base acres" in that crop net of any set aside acreage. The deficiency payment per bushel is equal to the difference between the legislated target price and the loan rate or average market price, whichever of the latter two is higher.

The individual farmer has no control over the deficiency payment per bushel, which is determined jointly by Congress and the market. The farmer has had considerable long-run control, however, over his established yield and base acreage. These quantities have been computed as moving averages of the farm's past yields and acreages in the crop. The 1985 Farm Bill precluded further increases in established yields by freezing these at 1986 levels. Farmers may still expand base acreages by increasing plantings of program crops during years they elect not to participate in the programs. Increasing future deficiency payments by expanding program crop base acreage can pay off for several years. Also, these increases in farm income are immune to short-run fluctuations in weather and market prices. If a drought cuts a participating farmer's yields in half, the farmer's deficiency payment check for that year based upon established yield and acreage is not affected.

The dependence of future government payments on maintaining high program crop acreage can serve as a major barrier to introducing sustainable rotations. Monoculture corn growers will be reluctant to shift to rotations including oats and green manures even if high market prices for oats and nitrogen, and low market prices for corn, make it seemingly profitable in the short run. They fear losing valuable corn base in the long run and attractive corn deficiency payments in the short run. Consequently, they may continue adding to surplus corn production despite contrary market signals.

The inter-commodity cross-compliance provision in the 1985 Farm Bill added another restriction to farmers' flexibility in changing crop rotations. This provision restricts farmers within their base acreage on other program crops if they are participating for any program crop(s). Consequently, a monoculture corn grower with no wheat base who wishes to add wheat in a rotation

cannot do so without losing eligibility for the profitable corn program.

As government programs encourage program crops, farmers might not only substitute program crops onto land that previously grew non-program crops but continue to grow program crops on the same land in more intensive rotations supported by higher fertilization and pesticide applications. Weeds and diseases flourish in cereal-intensive rotations because the pest has uninterrupted access to the susceptible host plant (Cook, 1986). Higher pesticide rates are required to sustain crop health.

Do farm programs increase agrichemical use?

By tilting U.S. agricultural production toward feed grains, food grains, and cotton, USDA commodity programs substantially boost agrichemical use because these crops are heavy consumers of pesticides and fertilizers. Fleming (1987) reported that the Big Four program crops of corn, cotton, soybeans, and wheat received at least 65 percent of total agricultural pesticides and fertilizer. These same four crops accounted for 61 percent of cropland used for crops in 1986 (USDA, 1987). Fleming cited further estimates that more than half of herbicides applied to field crops are devoted to corn alone and that herbicides represent 85 percent of all pesticide use. Vrooman (1987) reported that the share of total U.S. nitrogen, phosphate, and potash use devoted to corn, cotton, wheat, and soybeans grew from 42 percent in 1964 to 62 percent in 1985. Hallberg (1986) reported data from the Corn Belt showing that average applications of nitrogen fertilizer on corn grew from 65 lbs/ac in 1965 to 135 lbs/ac in 1982. While many non-program vegetable and fruit crops also receive high agrichemical applications, acreages of these crops are small compared to those of major program crops. Reichelderfer (1985) concluded that program crops are also more soil eroding than non-program crops.

Daberkow and Reichelderfer (1988) have questioned whether the historical moving average basis for established yields caused farmers to use more fertilizer and pesticides in order to capture greater future deficiency payments. The theoretical basis for this incentive is clear, however, as shown by the derivation presented in the Appendix. The derivation shows that incorporating expectations of future deficiency payments under pre-1986 regulations will inflate input use by an amount positively proportional to expected future deficiency payments. These input-boosting incentives operated for feed and food grains for over two decades between 1964 and 1986. Until 1964, farm programs were primarily based upon acreage allotments, loan rates, and paid land diversion (Blakeslee, 1980; Cochrane and Ryan, 1976). Direct payments which were introduced in 1964, and deficiency payments, which began in 1971, were both tied to historical yields and thereby introduced incentives to boost yields through greater input use in order to capture higher future payments. Established yield provisions may have substantially increased fertilizer and pesticide application rates during the two decades they were in place, but additional empirical work on this issue is needed (Young, 1988).

The simple static model presented in the Appendix, which relates established yield provisions to input use incentives, abstracts from the dynamics of adjustment and the pervasive uncertainty regarding key variables. High farmer discount rates due to short time horizons or uncertainty could also dampen the effects of future deficiency payment expectations. However, it seems reasonable that a deterministic dynamic model with constant expectations might converge to similar results.

Past economic analyses have often explained changes in output mixes and input use rates as responses to changes in market prices only. A more complete understanding requires incorporating commodity program effects. During much of the recent period, when many farmers received substantial deficiency payments for corn, there is strong reason to believe that the ammonia price/corn loan rate ratio cited by Daberkow and Reichelderfer (1988) did not fully capture the incentives for nitrogen fertilizer use in corn. Nitrogen applications reported by these researchers averaged 112 and 105 lbs/ac in 1970 and 1975, but moved sharply upward to 130-140 lbs/ac in the 1980's despite an upward trend in the nitrogen price/corn loan rate ratio. Technical change, better information, and possibly other factors could explain part of this growth in nitrogen use. Another candidate, however, is the incentive to boost future deficiency payments by increasing established yields.

Some important exceptions and caveats

While the selectivity and structure of the commodity programs impart a high-input bias, it should be noted that not all farm programs encourage intensive farming systems. Payments for long-term land retirement programs, such as the 1950's "soil bank" and today's Conservation Reserve Program, are not linked to base acreages and yields and therefore do not directly favor input-intensive crops.

Whether low-input systems will be competitive with current conventional systems without farm programs will vary by region and by commodity. Obviously, some non-subsidized commodities, including many fruits and vegetables, appear to be most profitably produced by very chemical-intensive systems, even in the absence of subsidies. The same applies for livestock feeding operations which have come under fire for heavy use of chemical implants and antibiotics. Also, set aside provisions associated with participation in the feed and food grain programs can sometimes work to the advantage of low-input growers who find set aside a profitable use of their green manure or forage legume acreage (Dobbs et al., 1988).

Several studies have been completed which show that organic or low-input farms can be as profitable, or more profitable, than their conventional counterparts in certain situations (see Hodges, 1978; Cacek and Langner, 1986; and Vogtmann, 1984; for summaries of several comparative studies in North America and Europe). Nonetheless, the overwhelming majority of U.S. farms continue to use conventional practices which rely heavily on agrichemical inputs. A negligible proportion of total

U.S. food and fiber is produced by genuinely organic methods. Considering the claims in the sustainable agriculture literature of the profitability of low-input methods in case study comparisons, a reader might legitimately wonder why low-input systems are not more common. The arguments presented above suggest that the answer, in part, is related to the structure of U.S. farm commodity policies. However, agrichemical intensification incentives also hinge critically on the supply-demand balance which drives commodity and input prices. During periods of relatively strong demand, high-market prices for program crops can provide many of the same incentives for intensive fertilizer and pesticide use as do commodity programs in other periods. For example, comparisons by Goldstein and Young (1987) revealed that a conventional grain-intensive rotation acquired a profit advantage over a low-input legume-wheat rotation whenever market wheat prices exceeded $3.50/bu.

The observation that market-driven price increases for grains and other program crops can motivate occasional intensive use of land and agrichemical inputs does not negate the argument for avoiding excessive use of these inputs by removing policy biases. Indeed, it reinforces arguments for conserving our land, water, and pollution absorption capacities for periods of real economic need.

Aggregate economic impacts of terminating or decoupling farm programs

To promote the environmental and fiscal benefits of wide-scale adoption of low-input agriculture, some economists and legislators have advocated "decoupling" all U.S. farm subsidies from production. This would permit "targeting" payments to particular types of growers, for example, to "family farmers" or to farmers using environmentally safe practices. Decoupling would make commodity programs neutral with respect to the choice between low-input and conventional production systems. Historically, however, American farmers have resisted decoupled direct payments. Such payments smack of welfare and shatter the argument that the subsidies have been "earned."

Given the substantial adjustment problems which would be associated with sudden termination of agricultural programs, some form of phased reduction or decoupling is more likely. Decoupling payments from selected commodities would weaken incentives for high chemical input production of those crops but would not necessarily reduce taxpayer costs if retargeted transfer payments remained high.

An even more extreme policy proposal was advanced by the Reagan Administration. On July 6, 1987, in Geneva, Switzerland, the Administration proposed at a meeting of the 93-country General Agreement on Tariffs and Trade that all farm subsidies in the world be terminated as part of a multilateral program by the turn of the century. While the long-run U.S. goal has remained essentially fixed, there has been no rush by other countries with major agricultural support programs, most notably the EEC, to endorse this proposal. However, the proposal does legitimize termination as an option for public debate. Willard Cochrane (1986), an eminent agricultural economist and long-time architect of government farm programs, has also recommended immediate termination. There are occasional reports in the popular press of farmers themselves who wish to get "off the public dole." In part, this grass roots sentiment seems to be founded in the belief that the long-run competitive strength of U.S. agriculture would be served by foregoing subsidies:

In the Midwest it is now coffee shop gospel that, despite fifty years of government assistance, farmers producing subsidized commodities lag behind livestock raisers, vegetable growers, and others who fend for themselves in the marketplace (Newsweek, 1987).

However, farmers who would actually vote to eliminate farm programs are probably a minority. Even those who speak out against farm programs presumably keep their federal checks and, if pushed, would probably condition their preference for a free market by requiring other governments to play by the same rules.

Although farm commodity programs can be criticized on equity grounds ("Why should corn growers receive subsidies if cherry growers and plumbers do not?"), the central economic defect of these programs is their inefficiency. A basic tenet of economics is that government intervention, in the absence of market failure, is less efficient than letting the free market allocate resources. In the case of farm subsidies, this means that the total dollar losses of taxpayers exceed the monetary benefits to producers and consumers.

Despite the economic efficiency argument for terminating government farm subsidies, most agricultural economists and politicians resist termination and focus their attention on the substantial adjustment costs it would impose. A recent study by a cross-section of agricultural policy specialists (Wallace, 1987) concluded:.

Highly leveraged farms would stand virtually no chance of remaining solvent for the next ten years in the absence of farm programs. Because one-third of U.S. farmers are considered to be highly leveraged, even a transition policy to phase out farm price and income support would likely cause rapidly falling land values, accelerated structural change, and added stress on the agricultural financial sector.

Producers of non-supported products would also be affected as some grain growers, sugar producers, dairymen, and other program commodity producers shifted to traditionally non-supported commodities. In addition to the adjustments mentioned by Wallace, agrichemical and machinery suppliers would likely face reductions in demand as U.S. output of chemical-intensive crops shrank and production practices changed after terminating farm subsidies. Employment and income in agribusiness would fall accordingly. These concerns probably underlie the recent opposition by the fertilizer industry to USDA's low-input sustainable agriculture program (House of Representatives, 1988).

Although microeconomic budgeting comparisons of conventional and low-

input systems under "no commodity policies" scenarios fail to capture all endogenous price adjustments that would in fact be realized, they indicate just how sharply incomes could fall for both conventional and low-input producers in the absence of farm programs. Goldstein and Young (1987) presented such a comparison for a cereal-intensive conventional system and a low-input legume-cereal rotation under the depressed agricultural economy of the mid-1980's. The low-input rotation became relatively more profitable than the conventional rotation without commodity programs, but net returns for the low-input rotation were only 54 percent of what they would have been with taxpayer subsidies. Comparisons by Dobbs et al. (1988) for conventional versus low-input cropping systems in the Northern Plains showed similar results. Taxpayer savings with a complete termination of farm programs will be accompanied by income losses for producers of program crops. Indirectly, other producers and consumers will be affected through changes in land use and in food prices.

In addition to the more easily quantified market gains and losses shared by taxpayers, producers, and consumers, there would be substantial non-market environmental benefits and losses from commodity program termination. Studies by Dixon et al. (1973) and by Miranowski (1975), while dated, provide estimates of the substantial environmental benefits. Dixon et al. estimated that least-cost free market production during 1965 could have satisfied output demands with one-half of the agrichemical use observed under prevailing government policies.

Overall, the most effective argument for retaining current commodity programs is that they promote social welfare by stabilizing prices for farmers and building buffer stocks against food crises (Womach, 1988). It is likely that world corn prices would have escalated considerably more in 1988 if U.S. feed grain policy had not built such large American stocks of corn. While defensible arguments can be made for some degree of price stabilization and maintenance of strategic grain reserves, it is not at all clear that the current system is the most cost effective (Hertel, 1988). With the enormous growth in on-farm storage in the U.S., use of storage subsidies and incentive payments should be able to ensure adequate farmer or government-owned reserves without the current policy structure.

Hertel (1988) recently modeled the national efficiency and distributional performance of the current farm program and three production quota alternatives, but he did not include decoupling. Hertel's results showed the current program sharply increased the demand for fertilizer and other off-farm inputs. It was also the most costly to taxpayers and imposed the greatest national welfare loss of the four alternatives examined.

Decoupling of farm subsidies to promote environmental and efficiency objectives will also impose differential benefits and costs by region and by commodity group. How much will market prices of corn and barley change as planted acreage of these crops changes in the absence of government acreage restrictions and target price protection? How will feed grain price changes affect the income of cattle and hog feeders? Will pasture and hay prices fall as more marginal program crop land goes into these uses? How will these adjustments affect western ranchers?

Non-market and dynamic benefits of decoupling may be more important than the various market effects discussed above. Historically high target prices for selected commodities together with water and energy pricing policies have motivated utilization of energy, topsoil, groundwater, and other resources beyond the economically optimal rates indicated by market prices. Letting the market determine resource depletion rates would have conserved greater supplies of these resources for future generations.

Agricultural policy also has an important impact on the long-run international competitive position of U.S. agriculture. Increasing evidence indicates that the United States no longer enjoys a competitive cost advantage over some of its major competitors (Doane's Agricultural Report, 1986; Ortmann et al., 1986). Nevertheless, some analysts (Wallace, 1987) are pessimistic about the capacity of terminating U.S. farm programs to improve our international trade position. However, it is possible a continuation of the current protected position could harm the long-run competitiveness of U.S. producers. As U.S. producers remain insulated from market forces, the gap between domestic and competitive world market production costs that would have to be picked up by taxpayers could grow beyond acceptable bounds.

New Zealand abruptly instituted a free market policy in 1984 after the costs of subsidies and grants became unaffordable (Johnston and Sandrey, 1989). The adjustment process has been painful for New Zealand's farmers and ranchers due to adverse weather and recent macroeconomic trends as well as to the sharp reduction in government support. A less abrupt transition would likely have cushioned adjustment problems, but only more time will determine the final outcome.

Some of the countries providing the U.S. its toughest agricultural export competition, such as Australia and Argentina, have reduced production costs for grains by using low-input livestock-forage-grain rotations which make sparing use of fertilizer and other agricultural inputs (Ortmann et al., 1986; personal communication, Albert Rovira, 1987).

U.S. agricultural policy also influences global economic and political stability. Expensive farm subsidy programs in the United States, the EEC, and other developed countries depress world agricultural prices and discourage agricultural development and food self-sufficiency in less-developed countries (Schuh, 1986). Schuh has argued that aiding agricultural development in LDC's promotes the long-run economic interests of the U.S. and other developed countries. The long-run capacity of LDC's to trade with the U.S. for mutual gain is based upon purchasing power, not need.

Recent changes: Creeping decoupling

The new conservation reserve, con-

servation compliance, sodbuster, and swampbuster provisions made the 1985 Farm Bill a landmark in soil conservation legislation. Reforms in the commodity program provisions were more modest with respect to their potential for improving environmental quality, but some progress was made. The most significant change was the freeze on established yields at 1986 levels. This eliminated the incentive to apply additional pesticides and fertilizer in order to boost future deficiency payments. The selective bias toward chemical-input-intensive program crops was modestly slowed by scheduling a gradual decrease in target prices. The target price of wheat, for example, was scheduled to decline gradually from $4.38/bu in 1986 to $4.00/bu in 1990. Mandatory Gramm-Rudman expenditure restrictions reduced actual target prices slightly below the scheduled levels in some years.

The 1985 legislation also introduced greater flexibility in acreage set aside regulations. For example, growers in some areas were permitted to use multiple-year grass or forage legume plantings as set aside. As long as these plantings were designated as set aside, they were not subtracted from the farmer's base acreage. However, the reduction in set aside rates from 27.5 percent to 10 percent for wheat and from 20 percent to 10 percent for feed grains in 1989 could induce growers with excess grass/legume plantings to plow up some of these soil-conserving cover crops.

Benbrook (1988a) has called attention to a favorable feature of the 1988 Drought Relief Bill. It permits planting soybeans and oats in 1989 and 1990 on part of a grower's wheat or corn base acreage without losing base. The modest steps taken in the 1988 Drought Relief Bill and in the 1985 Farm Bill might be characterized as "creeping decoupling." While this pattern represents a step in the right direction, the base acreage system and the selective nature of the programs continue to impose severe restrictions on farmers' flexibility in altering rotations.

Prospects for change in the 1990 Farm Bill and beyond

A combination of environmental and fiscal pressures appears to be forging a consensus both outside and inside government which will enable the creeping decoupling begun in 1985 to continue in the 1990 Farm Bill (House of Representatives, 1988; Benbrook, 1988a; de la Garza, 1988). House Majority Leader Tom Foley has warned that budgetary pressures would likely limit farm program expenditures to as little as $10 billion per year in the next Farm Bill, some $7 billion less than the average outlays per year over the past seven years (Hammer, 1988). This reduction stands in contrast to a record expenditure of $25.8 billion in 1986. Aided substantially by the recovering farm economy, the drought, and current budget-reduction provisions, expenditures are projected to decline to $12.2 billion in fiscal 1990 (de la Garza, 1988). The Chairman of the House Agricultural Committee has stated that the 1990 Farm Bill must consider reforming "...the rigid and confining nature of the current crop-specific base system...flexibility should be a major objective of the next Farm Bill...[the current base system] discourages the crop rotation methods that are the foundation of sound conservation practices" (de la Garza, 1988). Chairman de la Garza proposes, as a compromise, returning to a version of the somewhat more flexible normal crop acreage (NCA) system that was used prior to 1981.

Analysts within USDA have also recognized the linkage between current commodity programs and low-input agriculture and its associated environmental benefits (Daberkow and Reichelderfer, 1988):

...removal or modification of commodity program incentives would likely have the most dramatic short-term influence on the feasibility of LIA [low-input agriculture] systems. Empirical studies suggest that targeted output reduction or decoupling strategies could reduce the demand for agrichemicals. The magnitude of potential reduction, however, is uncertain.

A recent report by the Environment, Energy, and Natural Resources Subcommittee (House of Representatives, 1988) argued that "Congress should explore and adopt incentives that will eliminate the existing statutorily-based barriers to low-input farming systems" in designing the 1990 Farm Bill. The Subcommittee places major blame on the inflexible base acreage provisions as roadblocks to low-input agriculture and to greater use of cropping rotations.

Demands for reform have also been aimed at the sugar program in which price protection supported by import quotas and government loan rates have shifted high costs to consumers and potentially to taxpayers. Equity as well as efficiency considerations underlie indignation about the sugar program. Hammer (1988) reports an instance in which two Florida sugar growers in 1986-87 accounted for "...27 percent of total U.S. cane sugar output and 13 percent of all U.S. sugar production. This meant a windfall of more than $250 million to these two growers in one year alone."

While the discussion in this section has focused on potential changes in commodity provisions of the 1990 Farm Bill which would favor incentives for low-input agriculture, there is also a strong movement for complementary environmental legislation. Benbrook (1988b) has written that "The most pressing environmental objective for the 1990 Farm Bill will be to do for water quality protection what the 1985 Farm Bill did for soil erosion control." Some sort of agrichemical compliance, similar to the 1985 conservation compliance legislation, will likely be considered.

The total decoupling of commodity programs is likely to be too large a departure from existing policy to attract support from policymakers and bureaucrats more comfortable with incremental change. Decoupling is sure to encounter resistance from program commodity interest groups such as corn growers, cotton producers, and others who have benefited under the old sytem. Non-program crop growers are also likely to resist decoupling out of concern about increased supply competition from acres released from program crops. From the general public interest, however, it is difficult to escape the compelling efficiency, equity, and environmental arguments favoring decoupling. It permits markets to determine cropping pat-

terns and allocation of resources. Markets are likely to provide better signals for current resource allocation, the direction of future technical change, and response to changing international competition than the combination of historical tradition and current political power which fashions farm programs. Furthermore, by decoupling and retargeting, taxpayer transfers to agriculture can be explicitly targeted to meet environmental and social goals. This two-stage process should help eliminate some of the conflicts between commodity and conservation programs which have frustrated achievement of environmental goals in the past.

As Congress moves away from the current system of payments tied to selected commodities, some will argue for a simple termination of all farm programs as in the Reagan and Bush administrations' GATT proposals. Given the realities of international competition and the pervasive influence of environmental and social externalities in agriculture, outright termination could adversely impact social welfare. For example, the social and community benefits of preserving a sizeable rural farming population might justify transfers to "family-sized farms." Similarly, public intervention to regulate agrichemical use and other environmentally sensitive practices will likely be necessary in order to abate pollution to socially optimal levels, even in a world of decoupled or terminated agricultural subsidies.

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APPENDIX

Impact of Pre-1986 Established Yield Provision on Input Use Incentives

Let expression (1) represent a static current-period objective function for a farmer first confronting input choices in the presence of deficiency payments:

$$(1)\qquad \pi = P_t Y_t(X_t) - C(X_t) - FC + \bar{Y}_t(T_t - P_t) + \sum_{j=1}^{5} \frac{\left(\sum_{i=0}^{4} Y_{t+j-5+i}/5 - \bar{Y}_t\right)(T_{t+j} - P_{t+j})}{(1+r)^j}$$

π = net returns per acre for the program crop, considering both current-year returns and the present value of *increases* in future deficiency payments attributable to current-year yield, Y_t

P_t = the expected market price or loan rate for the crop, whichever is higher

$Y_t(X_t)$ = the yield as a function of agrichemical input(s), X_t

$C(X_t)$ = the total cost of agrichemical input(s)

FC = assumed fixed cost for all other inputs for this short-run case

$\bar{Y}_t$ = established farm yield in year t for the program crop, based upon previous cropping history, assumed equal to profit maximizing yield in absence of farm programs. $\bar{Y}_t$ also equals established yield in successive years if no adjustment in input use is made to incorporate the influence of deficiency payments

T_t = announced target price in year t

$Y_{t+j-5+i}$ = yield in each of the indexed years

$\sum_{i=0}^{4} Y_{t+j-5+i}/5$ = established farm yield in successive years; the simple 5-year average abstracts from USDA's practice of throwing out the low and high years in computing this average

T_{t+j} = expected target price in year $t + j$

P_{t+j} = expected market (loan) price in year $t + j$

r = farmer's discount rate.

The terms on the right-hand side of the equal sign in (1) represent the gross returns from crop sales in the current year, total agrichemical costs, all other costs (assumed fixed), current year deficiency payment and the present value of increases in deficiency payments over the next five years as a result of the influence of the current year's yield on future established yields.

Expression (2) presents the first order condition for maximizing (1) with respect to X_t under the simplifying assumption (which ignore the dynamics of adjustment) that farmers' expectations of all past and future yields, except Y_t, remain at $\bar{Y}_t$ in computing established farm yields in future years:

$$(2)\qquad \partial\pi/\partial X_t = P_t MPP(X_t) - MFC(X_t) + \sum_{j=1}^{5} \frac{MPP(X_t)/5}{(1+r)^j} \cdot (T_{t+j} - P_{t+j}) = 0$$

MPP = the marginal physical product of X_t

MFC = the marginal factor cost of X_t.

Assuming a zero discount rate and further assuming future target and market (loan) price expectations equal to current year levels, expression (2) reduces to equation (3):

(3) $$T, MPP(X) = MFC(X)$$

In other words, the current year profit maximizing level of agrichemical use requires equating the marginal value product *based on the target price* to the current year price of the agrichemical. Consequently, consideration of deficiency payments generated by target prices in excess of maket prices could theoretically move input applications considerably above levels justified by market (loan) prices alone.

Relaxing the simplifying zero discount rate assumption dampens slightly the incentive to apply inputs at levels justified by market prices alone, but does not reverse its direction. Equation (2) implies that positive discount rates will motivate profit maximizing input applications consistent with output prices between market and target levels. Profit maximizing input applications will vary inversely with the discount rate, but will considerably exceed those consistent with single year market prices alone for most commonly accepted discount rates. In practice, uncertainty about future target and market prices is probably a more important limitation to the simple decision model above than are positive discount rates.

UPCOMING EVENTS

May 8-16. Action for a Common Future, sponsored by the World Commission on Environment and Development, in Bergen, Norway. The conference will develop an agenda for action on the UN report *Our Common Future*. Contact Ms. Fran Spivy-Weber, National Audubon Society, 801 Pennsylvania Avenue, SE, Washington, DC 20005, (202) 547-9009.

July 9-10. Organic Meat Symposium, sponsored by the University of Minnesota Extension Service, in Minneapolis, Minnesota. Topics include regulations, production, and marketing methods. Contact Laura McCann, Center for Alternative Plant and Animal Products, 305 Alderman Hall, University of Minnesota, St. Paul, MN 55108, (612) 625-5747.

July 26. Milan No-Till Field Day, sponsored by the University of Tennessee Milan Experiment Station, in Milan, Tennessee. Contact John F. Bradley, Milan Experiment Station, 205 Ellington Drive, Milan, TN 38358, (901) 686-7362.

July 29-August 1. Soil and Water Conservation Society in Salt Lake City, Utah. The topic is "Water Futures." Contact Dr. Jan van Schilfgaarde, SWCS, 7515 NE Ankeny Road, Ankeny, IA 50021.

August 12-15. Conserv 90, a conference on water supply solutions for the 1990s sponsored by the American Water Resources Association and others, in Phoenix, Arizona. For information, contact Conserv 90, 6375 Riverside Drive, Dublin, OH 43017, (614) 761-1711.

August 15-18. National Sustainable Agriculture Forum, sponsored by the Universities of Nebraska, Iowa State, and Missouri, in Lincoln, Nebraska. Contact Jim Bushnell, Assistant Director, Institute of Agriculture and Natural Resources, University of Nebraska, 211 Agricultural Hall, Lincoln, NE 68583-0703, (401) 472-2966.

August 23-25. Fourth National Amaranth Symposium, sponsored by the Amaranth Institute, the American Society of Agronomy, and others, in Minneapolis, Minnesota. Contact Extension Special Programs, Minnesota Extension Service, University of Minnesota, 405 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108-1030.

August 27-30. IFOAM 8th International Conference, in Budapest, Hungary. The program will include social and economic aspects of organic agriculture, practices, marketing, and tours. Contact the Biokultura Association, IFOAM Conference Secretariat, Budapest, Arany Janos u 25, 1051, Hungary, Europe.

September 23-27. The Australian Organic Agriculture Conference, a regional conference of the International Federation of Organic Agriculture Movements, in Adelaide, South Australia. Contact Elisabeth Eaton, Conference Secretariat, Festival City Conventions, P.O. Box 986, Norwood, SA 5067, Australia; 08/269-4663.

September 26-29. International Symposium on Agroecology and Conservation Issues in Temperate and Tropical Regions, in Padova, Italy. The emphasis will be on the interrelation and transfer of research and application in sustainability and environmental problems between temperate and tropical areas of the world. For information, contact M. G. Paoletti, Department of Biology, Padova University, via Trieste, 75, 35100-Padova, Italy.

December 2-5. Midwest Fish and Wildlife Conference, in Minneapolis, Minnesota. A day-long session will address "Changing Farm Practices: Sustainable Benefits for Fish and Wildlife?" Papers and poster sessions are invited. For information on the special session, contact Ann Robinson, Izaak Walton League, 801 Commerce Drive, Decorah, IA 52101, (319) 382-2947. For information on the general conference, contact Blair Joselyn, Wildlife Research, Box 7, Minnesota Department of Natural Resources, 500 Lafayette Road, St. Paul, MN 55155-4007, (612) 296-3344.