

**SYMPOSIUM: AGRICULTURAL
INDUSTRIALIZATION AND
FAMILY FARMS: THE ROLE
OF FEDERAL POLICY**

HEARING

BEFORE THE

**JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES**

ONE HUNDRED SECOND CONGRESS

SECOND SESSION

OCTOBER 21, 1992

Printed for the use of the Joint Economic Committee



57-929

**U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 1994**

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-044518-3

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♦ ♦ **SYMPOSIUM** ♦ ♦
**AGRICULTURAL INDUSTRIALIZATION AND
FAMILY FARMS: THE ROLE OF FEDERAL POLICY**



WEDNESDAY, OCTOBER 21, 1992

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

The Committee met, pursuant to notice, at 8:30 a.m., in room 2359, Rayburn House Office Building, Honorable Lee H. Hamilton (Vice Chairman of the Committee) presiding.

Present: Representatives Hamilton and Fish.

Also present: Stewart Smith and Jean Rawson, professional staff members.

**OPENING STATEMENT OF REPRESENTATIVE HAMILTON,
VICE CHAIRMAN**

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

First, let me welcome each of you to the hearing and symposium, "Agricultural Industrialization and Family Farms: The Role of Federal Policies." This is the fourth and final hearing in which the Committee has received testimony on how we can organize our agricultural system to be more competitive, less environmentally damaging, more rewarding to farm families. We are especially interested in what federal policies are necessary to achieve these objectives.

Today, we have an opportunity to learn from a diverse group who has a common interest in farm and agricultural policy. I suspect that what we will hear today may vary, but we welcome that diversity.

Let me review some of the things we have heard at three previous hearings. The first hearing asked how we could assure global agricultural competitiveness. We are increasingly, of course, in a global economy. All of us will suffer if we cannot compete. Competitiveness also is a good measure of how efficient we are.

In that hearing, we heard that foreign demand for food will be determined largely by how much developing countries grow their economies; that export subsidies won't help in the long run; that our share of global markets will depend largely on how efficient our entire agricultural system is, not just the farm sector; that technology development will largely determine that efficiency, making a proper research agenda

critical; that commodity programs slow opportunities for farmers to shift to more efficient use of their farming resources.

Our second hearing addressed the potential compatibility of environmental and farming interests. We heard that environmental and farming interests are often confrontational; that several other techniques and systems like conservation tillage, integrated crop management, intensive rotational grazing, soil-building techniques could promote environmental objectives without reducing farm profits; and that current federal policies often work against farmers adopting these techniques.

We would like to hear more about these issues. While they raise the possibility of favorable outcomes, they suggest substantive policy changes that need to be approached carefully.

The third hearing addressed the issue of providing more economic opportunities for farmers. We heard that as farmers have become more specialized they have fewer enterprise, cropping and technology options; that in an efficient structure cropping systems across the country would vary more than they do now; that in many cases farmers will benefit from adopting integrated cropping systems; that, however, federal policy is stacked against adoption of those systems; and that we need to pay more attention to technology options and less attention to commodity markets.

I trust you will consider some of that testimony as this symposium progresses. We certainly don't have all the answers. We may not even have the right questions, but we have heard enough to have become quite interested and we look to you today to help to broaden our understanding.

We have a panel who have been thinking, working, writing about these issues. Dr. William Liebhardt from the University of California at Davis will compare different dairy farming systems. Dr. John Ikerd from the University of Missouri has looked at how farmers might benefit from providing more marketing services. Dr. Dana Hoag from North Carolina State University is skeptical of many alternative systems and will share that caution with us. Chuck Hassebrook from the Center for Rural Affairs will discuss the role of federal policy in promoting or discouraging these various systems. We have a panel of respondents to each of these presentations, including farmers who can share some firsthand experiences.

Finally, the symposium is designed to give each of you an opportunity to participate, and I encourage you to do so. We value your input on these issues which raise interesting and significant questions regarding agricultural policy.

At this point I will turn the session over to Dr. Stewart Smith, the senior economist with the Joint Economic Committee, for, I think, some housekeeping announcements.

Dr. Smith, please proceed.

**BRIEFING STATEMENT OF STEWART SMITH, SENIOR ECONOMIST,
JOINT ECONOMIC COMMITTEE**

MR. SMITH. Thank you very much, and good morning. Let me briefly review with you a few housekeeping items so that you and I both understand how we hope to conduct this session today. As you can see from the agenda, we are organized in panels. Each panel will lead off with a presentation. The presenters have been told to keep that presentation to 30 minutes. I would welcome 25 or 20 minutes, if we can do it. But you will be cut off at 30.

There will be a panel of three responders to each of those papers, and those responders have been asked to keep their comments to 5 minutes. Their assignment, by the way, is varied. Not every respondent will address the paper precisely, but in some cases will relate some of the activities and experiences they have had in the related fields.

A final part of each session will be for audience participation, and we encourage that. We are going to do that two ways. Spontaneous responses or questions will be taken, if you have them. We have one microphone in the center. If you want to ask a question, please come to that microphone. Realize that this is a hearing for the record. Please identify yourself so that we can associate a name with the statement or question.

In addition we will have questions submitted in writing, if you prefer that. Some cases some people have asked specifically if they can speak during the audience participation and you can do that by filling out a card. There is a 4 x 6 card in your packet. Just fill that out if you wish to be recognized, indicate what particular spot you would like to be recognized in, hold that card up, and one of the staff can pick those up. We have Jeff to the left, Mike is somewhere around in back, and Lisa is here outside right now. Just get those cards to them, they will bring them up to the Moderator, and you can be recognized that way.

Lunch is on your own. If you want to experience some congressional perks you can visit the cafeteria in the basement of this building. Some people may prefer the Library of Congress cafeteria at the Madison Building—that is three buildings up the hill—on the 6th floor. It gives you a little better view. And, if you insist upon eating in the private sector, we are not far from some quick restaurants up on Pennsylvania Avenue. But we don't give you much time for lunch. I would encourage you to experience lunch here at Rayburn in the basement.

With that very quick housekeeping, are there any questions before we proceed?

[No response.]

If there is anything you need, please let one of the staff know, and we will try to accommodate that.

The morning session will be moderated by Jean Rawson. Jean is with the Congressional Research Service. She heads up the Food and Agriculture Division there.

And with that, Jean, the podium is yours, and we will call our first panel right up.

**OPENING STATEMENT OF JEAN RAWSON, FOOD AND AG SECTION,
CONGRESSIONAL RESEARCH SERVICE**

Ms. RAWSON. Good morning and welcome everyone. Yes, I am Jean Rawson with the Food and Ag Section of the Congressional Research Service.

My task this morning is simply to be the moderator, to call up panels, to do brief introductions, and then to keep some control over the question and answer sessions when those get going.

Without further ado, the first panel this morning will start with a paper presented by Stewart Smith, who has just introduced himself. But in greater background, Stu is the senior economist with the Joint Economic Committee. He is on leave from the University of Maine where he is a professor of agricultural economics. Prior to that he was the Commissioner of Agriculture for the State of Maine, from 1979 through 1985. Prior to that, he was associate administrator of the Agricultural Stabilization and Conservation Service of USDA here in Washington from 1977 to 1979. He is a potato and grain farmer in Maine, and he has a Ph.D. in agricultural economics from the University of Connecticut.

In order not to interrupt the flow, I will go ahead and do the brief bios on the two people who will be the respondent panel. Please, if Mr. Stevenson and Mr. Guthrie would come up to the front at this time.

Steve Stevenson is currently the assistant director of the Center for Integrated Agricultural Systems at the University of Wisconsin, Madison. He has a Ph.D. in sociology from Minnesota, and he is a self-employed beef farmer in Wisconsin.

Mr. Guthrie has a bachelor of science in dairy science from Michigan State University. He has been a farmer for 16 years, currently farming 1250 acres and providing 4000 acres of custom farm business. He is strongly affiliated with the Farm Bureau, serving on the State Board from 1988 to the current time.

Without further ado, we will proceed.

PANEL 1

**FARMING ACTIVITIES AND FAMILY FARMS: GETTING THE CONCEPTS
RIGHT: PRESENTED BY STEWART M. SMITH, SENIOR ECONOMIST,
JOINT ECONOMIC COMMITTEE**

MR. SMITH. You will see much less of me in the afternoon than you will this morning. But I do want to set the stage for what the Committee has been concerned about and with what we hope to get from this session.

I also want to acknowledge a co-author of this paper, although it is not so listed, in Kate Crowley. And I am not sure if Katie is here this

morning yet. I don't see her. Katie was an intern with us this summer. She is a student at Johns Hopkins University, and she was active in both organizing this symposium as well as in doing some of the writing.

As the Chairman said, the Committee was interested in looking at federal policy which would support three objectives: would be globally competitive, would be more environmentally benign, and would support family farming. Although those are interrelated objectives, I am going to focus my comments this morning on promoting family farms. And indeed, rather than getting into the debate about what is a family farm, I am going to talk about promoting farming activities on the basis that if we don't protect farming activities we are not going to have family farms or any other kind of farms.

And Katie Crowley, whom I just introduced, just walked in the room. Good morning Ms. Crowley.

The industrialization of our agricultural system has substantially shrunk the role that farming has played. Now, we kind of realize that when we note that there has been this decline in farms, but we are also somewhat comforted—falsely, I believe—when we assume that as larger farmers buy out smaller farmers that farming activity is continued. And indeed, I will argue, and I hope you will agree by the end of this session, that what is really happening is farming activities have been lost and that is what drives the reduction in farm numbers and not vice versa.

So we want to look at this whole role of industrialization and how that comes about, and I talk about industrialization as the proportion of activity in the total agricultural system that is performed by non-farm firms. To get at that we have to look at that system and to measure what the farming component produces and what the non-farm component produces. I will do that first.

Second, I want to discuss the processes by which that farming activity is lost. Third, I want to talk about the policies which contribute to loss of farming activities. And fourth, I want to discuss a little bit about some of the alternative policies that the Committee has been listening to as we have had these hearings; that is, policies which maintain rather than discourage farming activities.

Well, how do we measure this thing called farming activities? I am going to do it by measuring the value added of those three components of this system. We have an agricultural system which is composed of an input side, a farming sector and a marketing sector.

This is the depiction that Alden Manchester at USDA uses, and when I talk about agriculture, I am talking about that total system, which includes everything from mining to steel production and fertilizer, all those things that go into the farming sector, and then we are also talking about the food processing, the restaurants, the food stores, the grain warehouses—that total system. When I talk about agriculture, that is what I am talking about. Others refer to that as agribusiness, as Ray Goldberg did back in 1957. USDA uses the term "food

and fiber" system. Some use food and agricultural system. But when I talk about agriculture, I am talking about that entire system.

When I talk about farming, I am talking about that farming component, which is a relatively small part of the total system. When I talk about industrialization, we talk about the proportions the input and marketing sectors provide, compared to the farming sector.

If you measure that and just look at it over time, you will see that the farming sector—there in the black—has shrunk rather dramatically from in this case 1910 to 1980. Both the marketing sector and the input sector have grown through that time.

Now, those are the actual annual estimates and they are influenced by some price impacts. If you simply look more clearly at the linear trend, you can see what is happening. The input sector has grown from 15 to 24 percent of that system, the marketing sector from 47 to 67, and the farming sector has declined from 41 to 9 percent. Obviously, we have become more industrialized as we shifted activities from the farming sector to the non-farming sector.

Now, these are not explanatory graphs by any means, but I think they are instructive, and they do indicate that through time much of the activity that has been lost to the farming component has actually gone into the other two components of that agricultural system. So, when we are told that all those farmers left farming so that the system could be more efficient, we are told only half the truth. The whole truth is yes, some of that resulted in total system efficiencies, but a good part of it was just simply a shift from the farming to the non-farm sectors and did not represent system efficiencies at all.

We can also speculate—and this particular graph is not in the paper because I have been cautioned that it is out of the realm of probability, or realism, and so I don't publish it—what happens if you extend that farm sector trendline out. It is almost a linear line and I see nothing that has caused it to curve yet. In fact, in the paper there are some footnotes that will indicate why some people—I am thinking about those involved with biotechnology—will show you that you can get another 90 percent reduction in farming activity. So maybe you will curve out here at 1 percent or so. All I am suggesting is that there is nothing so far that has indicated that we are going to maintain farming activities.

There is one exception to that. You may have noticed that the input sector actually slowed its decline in the 1980s, and I haven't had time to look at that. In terms of the total system, you can see that the input side gave up a lot of its gains just in the last decade. Some of that may have been reduced prices of inputs. Some of it may have been farmers postponing capital expenditures and other input purchases because of the financial distress in the early eighties. Some of it may have been farmers actually changing their farming methods and adopting less intensive input systems, which I think is an interesting phenomenon. While it has leveled out, it does look like something happened in the

1980s. But it really doesn't change, I don't think, the basic trends that are there and have been there for the past 80 years.

Let's talk a little bit now about why we lose these farming activities, and you won't be surprised when I suggest to you that the linchpin of all that is technology. As farmers adopt technology they shift activities from themselves, from the farming sector to the non-farm sector. It is obvious when pesticides displace crop rotations or cultivation. It is just as true on the marketing side.

For instance, in Maine, many farmers used to pack their own potatoes. They now ship most of those in many cases to either a central packing shed or, more likely, to a food processor. In any case, they have stopped performing those marketing activities. Obviously, they have taken a reduced return per unit of production, and the solution normally is simply to expand that commodity production in order to regain those lost returns.

You can see that when you look at cost per size of farm and you realize that the increase in size does not necessarily result in a reduction in the so-called explicit cost of production. What is happening is that farmers are expanding in order to increase their income because they have lost their returns that they used to get from performing more activities.

You can see this by looking at the Farm Credit Service Survey of Northeast dairy farmers. There are a few hundred farms in this survey. And, if you just look at the farm operating expense, this line—and this includes fixed costs as well as variable costs—you will see that the small herds are just as efficient as the larger herds. In fact, on a per cow basis, they are more efficient. On a per unit sales, if you do a little calculation up here, you will see that they are just about as efficient.

It is not the efficiency that has driven dairy farmers in the Northeast to grow larger. It is the fact that they have these implicit costs, the returns to themselves for their management and labor that they can spread over a larger number of units that drives that expansion. If you add on some so-called opportunity costs, that is, the returns farmers need to pay for the contribution they make themselves, it drives up the costs per unit of those smaller farms.

But there is a policy distinction here in that if indeed we adopt technologies and expand production in order to reduce these implicit costs rather than explicit costs, we would be just as well off if we had the smaller farms provided those farmers had some other way to capture opportunity costs, and that is what a lot of sustainable farmers are doing. They are displacing some inputs. In some cases they are taking on more marketing activities rather than expanding commodity production. That is a system that will maintain more farming activity and eventually more farms.

Let me just show you that this is not a unique case for dairy farms, again using the Farm Credit Service of Springfield. These are Maine potato farms. This is a smaller sample. These are actually bookkeeping

records. But, if you look at the adjusted cash operator expenses—I don't know if you can see that—the smaller units are 1328, the mid-size units are 1399, and the larger units are 1364. There is simply no efficiency in size until you consider these opportunity costs, what the farm family needs to live on, and then you see that those costs are lower for the larger farms simply because those implicit costs are lower.

By the way, Dean Dunham from Maine is here. And I don't know how well you have been doing up there, Dean. I notice you gave these guys all negative earnings that year. Better watch out for that research agenda.

The conclusion of all that is that small farms can be as socially desirable as larger farms provided we provide opportunities for other enterprises on those farms. You have got to get a return back to cover opportunity costs, but that doesn't have to be from commodity production.

Let's turn now to the policies that drive this erosion of farming activities. Well, since it is technology that shifts those activities off the farm, then we have to look at those forces that drive technology adoption, and there are two. There are those forces that make technology available; and secondly, those that provide the incentives for farmers to adopt that technology.

Technology availability is really a function of the public and private research system. The public research system is primarily the land-grant universities. And what we are seeing is increasingly the private sector has a influence over that research agenda. A great deal of that is because of the financial constraints in that public research system. Increasingly deans and directors of experiment stations turn to the private sector, and who funds private sector research? It usually is an input or a marketing firm that has some interest in developing a product or developing a service that then is sold to the farm sector. That always results in activity being shifted from the farm to the non-farm sector.

Now, I am not suggesting that changing the research agenda itself is going to solve the problem because you have policies which influence what technologies farmers adopt, and that is influenced by commodity programs which encourage farmers to specialize and to adopt a high-input system. It is influenced by input subsidies, and when we do product testing for firms, and when we allow environmental costs to be picked up by the public rather than by the farming unit itself. It is tax codes that encourage the purchase of inputs. It is technical assistance that encourages farmers to adopt higher input systems rather than those that depend upon biological systems, for instance. All of those policies encourage farmers to adopt technologies that shift activities off the farm.

Now, changing that policy environment, I suggest, requires some sort of social equation. If it is the case that those systems that shift activity off the farm are more efficient, then I think you can make a case that yes, we should continue to allow that system continue. But increas-

ingly, we have evidence that that is not case, that there are alternative systems that shift activities back to the farm which are just as efficient as the conventional systems that we now have.

My students did some case studies. We were looking for farmers who had adopted techniques which shifted activities back, and that is where I first ran into BST. One of the cases we looked at was a farmer in Maine who had rejected the notion of expanding milk production in order to increase income and had, rather, adopted a system of intensive rotational grazing, which is becoming a little more common now. A few years ago it was not very common here, although it was widely used for 40 years in New Zealand and France. It requires a more concentrated management of forage, but that system will displace a lot of the purchased concentrate feed. In fact, in this case this dairy farmer was able to displace 50 percent of his concentrate purchases with this intensive management grazing system, and in fact increased his net income about 25 percent, or a little less than that, and kept his production the same.

Now, it is interesting to look at why our research system up until a few years ago paid very little attention to that technique and yet has paid a lot of attention to developing BST, and I think there is no secret why that happened. In the case of BST it was a product to be developed and sold. Somebody was going to make some profits by doing that, primarily the drug companies that manufacture the product. And dollars went into research agendas in several universities across the country to work on BST.

On the other hand, there was no private financial interest in developing rotational grazing. The only financial interest, or the only interest, is that you will end up with more farming activity and more farms, although you end up with less profits and less activity in the drug industry. But, as a social policy, if we wanted more farms and more farming activity we should have put more effort, I would argue, into research for rotational grazing to make that more efficient and less into BST.

Finally, let's look quickly at policies which we have heard might reverse that trend of farming loss. Well, first of all, obviously, the land-grant university research agenda would have to be changed, and we have heard arguments that that agenda should be refocused so that researchers are aware and put their efforts into technologies that promote farming activities rather than non-farming activities. And indeed, I would argue that as a matter of technology assessment that should be a watershed item. If the efficiencies are the same, it is hard to justify how we can put public research funds into technologies that shift activities off the farm, and therefore result in fewer farms. You can only, I think, make that case if there are some total system efficiencies in the higher input case, and it looks like that probably is not the case.

Other policies would have to be changed. We have heard a lot about changing commodity programs or even shifting commodity programs to, say, stewardship programs, in other words, being less concerned

about what is produced and more concerned about how it is produced. It is stated in many ways. We have heard arguments for stewardship payments. We have heard arguments for decoupling and recoupling; that is, decoupling commodity payments from commodity production and recoupling them to stewardship payments or farming technique payments. We have had the libertarian viewpoint, which get you the same results: eliminate commodity programs and then pay farmers for any constraints you place on their property rights. But that is the same policy shift, the shifting from focusing on what is produced to focusing on how it is produced.

We have also heard that the tax codes need to be reevaluated. They should provide as much incentive to adopting biological systems and sustainable farming systems, for instance, as they do for providing incentives to purchase inputs. We have also heard that externalities should be eliminated either by some sort of input taxing or regulations on input use.

Those are suggestions that the Committee has heard in three previous hearings, and I assume that we will hear more of that later today when we get into the panel on policy.

In conclusion, it seems to us that more farming activities will mean more opportunities for farm families. It seems to me that is a bottom line. It seems to us also that federal policies will need to change if we had to create those opportunities because from what we have heard to this point, most federal policies work against shifting activities to the farm. And hopefully, this symposium will help the Committee to understand best how to go about that.

Thank you.

[The paper presented by Mr. Smith starts on p.117 of Submissions for the Record:]

**RESPONSE STATEMENT OF STEVEN STEVENSON, ASSISTANT DIRECTOR,
CENTER FOR INTEGRATED AG SYSTEMS, AGRICULTURAL
TECHNOLOGY AND FAMILY FARM INSTITUTE**

MR. STEVENSON. Good morning. Again, I am Steve Stevenson, assistant director for the Center for Integrated Ag Systems in the Ag Tech and Family Farm Institute. We are a publicly funded organization at the University of Wisconsin, Madison. I have been asked to respond to Stu's paper.

Stu, I really applaud what you are doing here, and there are a number of dimensions you open up that I think we can really profitably follow this day and as we struggle with these issues ongoing. Let me just focus on three of them initially.

One is your focus on the whole food system, which you are calling the agricultural system, or the input, the production ranching and farming, and then the marketing sectors, and the relative value reduction in farming and ranching activities. Both of those kinds of bracketing input and the marketing. The bracketing, or what is really clear, the

squeezing sectors have been particularly voracious over the last 50-year time period that those graphics laid out. The lion, though, has really been the marketing side, and I am glad to see that later on in today's discussion we are going to talk about marketing. I think it is real important for those of us who have been in agriculture. We have focused too long on production kinds of issues. It is important for us to begin to talk to people who are in the outside-the-farm-gate part of the food system.

Also, I am going to focus on the marketing side, because I think at least farmers in Wisconsin, and my sense generally, is that farmers are much more successful in the last 10 years of finding ways to recapture value from the input side than they have of recapturing value from the marketing side. Part of that is, of course, the ways you recapture value from the input side, you can do that a lot on individual decisions, individual farmer's decisions not to buy purchased inputs. It is much tougher, though possible, to recapture marketing values with individual action. Usually that becomes a collective effort, and I will talk some more about that. Okay. That is the first one. I am glad he is talking about a whole system's view here for the food/ag system.

Second, raising the issues about the overall system efficiencies, I think, is very valuable stuff, and pointing out that oftentimes moving activities out of the farming production sector doesn't improve overall system efficiencies. In fact, I think some of us would argue, if you include issues about impacts on the environment, impacts on the national resource base, impacts on energy usage, certain socioeconomic kinds of impacts, the overall system's efficiencies are not very attractive at all.

Third, in terms of land-grant universities, which is where I work, raising the issue about it may be a sector bias rather than a size bias that is going on here, I think, which will be helpful for me, and I am going to pick up on some of that, I guarantee you.

My major critique to your thinking is that it doesn't sufficiently factor rural community development into this. Most of us who have been working with sustainable agriculture, I think, are beginning to get some handles on agricultural or farming interfaces with profitability issues, with the impact on the environment and the natural resource base, and others are to begin to look at the interfaces with the whole food system. We need to begin to look at the interfaces of economic or farming activities, ranching activities toward rural community developments and development of rural neighborhoods because those agricultural activities, as you call them, that are moved off farm for the most part have also moved out of rural communities too. In fact, I would personally be less concerned that they have moved off farm if they had stayed in rural communities. What has happened, they have moved off farm and out of rural communities. And again, I think marketing is the biggest culprit here.

Using your Maine potato example, when you are talking about what has moved off farm, you are talking about the packaging has moved off

farm. I don't know Maine potatoes. My guess is, maybe, some of that packaging and warehousing stuff stayed in rural communities, or relatively rural communities. But what, the major part of the marketing, the advertising, the transportation and the French frying, where most of that value to those potatoes is added, is done way off farm, way out of rural communities.

So what I am going to argue here is that we need to talk about ways to recapture activity back on the farm, but also recapture activity back in rural communities. How do we add values on farms and in rural communities. And in this case, value added in all senses of the word. The stuff that I think people are beginning to do, reduce purchase inputs, is a way to recapture that.

You mentioned some direct marketing that farmers themselves can do. I would encourage us to talk beyond that about rural-based economic activities that begin to recapture some of that marketing stuff, and some of us are beginning to think about that a little bit, what those rural-based marketing organizations may look like. They are what I call egalitarian organizations, and they have some of these characteristics: Some collective ownership and decisionmaking; at the minimum, substantial profit sharing; principles of tiering up versus franchising down to reach appropriate levels of scale and scope, economies of scale and scope. That we tier up rather than franchise down, which is the traditional industrial way. That those organizations provide decent wages and benefits to people. That they have jobs that are flexible enough to begin to deal with the particular rhythms of farm families.

I think we will help ourselves if we focus as much on farm families as we do on family farms. And, when you begin to focus on farm families, you begin to see that the farming activities are important, but off-farm work is increasingly important too. So what kinds of off-farm work, either marketing kinds of things or even non-agricultural things, you interface and synergize with farm families.

Traditionally, the best off-farm work for farm families, particularly for wives, have been school teachers. Why? Good pay, good health benefits, and summers off. So that meets the rhythm of farm families.

What jobs can we begin to put in rural communities that have got those kinds of equivalents? What flex jobs? What kinds of job sharing? What kinds of new ways can we do so that farm families?—and I think increasingly farm families are going to be multi-occupational farm families.

Let me conclude by commenting on a couple of the policy recommendations. Your land-grant university research policy I applaud in terms of how do we begin to reemphasize research that enhances farming sector activities opposed to research that enhances what Stu is calling industrial activities. If we would take that seriously, it seems to me that there are certain kinds of key implications. One of them is that farmers are going to have to be a whole lot more involved in setting that research agenda. Farmer input is going to have to be a whole lot

more substantial if the input of that is going to be to begin to improve and enhance farming stuff.

Second of all, my guess is that applied interdisciplinary systems work versus basic disciplinary work, there is going to be more of that work. Because, to improve farming activities, you are going to have to look at the whole farming system, look at that whole farm system. This is going to mean some new models around which to organize research. It is going to take seriously interdisciplinary systems, applied farmer involved research. We at the University of Wisconsin are experimenting with some of that stuff, and if people are interested, I would be glad to share where we are with it.

There are some radial models in which the center of the research team, the hub of the wheel, if you will, is a set of interdisciplinary researchers committed to that. Around that wheel are some spokes that move off to disciplinary, oftentimes basic research.

I think we are also going to have to make clear the distinction between the experiment station and the colleges of agriculture. Those get all blurred up. At least they do in Wisconsin. The land-grant mission is really the experiment station mission, and I think we have to say that the experiment station mission is that of applied systems research, and faculty in land-grant universities are going to be members of the experiment station, and they are going to be members of the college and their particular departments. We need to find some ways for them to wear both of those hats.

In their role as experiment station members, they are going to have to do this applied farm stuff. In their roles as disciplined faculty departmental members, they may do some basic research, and we have to find ways to integrate those two.

The third thing, if this is the case, extension is going to have to deal a whole lot more with farmer networks than they are with agribusiness sales staff.

Other policy recommendations, I will leave till the afternoon discussion. I would add two of my additions to this policy agenda. One, some policy about research that will enhance local and regional economies. I sense that some of these efficiencies about food systems, particularly in marketing, are going to be helped a lot if we can shorten the linkages between producers and consumers, and you are going to need to talk more regional, bioregional kinds of things.

Second of all, I would argue for research and policy for better integrating agricultural and non-agricultural economic development in rural neighborhoods so that our focus is on multi-occupational farm families and providing resources for community building for people on the land. A lot of those people on the land are going to be farmers. I think a lot of those people on the land are not going to be farmers. We need to find ways to interface those.

Thanks.

RESPONSE STATEMENT OF TOM GUTHRIE, MICHIGAN FARMER

MR. GUTHRIE. I think you gave me the option of just staying here or going up to the podium, and I will just continue to stay here and present my points of view, and my points of view certainly will come from my experiences as a farmer and a farm operator. As it was indicated, I am a farmer in Michigan. My farming operation consists of about 1,250 acres. Plus we do a custom operation of about 4,000 acres helping neighbor farmers.

My operation consists of mainly 500 acres of alfalfa hay, 300 acres of soybeans, 200 acres of wheat, 30 acres of corn, 150 acres of granola, and 10 acres of oats. Also on this operation we have a 50-head cow/calf operation, and I also do some backgrounding of Holstein steer calves for a major pharmaceutical company to use in their research.

So my farming operation is very diverse, and I guess diversity is one of the keys to my being able to successfully continue farming, in my opinion. Had I not diversified, I think, perhaps, I wouldn't even be farming today.

I have, as an individual, come the route of what I would term sustainable agriculture and family farms over the years. I was born and raised in Kentucky. My father was a sharecropper, and so I moved around from farm to farm and saw how things were done. I helped my father in early extension work, working with the Extension and Soil Conservation Service and doing some contour farming in Kentucky. So, I guess, sometimes I feel that I have made the total gamut of what has happened in agriculture.

Certainly, I think of the family farm, when Dr. Smith gave his presentation and I read that, and I have to think about what I think the definition of a family farm is. Certainly, that is in individual ownership where it involves many family members. But my mind goes back to my grandfather, who was a farmer, and from my grandfather, the family that grew from my ancestors, there is only four of us in farming anymore. When I consider four farmers out of what my grandfather's family tree might look like, I think I am a family farmer doing my part to support that whole family. Maybe that is a different concept from the way a lot of people look at family farming. I think what my other cousins and uncles and aunts, I think what they are doing is important, but I think it is also important that they continue to talk to me and visit with me and be concerned of my role on a farm, and how I can maintain that role.

I think, in the farming arena today, we have some policy decisions that have been made, which are going to help not only myself but other farmers across Michigan and across this country to do their part as we approach and come into, what I consider, a more global society. Certainly, agriculture is going to be a major part of that. We have to be competitive, as was mentioned by the chairman, within this community.

I think there have been some programs developed, and one that I am working with and have worked with is the LISA program of the farm bill, and I think there are some positive points going for that, where it does move, as Mr. Stevenson said, some research from the land-grant universities themselves directly onto the farm. And I think it is very imperative that the researchers, the university personnel actually come and put their feet on the farm, carry out their projects on the farm, because I think it gives them not only a better understanding, but a firsthand knowledge what some of the farmers' ideas are and how they come about some of these things. Because, I think, traditionally farmers have been great innovators and great inventors, great creators.

Many of the things, I feel, that get carried out through university research first of all originated on the farm by some farmer's idea. In my case, for example, I think the society has offered my two older sons, who are 25 and 26, an opportunity to do things out in this world that are important, which they can go do without as much manual labor, without getting their fingernails so dirty, or as much mud on their boots. They can go do these things that are important to society. When they do that, then I have to find ways to compensate myself and to take up the slack or the work that they were doing while they were there. So I do this by innovation or by adopting a new technology to help compensate for that.

And I suppose I would have the alternative of going back or selling off a portion of my farming operation which they had continued to help work. But I think it leaves me with a challenge of not necessarily getting a bigger farm or dividing the farm I have into two farms or more, but a challenge to and should turn it into an opportunity to be able to produce, be competitive in an economically feasible setting, an economically sound setting, and an environmentally safe setting. These are all concerns of mine. And I think that with proper policy decisions and, perhaps, improving on some of the LISA project and policy decisions, we can do that.

MS. RAWSON. Thank you all very much. It is now time for questions from the floor.

QUESTIONS AND ANSWERS

MR. NEWTER. I am Rob Newter with the American Farm Bureau. I would like to make a comment that I would like you to respond to, Stewart. If your conclusion is that we would like to increase farming activities, things done on the farm to improve profitability and economic opportunity, I am in full agreement, but I think the basic point that you started from, using this table or figure, only tells part of the picture.

I think some people can make some assumptions that are not necessarily told in this, and that is, if you look over this course of time from 1910 to 1990, what has happened, obviously, we have increased technology which has expanded the input sector and a lot of things have occurred in terms of marketing products that are sold, much more

packaging, preparation and so on—the conveniences of modern day—and a lot more food consumed out of the home, so that is going to expand that sector. And, obviously, the relative portion that comes from farming has declined in this picture, but I think by showing this in 100 percent of the ag sector it implies a static system, which obviously is not the case: the entire pie has grown. So, while farming activities certainly have become a smaller portion of that, I think making the conclusion that we have necessarily lost farming activities is not always the correct assumption. I think some farming activities, as Tom talked about, he has expanded in terms of efficiencies to make up for fewer people and so on.

So I think, as I said, I don't disagree with this picture, but I don't think it always tells the whole picture, the whole story, because we have to not only look at this as a single system with constraints on both ends, but you have to look at the extent to which the entire sector has grown and what activities, farming activities constitute of that expanding pie.

MR. SMITH. I think that is a very good point, Rob. I didn't have time to show it, but if you look at figure 4 in the packet, that is the chart that Rob refers to. That shows the absolute values of the system and not the relative values. The farm sector has declined absolutely, although, obviously, less than it has declined as a portion of the system. It has declined about 10 percent in absolute terms, while the other sectors have increased, input sectors, by around 400 percent and the marketing sector, 700 percent. The numbers are in the paper. That shows a much slower decline if you look at absolute numbers.

I think, though, it is probably more interesting and probably more instructive to focus on the proportion of the system because that, it seems to me, better describes what that system is, and is going to give you more indications of what the future may hold. I look at it like a person that is drawing a good salary and he feels very comfortable. But then the firm he works for goes out of business and there is a very abrupt change. And, if you look at farming as a proportion of that system, I think it relates to that. If you are shut out, it doesn't make too much difference what your absolute value was, if technology changes such that you lose, say, 90 percent of your share in the system. But it is a good point.

MR. LEVINS. My name is Dick Levins. I teach farm management with the Minnesota Extension Service and the University of Minnesota.

Mr. Smith, I really enjoyed your paper. I thought it was very nice. I have thought through some of these things, although not nearly as well, and one thing that keeps coming up in my mind is that by hook or by crook we have given or assigned the rights to virtually all of the farm land in this country to the group of people who are now the farmers, so that that resource is controlled. I mean, it is a private property. Perhaps, that is the way it should be. I am not arguing that.

But, if your figures are correct, that this size farm cost, figured in a certain way, are the same as this larger farm, what would that change. I mean what is the incentive, you know, for this person to come in and be smaller? Someone who now controls land is going to have the decision Mr. Guthrie faces of transferring part of that land to other people. Otherwise, the farming structure that we have right now is the smallest it can be. Some of the research I am doing shows that there are big incentives. The person already in farming has a natural advantage in purchasing more land than someone, for example, like myself doesn't have.

Have you thought about, you know, this next step of how you would go about encouraging transfer of ownership so you would have more farmers, you know, given the rest of your argument?

MR. SMITH. One part of that is that some of these technologies which shift activities back to the farm result in more extensive farming where you get less production, less output off the same land base. There is quite a lot of confusion about that relationship between the size of the land base and output. That is why some of the sustainable agriculture techniques will actually require more land than farmers now control because it will be a less intensive production system. Look at BST versus rotational grazing, which we are going to hear next session. If the land base of a conventional dairy farm is devoted to an intensive grazing system, in many cases you will have less output out of that same land base, although you will have a greater return to the farmer because there is more farming activity, even though there is less land per unit of production.

MR. GUTHRIE. If I could respond to that and some of the comments made there about getting more people involved in agriculture, perhaps just share with you some of the ideas that go through my mind as a farmer about getting more people involved.

I have the acreages I have, and I indicated my two sons moved away from the farm. But I am to the point now where if I could, and if there would be a way to involve my farm as part of a total community and make the total community around me a part of my farm, then perhaps I would have an opportunity to bring my son, one who is majoring in communications, back. Because part of his job then would be to carry out part of the farm operation, taking this to the community, or to the other people in the non-farm sector.

So I think that there are opportunities to involve more people. Not necessarily the size of the farm or the number of acres that are farmed, but how much of the total operation you want to make the farming operation.

Years ago, I guess, when all food was produced on the farm and consumed on the farm, I don't think we would ever go back to that. But perhaps we could get back to the point where a more complete community could be developed on the farm, where it would be produced and consumed within the community or, perhaps, that community

could even get bigger, as we talk about a world community and what our role is in that.

Ms. RAWSON. One last question.

MR. DIECKMAN. My name is Don Dieckman. I am with the Humane Society of the United States, a post that I came to a year and a half ago from a farm in Missouri.

I would like to ask Steve Stevenson if it would occur to him that possibly some of these off-farm jobs that he is interested in farm families having might be in activities that could stay on the farm. I am concerned about rural economic development. That plays into the hands of this demise of the farm family structure that we have.

MR. STEVENSON. An example that I am real impressed with, in Wisconsin anyway, is that a new cooperative that sells organic cheeses, yogurts, and it is about 2 years old, pays about \$3 a hundredweight more for the milk to the farmers who are involved in that cooperative. The jobs that are involved, they are jobs that some farm wives are involved in. Some of the marketing kinds of stuff, some of the recordkeeping and management kinds of things. It is also a very sophisticated marketing organization. It sells the cheeses locally in Wisconsin and sells regionally in the Upper Midwest. It is beginning to make some contract negotiations with the Japanese for powdered organic milk.

I guess what I am saying in this case is, I don't think you can move as much milk. I mean, you could do that on the farm. We also have some people that are trying to do farmstead cheese factories, where that is all going to be done on one farmstead, and I think that is an option. But that farmstead cheese factory is not going to move as much milk, it is not going to involve as many jobs in that rural community as I think this collective would. And I don't mean to say one against the other. I am open to on-farm, farmstead kinds of things. Does that address your question at all?

MR. DIECKMAN. It addresses it, yes.

Ms. RAWSON. Well, one quick one.

MR. DUNN. I am Mike Dunn with National Farmers Union.

I commend Chairman Hamilton for having this seminar today and for the participants. I think it is something long overdue.

Mr. Smith, I am wondering is there similar information available you have from the Farm Credit System in Springfield of other areas such as the Omaha District, so we can look at other districts and some of the what some of us Midwesterners think is more traditional farms? That is the first question.

And then a follow-up question. It occurs to me that as we have this increased marketing share, we also have a correlation here of fewer and fewer participants in that marketing share through the consolidations of the livestock industries and others, and I am wondering if there is some type of correlation there. Mr. Stevenson, I would like you to address that one as well.

MR. SMITH. The first question, I am not sure what the other Farm credit Systems have, whether they have the same data or not. But some of the USDA's Farm Cost and Return Surveys, at least a few years ago, broke costs down by size of farms. Some of that was in the Midwest and at the time they showed the same pattern basically. Once you get up to 150,000 or so gross sales, the costs level out. But I don't think that survey has broken costs down by size in recent years.

But I think it is an interesting question. We should be getting more data like that. I am not sure about the other farm credit services, though. I will let Steve take the second part of the question.

MR. STEVENSON. I agree with you. Again, it is a movement off farm and out of rural communities and to particularly large multinational organizations structured in a way their profit centers, again, are not in those rural communities. So I agree with that.

I think we need to look at that and say what are ways either to leverage that system. I know less about beef marketing than I do about dairy. In the case of the Wisconsin dairy farmers, Kraft is the key actor. Or, I mean Kraft is the equivalent of IBP, the big beef company? And some farmers and some cheese producing co-ops are beginning to try and get together to negotiate with Kraft. I mean that is one way, is to begin to collectively begin to do it. That is looking at the existing system and leveraging.

The other way, are there some alternative food systems. I think we are beginning to see a split in the food systems in the country, which are the dominate food systems and a set of alternative food systems which has a lot of different, more regional community support of agriculture, direct farm marketing, a whole set of alternative food systems. There are different strategies depending on which of those food systems you look at.

Ms. RAWSON. Well, I would like to thank this first panel very much.

Now, we need to move on to the next one, and I would like for those people to come to the front of the room, please, while I do the introductions.

Giving the keynote paper on this panel will be Bill Liebhardt, who has a Ph.D. in soils from the University of Wisconsin. He is currently director of the University of California Sustainable Agriculture Research and Education Program at Davis. He is also associate director of research for the Rodale Research Center in Kutztown, Pennsylvania.

On the response panel for Mr. Liebhardt's paper will be Mr. Rick Adamski, who is a farmer from the State of Wisconsin; Mr. George Bird, who is the director of the Sustainable Agriculture Research and Education Program of USDA. Prior to taking that position he was a professor of nematology at Michigan State University. He was raised on a poultry and dairy farm in southeastern Vermont, and holds a Ph.D. from Cornell University. Also on the panel will be Ms. Suzanne Smalley, who is Extension Program Leader for Agriculture and Natural Resources Programs at Michigan State University, from 1984 to the

current time. She holds a bachelors and a masters from that university in home economics and continuing education, and is currently working on a Ph.D. in extension education.

Welcome to the first panel. Mr. Liebhardt, if you would start us off, please.

PANEL 2

DAIRY FARMERS AND CONSUMERS AT CROSSROADS: BGH AND ROTATIONAL GRAZING: PRESENTED BY WILLIAM C. LIEBHARDT, UNIVERSITY OF CALIFORNIA AT DAVIS

MR. LIEBHARDT. The study that I am going to talk about today is a result of about a 2½-year effort by a group of people on the back of this report. This is an executive summary for a book that is going to be coming out, probably in February entitled *Hormones, Grass and Milk: BGH, Rotational Grazing and You*. There are 10 authors and they represent a wide spectrum of disciplines. It is a multi-disciplinary effort. We attempted to do somewhat of a systems analysis of two technologies that dairy farmers could adopt.

So what I am going to show you is a synthesis, and it won't be precisely this paper. I don't have time to give every aspect of this the do it needs in the few minutes that I have. I think we have to look at where we are going in agriculture, what do we want to landscape to look like. This is also about animals and people.

I took a picture of an advertisement recently in Northern California. It has a cow laying in the grass and it says *Splendor in the Grass*. For those of you that are old enough to remember *Splendor in the Grass* I think what this is all about is that milk has a very special connotation in terms of marketing. Stewart talked about marketing. It has this wholeness, this naturalness, this pureness. And so anything we do that changes the perception of milk, I think, is an extremely risky business for a dairy farmer. As somebody who grew up on a dairy farm in Wisconsin, I think we have to look very carefully at this marketing issue, of these two technologies.

This is a picture I took recently of a mountain climber. This is also about risks. Both farmers and consumers have risk in terms of the way crops are grown, the way their milk is marketed. They have risks financially. Maybe not the same kind that this person has, but dairy farmers are really in a very risky situation with either of the technologies that we may look at.

I am going to try and do an overview analysis of this situation, so that we don't just focus on one aspect of it. I think many of the problems that we have in agriculture are a result of our reductionism methods and we need to look at the system in total.

Well, historically, the way we have produced milk was a very low input intensive thing. If we had pasture, we turned the cow out and the cow went out in the spring and it grazed, and usually by the end of July or early August we had most everything grazed down, and we had

weeds and we had a bovine gymnasium. But it was pretty tough to eke out a living. And this system could not compete with well-managed alfalfa hay and well-managed corn silage. It simply could not make it. And it didn't make it not because pasture was not a good alternative. It didn't make it because we didn't know how to manage pastures.

How many of you, if you grow alfalfa or corn silage, would go out and harvest the crop every day. I mean that would be absolutely asinine and stupid. Nobody would go out with a harvester and harvest corn every day. But that is precisely what we did with our pastures. It fell apart because we didn't know how to manage the pasture. And so pasture has been this stepchild that has never been managed in an opportune way.

So, from that then, we went to the system where everything had to be brought in. We moved to confinement feeding almost across the country. Everything had to be hauled in and everything had to be hauled out. There are farmers across the country that have machine sheds full of labor-saving equipment and they have hardly any free time during the day. Why? Because we took over activities that cows can perform better by themselves.

There is another farm that happens to be in Pennsylvania. You can see everything stored. Everything brought in and everything hauled back out, and the cows have a small area to work in, to go out for fresh air during the day, but that is about it.

Sorry you can't see this. This is a picture of hay. So we are making hay now for the animals 12 months a year. We are feeding silage 12 months a year, with all of our equipment, all our labor-saving equipment that has to be kept up, maintained and repaired. We got cows that we feed almost like pigs. We have forgotten that they are ruminants and can do things on their own. And so, in a sense, we have taken over many of the activities that should be left better to animals.

This is a friend of mine, Bill Murphy, who does a lot of work with dairy farmers. He does a lot of work with rotational grazing. But I think it is true the quality of life for dairy farmers is abysmal, and there are systems that can change that.

I would like to quickly go through a general comparison of rotational grazing and bovine growth hormone. First, we are going to look at the economics, the social and environmental factors. I think the thing you have to remember is that for the FDA to approve bovine growth hormone will require looking at cow and human safety primarily. They are not looking at all the social, the environmental effects. One of the reasons that we wanted to do this study that I thought was necessary was to expand the debate. Many of the analyses that I saw on bovine growth hormone were of the type that did not take into account the systems approach. Very few looked at what consumer reaction was. Or if they did, they would acknowledge that there may be some consumer resistance and then go on and do the analysis as if it was in a vacuum. So this was an attempt to expand it, to enlarge the discussion about

this so that farmers and consumers would have a better information on making this decision.

So, if we look at bovine growth hormone and what is going to happen at the farm level, the first thing is that it starts off with an injection of a hormone, bovine growth hormone or BST—bovine somatotropin. So it starts off with increasing the level of the hormone in the cow. That results in a milk production response. The idea is to get more milk from the cow.

Now, the industry says that you are going to get 10 to 25 percent. Our studies show that the range will be anywhere from 1 to 26 percent and that a third of the farmers probably will get less than 10 percent that they say. So, from that standpoint, it is an extremely risky technology, I think.

Then, because it forces the cow to produce more, there is health and stress problems. There is more mastitis. That has been documented now. And it would appear that it is not just more across all farms, but on some farms, one out of two, one out of three, whatever it is, will have significantly more mastitis.

There are reproduction problems. It is harder to get the cows to conceive. The calving interval is longer often. Some cows simply have to be culled. Some studies indicate the culling rate could be much higher. So, in the economics of all this we have to figure in a higher culling rate, and you have to remember it takes 2 years before we get an animal in production.

There is a switch in the feed that is fed. A cow with bovine growth hormone needs a denser diet. What that means is more grain and less forage, which means a higher priced ration. It is more efficient and each 10 percent increase in production takes about 6 percent more feed. That is where the profit is going to be made, if it is going to be made on this.

Obviously, if there is more mastitis, there will be more use of antibiotics. That affects both farmers and potentially consumers if it is up in the milk, although the restrictions right now are very tough.

And finally, the veterinarian costs will probably be increased as a result of these practices. So, in total, what this technology attempts to do is to enhance milk production by putting in more inputs.

What are some of the things that the farmer has got to weigh, and there are many things. This is really a complex decision for a dairy farmer, I think. He has to look at production. If everybody adopts this technology and milk production increases 12 percent, which is what OTA says it would be, we simply would not have a place to put all that milk, which means that the government would have to buy more, which means that dairy farmers would be assessed, which means the price that they get will go back down. So it is like the harder you run, the farther behind you are.

Consumption. The consumption of milk, I haven't talked to anybody that thinks that the consumption of dairy products would go up if

this technology comes in. There are many who think it may go down. The consumer surveys show a significant problem with the consuming public in accepting this technology.

And so farmers have to weigh this. Do I want to market in the teeth of consumer resistance? Is that where we want to go in a dairy industry? Is that where farmers want to go?

The number of cows, obviously, would decrease and so would the number of farmers if this comes in. It will speed up the technology treadmill.

The market risk, I think personally, from this is a very high and the potential reward of using this technology is very low. I just don't see where it is going to pay off.

There are animal welfare questions about the injection of this material and overwhelming the normal hormone levels of animals. I think there are questions about animal health that relate to their welfare.

Labor. Everybody says labor will increase. You have to inject the animals. You have to do different things. You have to manage them differently. And, if anything, my suspicion is that it will increase the stress that is already evident on a lot of dairy farms.

Lifestyle. It is going to be more of the same: run harder, run faster, hope you can pay off the debts. Input costs will definitely go up with this. It is one of these things that at the systems level is going to increase input costs. I don't see any way to avoid it.

Let's look at some of the effects on your farm. As I said before, it is a more dense ration, which means more grain is fed, less forage. That means there is going to be an increase in use of fertilizers, pesticides as a natural phenomenon of this. You grow more grain crops those things are going to go up.

Soil erosion, if you have more grain and less forage, is going to increase. You are going to use more fuel at the farm level. Now, the one thing that could change this on a regional or a national level would be that if everybody went into this and there was no consumer resistance then the cow numbers would, obviously, have to drop, so because there would be less cows there might be less environmental impact. But it certainly is going to change the mix of what cows eat. And on individual farms, my sense is that they will get bigger and you will have more of these at the farm level.

And so it is going to impact soil quality, it is going to impact water quality and air quality. All of these things are going to be impacted as a result of using this particular technology.

Now, let's look at consumers. They are going to be affected by this and they are going to have a choice to make. Consumer surveys from a number of different states indicate that there is substantial resistance to this technology for a number of reasons. If you take some of the studies and look at how many people would reduce their milk consumption or stop it, it would have a significant impact on consumption of milk.

And the consumers are concerned about health issues. There is a real debate about the health issues of the milk and is it changed or isn't it changed. There are concerns about antibiotics, and concerns about IGF-1.

And I would say, there is another point—can we test everything? I think often science seems to put forward the view that we know everything and we can test everything. We oversell what we can deliver. We can't test everything and we can't know all the effects. There is just no way. And so right away I think there are significant questions, I don't care if you test this thing until you are blue in the face.

The price of milk probably is not going to change significantly one way or another. The federal policy structure really doesn't allow that. And farmers get so little of the real price anyhow.

There are all kinds of issues about the review process. It has been written up in the press. There are substantial comments about the review process not being open, not being fair.

There are environmental concerns that consumers have. The same ones we have talked about. Many consumers are concerned about animal welfare issues. The survivability of rural farm communities.

So it is not just a matter of does this milk have this or doesn't it have that, there are a range of questions: Animal welfare and ethics questions. Some consumers feel like we are playing God with this technology.

And then there is the labeling. Consumer surveys show consistently that 75 to 95 percent of them want the milk labeled if BGH is used to produce it. The industry has resisted this very strongly. So this is a huge item for debate.

So I think you can see as we go through this, if you look at the consumer concerns, farmers have got to look at these in terms of whether they want to adopt this technology or not. Now, if somebody chooses not to do it, they have to also know what their neighbors may do, because all the milk may be commingled. So this is not something where just one farmer or one consumer can determine what is going to happen. This is going to be a very complex thing. We don't know what is going to play out if this material is approved.

There is a lot of this that is very hypothetical, but I think the risk level for farmers is very high—if you want to bet the ranch, then go ahead and use this product.

This is a little picture of grass. We are going to look at the other side of the equation now. As I said before, we didn't manage our pastures correctly. We didn't manage them very well at all. This is a simple chart that shows dry weight production and regrowth time of a pasture. The simple little chart shows the response.

What it shows is that with a few days of growth, you only have a little pasture. In other words, if we go out here at, say, 6 days, we have probably about 500 pounds of forage per acre. In other words, it would look about like this. And this goes back to the statement of if

you do continuous grazing where you don't divide up the paddocks, where you just turn them into 100 acres, then every acre is grazed every day. What rotational grazing does is it takes that 100-acre field and maybe it divides it up into 40 paddocks, and you put the animals in a particular paddock for 12 hours to 3 days and then you move them off, and they are not back for 15 days to 40 days, depending on the time of the year.

So it is managing grass and it is managing animals, something that is done on the farm by farmers, and it produces high quality forage at a low cost. And, for those people in the Upper Midwest and Northeast, they are not battling making hay when it rains.

Here is a group of cattle grazing. I took this picture in early September. They had just been turned into an area. They are doing all the harvesting, all the fertility maintenance on their own.

Here is another one. You can see they have moved out of this one and they are over in this one, and you can see the difference. That is all it is, is moving them from paddock to paddock. I shouldn't say that is all.

Okay. So let's look at the same kinds of things. With rotational grazing, the first thing that happens is more forage is produced. The animals eat much more forage and less grain, which reduces the cost of production. We have done a number of case studies on farms across the country, some go up, some stay about the same, some drop in milk production. For farms that tend to be low in production, some farmers show a substantial increase. And I think that what it indicates is that the forage under this system is so much better than what they were putting up before.

The health and stress issues are reduced substantially. Cows are out in the open on pasture. They get exercise. They can carry out all their natural processes. Mastitis is reduced instead of increased. Reproductive problems are reduced instead of increased. Antibiotics use goes down.

There is a problem with bloat on some farms if alfalfa is the forage, but that usually is a minor one. And the veterinary costs, in general, go down with this technology. So overall you have got a reduction in input costs, because the animals have taken over those kinds of activities themselves.

Farmers will have the same decisions to make with this technology as they will with bovine growth hormone. They have got to look at production issues and they have got to look at consumption issues. I haven't spoken to anyone that thinks if farmers went to this technology that it would reduce consumption. It is probably a non-issue for most consumers.

I can't see that there is any market risk associated with this technology over what there is to marketing milk as farmers do now. And, if bovine growth hormone comes in, I have heard some farmers and some farmers co-ops talking about they are going to segregate their milk and

market it as free of synthetically produced BGH, which could give them a market enhancement if this becomes an issue. Now, nobody knows if that is going to happen. But it clearly is a strategy that producers could use if there is resistance.

Labor invariably goes down because you have now transferred much of what you were doing to the animals. Now, I grew up on a farm in Wisconsin and when pasture time used to come, we used to say, thank God, they are out in pasture. We don't have to feed them silage. We don't have to bed them down. We don't have to clean out the barn. What we did in confinement feeding, we went just the opposite way. We said, Oh, instead of doing that, we will do it 12 months of the year, so we can keep all of our equipment going. We are really clever sometimes.

Lifestyle. Lifestyle issues for many farmers are improved dramatically. My friend Bill Murphy, who works with it, a lot of farmers told him that one farmer who switched from confinement feeding to this, he said, "Geez! I even have time to make love to my wife now." So talk about family values.

[Laughter]

And that is important, believe me.

Input costs generally go down. That is the big impact that this technology has. It is the thing Stewart is talking about—farmers reclaiming more for themselves. I had one farmer in Wisconsin who does this tell me, he said, "The problem we have in the dairy industry is that every time somebody says let's do this nice new technology, if I produce a dollar's worth of milk," he said, "80 to 90 percent goes to somebody else." He said, "Using this every dollar I save is mine. I don't have to share it with somebody else." That is a very simple economic fact of life.

Rotational grazing reduces the amount of stored feed you need. You don't have to put up hay for 12 months of the year. Cows are grazing 6 months of the year in northern environments, and longer in some cases.

You have less machinery. I know one farmer that went to rotational grazing and within one year sold about \$100,000 worth of equipment that he didn't need. He refinanced his farm and survived.

You don't have to be bedding them down 12 months of the year, and you don't have to spread manure 12 months of the year. The labor in all of these is reduced.

Rotational grazing, as I said, increases the forage and reduces the grain fed. Therefore, the amount of fertilizers and pesticides is going to be reduced. If you put more land in forage, the erosion is going to be reduced. So the overall effect is an enhancement of soil, air and water quality. In other words, this process solves a lot of environmental, social and economic problems for the farmer, just by adopting it. Instead of making problems, it solves them. It does not take any

government regulations. There is no review process for it. It is something farmers control at the farm level.

You do have to put in more fencing if you don't have fences. But there are very economical, inexpensive systems right now. You have to create lanes so that cows can walk out, and you have to have water distribution.

I don't know how clear you can see that, but this is a water distribution system for 55 cows on pasture. It is a simple little bucket with a float in it. This does not have to be expensive stuff.

I don't think there are many consumer issues. The health of cows is improved. There are less antibiotics. There is no review process. The price of milk probably is not going to change substantially. The environmental and social effects seem to be very beneficial.

Animal welfare. The cows are out on pasture much more. There is no injection. There is none of all that business. There are no ethical questions about this. And there are no labeling requirements. There are no labeling issues, unless somebody wants to use it as a market advantage if BGH comes on.

I think the other thing it does is it enhances rural communities. It keeps farmers on the farm. I have talked to farmers who said they wouldn't be farming today if they hadn't switched to this. Their family lifestyle is improved. It provides jobs on the farm.

And then, I think, there is a big question about whether we are going to centralize or decentralize our agriculture. Those of us who have gone to Eastern Europe, or read about Russian agriculture, often criticize Russian agriculture for being this concentrated, monolithic thing. I think a real question we have to raise with this is do we want four biotechnology companies in their corporate headquarters setting dairy policy or do we want thousands of individual farmers making these decisions across the country? Do we want centralized, as we criticize, or do we want individual farmers making these decisions?

My sense is that bovine growth hormone is a way to homogenize the dairy industry—to use a dairy term. If you want to unhomogenize it, you go the other way.

As I said, this is a systems process. There are a lot of factors up there that are interacting. There is no way to anticipate what is going to happen in the future, but farmers and consumers need to be cognizant of all of these things.

I put values in there on a chart. I think our values do play into this. Our vision of what we think this country is going to be and what agriculture is going to be like. My question is do we think we are going to end up with two dairy farms, one east of the Mississippi River and one west of the Mississippi River? Is that where we are headed? Is that the rural landscape we want? Is that the rural communities we want? I think we have to put those questions on the table.

And who do we want making decisions about where we go in agriculture? To put substantial power in the hands of four companies, frankly,

is wrong. I think it has food security issues that we ought to think about. Not just for milk production, but about agriculture in general.

Okay. That is it.

[The paper presented by Mr. Liebhardt starts on p.134 of Submissions for the Record:]

Ms. RAWSON. Thank you. Let's move right into the response panel now. You may either use the microphone in front of you or come to a podium if you wish, in whichever order you would care to.

RESPONSE STATEMENT OF RICK ADAMSKI, WISCONSIN FARMER

MR. ADAMSKI. Good morning. I would like to introduce myself in a little more detail to explain the fact that I, indeed, am a dairy farmer from northeastern Wisconsin. We, my wife and I, own and operate the farm on which I grew up. The farm itself consists of about 250 acres and we milk about 37 Holsteins on our farm.

The vast majority of income comes from the sale of milk on our farm, but recently we have expanded the income-generating side of the farm to include the direct marketing of beef raised on our farm from the Holstein steers. We have done this to better utilize the main crop on our farm, which is indeed pastures.

Grazing has always been an important part of the feeding practice on our farm. However, in 1987 we made the switch to intensify the use of grazing by switching to the rotational grazing practices. Our dairy herd is given a new piece of pasture twice a day. After every milking, they are given a new piece of pasture. Replacement heifers and steers are changed every other day.

I also have to reiterate or underscore the fact that this is a family farm by stating the important point that my parents and my uncle play an integral part of helping with the operations of the farm.

In responding to the paper that Dr. Liebhardt just presented, I would have to only reinforce what he had concluded. I think the decisions that I had made in 1987, which was to decide to go into intensive rotational grazing, are indeed the same research, to a much lesser degree, of course. But so much of the benefits of rotational grazing to me were realized. I think the lower capital input costs, the lower start-up costs were all positive factors to think about the possibility that we could actually continue dairy farming in an environment where it is actually depressing to think that we are part of an industry where its progress to have fewer of us.

And I really despise to be a part of an industry where it is progress to have fewer farmers. Every other economic development area, every other economic development industry seems to advocate that we have to have more tourism, more marketing, more whatever, but in agriculture it is progress to have fewer farmers, and I think that is wrong. I think we have to have more farmers on the rural landscape to take care of ourselves, to take care of the land, to take care of each other, to take care of the food that we are producing. It doesn't make a lot of differ-

ence to me if I am the only farmer in the county. I think that the community is far important to any economic value. We have to realize that economics is a part of sociology, not the other way around.

I think one thing that I would disagree with in Dr. Liebhardt's report is when he said that the consumer response is a non-issue. I think that the consumer response in comparing the two is actually a positive one for rotational grazing.

Another reason why I chose to be a farmer is that I have seen a lot of the inputs going into the dairy industry and I don't like them. I like to produce as much food for ourselves as we can. I don't like a lot of the increased use of antibiotics in dairy cattle. I don't like the use of new technologies, such as BGH, that are being researched to go into the dairy marketing sector. And I personally have made the choice to dairy farm so that we can have control over what we are consuming.

As a matter of fact, we are looking at expanding our poultry operation. As a sideline, we have 50 chickens, because I don't like all the growth regulators, the antibiotics that are going into the poultry industry.

So I believe that it is a consumer positive. I know a lot of people who are not farming are disgusted to look at the dry lots, which people use as exercise lots for their cattle and a total confinement system, and to see all of the mud that the cattle are walking through. I think that is a consumer negative, and we see very little of that with our rotational grazing system.

I also would like to make the point that the rotational grazing seems to me to enhance the value of labor. We use labor euphemistically in place of people. And we can write off labor in saying it is costly, but labor is essentially people, and farmers are almost becoming numbers and less significant than what they need to be in the economic balance sheet. Capital is everything in our society, people are nothing, and rotational grazing challenges that.

I think it challenges it because we have measured efficiency in agriculture and all throughout our industrial system by measuring how much we get out of what we put into a system. After we have done with everything, we measure how much we get out of what we put in, and I think that is backwards.

I think that we should be looking at what we want to accomplish and to use as few inputs as possible to accomplish what we have to do. That is why farmers are running around trying to get 25, 26, 27, 30,000 pounds of milk per cow per year, and for what reason. My goal in farming is to make a living, and I want to use as little as possible of my time and money to accomplish that goal, and that measure is not being done by conventional ag economics. It is unheard of. But we have to start measuring that way. I think we have to measure more the gross margin rather than the gross income.

I participate in a farm training sector at our local technical college, the technical college in Northeastern Wisconsin, based in Green Bay.

Our farm training instructors in conventional farm management advises us that in a dairy farm that we are supposed to be comfortable with a return of \$1 of gross income for every \$3 of capital investment, and that is pretty standard throughout the dairy industry. In checking with other universities and other recommendations, banks, that that is standard. I think that is scary. I think on our farm our measure of that farm analysis comes out to be \$1 of gross income for every \$2 of capital investment, and I don't think that is good enough. I think that we have to strive for a lower capital cost and a greater gross income, because it is pretty scary to be involved in a sector where we have such a small amount of income covering our capital costs.

Checking with other industries, it is often the inverse. The inverse of those numbers is more conventional. I know in an asphaltting firm, which I am familiar with, that they have \$3 of gross income for every \$1 of capital investment. So I think that a lot of the farm management advice that we have been getting is shaky, that it has to be challenged, and I think that rotational grazing does that.

I can't add much more than the fact that New Zealand has long been recognized as the leader in rotational grazing. They made the decision to use rotational grazing, I think, 40 or 50 years ago, and they did not subsidize a lot of their grain growing sector. They emphasized their forage production as the means of harvesting of their crops. It is from them that we have learned a lot about rotational grazing.

Our researchers in this country have not helped. We have been our own research on the farm, and using rotational grazing to our advantage.

Again, I think that BGH is almost a non-issue for us, because I think the research dollars are being wasted compared to what should be done with rotational grazing.

Thank you.

**RESPONSE STATEMENT OF GEORGE W. BIRD, DIRECTOR,
SUSTAINABLE AG RESEARCH AND EDUCATION PROGRAM,
USDA; AND PROFESSOR OF NEMATOLOGY, MICHIGAN STATE**

MR. BIRD. Dr. Smith, members of the symposium, as director of the Sustainable Ag Research and Education Program and a professor at Michigan State University, it is indeed a privilege today to be able to respond to my good friend Bill Liebhardt's paper.

When I assumed the responsibilities of the sustainable ag directorship, about a year ago, I thought I would be coming to Washington to spend most of my time on what I would have called environmentally sound farming practice. Before I go any further, I believe most of you were distributed a copy of my comments for this morning. However, what I have found is that I spend most of my time dealing with social issues, issues related to quality of life, quality of life for farmers and ranchers, members of rural communities, and society as a whole.

Now, as was indicated earlier, I was brought up on a poultry/dairy farm in southeastern Vermont, but for the last several decades I have spent most of my time working on pest management issues related to crop science and crop production. So during the past year, I have had to relearn animal agriculture. What I am going to say this morning will be basically my observations during the past year, and the vast majority of these are primarily in support of the potential of rotational grazing. The potential of rotational grazing has an important integrating factor for what I am going to refer to later on as the 21st century family farm.

Does rotational grazing work? Yes, it does. During the past year, I have had the opportunity to see rotational grazing work in Vermont, New York, Wisconsin, and Virginia, and I have witnessed testimonials on this topic given by farmers from Tennessee and South Carolina. When you see a farming practice working on that range of different geographical locations, you begin to believe that, yes, it is a sound concept.

On a recent visit to a dairy operation in northern Vermont, the farm family began their story by saying, "Before we changed we had already called the auctioneer." I also heard during the past year a South Carolina farmer saying, "By switching to rotational grazing I significantly increased my net profits." And last summer, at a major conference in Memphis, Tennessee, I witnessed a farmer describing his rotational concept and practices in detail to more than 250 members of the agricultural community attending that meeting. These are important indications that initial progress is being made in the area that some of us call sustainable agriculture.

From my travels during the past year, I have come to the conclusion that in the United States there are basically three types of farming systems, and I am going to refer to these as the industrial agribusiness model farm; family farm, which will go under transition to the 21st century family farm; and the part-time farm. The back of my handout describes the most important thing that I have to say to you. What I have attempted to do is describe the various attributes of these three very different types of systems.

These models are very different from the excellent Lipton and Manchester model that Dr. Smith showed in one of his overheads. But, on that particular illustration, you saw an industrial model for the inputs and an industrial model for the outputs. But most of U.S. agriculture today is also an industrial model for the farm. I have come to the conclusion that no one policy for the future can serve all three of these types of farming systems, and I also believe that no one research agenda can serve all three of these different systems, and neither can a single education or outreach agenda serve these three different systems. It appears that we are going to have to have separate policy, separate research and separate outreach programs if these particular entities are going to survive either isolated from each other or in harmony with each other.

Agriculture, as we look at it for the future, is going to have specific goals. This morning, I want to tell you that during the past year there

has been considerable success in getting many different people from many different walks of life to agree that the concept of sustainable agriculture in section 1603 of the Food, Agriculture, Conservation and Trade Act of 1990 is a goal that most of U.S. agriculture and most of society can strive towards.

In conclusion, last summer I attended a meeting of the Northeastern Sustainable Agriculture Administrative Council in Grafton, Vermont. One evening, I borrowed the automobile of a farmer member of the Council—a dairy farmer from New Hampshire—and I went on a 29-mile circular drive by the site of the "old home farm." When I was a child, there were approximately 24 commercial farms on that particular route, and today this is still a very rural area. However, during my evening drive, I was only able to locate one commercial farm.

The 21st century family-farm model has outstanding potential for playing a major role in continuation of what many of us here today call the American dream. It will, however, require innovative policy, research and education initiatives designed specifically to foster this type of agriculture and quality of life. As a person primarily from academia, I want to add two additional comments. New coalitions among farmers, non-profit privates, agribusiness, government and academia are probably at the very core of sustainable agriculture.

Second, there are two sciences, which that I know of, that are available to us and that we have yet to open the door to. One is the science of ecology. The science of ecology is basically a post-second world war science. The second science that could help us in agriculture is the science of systems science.

Thank you for this opportunity.

[The prepared response statement of Mr. Bird starts on p.138 of Submissions for the Record.]

RESPONSE STATEMENT OF SUZANNE SMALLEY, MICHIGAN STATE UNIVERSITY EXTENSION

Ms. SMALLEY. I am Suzanne Smalley from Michigan State University Extension, and I think my comments will support those that have preceded me, but perhaps from a little bit different perspective. When I learned that I was to be able to respond to Dr. Liebhardt's presentation, I decided that what might be most useful, hopefully, is to reflect a bit on our experience at Michigan State University and our work in both areas of helping to explain what has been going on, in terms of use of bovine growth hormone in dairy cattle, and to help prepare dairy farmers for the potential of using that technology more widely, and also our experience in rotational grazing. I tried to reflect over the past five years on some of the experiences and observations that I could make in each.

We have already looked at some of the major differences between the two technologies, but I would like to focus more on the differences that I believe I could observe in our State and how that affected Extension's role in taking some of the research results and working with farmers in regard to those.

One—and I am going to do that a bit in terms of setting some comparisons and contrasts, and perhaps some—there will be some more middle ground, but I am going to try to contrast the two, at least as I have observed them.

If I look at where the information and the push or the pull for extension programming in the two areas seem to come from I would have to say that we could look at the BST area as, perhaps, being more supply driven. There was a lot of research being done. We were beginning to hear results of that research. Our extension specialists were picking up on it and our agents were beginning to ask about it. But, in large part, it was coming out of the research institution itself to extension.

On the other hand, if we looked at the push or the pull for the intensive rotational grazing, I would have to characterize that as perhaps being a bit more demand driven. It wasn't that there was all this research, at MSU at least, going on in the area, but we were starting to get a lot of questions from farmers about this new technology that they were hearing about. So there is a little bit of difference in where the pushes and pulls were coming from.

As we began to work in both areas a little bit, we also saw some other differences. We found that the research results coming to us in the area of BST came from some of the traditional research coalitions, I might say, on our campus and others. A lot of information coming to us out of departments of animal science, large animal clinical sciences. Those were traditional groups who had worked together over time and had developed a lot of good teamwork, and our extension agents were very used to going to those groups and getting information.

On the grazing side, we were finding something a little bit difference. We didn't have working groups all put together ready to look at what was going on in the research side and to begin to develop educational programs and materials. That required us to forge some new partnerships that had not on our campus existed at that point. What we really had to do is get together some of the folks in animal science, some of the folks in crop and soil sciences, some ag economists and a few other people as well. A broader group that took some time to get together to develop the working relationships that were needed to help develop programs in that area.

We had some groups already existing. In our state, we develop programs through committees called Ag Industry Committees. The Dairy Ag Industry Committee was all set up and ready to deal with some of the new information on BST. The deal with grazing, though, seemed to be a little bit broader. We were bringing in other people and it required us to add some people to the existing coalitions.

Our work through extension with BST and biotechnology has taken more of a traditional diffusion of innovation approach. That is, we have taken the research results, we have tried to put them in forms that we thought would be understandable and meaningful to people, and we have delivered that information. Our extension role in Michigan with grazing has taken quite a different turn. For one thing, we didn't

find a whole lot of research results to disseminate, so that changed things. Another thing that happened is that extension agents who are getting all these questions from farmers in their areas began to perceive their role as one of making sure that the researchers knew that the questions were coming in, to try to work with the farmers to influence the direction of the research, and also to try to help to legitimize some of the farmer experiences that they were beginning to hear more and more about in the area of grazing. So I think our role became quite different between the two technologies.

I think that as we think today about the industrialization of agriculture, it occurs to me that there is a corresponding industrialization, in some cases, of our educational and extension system. The work we have been doing with biotechnology tends to let us use, as I mentioned, our traditional diffusion of innovation approach. It is producing an educational product and delivering it.

The grazing example gives us an instance—and I think there are many more as we talk about some of the other technologies—where that system may not work so well. We may really need to rely much more on farmer input up front on what I perceive as a changed extension role in helping to link farmers and researchers, and to play an increasingly important intermediary role.

I think it also may tell us that the past extension has been seen as the middle player. The researchers do their research, they pass the information off to extension folks and then extension folks to the farmer. I think it is time for us to rethink that relationship and look more at a system where extension and research are more integrally related and farmers are also a key part from the beginning, not just at the end.

I guess, if I were to try to translate some of the experiences we have had in Michigan to some suggestions that might help to influence policy, it seems to me, one of the lessons we have, perhaps, learned is that the whole process of agenda-setting for what is important within agriculture has to not only allow but really encourage that farm-based and community-based values get put into the formula and are weighted along with university-generated experience and knowledge. It seems like we have to find ways to make sure that we get an appropriate balance between those areas to come up with what our priorities are.

I think we have to have policy that forces, in some cases, better integration of extension and research. We have to be doing the job together. We have to give extension a chance to share back what it is hearing from farmers and research, as well as more involvement of farmers and extensionists in the research itself.

I think that someone has already touched on the necessity of avoiding one-size-fits-all solutions. It would be nice to have one technology that we could just promote the heck out of for everybody, but I think we have learned that that doesn't work and that there will be lots of different solutions for different people. It seems to me that that also requires us to be pushing towards more systems thinking, more systems approaches and more teamwork approaches.

I think it also means that we have to allow time for some of the new teams to develop. Our experience with grazing and with other technologies is that when we are looking more broadly at an issue, it is going to take people who have not traditionally been involved with one another, whether that is from different disciplines on one campus, whether it is across State lines, or whether it is farmers and researchers and extensionists all working together.

What we have experienced often in extension is one-year projects. One year, can I get everything together, deliver the product and evaluate? That may not be realistic. I hope as we can proceed we can look at, perhaps, some longer time frames to build some of the working relationships, but on the other hand, some ways to combine functions so that we are not waiting to extend the results until the research has already been finished. But we are more integrally involved in the whole process.

Thank you.

Ms. RAWSON. Thank you to the panel.

We now have about five minutes for questions from the floor. Please come to a microphone and identify yourself.

QUESTIONS AND ANSWERS

Ms. BAILEY. I am Betty Bailey with Rural Advancement Foundation International in Pittsboro, North Carolina.

I wanted to ask Mr. Adamski a question. You mentioned or talked about your own initiatives and research on your farm with rotational grazing, and you also talked about the fact that you hadn't gotten that much help from research institutions. You were initiating that on your farm, and I think that that is often the case, and speaks to what Ms. Smalley was saying. Often, it is seen as a one-way street and that the research institutions send the research findings down, rather than they are initiated by the farmer.

I wanted to ask you, if you had access to those resources or if you were able to help set the priorities for the research institutions, what would you ask them to be doing?

Mr. ADAMSKI. Well, I think one area that we are starting to touch on in Wisconsin is what level of grain feed is optimal, or which is economically optimal for our dairy farms. That is one area that we hope to be doing research. We had hoped to be doing it this year, but it looks like it will be postponed until next year.

Water systems. How we can best and most economically distribute water to the cattle so that they can have it out on pasture. I think that the forage mix, which particular grasses and which particular legumes make the best possible pastures. The type of breed of cattle and which characteristics in the breed of cattle would be the best grazing cattle.

So there are mostly those management decisions, and we are discovering more as we go about it.

Ms. BAILEY. Thank you.

MR. WESTFALL. My name is Don Westfall. I am with Abel, Daft & Earley here in Alexandria, Virginia.

The responses seem to exist in a price and policy vacuum. I didn't hear much about price influences on the adoption of various technologies, either of the two technologies, nor did I hear very much about policy. I know there is another discussion later on about agricultural policy, but it seems to me that these things can't exist independent of what happens to agricultural policy, particularly dairy policy.

Over the last few years, we have had a major restructuring in dairy as a result of policy changes. Professor Liebhardt, in particular I found your discussion of the price impacts rather confusing. It didn't necessarily follow in my mind that if you increased production of milk, there wouldn't be a price response, and I would like you to discuss that a little further. To the others, if you would talk about how you see agricultural policy and price affecting the adoption of the technology.

Thank you.

MR. LIEBHARDT. I am not an agricultural economist, and maybe I can make it clear this time.

Let's take the bovine growth hormone. If you assume the average of response of 12 percent and everybody adopted it, that would be a massive increase in production in a very short time. As the dairy program operates now, anything over 7 billion pounds of excess milk is going to have to be bought up by dairy farmers. Twelve percent would increase dairy production way above the 7 billion pounds. If that happens, dairy farmers would then be assessed to buy that milk off the market.

So, in one sense, they would produce more, the market would then get flooded and they would then be assessed, which would drop their price. So, it seems to me, in the end, they would be producing extra milk that the market doesn't want.

You have to remember that we have a chronic surplus in dairy production. A few years ago we had dairy cows being slaughtered to reduce the dairy production. So clearly, the dairy policy, as it now exists, is going to have a big impact on this. I just don't think that you can turn this technology loose and not have something happen. With rotational grazing, if everybody went to it, it is hard to say what would happen to production. My sense is that it would probably stay at about the same level that it is now. It could increase slightly, some farmers go up, some go down. I don't think it would have this massive effect on increasing dairy production in the short time that bovine growth hormone did. So I think the market risk, assuming no consumer resistance, is far less for rotational grazing than bovine growth. Bovine growth hormone, to me, is a real risky affair, both from the pricing policy and from consumer response.

MS. RAWSON. One last question.

MS. VANDEMAN. I am Ann Vandeman from Economic Research Service, USDA.

Given the way that you have described the technology and the comparison between the two technologies—the costs and benefits—how do you explain the fact that rotational grazing has not been more widely adopted more quickly? Are we dealing primarily with just an information problem? Is education where the emphasis should be? How do you explain that?

MR. LIEBHARDT. Okay, I will take a crack at that. I think that what Ms. Smalley said is correct. Land-grant institutions don't have a lot of information about them, and in many places are resistant, or are against it. As she said, it is demand driven. It is farmers who are out there trying it and making it work.

In terms of doing this study, trying to get information from land-grant institutions on this study is difficult. The best case studies we found were on individual farms. The best information we had was on farm research. So you have dairy and animal science people who have basically been pushing confinement feeding, all these technologies that are high input.

I did a check just on the 1988 or 1989 dairy science meeting. I went in and looked at all the abstracts of all the papers delivered. There were 45-plus on BGH and none on pasture management. I think that tells you where the dairy science profession is.

I would say that, in general, they don't buy into the technology of rotational grazing. They have been resistant, recalcitrant. I am laying it out on the table as fair and honest as I can.

There are people in the land-grant system who are working on it. There are a number of them. But, by and large, the dominant theme is to get your herd average up to 25,000 pounds, 30,000 pounds, push the hell out of the cows, and that is the way you will make it. Now, as farmers are demanding more information on this, some people in the land-grant system are responding. But I would have to say that frankly the land-grant system is behind the curve on this, as they are on many things—as is USDA.

MS. RAWSON. Would any of the other respondents like to take 30 seconds?

MS. SMALLEY. I will do this quickly. I certainly agree with the things you have mentioned. I have the highest regard for my colleagues back on campus, and I am thinking of a particular person in our department of animal science who did his doctoral dissertation on grazing.

I think part of it, as Dr. Liebhardt mentioned, is some of the people in animal science haven't necessarily caught on with some of the advances in the pasture management, to look at grazing in a new way. It takes time for some of those things to leap from discipline to discipline, and I think we are in a lag situation. I think it is coming, though.

MR. ADAMSKI. In the dairy industry, we have seen a lot of capital subsidy that has gone into making this infrastructure what we have today. There are silos, there are harvesters, there are large building facilities that farmers made the decisions in the seventies and eighties to have,

when we had capital gains exemption of income tax, accelerated depreciation—all of these capital subsidies that enhanced where we are today, and people just don't change overnight.

In 1988, we had a field day where there were two neighboring farmers who came to hear about our rotational grazing. This year, we had one where there were 50 people. So we have gone to an interest level. We are getting there. It is going to take a long time from where we are.

MR. BIRD. Yes, rate of adoption is something that is relative, and I would like to say with the vast majority of our U.S. agriculture structured around the industrial agribusiness model, which is not conducive for adoption of these types of technologies. I think I would argue that adoption has been more rapid than we should have expected.

Ms. RAWSON. One more comment from Mr. Liebhardt.

MR. LIEBHARDT. Yes. I think another major problem that we have within the land-grant system is the reward structure. If the reward structure were changed to reflect this activity—it is much more sexy, has much more pizzazz to have somebody running around a laboratory with a white coat injecting cows than it is to get out on farms and work with farmers doing this.

Policywise, I think one of the things that would help is, as farmers are going towards this methodology—and we have a lot of beef cattle people in California going towards it now—it does take people trained in this to go out and work with the farmers. It would help if we had more people like this go out at least the first year, and Bill Murphy is finding this in Vermont. He has a person hired and she goes around and works with about 25 farmers on a routine basis, because there are some things that you have to learn about this. It is a different way of operating.

Ms. RAWSON. I would like to thank the second panel very much for their excellent presentations.

We will aim for 11:05 to come back and see how well we do. Thank you.

[Recess]

Ms. RAWSON. If people would start to get back into their seats, we would like to commence with the third panel.

Attention, please! I think if people will take their seats, our panel has already taken its seat, and I would like to begin with the introductions right now.

Our third panel for this morning is composed of Mr. John Ikerd, who will be talking on marketing activities in sustainable agricultural systems. Mr. Ikerd was educated at the University of Missouri and has bachelor's, master's and Ph.D.'s in agricultural economics. He is an extension professor in the Department of Agricultural Economics at Missouri. He is currently providing leadership for the Sustainable Agricultural Systems Program, coordinating sustainable ag research and education programs within the University of Missouri and between the

university and other private and public agencies at the state and national level.

On the response panel for his paper is Mr. Thomas Dobbs, who is currently a professor in the Department of Economics at South Dakota State University. He holds a Ph.D. in agricultural economics from the University of Maryland. He specializes in economic development and resource economics, production economics, and agricultural policy and international agriculture.

The next respondent on the panel is Mr. Kent Yeager, who is an Indiana farmer. He has a great deal of affiliations in the local community. I will read all—well, I will read all of them. They are the Farm Bureau, the Corn Growers, the Cattlemen's Association, Pork Producers, Extension Advisory Board, 4-H Council, Chamber of Commerce, and last but not least the Heff Township Volunteer Fire Department. He was appointed by Governor Bayh to the Indiana Commission for Agriculture and Rural Development at its inception in 1989, and he serves as one of three committee chairmen for that Commission.

The third respondent on our panel is Jane Turnbull, who is a project manager in research and development for Pacific Gas and Electric, currently on a rotational assignment to the Storage and Renewables Department of the Electric Power Research Institute in Palo Alto, which is concerned with such issues as biofuels and other farm commodities that could be used to improve marketing opportunities for farmers. Jane received a BA from Wellesley College and a master of science from MIT in biochemistry and molecular biology.

Without further ado, if Mr. Ikerd would take the stand, please.

PANEL 3

MARKETING ACTIVITIES IN SUSTAINABLE AGRICULTURAL SYSTEM: ANOTHER PIECE TO THE PROFITABILITY PUZZLE: PRESENTED BY JOHN E. IKERD, UNIVERSITY OF MISSOURI

MR. IKERD. I appreciate the opportunity of being here today and speaking to this distinguished group and to the panel.

A little bit on my background, it is like coming home for me to talk about marketing, because I worked for 3 years with Wilson Foods between my BS and MS degree in the area of merchandising, advertising, sales promotion—this whole area. I also taught an undergraduate marketing course for 6 years in North Carolina State and spent about 15 years working in extension livestock marketing before I became interested in farm financial management, sustainable agriculture, and a lot of other things.

I have a professional passion at the present time on other issues related to sustainable agriculture, such as those that deal with the quality of life in rural communities, linkages between sustainable agriculture and rural economic development, on-farm participatory research, and an overall farming systems approach to the issue of sustainable agriculture. I am going to focus my remarks today very narrowly on the mar-

keting aspects, the marketing activities, within sustainable agriculture. I want to emphasize that I think that marketing is just one piece of the other things I have talked about in developing overall farming system, and in the overall development of rural communities, and in helping the farm families within those communities.

The topic I have today is "Marketing Activities in Sustainable Agriculture: Another Piece of the Profit Puzzle."

Sustainable systems must be profitable. There are differences in opinion about how sustainable agriculture ought to be defined, but I think that there is a growing consensus that sustainable systems must be profitable. Although certainly not all profitable systems are necessarily sustainable. Sustainable systems must be ecologically sound, economically viable, and socially supportive in order to be sustainable.

I think the past economic analyses that have been done on the economics or profitability of sustainable systems have had a shortcoming in not considering marketing. In general, we have assumed that farmers are marketers of raw commodities, not products, and we have assumed that prices are the same for all systems we have looked at, both those we call conventional and those called sustainable. I list some studies in the paper that have consumed that, and among those is one study that I did myself. We made those same assumptions. We assumed that prices were the same and that even price differences for such things as organic production would soon be competed away, and so in the long run we assumed that such differences would not exist.

Farmers in the past with conventional systems have, in fact, been commodity producers producing raw commodities, and their long run profitability, or their ability to survive in agriculture, in the past has been a function of their ability to expand horizontally. As we have increased the efficiency of agriculture, we enabled farmers to acquire more land so that they could farm more acres and produce more by expanding horizontally, by expanding and acquiring more land and producing more with a lower per unit margin.

I contend in my paper that many farmers, at least in the future, will market products as opposed to commodities. I will explain my definition of those or the distinction between those two later. I contend that, by and large, most farmers in the future will survive by expanding vertically rather than horizontally. As we have talked about sustainable agriculture, we talk about farmers that are replacing inputs, purchased inputs, by management of resources. That means that they are widening the margin by moving costs down, and that is a viable strategy. But what I want to talk about today are farmers that expand vertically by moving farther up into the marketing system, by moving beyond the traditional farm gate to perform functions that are within what we saw earlier called the non-farm sector or the marketing sector of agriculture, integrating marketing into the farming segment in much the same way that we integrate inputs into farming with the traditional approach to sustainable agriculture.

I contend also that if farmers are to be successful in pursuing this objective, they will need a level policy playing field. The policies of the past have supported a kind of agriculture that could only survive, where farmers could only survive, by expanding horizontally. We will need policies in the future that will give farmers at least the opportunity to compete by expanding vertically rather than horizontally.

The public mandate for agriculture in the past, I contend, was to support the industrialization of the U.S. economy. I think the mandate given to agriculture back at the beginning of this century was to free up manpower. Most of the people were out on farms. We needed to free up manpower to go in and work in the factories and in the offices to support the industrial process.

In the early part of this century, people spent a large proportion of their income on food, and we needed to free up income that was going to food, to make it discretionary, so we could buy the things that industries produce—the boats, the cars, the movie tickets, the recreation—all of those things we associate with the good life. So, in order to achieve these objectives, of freeing up manpower and reducing expenditures on food, we put in place government programs that would bring that about, that would improve the efficiency of agriculture through specialization and mechanization, that would reduce the labor input, that would reduce the cost of food relative to other items within the society.

We did that by stabilizing market prices so farmers could invest more in equipment, machinery, facilities with the certainty that prices would not drop below a certain level in the future. We did that by policies, tax policies and others, that encouraged investment in equipment and machinery that allowed us to farm the same land and produce more with fewer people on the land. We did it within the land-grant university system by developing and transferring production-increasing technology, productivity-increasing technology. And we put in place, what has become to be known among economists, is the technology treadmill.

Basically, the way we provided the motive for adoption of new technologies and new practices that would improve the efficiency was through the short-run profit potential of adopting new production technologies. We put a technology in place. As a result of that, the ability to increase production went up, which lowered the cost per unit of production. So temporarily, then, we had widened the margin between the farmer's price for the commodities and the farmer's cost to produce it.

So the farmers that adopted the new technology realized short-run profits. But, as more and more farmers adopted that technology, production would expand overall. As production expanded, then the price would fall, eliminating the profit gap. It was no longer there. Those that adopted later had to adopt just to survive and those that adopted too late could not survive, and were forced out of business, and that

put their farms up for sale so that they could be bought by other people to expand the technology even further.

As the gap disappeared, other farmers were forced to adopt, and those that didn't adopt quick enough moved on. That was the process by which they were "freed" —I put freed in quotes. That is the process by which they were "freed" up to go work in the factories and elsewhere.

The technology treadmill meant that you had to do this over and over and over and over again in order to create profits. And, as we did it over and over and over and over again, you had to adopt the technology faster and you had to adopt it more quickly on a larger scale just to keep up. You are running faster just to stay in the same place.

The figures associated with this particular trend support me when I say that at this point in time, agriculture has fulfilled this mandate of the past. I argue that the past mandate is basically fulfilled today. If you look back to 1890, 40 percent of U.S. farmers—22 million people—farmed. Forty percent of the people were farmers. That was all across the country. The 1890 census indicated that. I suspect—they didn't keep records on it at that time—but something over 50 percent of their income was spent on food at that time, because farmers were fully employed feeding themselves plus the other people, and we had some marketing costs in there. So just the people tied up in food production would have been over 50 percent.

If we look at 1990, a hundred years later, we see that 4.6 million, 2 percent, of the people farmed. From 40 percent down to 2 percent. We "freed" up people to go to work in the factories, whether they want to be "freed" or not. We now spend less than 12 percent of our income on food, down from something more than 50 percent. So we brought down the cost of food production. We have freed up discretionary income to be spent on those things that we associate with the quality of life in an industrial society.

Even if we look at that 12 percent spent on food, 80 percent of that, as we saw earlier, is in marketing costs. It is not value added on farms. Eighty percent of that 12 percent really goes to pay for packaging, promotion, advertising and various other things, processing and so on. Roughly 10 percent of that, or half of what is left for the farmer, goes for purchased input costs.

This means then that only 10 percent of the food cost is made up by value added on farms. It gets us back to where we started from before. The point being that whereas when we spent over half of our income on food, and most of that was on-farm produced, there was a lot for society to gain from increasing the efficiency of agriculture. But, folks, there is very little left for society to gain today from further increasing the efficiency, regardless of what happens on a farm. There is only 10 percent of food costs left on farms, and food costs are only 12 percent of the average consumer's budget.

It just doesn't make sense anymore to have programs in place with the primary focus of increasing the efficiency of agriculture. There is very little left to be squeezed out. When you look at farm profitability, farm profitability from the past has come from that squeezing out process. And we are down to the point now where there is so little left to be squeezed out it makes very little sense any more for farmers to look, from the standpoint of increasing their profitability, at reducing costs further and trying to squeeze more and more out of that 10 percent. There just isn't much left there either for consumers or for farmers to gain from increasing the efficiency of agriculture.

These programs and the policies made a lot of sense in 1900. They just don't make much sense in 1992. The challenge then to farmers—and I will spend most of the rest of my time on that—in the future is to expand vertically rather than horizontally. Rather than trying to produce more cheaper and buy out more of your neighbors—there is not going to be that many of them left—the challenge is to expand vertically. We are doing that through replacing input costs, reducing purchased inputs, but we must also do it from the standpoint of overall sustainability. Some of those lower input systems, more environmentally sound resource-conserving systems, may not be competitive in terms of total costs if you are simply producing raw materials. We may have to expand vertically to make those sustainable systems—from the standpoint of resource and environment—to make those systems sustainable economically. We do that by adding value to farm commodities.

How do we add value through marketing? Well, first let me give you the fundamentals of marketing—like going back to teaching a basic marketing course.

First, agricultural marketing includes all of those activities that are involved in transforming raw commodities into finished food and fiber products, including all of those things that occur between the raw commodity and the finished consumer products. There are four basic kinds of activities that take place that add value to products as they move through the marketing system.

One of those is form changes. Processing is the most usual example we talk about here. But form changes can range from grading apples into uniform lots, which changes them from being mixed to being uniform, to transforming wheat into Wheaties. Those are form changes, and there is lots of them to think about.

The other is place or space relationships. We can add value by changing place. Agriculture is something that is produced out all across the land. So the products sprout up out there across the land, but the people who consume are concentrated in certain areas, in towns and in cities. And so we increase the value of a product by moving it from where it is produced to the point where it needs to be consumed, or the point where the consumer wants it. Transportation is the most likely function that you think of here.

We can change value by changing the aspect of time. Agricultural commodities, basically, are the result of a biological process, many of which are seasonal in nature so that we have a harvest season. But people's taste and preferences tend not to fit those particular seasonal patterns. So we can increase the value of something by spreading it out from those periods of periodic production to where it is supplied over a longer period of time. Or we can increase value by being able to ensure that we can deliver something regularly over time according to some schedule.

Lastly among those value-adding activities is the aspect of possession or exchange. Producers and consumers are different people. If we can get the right producers producing the right things and get them somehow linked up with the people that want those particular things most, then we increase the value of what comes out of the marketing process.

So that is Marketing 101. But that is really the bottom line in terms of how you create value through expanding vertically through marketing.

How does that compare to what we have done traditionally in agriculture? And this is where I have spent most of my career. In agriculture, as farmers, we typically treat marketing as commodity marketing as opposed to product marketing. When I was with Wilson we did product marketing. When I was working with farmers we did commodity marketing.

What are commodities? Commodities are basically things that are interchangeable, regardless of who produce them or where they come from. No. 2 yellow corn is No. 2 yellow corn and I don't much care whether it is yours or yours or somebody else's. Anybody can produce it anywhere around the world. If it meets those specifications, then it is a commodity. It is not a particular producer's product; it is a commodity. Choice beef—I don't care what feedlot it comes from, as long as it is choice and as long as it tastes good, I will eat it.

As a result of being interchangeable among producers, commodities tend to be very competitively priced, because you can get them from anybody anywhere around the world. Locational differences tend to very rarely exceed cost of transportation between areas, because if it does, then somebody goes and buys it and transports it from one place to another.

Differences in time, with respect to price, generally will be about equal to storage costs, unless somebody guesses very poorly in terms of how big the harvest is and how long it will last. So there is very little opportunity for profit margins associated with either form, location or time. I spent most of my career working with farmers on timing decisions. Commodity marketing comes down to basically forward pricing, where we have contracts and futures markets and options, and so on. And, the government is very heavily involved in providing market infor-

mation, in regulating futures, providing options, and so on, in the forward pricing area.

But from the standpoint of the individual farmer, the farmer always had to realize that he was trying to make money out of timing the sale, that if he was to make money from the marketing end of the business, then he must compete with speculators who spent their full time trying to guess where markets and prices were going to go. Most farmers spend a very little portion of their time trying to do likewise, and as a consequence, in most cases, farmers whom I have worked with and who were involved in marketing were more likely to end up losing money on marketing than they were making money, although there are some notable exceptions to that rule.

How does that relate to product marketing? Product marketing is different. Commodities are alike, but products are different. That is basically how you define a product. It is something that is different. Products are differentiated. In my freshman economics course, it rung a bell in my head when we started talking about differentiated products. I saw how futile it had been, me down on the farm in Southwest Missouri milking a dairy herd, where my milk was like everybody else's milk. And I thought to myself, if somehow I could get where I could produce something that was different. Differentiated, that was the word that we used. We differentiate commodities in ways that give them distinct values so that they are different from everybody else's. We want what we are producing, what I have, to be different and hopefully better than what somebody else has to offer for sale.

These distinct differences with respect to time, place, form and possession give it distinct values. Sometimes those values are tangible values, as in nutrient content or color that you can see. Sometimes those values are intangible values, as in brand product advertising. People simply think it is different, therefore they will pay more for it, and to them it may be different simply because they think it is different. I never worried too much about that whole thing. If you can make it different, you have created an opportunity to separate yourself out and to make money, or to make profits from marketing.

Products—as opposed to commodities—are all less than perfect substitutes. That is what makes them products. Those products that have very few substitutes, and have a significant market, have the potential for having a large value difference between them and the other things with which they are competing because there is nothing else that will quite substitute for it. So people will pay more for yours because it is more different.

You can have products that have many substitutes. In this case the value differences will be small and you are limited in the extent to which you can price your product different from those of your competitor. But nonetheless, the difference makes it a product.

Marketing then is a key piece in the overall profit puzzle of the future, as far as I see it for farmers. Many farmers have found ways to make their lower input farming operations economically sustainable by

marketing. They have found ways to make them economically viable—farming operations have been made economically viable through marketing. They differentiate their products. They differentiate commodities. They use activities such as processing, transportation, storage, merchandising—all of these things that we have talked about here—in terms of changing time, space, form and possession.

Farmers are using these to increase profitability. They find a profitable market niche, a group of consumers for an environmentally friendly product that can produce on their farm. Now, I give three different examples in the text of my paper, and I am going to give a very short synopsis of those and you can read more about them in the paper, if you are interested.

I will point out to begin with that these examples are not hard to find. It didn't take me 15 minutes to round up these three people to be on a program that we were going to have on niche marketing. There are a lot of them around. They don't get a whole lot of attention, because basically they are different, so it is hard to classify them as one big group of folks. Basically they are different. They are different from each other and they are different from conventional farmers, but they are out there.

The first one I talk about is Ray Evans. Ray Evans has a farm he calls Evans Funny Farm, because one of his kids said, "Daddy, this is really a funny farm you have out here." Anyway, that is where it got its name. He farms 18,000 square feet. I think that is less than a third of an acre. Now, some people would look at that and say, "Well, that's just a hobby." But he grosses \$2 a square foot. That is \$36,000. And his net is about half or more of his gross. That is \$18,000.

Now, if you look at the average farm in Missouri, using the same measure of cash income, the average farm in Missouri is 275 acres, not a third of an acre. But the average farm in Missouri has a net cash income of \$8,000, not \$18,000. I would say that Evans Funny Farm might be looked at as being funny, because it is doing so much better than a lot of other of our farms are in Missouri. Now, there are farms in Missouri who do a whole lot better than that, and I don't want to get Missouri in the same stage as Arkansas, even though we are pretty close. We are not the lowest of the low.

[Laughter]

What are the keys to Ray's success? He markets. He has 10 or 12 restaurants, and he says he would rather have fewer that bought more, rather than have more customers. In other words, he is looking for fewer customers. He takes risks on new products. He produces fruits vegetables primarily and various other things—edible flowers and things like this. He brings the product in and he says, "Let's try it for a while and see how it works for you. Then, after we see how it is moving, then we will put together an order on it." If it doesn't sell, he takes it back. If it does sell, then he writes out the order. He absorbs the waste if too much comes in.

He produces a very high quality product, because he knows he is producing for restaurants and restaurants cannot afford to skimp on quality of food. It is such a small part of their total cost and such a small part of the menu price that they cannot afford to skimp on quality, and that is what he brings them.

How does he do all this? He charges for it. He creates value, but he charges for it in the prices. He puts it in the prices and prices his product in such a way that he can make money doing the other things. He decides first what service he is going to offer, and then he says how much is it going to cost, and then he prices it so he can cover those costs plus a profit.

My next example: Jack and Suzanne Frazier moved down to the Ozarks from somewhere up in the Northeast and grow organic herbs, vegetables and edible flowers. They make their living on 2 acres of raised beds. The keys to their success: Ingenuity, quality and shelf life. But it really reflects ingenuity.

First of all, from everything they produce, they remove every piece of foreign matter—damaged stems, leaves, everything—because that is where deterioration in quality starts, from the injury to the plant. They take all of that out. They also invested in a mechanical salad spinner, so everything goes in there and is washed and then spun dry.

But the thing that really intrigued me about this story is that they had read enough and knew enough that they realized that plant materials that are flooded in carbon dioxide deteriorate more slowly than those that they are exposed to oxygen. So what they have done is they have gotten some specially made plastic containers. They also realized that carbon dioxide is heavier than oxygen, so they have a bottle of carbon dioxide, pour it into these special containers and then seal them up. They have a good product to start with. It has much longer shelf life because of the way they process it, clear plastic bags and the plastic containers that are filled with carbon dioxide. They put a lot of work into this. How do they make it pay? They charge for it. They know that it is more valuable. They figure up what it is going to cost and what they have to live on and they put that into the price, and the people pay the price because the quality is different.

Last example, Shepard Farms. They are involved in the pecan business. This farm is several hundred acres; I can't remember exactly how many. I could have called him and found out, but it is not really relevant. It is several hundred acres up in north Missouri. They put together a combination. They started out in pecans, but then they brought in buffalo to graze around the pecan trees and other areas. And then they got involved with Gama grass to feed the buffalo. Now, that is a sustainable operation, the buffalo roaming under pecan trees on Gama grass. Right?

The real question is how do you make it pay, particularly when you are up in North Missouri where there are not many folks around. So how do you make it profitable? Well, they started out with a mail order business by selling the pecans and pecan products, which are fairly eas-

ily sold by mail order. They put together a catalogue and shipped it out. So it wasn't as big a jump for them, then, when they got involved in buffalo, to go ahead and start selling buffalo jerky and buffalo sausage and this sort of thing. They just integrated it into the mail order business. But they went on further, into steaks and roasts and that sort of thing, which they ship under dry ice. They also used the same concept when they got into Gama grass. They discovered that a lot of other people wanted to grow Gama grass, so they started selling the seed from the Gama grass. So the buffalo basically roam for free out there. They sell the seed of the Gama grass to pay for the pasture.

Anyway, the thing is, how did they make that overall thing work? They merchandised. They dealt with different products that were sustainable on their farm operation and the way of life they wanted to pursue, and they found a way to merchandise those things in such a way that they could make that sustainable operation profitable.

As I say, these examples are everywhere. There is a whole set of tapes that have been put together. Rodale was involved in that. I think it is number six of a nine tape series that is on high-volume marketing. There are good examples in there. *Small Farm Today Magazine* comes out of Missouri, is edited by Ron Macher, and is full of examples. There are others from around the country.

Ron Macher calls these farmers "agripreneurs." I don't know if he stole that term from somewhere else, but I promised I would at least quote him for a year or two, and then I would adopt it and not worry about it anymore. Anyway, he calls them "agripreneurs"—agricultural entrepreneurs.

He talks about the characteristics of these "agripreneurs," who he has worked with over the years. He says they are risk-takers. They are not afraid to try new things. They are willing to learn from others. They are salesmen, not just growers, not just farmers, not just producers, but salesmen. He says they are willing to make and to keep commitments with their customers, and they have learned how to set prices rather than just take prices.

You could spend the whole hour talking about "agripreneurs," but the people who I have talked about have these characteristics in common. All these "agripreneurs" are different from each other, but what we are looking for is some of the common threads that tie them together.

Ron also talks at great length about some of these things, but he says that he feels that one of the strongest attributes of the people who he has seen be successful is their strong emphasis on families. They see the family as important, in terms of setting goals and values and in developing aspirations. They see that responsibilities within the family are important.

He also sees successful families that aren't afraid of hard work, that don't really look upon work as something to be avoided but as something you do everyday. I think we have made a mistake in economics

by consistently looking at work as something to be avoided. If we were all out of work, what would we do? Work is something to be enjoyed as well as something to earn a living, and that is what Ron says is a characteristic of agriprenuers. He also says that they are willing to take responsibility themselves for their profitability. That they are not looking for somebody from outside to come in and tell them how to do everything. They take the responsibility.

Now, let's talk about the policy implications, as I wind down here. I support a lot of the things that have been said before, and I have on many other occasions, about the need for sustainable agricultural research and education in the land-grant universities and so on. We need research and policies that will support strong rural communities and quality of life in rural communities. But let me talk specifically now about marketing.

How do we level the playing field for these entrepreneurs so that they can compete with commodity producers? Well, first of all, the public does have an interest in efficient markets. I think that should be said upfront. There is a public good associated with market efficiency. It doesn't just evolve naturally out of the free enterprise process. In fact, the opposite will evolve naturally out of that.

Traditional open markets are, in fact, disappearing. Even in terms of direct sale between producers and processors, processors would rather deal with a few large producers than a whole bunch of little folks, regardless of whether it is indirectly through an open market or whether it is one on one with contracts. We see around the country that contract production is going even further, so that farmers really aren't farmers at all anymore. There is really no transfer of ownership. The farmers end up basically being hired workers for the processor or the feeder, producer of feed, or whatever.

The consequence is that the markets are disappearing. As public markets disappear, the smaller producers have lost access to markets that are critical to their survival. Large producers benefit from programs ranging all the way from the market news service on one hand to export enhancement on the other, but there is practically nothing there for the farmer that doesn't fit the traditional, conventional mold of the producer of an agricultural commodity.

It is in the public interest to maintain competitive markets, not only between commodity producers, but to maintain the ability to compete between the smaller diversified product producer competing with the commodity producer. I have mentioned three marketing policy options for the future. One, I suggest, is to take a more serious look at farmers markets. Basically, the farmers markets that the government have been involved in putting in place in the past have been a way to appease a vocal group of farmers within a community and a vocal group of consumers. They said, "Let's give them a little bit of something to shut them up." I am talking about taking a serious look at farmers markets as a way for producers, product producers, to market their products on a large scale. It may mean that farmers have to add more value to their

commodities, to turn them into products, before they get to the market. It may be that the market itself has to provide the opportunity for value-added processing, for storage, for transportation, or to provide other functions that will translate commodities into products.

Small-scale producers/processors is the other option that I talk about in the paper. We have basically looked to the industrial model of processing in the past. I think there are opportunities for small scale processing. If we had small scale processing, then there wouldn't be the tendency for everybody to want to buy from a big producer. Small scale processors would buy from small scale producers in smaller lots.

Can something like that survive and prosper in the 21st century? Alvin Toffler, among other futurists, thinks that they can. They point out that large firms lack the flexibility that it will take to compete in the dynamic society that we expect to see in the 21st century. Already we have looked back over the past decade and two thirds of all the new non-farm jobs have been created by small businesses, not large businesses. The trend is already underway. In fact, Toffler, in his book, *Power Shifts*, has a whole chapter on family firms—fam-firms, he calls them—which are consistent with the models of family farming that I am talking about today.

The last policy option that I talk about in the paper is public niche markets, the creation of public niche markets to replace the old public markets of the past. Catalogue sales, for example, is something that a lot of people are doing on their own. We can do catalogue sales cooperatively; we could get cooperative listings and publications and catalogues.

We can do niche marketing electronically. We can take programs like as the Foreign Ag Service has linking up foreign buyers with sellers in this country, and such as Extension's program on going global, which deals primarily with foreign markets. Why don't we take the same concepts and link people up within communities, within states, and within regions, with the government overall, through a public policy process, providing the electronic infrastructure, the media infrastructure, the mailing infrastructure, or whatever it takes to allow people to exchange information more effectively than they are doing now.

The new markets I am talking about here would be public markets for products, value-added products, as opposed to commodities.

Finally, in conclusion, let's consider the farmers of the 21st century. I think, will be family farms of the 21st century, but I think most of those family farms will be a different family farm than the family farm of the last century. They will be "agripreneurs," the family farmers of the future, and they won't think like conventional farmers. In fact, the most consistent piece of advice that people give to farmers who want to be "agripreneurs" is, "don't think like conventional farmers. Think about producing value, not producing commodities. Not producing corn, oat, wheat, or whatever, but producing value."

Public policies for the 21st century, I think, could profit from that same philosophy. You are developing policies for these new kinds of farmers. Don't think conventional commodity policy. Rethink. Think about what this particular farmer needs to be competitive with the larger producers of agricultural commodities.

What we are talking about here is a new paradigm. "Agripreneur" is a new paradigm, which is part of the new paradigm of sustainable agriculture. New paradigms require a new thought process, a rethinking, if you will, and possibly a whole new beginning.

Thank you.

[The paper presented by Mr. Ikerd starts on p.140 of Submissions for the Record:]

Ms. RAWSON. We will move into the respondents right now. You can either just use the microphone in front of you or you can go to the podium, if you wish, and identify yourself. Thank you.

**RESPONSE STATEMENT OF TOM DOBBS, PROFESSOR OF ECONOMICS,
SOUTH DAKOTA STATE UNIVERSITY**

MR. DOBBS. I am Tom Dobbs of South Dakota State University.

I think John has made a very valuable contribution to the issue of making sustainable farming systems profitable to farmers by focusing on adding value, rather than just reducing costs.

His conceptualization of the issue helps to clarify thinking about the range of policy possibilities. This thinking leads John to identify several needs and opportunities, just two of which I want to reemphasize in the opening part of my response. Neither one of these got as much elaboration in his oral comments as they did in the written paper, and I think they are worth calling renewed attention to.

One of these is new support for old institutions. In the paper, John indicates that farmer cooperatives, for one thing, may be needed in some instances to support marketing activities of these "agripreneurs" that he refers to. I agree. We are already seeing this in the Northern Plains. The Northern Plains Sustainable Agriculture Society has put together a task force on marketing of the agricultural produce of their members. This task force consists of people from North and South Dakota and Minnesota.

Our sister institution in North Dakota, North Dakota State University, has provided some support to the efforts of this task force. However, there are few remaining research or extension faculty in the Nation's land-grant universities who have expert knowledge and experience in planning and organizing agricultural cooperatives. Profitable and sustainable farming in the next century may call for renewed land-grant and USDA support for some old institutions such as agricultural cooperatives.

A second point mentioned in the paper, and not quite as much in the oral remarks, is small scale processing. John also sees a role for more

small scale agricultural processing as a means of leaving more value added in farmers' hands.

Now, on the one hand, I have been personally skeptical of some of the past public sector attempts to "promote" certain kinds of small scale processing—in particular, some of the efforts in the late seventies and early eighties with small scale fuel ethanol production. As a result of some of my experiences and research in that area, I have a strong belief that caution and sound economic judgment are imperatives for any public policies for small scale processing.

Nevertheless, there are grounds for some optimism in line with John's views. Public policies, which would be most supportive of small-scale processing, in my view, are ones which would force processing facilities of all sizes to internalize all of their external environmental costs, since I suspect that, on balance, large scale processing facilities produce disproportionate externalities.

Now, having mentioned those two points as reemphasis, I wish to emphasize I am largely in agreement with the views expressed in John's paper, but I do have some concern with the implications of a few of the points he raises. One of these points is the emphasis on niche, including organic, markets. I continue to think we need to be cautious in our assumptions about the potential for organic markets to provide general and significant income support for agriculture.

In our studies at South Dakota State University, we have found that, at present, organic premiums do sometimes provide sufficient increases in gross revenue to make certain sustainable systems profitable or more profitable than the conventional farming systems with which they are compared in the same areas. However, organic markets are highly variable and subject to rapid price declines as more producers move into those markets. A widespread shift to "agripreneurial" farming could cause substantial reductions in the premiums now available or presently available due to limited supplies.

John rightly emphasizes policies to "level the playing field" for niche marketers. However, we must recognize that there would be difficult adjustment processes for agriculture associated with such policies. Present organic and other niche producers would be among those facing the difficult adjustments, precisely because they would be facing new competitors in their markets. That is not an argument against leveling the playing field, but a note of caution.

In summary, I would like to call attention, in part, to a recent article by Bruce Gardner, which argues that there really is no longer a sector-wide farm income problem in the United States. I am sure many of you in this audience have read that article. Moving to a more entrepreneurial agriculture and leveling the playing field by gradual removal of commodity-oriented income supports are possible policy implications of Gardner's conclusions. However, that alone would not assure, in my view, either environmentally sound farming systems or a moderate-size family farm structure—two issues we are spending quite a bit of time on in this symposium.

Accomplishing those two goals will require continued government involvement in agriculture, in my view, but an involvement which does three things: (1) compensates farmers for some of the income sacrifices associated with their use of environmentally sound farming practices; we have heard that echoed today already and probably will again; (2) effectively targets moderate-size farms; and (3), and this is a really difficult one, avoid simply capitalizing the income transfers into permanently higher land values.

Thank you.

[The prepared response statement of Mr. Dobbs starts on p.150 of Submissions for the Record:]

**RESPONSE STATEMENT OF JANE TURNBILL,
ELECTRIC POWER RESEARCH INSTITUTE**

MS. TURNBILL. I did bring some slides, but I didn't bring prepared remarks.

I am here representing EPRI—the Electric Power Research Institute—which is the umbrella research organization for most of the U.S. electric utilities. We have about 700 member utilities in this country and we have 5 member utilities abroad. I am in the storage and renewables department and having been looking specifically at what the options are for new and alternative energy resources.

The resource that we have found to be really very attractive in the immediate short run is biomass or biofuels. At this point in history, we have in this country 7000 megawatts of power being generated from biomass. In California alone on PG&E's grid, there are 700 megawatts. Seven hundred megawatts is about the size of a pretty good-sized coal plant, so it is not inconsequential at this point in time. But most of the plants that are out there are in the 20 and 30 megawatt size, and they are found largely in rural areas, because it is in the rural areas where the resource is most available.

We have been looking at the use of wastes for the feedstock for these plants, but it does look as though, if this is going to be expanded to become a truly significant resource, we are going to have to go to new feedstocks, and those new feedstocks are going to be new agricultural products.

They come in two groups, the woody crops and the herbaceous crops, and thus far most of the crops that are being developed out there have been in the woody crop category. But there is a great deal of interest and excitement about the herbaceous crops.

You see here poplars that are growing in Minnesota, and being harvested in Minnesota. In some cases, they are being harvested for pulp with the residual material going to power generation. In some cases, they are being generated directly for power generation.

Dedicated energy crop production—what we are about at this time. We are seeing that the crops that are being produced out there, right now, and the work that has been done by Oak Ridge National Lab over

the last 14 years is really beginning to come to real fruition. Crop production today comes in the 3 to 7 bone dry tons a year area. We expect that within 20 years it will be 7 to 12 bone dry tons a year. At this point in time, there is less than 50,000 acres planted in this country.

My conclusion, which I am telling the electric utilities by the end of this year, is that it is very realistic to think in terms of 50 million acres being planted within the next 20 years.

The cost of raising these crops at this point is between \$45 and \$50 a bone dry ton. Even during it in a fully environmentally sound way, we expect those prices should come down to \$35 to \$40 a bone dry ton.

At this time, we are thinking largely of short rotation woody crops, but the future really looks extremely exciting for the herbaceous perennial crops as well. But, in order to make the change, we have to go through zonal selection, genetic improvements, better crop and site matching. It is really quite a sophisticated process.

I mentioned harvesting improvements last there. But contract farming really does speak to the future of the family farm. Electric utilities are in the electricity production world. That is where their expertise is. That is where their interest lies. They do not want to get into farming, and they are not going to adopt biomass as a resource if they have to do the production of the feedstock itself.

This is a DOE graph, but as you can see, the wood residue waste has been the feedstock of choice, and it looks as though it will be, at least in this next 10-year period. But the anticipation is that between the year 2000 and 2030 there will be incredibly significant—this is where the 50 million acres comes in, the growth of the energy crop production.

It is a generalized resource. The only place in the country where it does not look promising is the Western portion of the country, which is highly arid because of the irrigation requirement. The perennial grasses in the Central States are the ones that are getting the most attention right now because they are really exciting. Switch grass and new clones of those will grow the 8 bone dry tons per year very economically.

Renewable and domestic energy resources. We are looking to get off the fossil fuel dependency that we have. No net CO₂ production, a very major consideration. Reduction in SO_x and NO_x emissions. In fact, we may have some scrubbers on some of the coal plants being displaced by co-firing with biomass instead. They won't have to clean the sulfur out.

Enhancement of rural economies. We do see this as a really major contribution to rural America. Restoration of degraded lands, habitat protection and development, riparian area protection improvement are all important, and we have put together with the Audubon Society a National Biofuels Roundtable to look at criteria for developing these grasses and these woody crops in a truly economically sound way, as well as in an environmentally viable way. Within the next year, we ex-

pect to have principles established to do this. We have a roundtable of 26 really competent people working in this area.

There are co-products as well. Higher value co-products that will help this come into being. Besides electricity, there are liquid fuels, pulp for paper production, aliphatic chemicals—all coming from the same products.

Obstacles to biofuels development are the same as you have heard here earlier today. Concerted commitment is lacking, and my concern is to get the electric utilities to take this as seriously as they should. Agricultural and energy policy playing fields are not level out there. We have done a supply curve and we do know that the current commodity pricing structure has increased the cost of the biomass fuels somewhere between \$10 to \$12 a bone dry ton, based upon existing policies.

And farmer education is needed. There has been very little reason for farmers to take it seriously if they haven't known about this. We are just about at the point where we really do want to tell them, but it can't be done—the electric utilities, again, can't do it by themselves. It has to be done in cooperation with the agricultural people.

Thank you.

RESPONSE STATEMENT OF KENT YEAGER, INDIANA FARMER

MR. YEAGER. My name is Kent Yeager and I am from Indiana, and as you can no doubt tell by now, I am from southern Indiana. When I begin to speak, it doesn't take long to pick up on that.

I would like to say, Stewart, that oftentimes people say that there is no practicality in Washington, D.C., and that is much of the problem up here. But I couldn't tell from back there, but tape duct has found its place here, and that is good. I think people back home would be real interested to know that.

I think John pretty well covered a lot of the points that need to be made about some of the opportunities. I found myself wondering yesterday and last night what I could say in 5 minutes in order to add something to this. I think probably what I will do is raise a lot more questions than I will provide any answers, which is pretty typical in these situations.

But, to tell you just a little bit more about myself, we grow, of course, corn, soybeans, wheat, and we also grow popcorn, and we don't just grow one type of popcorn. We grow not only shelled popcorn that is the traditional popcorn that you go in the store and buy, but we grow popcorn. It is a rather small company that markets that to microwave on the ear, and we have grown for them since they started with it, I think, in 1986, and it has had its ups and downs. A lot of people got into that market, but it has been an interesting little thing. We are the only person that grows for that boy, and I think the point I want to make with this is that there is a real lack of connection with people and their products anymore. And those of us that are used to producing a mass quantity of product, it feels good to know that you produce some-

thing and be able to find it. They have a national marketing network. I have found the popcorn in Arizona, in California, in Texas, and lots of places. They put different people's names on the label, but the background on the label is always the same, and I can always tell. I take a lot of pride in saying that that is my popcorn, because I know if they marketed it, I grew it for them.

I think that goes back to a little bit about what John was saying, and there is some opportunity in that connection. I will talk a little bit about vertical integration and contracts that maybe haven't been brought out too much, and a little bit about biotechnology, which I think we have hit around on, but haven't really mentioned too much.

I think many times we have found ourselves wondering what it is that we can do to help make this connection, and we have seen people take advantage of it. Large companies take advantage of it. Tyson Foods, for instance. Any of the big food companies have tried to make this connection, follow a product all the way through. Some of them, you know, are not going from the very product inception to actually marketing in a store, but that is the trend we have seen. And where that leads us with vertical integration and contracts, I think is important.

I not only farm in Harrison County, Indiana, but I work for Indiana Farm Bureau as a field representative, and I have seven counties in Southern Indiana, and five of my seven counties are counties that I would say are really economically depressed, severely so. A lot of resources aren't being used, and I think the one that bothers me most, of course, that is not being used is the human resource.

I think one thing that is a big concern in Indiana right now is a vertical integration idea, and where we may be headed with this, as far as a company, for instance, having what we have now in the poultry industry, starting out where one company owns the turkey or chicken or whatever—it may be from the time that chicken is born all the way through until it is marketed. Now, they can provide a very consistent product that way, and there are some real reasons for doing that, and I am not here to argue for or against those reasons. They have managed to take advantage of something that maybe some of us can do on a little bit smaller scale.

I think the pork industry is faced with that same question, right now. In the pork industry, we have talked since I started farming some 20 years ago about improving the quality of pork, and price was going to be based on quality, and all that. We haven't really seen that change take place too much, but I think in the next 3 to 5 years we are going to see that change take place. We are going to have companies that are going to be very much product oriented in their marketing, and if they can't get the product that they want, that they need to market to consumers, they are going to become increasingly interested in owning that product prior to conception to the breeding herd, and everything all the way through.

So, the question that raises and where that leaves independent farmers and their access to markets, I think, really is the potential problem.

I just would mention that biotechnology, I think, while we may talk about some of its disadvantages—and there certainly are some—it offers some real opportunities to us in being able to raise specific products in one way or another that may fill a particular market niche. But, again, we are going to get into more contracting and dealing with somebody else besides the typical commodity that we have taken. No. 2 yellow corn is worth so much, and it is no problem, but maybe the specific commodity would not meet what the buyer wanted.

Now, we have not had a problem with that with our popcorn, because we have been able to work well with this individual, and I understand the problems he is up against and he understands the problems we are up against. But that is not available to everybody, and that is one of the problems with a lot of the niches.

I would like to point out three things that I think are real problems and need to be addressed, and one of those things is in rural areas, particularly in the rural areas that I am in, we have a real problem with capital investment, right now. There just isn't the capital to invest. In our area predominately, our banks are not local banks anymore, and they are not interested in taking a chance and doing rural kinds of loans and helping conduct economic activity in rural areas like they were 20 or 30 years ago. So we have a very different situation there.

One other thing that needs to be looked at, as far as federal policy, is very careful regulation. We have talked about several of the problems—the fixed cost aspect that Stewart mentioned in the opening. Some of those fixed costs that get involved with the family farmer, things that a lot of people take for granted, which are things like health insurance, is a very clear one, and one that really dominates a lot of thinking for farmers and rural people now and how that is provided.

One other one is vacation time: Having time to build, having time to spend with the family. Because, you know, as has been said earlier today, farmers really get so busy that they just keep stretching themselves thinner and thinner and thinner, and that is a real concern I have and it is what I have seen going on in the area that I am in.

Also regulations tend to lead to bigger operations, I think. Operations that can provide legal services and things, somebody that just pretty much deals with the regulatory area. And, I think, we all find ourselves falling into that trap with increasing amounts of regulation.

The last thing I would mention is public research. We have talked about a little bit about rotational grazing and reasons that that has not received more attention than it has. Just one personal example. We farm a little bit in Kentucky, in fact. In 1978, we got into a project that was at that time federally funded, which the University of Kentucky got into with integrated pest management. I was very excited about this and spent about 3 years doing what I called weaning myself off of corn insecticides. But I was scared not to use it up until that time; afraid

something would happen. But, with having this integrated pest management program, we were able to do that. It offered a real economic advantage once we got into it, and that is what caused its adoption at that time.

That program was dropped in about 2 years' time from the federal level because of cutbacks. A number of us set up a group in which we had about 20,000 acres, hired a full-time person to run our scouting service, and we had a good operation going on our own—an independent business that we all subscribed to. It was a co-op deal, and I think co-ops are another thing that offers us some opportunity for specific purposes. But we had a co-op deal going until 1983, in the PIK year, when we set aside so much ground that we couldn't sustain even the small amount of fixed costs that we had built up in that little pest management operation, and we had to can it. So some of us have tried to adopt that. But I found myself many times thinking, you know, fields need to be scattered every week, but it is one of those jobs you can put off, and you will get up today thinking, well, I will go look at that field, but it is not easy to look at, and I find myself 2 weeks later thinking, Boy, I need to go look at that field, but it is hard to get yourself indoctrinated to that sort of thing, and it takes help to do it. So I think some of the public research can really help to get that done and provide people who can teach all of us how to do it.

Thank you.

MR. IKERD. I wanted to make just a real quick response, particularly to what Tom said about the organic premiums, because I think it reflects a misunderstanding between what I am talking about and what he is talking about.

I would agree that the organic premiums will be reduced to reflect differences in cost of production if we make organic production a commodity, or organic produce as a commodity rather than a product. Now, it is distinctly different for some of these producers who are able to market something like organic popcorn, or whatever, because it is different from anything else that is available. If, in fact, we develop organic standards so that everybody's organic popcorn is the same, then it becomes a commodity and then the premium goes back down competitively to whatever the difference in cost of production is. But that is not what I am talking about.

I go back to this thing with the paradigm shift. It is a difference in mind-set, a difference in way of thinking. What we are looking for are not things that have wide-scale adaption in a lot of different places. We are looking, in fact, for things that can't be produced wide scale in a lot of different places, but are unique to a specific product or producers with specific qualities in specific places at a specific time. We are looking for small opportunities, not large opportunities. When you are able to mass produce it and mass market it, it becomes a commodity and the profitability potential is gone.

So we need to change our whole way of thinking about opportunities for farmers, away from mass production for mass markets, back to

niche markets by individuals, and that means that instead of developing and transferring technology, we have to empower people to be different. That means giving them an opportunity to be different through technology. That means giving them an opportunity in technology. That means giving them the opportunity to access the capital to be different. Not alike, but different. That is the challenge that is before us.

Ms. RAWSON. I would like to thank this panel very much for its excellent presentations, and now we have almost 10 minutes available for questions. Please step up to the microphone and identify yourself.

QUESTIONS AND ANSWERS

MR. STITZ. My name is John Stitz. I am with Catholic Rural Life in Kansas.

Dr. Ikerd, I have a couple of questions for you. And, Dr. Dobbs, you may want to comment on this. Kansas was founded and grew up on wheat and cattle. Basically, we are culturally and economically locked into that system, and that is large scale production. When you pray, do you ever lay that paradigm of yours on wheat production and that agriculture?

My second question refers to your last paragraph where you refer to public policy. How do you see this emerging in the future against the policy that is envisioned by GATT and NAFTA?

MR. IKERD. Okay, on the first one, on wheat and cattle, as I said in the beginning, I think we have squeezed about all of those basic commodities that there is to be squeezed out. There is so little left in terms of value added on farms that if we gave it all to the farmers, at 2 percent a year, it would be gone in 5 years.

What we have done in the past to maintain profitability in agriculture, at least periodically, that option is gone. Stewart's trend line hits zero in the year 2010. As they throw around in political circles, that was a good old dog and he hunted a lot, but that dog is not going to hunt in the next century. It is gone. And I think we are being dishonest with farmers if we tell them that somehow we are going to continue the opportunity for agriculture to be profitable by pursuing the same policies that we pursued in the past. It made sense for the last century. It simply does not make sense for the next one.

I lived in Oklahoma for 8 years, and Oklahoma farmers are wheat and cattle farmers, and Kansas farmers are wheat and cattle farmers, and there are fewer and fewer of them all the time. There aren't going to be any farmers in Oklahoma and Kansas in 20 or 30 years unless farmers become "agripreneurs."

Now, in terms of the public policy with respect to GATT and this sort of thing, it is back to the old paradigm. It is based on the assumption that we are the world's major producers of raw commodities, undifferentiated raw commodities, to be sold in the international markets, and I think we will continue to do that as an economy for a

long time to come. The question is how many people will be involved in doing it? Not very many.

I think, for the strategy of being competitive in world markets and producing raw commodities, then GATT negotiations and things like that may make sense, from the individual's point of view. But from the standpoint of providing economic opportunities for farm families, it is basically irrelevant. It is just not relevant to the issue of creating opportunities for family farms. It may help destroy them, based on the model that I talked about, but it is not relevant in terms of creating opportunities for more farmers. I am not opposed to it. I am just saying it is not relevant to the issue.

MR. DOBBS. You asked if I would just elaborate briefly. The economy of the Northern Plains or the Dakotas is not all that different in character from the Central Plains of Kansas.

I am in agreement with John that there are opportunities for niche markets, including in the Plains. And I am not sure there is even any difference, in fact, in our amount of emphasis, but I did want to use my remarks and this opportunity to again caution. I don't feel that the niche markets and the organic markets—and I am not suggesting he does—constitute a solution by itself, and he didn't suggest it. But I think we need to emphasize that this is not a solution to the goals of sustainable agriculture in the Plains—maintaining family farms and assuring environmentally sound farming practices. It is part of the puzzle. I think it may be very easy in a policy arena for us to get caught up in entrepreneurialism as the solution by itself, and I wanted to use my remarks to emphasize that caution.

MS. BIRD. I am Elizabeth Bird from the Center for Rural Affairs. I want to follow up on what Tom just said, because my questions for John and also for Jane relate to this.

What are the limits of what you think this small-scale, high-value products and marketing might be? To what extent do you see it as a solution to the puzzle that Tom laid out? Or, how small a piece of the puzzle is it? Do you see the demand curve for those kinds of products as being more elastic than for food in general, so that means there is potential for an ever-expanding market for these kinds of products, or are we going to run into limits on that score as well?

Relatedly, if you start thinking of farming as a small business, one of the things that concerns me as a small scale entrepreneur is that the rate of failure of small businesses is very, very high, and if we saw that rate of failure on an ongoing basis in the farming sector ... I mean, the thing about small businesses is that new ones keep coming up, so overall it may not be a loss. In farming, the land is such a major fixed asset, and farming has such profound impacts on both its natural environment and the rural community environment, to conceptualize farming in those terms with constant overturning is scary to me.

Relatedly for Jane, my concern is similar to Kent's, I think, about the idea of producing on a massive scale for biomass conversion, that you

get into the problems of contract farming, and I think that he laid those out well. So I am interested in what you foresee as the potential for small-scale conversion. You mentioned that a lot of the conversion that is going on now is small scale, and I recognize that you work for the electricity industry, so this is not your interest. But I wonder if you see the potential for locally based, farm-based electricity generation that can be more under local farmer control.

MR. IKERD. I will try to be brief. I don't know if I will hit each of the questions, but I will try to.

First of all, the extent to which this niche marketing or "agriprenurship"—let's just call it that—is applicable. Well, again, here is a matter of having to turn conventional thinking upside down. We say that 10 percent of the farmers produce 90 percent of the products. I don't know what the percentages are, but somewhere in that category. Just let me round them off to that. That is our reason, basically, for dealing with large farmers. We say, "Well, what we're interested in is reducing the cost of food." Now, if what you are interested in is reducing the cost of food, working with large farmers is right. But let's flip it around. Let's say that we are interested in opportunities for "agripreneurs." Then, that means, if we could do something, like I have talked about, with 10 percent of agricultural production, then we have changed the lives of 90 percent of the farmers without changing production ratios at all. If we focus on people, we focus on opportunities for farmers, then we are focusing on things where we don't have to influence all of the commodities produced. At 10 percent of the commodities, we could influence the lives of 90 percent of the farmers.

Basically, what I am talking about, when I talk about the ability to expand and so on, is moving up into the marketing system. Not doing things that other farmers are doing that would increase the supply of food, but changing the nature of the food product by doing more differentiation—more of the processing, transportation, storage, the marketing functions. Most of these things could be done by farmers rather than by marketing folks.

So that they are not competing with other farmers and saying, "Well, you have to expand production in order to create this profitability." That is back to the old mind-set. The mind-set I have is, no, we are not talking about more production, maybe even less. We are talking about doing different things, not doing more things.

And then the question on the risk involved in businesses. There is more risk. That is the nature of entrepreneurship. It is risky. But profit is the return to risk. If you get down to Economics 101 again, profit is the return to risk. All the other stuff, rent and wages and all that sort of thing, accrue to other factors, but profit is the return to risk. Anybody that isn't willing to take a risk isn't going to make a pure profit. They may make a return to their labor, their land, or capital and so on, but not a pure profit. So the risk is inherent and it has to be there.

I think what we are talking about is farmers being more like other business people that do in fact take risks. Just because you take a risk and it doesn't work out, and if your losses are diversified, it doesn't mean you have lost the farm. It means your losses were involved in one niche activity as a part of an overall farming operation that was designed to take risk. That is the systems approach again. So, if one of your endeavors fails, you have to have an overall farming system that doesn't fail, so you can absorb the risk without losing the farm. That is a part of the new paradigm for farming that we are talking about.

Ms. TURNBULL. I agree with John's comments completely. But, to answer your questions, Elizabeth, in terms of scale, one reason we set up this National Biofuels Roundtable was concern about such massive potential change of land use in the country. Fifty million acres or even the possibility of 100 million acres, which use is not utterly unrealistic, is a massive change.

We want to make certain that whatever is done is done from an environmentally aware perspective, and so we do have the best landscape ecologists and the best soils biologists and the hydrologists and the geologists. So we are looking at defining protocols to make certain that what changes may be done to the land will be positive in some way. In fact, we are even hoping there will be a new value created, a value that goes with the creation of habitat or improvement of riparian areas because of these crops going in. We want to take degraded lands and make them better, and move habitat into areas where habitat does not exist, and have a product there.

We are interested in the CRP lands, the 35 million acres of set aside lands right now that could be put into perennial or woody crops where there would not be erosion considerations, and rather than set aside, you end up with a new market, a new product on those lands.

In terms of contract farming, this is a real concern. I have talked at length with the people at the University of Minnesota about, you know, what is the smallest size that becomes feasible. For herbaceous crops, I think we have concluded that 50 acres is feasible. For woody crops, 100 acres. This is assuming you can mobilize the harvesting equipment into the woody crop areas and have a shared means of putting capital into the harvesting equipment. The herbaceous crops is pretty much conventional harvesting costs, so you don't have to have an investment in the harvesting materials.

My concern is really how do you organize a system that is brand new? We do have the Extension Service in California working with the Farm Bureau in California to put in place a marketing co-op for the eucalyptus that they have developed. They have eucalyptus plantations which are 50 acres here and 100 acres here and 10 acres here. Those people mostly went into growing eucalyptus for the purpose of firewood, but now they have found that there is a new market in the power plants out there. But they don't know how to get the material to the power plants. So the Extension Service has been working with them and trying to define that. But we don't have a protocol in place,

and so we are looking for, you know, new and imaginative ways of creating an abridging infrastructure between this production and a new market out there.

MR. DOBBS. Maybe, I could just say one quick thing on Elizabeth's point. You emphasized risk as part of your question, and John responded to that in part.

I think part of what we are going to have to do to make entrepreneurialism work more effectively in agricultural and non-agricultural sectors is look at what kinds of general public policies, not agricultural or sector policies, *per se*, make entrepreneurialism work. And one of those things, for example, is generalized kinds of health insurance. We see a great deal of immobility and a great deal of job choice based on availability of health insurance. If we put health insurance in the public sector one way or another, like we have education now, that opens up a lot of options in people's choices and their ability to take risks in other areas.

MS. RAWSON. Thank you. I think we can squeeze in one more very short one, Don.

MR. DEICHMAN. Yes. The answer might be tough on this one. I would ask Agricultural Economist Dobbs if he and others in his profession agree that increasing opportunities in farming is a valuable goal, and if you see that as conducive to global competitiveness? And Mr. Yeager, if there were time, might throw in on this.

MR. DOBBS. Well, I definitely think it is a valuable goal. I believe that Steve Stevenson made a comment earlier this morning that I think is very central to this symposium today. One of the key issues is where does that value added take place. Much of the concern in rural areas is not only that the value added has left the farm, but it has left the area. So I think what a lot of this is all about is trying to construct a desirable life style, with a good mix of farms and small towns or rural cities, and so I hope a lot of our focus is on that. I certainly think it is a goal.

The second part of your question was how is this going to affect international competitiveness?

MR. DEICHMAN. I asked you if it was conducive to international competitiveness.

MR. DOBBS. Is it conducive to international competitiveness? That is the big open question that a lot of research is all about. I think in the long term it is going to be, because I see a worldwide trend of moving towards more environmentally sound farming practices. Any country that moves unilaterally in a direction, whether that is an environmental area or some other social area, and if that is out of line with what others are doing, it can threaten competitiveness in the short run.

MR. YEAGER. I would like to quickly comment there. I think that farming, when you get right down to it, is very traditional and rural areas and rural people are very traditional. All of us are talking about change, and that is not something that farmers or rural people tend to accept very well to begin with, so it makes this all very difficult.

I think, as we think about some of these different ways to do things, the thing that is vital to rural areas is not so much whether all these people are farming—ideally that would be great if they were, but I don't think that the economics we have seen over the past few years are going to change that. I mean, long term can change the basic economics, but the thing we have to try to do is to revitalize these rural areas, keep those families close, provide them with opportunities to generate income. Maybe it is farm related, hopefully, but maybe it is not. We have to do something in rural areas.

I see rural areas that have some of the same problems basically that I see in blighted urban situations, with there just not being an opportunity and resources being wasted at the same time. Not just human, but also resources that are there in the community that used to be used.

I know that is not an exact answer, but I think we have to work on rural development and get people to accept change a little bit, that maybe they could make and maintain the family structure, which is so important to them, whether they maintain the farm or not.

Ms. RAWSON. Mr. Dobbs has requested 15 seconds.

MR. DOBBS. I just wanted to make a correction. I see in my typed notes that I have typed in John Gardner instead of Bruce Gardner, and I repeated that in my oral remarks. So, in case some of you are wondering what article I am talking about, it is Bruce Gardner's article.

Ms. RAWSON. Thank you to this panel and the two preceding ones very much for this morning's activities.

We will take a break now for lunch and reconvene at quarter of two.
[Recess.]

AFTERNOON SESSION [1:50 P.M.]

MR. SMITH. Good afternoon.

The fourth panel will be Dana Hoag, Fred Buttel, Wallace Dunham and Jim Worstell, if they would please take their seats up here. This panel will look at some of the constraints and limitations on sustainable agriculture and its adoption.

Just keep in mind that we focus a lot on sustainable agriculture in this symposium. The basic question we're answering is a bit broader than that. We're talking about shifting economic activity back to the farm. It happens that sustainable agriculture is one of the techniques that seems to be doing that reasonably successfully.

The paper will be presented by Dana Hoag, who is an associate professor in agriculture and resource economics at North Carolina State University. He has been there since 1984 as an Extension specialist, a researcher, and a teacher. His research interests include natural resources, risk, farm production, farm environmental policy. The title of his paper is slightly different from that listed on your program. It is entitled "Economic Limitations of Sustainable Agriculture: Have Policy Makers Jumped the Gun?"

Before Dana starts, let me introduce the three panelists. First is Fred Buttel. Fred has a sign up here and Fred is over there. There's a disconnect.

[Laughter.]

You must excuse him. Fred is a rural sociologist.

[Laughter.]

No one gets referred to as "Doctor" in this symposium. That is something we do here in this town. We level the playing field. There is a chairman and then everyone else is Mr. or Ms. In fact, Dale Hathaway can give you some advantages of not having a title when you come to testify before a committee.

Fred Buttel is professor of rural sociology at the University of Wisconsin at Madison. He is also director of the Agricultural Technology and Family Farm Institute, an institute concerned about the very issues that we're discussing. He holds a Ph.D. from the University of Wisconsin. He also happens to hold an M.S. from Yale University, an institution from which I have a degree. Although it doesn't say it here, I happen to know he's been president of the Rural Sociology Association.

Wallace Dunham, to Fred's left, is the assistant vice president and the director of the Maine Agricultural Experiment Station. He is also dean of the College of Applied Sciences and Agriculture at the University of Maine. He received his Ph.D. in agricultural economics at Cornell University, and he has taught agricultural economics at the University of Maine for a number of years, serving as the chairman of that department.

Jim Worstell is a farmer. He is one of these part-time farmers who puts in 20 hours a day on the farm. In addition to that farming activity, he also works with nonprofit farm groups in the south, and he also has had experience in teaching and research at several universities earlier in his career.

With that, we will move right to the paper by Dana Hoag, "Economic Limitations of Sustainable Agriculture: Have Policy Makers Jumped the Gun?"

PANEL 4

ECONOMIC LIMITATIONS OF SUSTAINABLE AGRICULTURE: HAVE POLICYMAKERS JUMPED THE GUN?:

PRESENTED BY DANA HOAG, NORTH CAROLINA STATE UNIVERSITY

MR. HOAG. It is an honor to be here, and especially to speak to such an attractive, intelligent and friendly crowd. I need to butter you up because I've been asked to play the devil's advocate, so to speak, and I want to escape with my life.

[Laughter.]

First of all, I want to clear up one thing. Hopefully, after we leave today, you won't say I'm a skeptic of sustainable agriculture. I don't

think sustainable agriculture exists, so I hope you will leave saying that I'm a skeptic of the term, not of the practices.

Mr. Smith and others have done a pretty effective job of showing that farming, the way he has defined it, has declined over the last 80 years, and I think there's no real argument about that. But, ironically, it is our own doing that has created this problem. I don't think most people question really whether that's been good or bad, until a conference like this. I guess the point here is, have the costs of this increased production been too high in terms of environmental costs and in terms of the changing farm family structure?

Sustainable agriculture is a good case study to look at, because there has been a lot of efforts in this in recent years and they're addressing some of the same problems. Small farm, labor-intensive, management-intensive technologies are consistent with sustainable ag objectives, including trying to protect the environment. The sustainable ag groups have been remarkably successful in recent years in effecting farm policy—maybe not as effective as they would like to be, but they have made marked gains in persuading the federal and state governments to spend money on research and extension and in gaining widespread support.

Today, my role, as I said, is to play a little bit of a devil's advocate and discuss sustainable ag, and review what it has done. As you have probably guessed by my title and my remarks so far, I do think policy-makers have jumped the gun, in large part, on sustainable ag in the things we've done. I would go so far as to say that I think a lot of the programs don't have as much substance as they can, or could have had, and did not really accomplish what people intended them to accomplish in many cases.

Before I go on, though, I want to make it real clear that I'm not someone who's saying that we can't help the environment through farming, that farming doesn't hurt the environment or anything of the kind. I'm not really challenging the objectives of sustainable ag. My research has revealed cases where you can reduce pollution without really causing significant profit losses. However, my research also indicates that many times there are profit tradeoffs. I have worked in groundwater, air pollution, surface water, and soil conservation issues. In all of these, there usually is some middle ground where tradeoffs can occur and that are good for everybody, but there are always extremes where significant tradeoffs have to be made. So, again, I'm not really challenging the sub-objectives of sustainability.

Along those lines, the first question you have to ask is what is sustainability? There seems to be as many definitions as there are people who talk about it. These people conclude that, by and large, sustainable ag is a philosophy, a way of thinking about agriculture, and some people argue that it should not be held to rigid definitional criteria.

For example, in the Farm Bill, it is hard to argue with it. It says, and I'm paraphrasing:

An integrated system of plant and animal production practices having a site-specific application that will, over the long term, satisfy human food and fiber needs, enhance environmental quality, make the most efficient use of nonrenewable resources, and integrate, where appropriate, natural biological cycles and controls, sustain the economic viability of farm operations, and enhance the quality of life for farmers and society as a whole.

I don't know anybody who could argue with that. My question is, who wouldn't have said that in the first place? For many of us, like myself, in research or extension, we have a problem with this vague definition. For example, there is often tradeoffs between profit and environmental objectives, and may time there's a tradeoff between the environmental objectives themselves. The sustainable ag definition offers no guidance about how we can measure sustainability.

For example, one farmer may be plenty willing to give up five dollars an acre to control erosion. He may think that's the only sustainable thing to do. Another farmer might think that five dollar loss is not sustainable to his economic plan.

One of the things I did in North Carolina was to look at 36 crops. Basically, I looked at three tillage levels—high, medium and low—and three input levels—high, medium and low—across four rotations. So I was arguing that you could change tillage level, input level, or rotation to address environmental problems.

I have a paper on the table outside, if anybody wants to look at it in more detail, but in view of the time here, I have just standardized everything on the same index. What I want to point out is, if you look at this first system, it's the most profitable system. Profit is the first bar, then erosion, followed by nitrogen, followed by pesticide leaching into the soil. If you look at the second bar, it's the one that has the least erosion. Out of those 36 systems, I found one that erodes the least. Notice that profit went down. Of course, erosion went down. The point is, erosion went down and profits went down a little bit, and nitrogen and pesticides went down.

Now, the one that had the lowest nitrogen leaching is this one. The one that had the lowest pesticide leaching is this one. The point is, all of these involve tradeoffs. There is not one system that is profitable, reduces pesticide leaching, reduces nitrogen leaching, and reduces erosion. My question is, which of these is sustainable? I don't think anybody here can answer that question. If you attempted to, we might all walk out of here saying, "Boy, we all agree with sustainability." The problem is, when we walk out the door and have to choose a system, we don't agree any more. That's what gives researchers fits.

No single definition can be inclusive about the possible multiple objectives without attaching some sort of objective weight to these outcomes. In other words, if you're in an area and I have to sacrifice soil erosion for pesticide leaching, how do you weight that? Which does society really care about, and does that change from region to region, individual to individual, and so forth?

This gives rise to the question in my mind, should the definition of sustainable ag be redefined, or should it just be totally abandoned? Without a more detailed definition, how do we know where we are, where we've been, or where we're going? How can individual farmers know whether their systems are sustainable? Virtually every farmer meets one of the parts of that definition I read. Is one of those enough, or does he have to meet all of them?

Let me give an example. Integrated pest management results in more applications of pesticide. Now, I have written in my paper "use." I have to be careful about that, after consulting with my colleagues. I wrote this paper over the weekend, by the way, which is all the time I was given. Again, sabotage.

[Laughter.]

This is a study done in the alternative ag book that was put out by the National Research Council in surveying farms. The applications went up—in this case, doubling for that crop—and in almost all of these, applications of pesticides went up. Now, people that are in IPM are eager to point out that maybe the total rate went down, or maybe they used it more wisely and carefully. But the point I want to make is, when a sustainable ag person says to me, I want IPM, what they usually mean is, I want less pesticides. That's what they're usually telling me underneath it. If I go and I use IPM, and then it results in more pesticide, have I succeeded or have I failed?

The real objective was reduced groundwater pollution or reduced surface water pollution, something like that. What I contend is that we ought to get down to the real definitions of what we really mean to say.

I have focused on environmental aspects of sustainable ag, but I believe they're complementary to things that we're talking about today; that is, value added at the farm. But it is difficult to discern in the context of sustainable ag which is the objective. Is the objective the environment, or is the objective the small farm or the value added at the farm? If the objective is the value added at the farm, then policies need to be designed that really address that, because not every environmental policy will lead to smaller, more family-oriented farms. I will give some examples later.

Let me just point out, too, that sustainable ag—along the lines of this definitional problem—was originally called LISA—Low Input Sustainable Ag—which in our state was extremely controversial, as I'm sure it was elsewhere. The low input part of the title was dropped. I contend that the reason sustainable ag is less controversial is that it really doesn't mean much. If you go to a farmer and say, are you sustainable—yeah, I'm sustainable. You say, are you using low input, then they start getting worried because they know what it means. I think it's more important to be clear than it is to have a definition that everybody agrees with. Again, I think we should focus on what we really mean, the objectives we're really after.

Now, I have sat here and shot down the definition of sustainable ag, and now I have to talk about it. So what do I do? Sustainable ag, for the rest of my talk, what I'm going to mean is practices associated with it, like IPM and conservation tillage, those things often associated with the term sustainable ag.

What do we really know about sustainable ag? Research and education programs to mitigate environmental pollution have existed for some time. The sustainable ag movement, I contend, has played a small role in coming up with any new technology. It may have brought full technology back in practice, and it may have gotten people hyped up about the environment, but I don't see very many new systems coming out. In fact, reducing soil erosion was a major goal in the '85 Farm Bill, where sustainable ag was just introduced. Soil erosion was being addressed before sustainable ag was popular. Nitrogen use is being addressed in Nebraska and other places where groundwater is a problem. Again, I don't think that's due to sustainable ag.

The problem is, progress may appear to be slow. I think researchers are doing a lot of work, Extension agents, and Extension personnel like myself are doing a lot of work to promote these systems, like the rotational grazing system. But progress is going to seem slow to the public, because it's complicated. We just can't do a full reverse tomorrow, or if the public didn't know about a lot of pollution until recently, we can't meet all those goals instantly. Generally, we simply just don't know enough about where pollution comes from to design policies, how it is caused, what its effects on the environment even are, and which systems could alleviate the problems. We know nitrogen has gotten in streams; we think it came from farms. But you can't tell me which farm it came from and exactly which practice it was and what policy would affect that. That's been the problem all along. I'm not arguing it doesn't; I'm arguing that we don't know enough yet to be careful and accurate about doing a policy to correct it.

On the whole, tradeoffs of sustainable ag are inevitable. People are always going to find exceptions. They're going to say, for example, tillage is a substitute for herbicides. People either put a herbicide out to kill a weed or they till to kill a weed. Now, when I say that, people will always say, I know somebody in conservation tillage who doesn't use more pesticides. That may be true, and I agree that can happen. The question is, does that generalize? How transferrable is that to everybody else? Can everybody else do that? There is a cost to learning new systems. There is a cost of developing that research. The underlying physical properties are such that tillage and pesticides are substitutes. You can change that substitution, reduce the impact, but you'll never get around the underlying physics.

Next, I want to address, will farmers adopt sustainable systems? Aside from definitional problems, there are some major economic hurdles to get over. Most researchers and farmers conclude that sustainable systems on average are less profitable—I said on average—than conventional systems. The General Accounting Office did a literature

search and concluded that economic performance of alternative agriculture—they were talking about alternative ag at that time—are few, methodologically limited, and enterprise specific. They could not conclude, one way or the other, whether sustainable ag, or alternative ag, as they called it at the time, was better or worse. They also concluded that farmers believed that it was worse, that profits were lower. They also pointed out that the farmers they interviewed believed that adopting alternative ag practices may require greater management skills, cause greater weed problems, lower yields and lower profits.

The most compelling evidence that sustainable ag might not be seen as generally profitable is that not many people use it. Youngberg, a noted expert in this area, in 1988, stated that he believed about one to two-and-a-half percent of farmers used no chemicals or were in transition to using no chemicals. Considerably more people are using things like conservation tillage, IPM, and practices like that. But my question to you on that is, I presume, if they're using conservation tillage—one-third or somewhere in that neighborhood are supposedly using conservation tillage—I assume those one-third of the farmers think it's more profitable. But I don't know whether it's more sustainable. Nobody here can tell me whether those farmers are using more chemicals, whether they're causing more groundwater problems. I don't know whether they're more sustainable. All I know is they've adopted those systems, which again goes back to the definitional problem.

Another curious thing is that in Liebhardt's example, for example, they show how we can use these farm value-added techniques as competing with, say, outside technology. I don't argue with that. I think that's absolutely true. I think things like rotational grazing show a lot of promise. The problem is that profit isn't necessarily the only thing farmers think about. There are several reasons why a farmer might now adopt an equally profitable system.

First and foremost is that they're concerned about labor and management. If they view these systems as labor and management intensive, which I think is what Stewart's point is, their opportunity costs are too high. The farmer who says his sons don't farm; they view this as too high. So that's a big hurdle, I think, that is not profit based. I can show you a system that's more profitable, like rotational grazing, but you have to get over that hurdle, as was pointed out in the paper. There are other things you have to point out. You have to say it has less labor, or whatever it is that's in the farmer's mind that is holding him up.

Second, associated with the first problem, is the increased risk. When you adopt a new system that requires a lot of management, there's a lot of risk. After hearing the paper today, I called the rotational grazing people in North Carolina and talked to them a little bit. I asked them whether rotational grazing was more profitable in North Carolina. They said yes. I said, do people use it in North Carolina and they said no. I said why not? They said, well, when we talk to farmers, they think that it takes more labor. They think it's more risky. They're

afraid that a drought will cause the grass not to grow at the times they need. So there are significant hurdles. They're afraid to risk the change.

Nitrogen fertilizer is the best example I can give in this case. We have done lots of studies that show we can replace nitrogen fertilizers with more natural sources—manure, grain manures, things like that. Farmers continue to use nitrogen fertilizer, commercial fertilizer. The reason is it's a lot cheaper and easier to go out and throw a few pounds of fertilizer out, and if you waste it, big deal, you lose a few cents an acre. If you get the rainfall you need, you get big gains.

Now, on the flip side, when we've looked at manure in North Carolina, the nutrient content in manure varies significantly. The amount of nitrogen available out of that manure varies considerably. We can't tell you for sure how much of the nitrogen out of that manure is going to be available to the plants in any one year. So farmers see that as very risky.

GAO identified a whole bunch of other barriers to adoption. I think it's interesting to point out that if you look at the average of all farms, one is that they agree and five is that they strongly disagree. You have to go down the list quite a ways before you see commodity programs. The first one appears right there, about the sixth one. Then if you look down a few more, you will start seeing other ones that we're talking about here today. So farm programs do cause a problem, but they are weighted way below other concerns that farmers have about yields and weeds, and things like that.

This barrier of commodity programs is important. I agree that commodity programs do discourage sustainable systems, primarily rotations, and probably lead to more pesticide use, and things like that.

However, the results are somewhat ambiguous. Farmers, as I just showed, think that even if you took away commodity programs, there are still significant hurdles they're going to have to get by before they're going to adopt them. Second, commodity programs, in some cases, in some studies, have been shown to actually increase the advantage of a sustainable system. In fact, Kate Painter is going to talk a little later in her article that, on average, they were about the same. That was maybe site-specific, I don't know. I think generally it's true, that commodity programs cause a disincentive, but I want to point out that it's not so cut and dried.

In summary, on the commodity programs, I do agree they cause problems. They create unnecessary disincentives to rotations and other things, but their elimination won't necessarily lead to mass adoption of sustainable systems.

I guess it's important to also ask how much of this has been research and extension's fault, if fault is to be laid. Many Extension workers in North Carolina have observed that if they hold a meeting, say, on no tillage, and they call it sustainable ag, no one will come. Literally, no one will come. Some counties, maybe one or two. But if they call it no

tillage or BMPs or something like that, they'll fill the room. So on the flip side, when a county does have an interest in sustainable ag, and that person comes to the Extension office and says I'm interested in sustainable ag, they don't know where to go. On the flip side, when they do have someone interested, no one knows where to get any information about it. So I think that we could do a better job in working on research and extension.

I think what the Extension people have tended to do is just meet the farmers where they are. We're not so worried whether you call it sustainable ag or whatever; we're just worried about helping you do a better job of farming, to make more money and have less impact on the environment.

The last issue I want to talk about is simply, have we jumped the gun? Policymakers appear ready to promote the use of sustainable ag, as they have done already, and they think that's going to reduce environmental damages, yield higher profits, promote less reliance on chemicals, and boost the value added to the farmer. Now, I have outlined several reasons why our efforts may not yield those anticipated results. First, and most important, we do not have a clear definition of where farming is and where we want to take it. Nobody here has even agreed whether small farms are an option. We've talked about family farms, we've talked about several things, but I'm not so sure what the goal of farming is. If you tell me as a researcher, I can tell you how to get there the cheapest, but that's not my job as a researcher. That's a policy job. That's a policymaker and society's job.

Sustainable agriculture provides a loose framework, and that's probably good, and it has promoted some unity. But it doesn't give that guidance we need. For example, to go back to the IPM example, is IPM undesirable or desirable if it results in more chemicals or more applications?

Second, information about sustainable ag is ambiguous. More research is needed to determine when and where it is profitable and what the external benefits are, how much pollution is it preventing and so forth. An education program is very important. An education program is just as likely to decrease as to increase its acceptance of sustainable ag. I've seen people in North Carolina go out and say there's a guy in Iowa who uses a system, that just doesn't wash in North Carolina. You have to tell them, I have research plots in North Carolina and I can tell you this or I can tell you that.

A recent study done in North Carolina showed on a group of 600 farmers whether they were sustainable or not sustainable, based on a statistical technique. Basically, they found an interesting result, that farmers that they classified as sustainable had less farm experience, relied less on the Extension Service, and had lower farm incomes. As this author concludes, if these farmers' production choices are rooted in values that are not shared by most farmers, then making more technical information available or removing policy barriers will not yield sufficiently widespread adoption. So you have to ask yourself, when

you see these systems, like what John was talking about, not everybody is an entrepreneur. I see all kinds of great systems, but not everybody is the same and you have to ask yourself, when you're trying to teach a technology or a system or anything else, you have to ask yourself what values do the farmers hold.

Third, sustainable agriculture advocates have focused on finding examples that are profitable. It's sort of like I'm going to prove that sustainable ag is profitable. They have not adequately dealt with transferability. Once you find a farmer that's unique—and I have seen some really convincing evidence that some farmers have been very innovative and done some neat stuff—the problem is you can't tell me how I can transfer it to any other farm, whether it will work on any other farm. In addition, they have not put enough emphasis on other things than profitability.

For example, I argue again that sustainable ag has really not produced new technology. The Soil Conservation Service, the Extension Service and others, have been promoting a lot of these methods all along. Farmers have therefore had the option all along to adopt a sustainable system. I could have adopted rotational grazing before I ever heard the word sustainable ag. People haven't, though. This implies—and I think the data and all the information implies—that farmers are rejecting the systems that mean you have to put more labor and management on the farm. They have already told us the answer to that because they've had those available in the past.

That doesn't mean they won't change, and that doesn't mean that the policy hasn't been the problem. But they have already answered that. When I talked to the rotational grazing expert, he told me that people that refuse to use rotational grazing have rejected that because they think it requires more effort and they don't want to learn it. But when they get in an economic crunch, as they are now, they are all of a sudden concerned. So they'll change; they'll change when they have to. But I think there is this sort of overwhelming message from the farmers that they don't—I don't know if they're looking for ways to get back on the farm. A lot of them are part-time farmers and they're looking for ways to keep off of the farm, to make that farming activity easy. Not everybody is looking for that. If you want to design a policy, I think you just have to keep that in mind: how do we raise the value added of the farm so that it can compete with off-farm opportunities.

I don't want to end on a negative note, but I want to make sure I point out that I do believe there are all kinds of exciting technologies that can help out farming and reduce pollution. But some of them are not going to make smaller farms. Some of them are technological. For example, a new herbicide in North Carolina called Accent reduces leaching risk, by my calculations of an index that I have developed with a colleague in Florida, by over a hundred-fold. This chemical is applied, in rough terms, like a tablespoon an acre. It has an LD-50 of 12,000, for those of you who are technical. That's three times safer than salt. It's very, very, very effective. To me, that's an exciting tech-

nology boost. We're able to put out chemicals that are safer, applied at lower rates, and probably have eliminated the groundwater problem in that area for the particular substitutes that were replaced by that chemical.

However, some of the technologies are not aimed at that technology. They're aimed more at the value added type. In the Midwest, for example, an increased awareness of nitrogen pollution has led to large reductions in nitrogen use with really no appreciable loss in profits from some measures. In other words, some of the technologies involved, rotations and things like that, and some involve chemicals. Therefore, education can and does have a positive impact on the environment. So I'm excited. We are making gains in technology; we're making gains in all of these areas.

In closing, the definition of sustainable agriculture needs to be made more clear or eliminated entirely. Clear, unambiguous objectives should be identified and guidance provided about what to do when tradeoffs are encountered. For example, in some areas soil erosion is relatively more important than groundwater contamination. One's a problem and the other really isn't. Therefore, freedom needs to be given at the local level to identify and solve problems that sustainable ag at a national policy can't address. Research and education programs should be funded to develop and transfer new technology that meets the social agenda. While it could be improved, I believe the research and education system we already have should not be abandoned since it already provides incentives and opportunities to conduct meaningful programs. The fact that we've done a bad job in some ways in the past doesn't mean that everybody does a bad job and there is no research out there that is helping these farmers.

Finally, I would agree wholeheartedly with eliminating commodity programs all together if it were up to me, or at least eliminating their disincentives for these kinds of systems. But I want to point out that I would discourage adding a whole new set of programs aimed at some of these objectives. These programs have a way of costing too much, not providing what you really intended them to do after they go through Congress and get made over several times, and then they get implemented through an agency and then they go down to the county, they just don't seem to have a way of working the way they're intended. And then, once they're in there and not working the way you want, you can't get rid of them.

I want to give you an example. The sugar program now costs \$260,000 per sugar grower. Now, I doubt if the creators of this program intended it to be like that. But that's what can happen. You build one program that fixes this, and then you've got to have another program over here to fix a problem that that program caused, and you end up jockeying around like that and you end up with a nightmare.

Thank you.

[The paper presented by Mr. Hoag starts on p.152 of Submissions for the Record.]

MR. SMITH. Thank you, Dana. You were just 30 seconds over. That's very good. We're going to have the light on for you, Fred Buttel, for five minutes, and when it turns red, we'll try to wrap you up.

**RESPONSE STATEMENT OF FRED BUTTEL, PROFESSOR OF SOCIOLOGY,
UNIVERSITY OF WISCONSIN AT MADISON**

MR. BUTTEL. That doesn't sound encouraging.

[Laughter.]

Thank you, Stewart. It's a pleasure to be here, and I particularly welcome the opportunity to respond to Dana's thoughtful and provocative paper.

The way I would like to begin my comments is to mention that I suppose in some ways I like to think of myself as, over the years, having been a constructive critic of sustainable agriculture and the sustainable agriculture movement. I should hasten to point out that I am by no means an opponent of the underlying notions represented in sustainable agriculture, but my own views on sustainable agriculture are different than Dana's and I would like to say a few words about them in the time available to me.

I think one way of indicating what my views on the matter are is to begin with an observation that we, broadly speaking—that is, persons in and concerned about agriculture—have long had a tendency to see and to define the social problems of agriculture in relatively narrow technical terms. That is, when we think of the loss of family farms, we tend to think of it having been caused by labor displacing technology, by excessively capital-intensive technology and so on. When we think of agricultural environmental problems, what tends to come to mind is certain technologies like ag chemicals or practice changes, like reducing crop rotation.

In my state, when people think about the viability of dairying, or profitability of dairying, it's almost like a broken record; our dairy science people tend to begin with the idea that if Wisconsin was above the median in milk production per cow, that everything would be fine.

Now, in many ways, when sustainable agriculture came to be a fairly widespread notion, oftentimes we tended to succumb to this technical framing of what basically are social problems. That is, the basic idea behind sustainable agriculture in its early days, and in some stereotyped forms today, is that basically what is involved is that if we can fund sustainable agriculture research, we will develop sustainable agricultural technology which, when implemented, will make our agriculture sustainable. Oftentimes there is, relatively speaking, a off-the-shelf model that is in the back of people's minds. For example, take the quite important instance of intensive rotational grazing, which is an available technology that, with a certain amount of on-farm experiential work and a little bit of fine tuning is the sort of technology that can help us to solve our problem.

Now, the problem with this conventional sense of sustainable agriculture, in my view, is that oftentimes we don't give enough attention to the institutional structure of agriculture, and we have to recognize that for a number of decades this has been an institutional structure that has, for example, subsidized capital-intensity in agriculture, and that has tended to encourage monocultural practices, and that has heavily subsidized wasteful irrigation. It has had as an underlying goal of producing undifferentiated commodities. We earlier heard about number two yellow corn. It has been an institutional structure in which agriculture has been largely exempted from federal water quality legislation and so on.

Now, sustainable agriculture technologies that are here today, not surprisingly, occasionally don't look that attractive in the midst of this institutional environment, so neither proponents nor skeptics of sustainable agriculture should be shocked that occasionally it isn't more profitable. Indeed, as George Bird pointed out this morning, the adoption of many sustainable systems has actually been more rapid than we should have expected, given the institutional environment we operate in.

Sustainable agriculture, in my view, also should be seen as being as much, if not more, a policy agenda as a research program and technology tool kit. One way of looking at this is to remember that, when all is said and done, what we now commonly call the sustainable agriculture agenda, which has gained some foothold in our land grant universities and experiment stations, was largely forced on our agricultural colleges and experiment stations by citizens action. In the process, sustainable agriculture was often linked to a number of other concerns about the land grant system. For example, it was linked to notions that it wasn't as responsive as it should be, and that there is too much separation between science on the one hand and farms and farmers on the other, and that it was excessively specialized. There is some concern about the neutrality of extension, and also some amount of hostility toward corporate-linked basic science.

Now, in the process, what has been demanded of land grant universities is a type of sustainable research which, while extremely valuable, is only part of the picture. What is demanded is very highly applied, multidisciplinary, short-term time horizon research. In other words, what was expected was useful research results tomorrow, if not sooner.

What I think we need for the future is to think of a planning capacity and a research program capacity to do the research that's necessary to meet the needs of the 21st century, as well as to meet the needs of this year. The technical bases of this research will take a long time to work out, and I think the bottom line of what I would like to suggest to you here today is that there is a need for long-term, basic agro-ecological research as much as there is a need for short-time-horizon research of the sort that tends to predominate in sustainable agriculture today.

Now, I believe the red light is on and that's the end of my time. But let me just mention as I'm pulling away from the stand that we shouldn't disconnect these concerns from those of farm structure that were brought up this morning. Indeed, I think there is some important stories that need to be told about the importance of sustainable agriculture with respect to sustaining family farms.

Thank you.

MR. SMITH. Thank you, Fred. We will have an opportunity to come back to this conversation later on.

Dean Dunham, please proceed.

RESPONSE STATEMENT OF WALLACE DUNHAM, ASSISTANT VICE PRESIDENT AND DIRECTOR, MAINE AGRICULTURAL EXPERIMENT STATION; AND DEAN, COLLEGE OF APPLIED SCIENCES AND AGRICULTURE, UNIVERSITY OF MAINE

MR. DUNHAM. Thank you.

I'm not sure where to start, because this is a topic we could spend an awful lot of time on. But let me say that I think Dr. Hoag has brought up a lot of interesting points, and a lot of ideas or thoughts that need to be addressed.

It's interesting—and I was glad you pointed it out—the fact that whenever you use the term "sustainable agriculture," it turns people off, because that's exactly the phenomena we found in the State of Maine. Yet, I was the one who instituted the sustainable agriculture program, for lack of a better name. I believe in it and I believe its a direction to go. I will outline my reasons for that in a minute. But the name has been troublesome.

The concept really means different things to different people. That's been a very troublesome thing. I think the problem was exacerbated when the Department of Agriculture came out with their term "LISA". I guess it was thought to be a neat acronym. It has been referred to as low input/low output Agriculture. There was an editorial in the *American Agriculturalist* by the editor, Mr. Conklin, on low input/low output agriculture.

The chairman of the Ag Committee in the State legislature of Maine picked up on that, and every time I go to the State legislature, which is quite frequently during the legislative sessions, he usually starts out with a little discussion about, "How's your low input/low output program going at the university?" This is a little joke with him. But it is really unfortunate. So we downplay the name, and what we try to talk about is what we're trying to do.

When I came on the job, when I first became dean in 1982, one of the real problems that was facing our agriculture was how to deal with increasing environmental concerns of the public. The solution to the problem is compounded by the fact that we do not have a homogeneous agriculture, but a heterogeneous agriculture. Different commodi-

ties, different climates, different soil types throughout the country call for different types of regimes.

One of the major crops that we deal with in Maine is potatoes. We deal with low bush blueberries, which is unique to our part of the country. We have some apples. All of those use chemicals very extensively. In fact, in potatoes, what was a minor item of expense, the use of chemicals of one sort or another, has now become a major expense.

One of the biggest problems facing agriculture today is environmental regulation. The State of Maine is very environmentally concerned, and concern over the environment is increasing with the public. The result is that more and more rules and regulations and laws and restrictions are being placed on agriculture. In order for agriculture to compete, we need to find ways for agriculture to reduce their reliance on some of these substances. So essentially that's the reason I got involved with sustainable agriculture. What we are essentially trying to do is raise the consciousness level of the need to focus on finding ways to adapt farming practices that are, one, environmentally sound, and second, more profitable. And more profitable compared to current practices basically.

Surprising as it may seem, I don't think we spend enough time on that profitability angle. I think we have been overly concerned in the past with production, making the assumption that if we maximize production, we're going to maximize profits. Of course, we never do that. If you do maximize production, you won't maximize your profits, but most people don't understand that. So we need to focus more on environmental integrity and more on profitability. In fact, we do not have all the answers yet, and the very reasons that Dana mentioned in his paper are the very reasons that we at the land grant universities ought to be involved more and more in this.

I see the red light is on, so I want to make just one more comment. One of the things we have been attempting to do is to try to get more and more interdisciplinary programs and projects, trying to get researchers working across disciplinary lines. We have been modestly successful in that area. We have a large potato ecosystem study, where we have about five disciplines working together. We have farmers involved in critiquing what we're doing. We feel that's a way that's eventually going to lead the way to a research program to help agriculture, at least in the State of Maine, and hopefully beyond.

Thanks.

MR. SMITH. Thank you, Dean Dunham.

Jim Worstell, please proceed.

RESPONSE STATEMENT OF JIM WORSTELL, KENTUCKY FARMER

MR. WORSTELL. I raise alfalfa and I sell to horse farms. I'm in central Kentucky, right on the edge where the mountains and the bluegrass meet. I sell my alfalfa hay to the horse farms there, vertically inte-

grated, I guess, going straight to the market and don't go through a lot of middlemen.

As for my strawberries, I have a rotational grazing thing. I go in, me and my wife, and then a family that lives next door that always is in need of work. We go in and pick the best ones and sell them to Boone Tavern and some of the real good restaurants, and then we open it to the "you pick" people. We pick in the morning when it's still cool, so we can keep the real good quality, and then in the afternoon and evening, we open it to the "you pick" people and they come in and pick everything. You know, they really clean up the patch. They pick the rotten ones, the ones that we would never pick. So they really clean up the patch for us. Again, it's vertically integrated. We get more money by selling direct to the restaurants and to the consumers.

We have tobacco, and thanks to a real good government program that manages the supply of tobacco, we make money on tobacco, too. So I think we have good marketing of those three crops on our farm and it helps us a lot. Also, because after a heavy frost, with these three crops, I can work with some of the nonprofits in trying to change around the land grants and extension in the South. So that's what I do in the wintertime.

The main response that I have to Dana's paper is it proves one thing—farmers aren't nearly involved as much as they ought to be in deciding what researchers do. I don't know of very many farmers that would sit through a 30-minute debate on what sustainable agriculture is. Who's interested in that? Not too many farmers. They're interested in things that will solve the problems they have on their farms. They need profitability on their farms. Their kids don't want to go into farming. They know they have environmental problems. They're using pesticides right and left, and they need alternatives for that. They know that nitrates are getting into the streams and they have to do something about that, because the people drinking the water downstream are complaining. So there are a lot of problems they have to deal with and they don't have time to. I'm not surprised that they don't come to meetings to listen to debates about what sustainable agriculture is.

Researchers are real good at solving problems, but they don't seem to be very good at selecting problems. BST, did any farmer ask them to do research on BST? I don't think so. Herbicide resistant corn. Did farmers ask them to do research on herbicide resistant corn? I doubt it. Proving that sustainable agriculture is bad. Farmers didn't ask them to do research on that. So who is selecting these problems? You know who's selecting them. It's the seed companies, the chemical companies—and I suppose on the other end—a lot of the marketers are selecting some of the ag economic questions.

We tried in Kentucky to determine why they're doing the research they're doing. They're spending \$53 million in state tax money, and I don't know how much more extra federal money—I know it's \$10 million just for extension in federal money—in the College of Agriculture.

We couldn't even find out how much they're spending until we went through the Freedom of Information Act. When we did find out, we tried to ask them to address four simple questions: what are your research projects, what are their goals, what have you achieved so far, and how much are you spending on it. It took them eight months to get that information to us, and when we got it, it was nowhere near complete. It was a huge box that we then had to spend a lot of time wading through to try to summarize. So they don't even have a system. But to their credit, they have agreed to meet with us this winter and try to work on getting a system.

Just in general, the researchers that I know are pretty well out of touch with farmers, most of them—not all of them—but most of them. Especially the young ones, who grew up in the suburbs, they haven't been on very many farms, if any. They don't know what farming is all about. You can't really expect them to appreciate the farmers' situation and be able to help it.

A good example is the NRI money, the main source of competitive grant money in agriculture. NRI is controlled by the big research labs and some real out-of-touch administrators. Then, if half of 1 percent is going to sustainable agriculture of the money that's going to agriculture research, and maybe 3 percent is going to NRI, then that leaves 94 percent going to ARS. What I would like to know is, who are those people working for? Who are these researchers and Extension people working for? Who is their real client? Some of them say it's the farmer; others would say it's the consumer.

But I'll tell you who I think the real client is, and that's other researchers. How do they get tenure? They get tenure through peer review. What's peer review? It's other researchers who also grew up in the suburbs, and also don't go to farms, who are in a mutual admiration society. That's how the research system works. So I would like to see farmers on tenure review boards. Wouldn't that be something to see? Farmers deciding whether these guys get tenure or whether these ARS people get their equivalent of tenure. I think it would be real interesting.

The red light is on, but there are a couple of other things I would like to comment on. Profitability is definitely key. Any operation has got to be profitable, and if you're changing operations, there has to be an increase in profitability or else it isn't going to work. But that's exactly what sustainable agriculture is doing and ought to be doing. There is a real good example about the nitrogen work that Dana glossed over. North Carolina has been a little slow on this. Virginia is really going ahead. John Grove at the University of Kentucky is going ahead on Pre Sidedress Nitrate Tests, or as others call them, late spring nitrate tests. They're really good and they really work. I think, maybe, you're aware of them. But that's a specific area where you can reduce pretty significantly nitrogen use and increase profitability and decrease of the chance of nitrates getting into the water.

One final thing I would like to talk about is George Bird's comment about how we need more ecology and system science. Because, if our goal is efficient, competitive agricultural products or commodities, there is no way we're going to be able to compete with some of the situations you see around the world, because it's an open system. You can talk about a level playing field, but if that level playing field is polluted with DDT, and if that level playing field is created by taking advantage of a lot of low-paid workers, as it is in most of the world, really, all the developed world—they're still using DDT in Mexico—if we're trying to compete with that, when our farmers here in the United States have all the restrictions you can think of on their pesticide use and on the way they treat their workers, it just isn't going to work.

In Kentucky, we have a real labor problem. You have federal policy and welfare, Medicaid, social security, that is keeping us from getting local workers because they can't afford to lose their medical card, just to work for you a little while putting up your tobacco. So it's an open agricultural system and you have to look at all these other factors if you really want to make us more competitive and more efficient.

Another problem, from the perspective that Mr. Hoag is advocating, is that sustainability is a property of systems. It is not a set of methods. Sustainable systems are the ones that are going to last. It would be hard to tell which of those systems that he put up are going to be sustainable because we don't know whether they're going to last. That's the key thing. In order for it to last, since change is going to happen, resilience is the key and that's what you've got to build in. You build in resilience by giving people the opportunity and ability to go in a whole bunch of different directions, depending on how things change. That's what Extension has got to start doing. It's got to start developing information networks for rural development and environment; it's got to start developing farmer-to-farmer research networks and farmer-to-researcher networks. Extension has got to be able to facilitate and manage those kinds of networks, and if they can't do it, they really ought to get out of the way. We could talk about privatization of the whole system. There are a lot of nonprofits that I think would be willing to do that job and could do a pretty good job of it.

Just one last thing, and that is that successful farmers look to other successful farmers. You don't look to somebody that sits behind a desk all day. You look to other successful farmers. So the key, I think, is not farmer-extension-researcher interaction but farmer-to-farmer interaction, with researchers then paying attention to the questions that the farmers raise and trying to solve those problems, rather than paying attention to another person that grew up in the suburbs and never sets foot on a farm.

I'm sorry that I took too much time.

MR. SMITH. Thank you.

Dana, do you want to respond to any panel member before we open it up to audience participation?

MR. HOAG. I guess just to say one thing. I agree on with the farmer's perspective. One comment that I would make for sure is that the tenure system is very biased against this research. We do talk to each other too much. I would acknowledge that. But in my case, I would have done much better with farmers on my tenure review committee.

What I'm trying to say is this is not simply me spending a lot of research, trying to—You know, that may sound cute, I suppose, but I didn't spend my time trying to refute sustainability. What I spent my time trying to do is to work with farmers and try to help them keep their pesticides out of their groundwater and these issues. The more time I have to take away sitting on sustainable ag committees, to meet with people and talk to them and things like that, the more time I can't spend out with farmers, talking to them about how to solve their groundwater problems, their soil conservation problems and so forth. So I would agree. But sometimes it may appear a little different than it may sound, I suppose.

MR. SMITH. Questions, comments?

QUESTIONS AND ANSWERS

MR. SCHALLER. I am Neill Schaller from the Institute for Alternative Agriculture.

Just a quick comment. I think it would be very tempting to listen to Dana and say well, he's got to be today's "token skeptic" on this program. In fact, what I think you do, Dana, is build a powerful case for sustainable agriculture research and education. Your bar graph up there, you raised the question, appropriately, which is sustainable? Fifteen years ago we might have just had profit and maybe one other thing on that, and we would be looking at those two. We wouldn't be asking near enough the right question. We would probably be saying let's get the profit and the productivity and then, if there's damage, we'll come back and repair it later and find some sort of a fix for that, like erosion curbing and so forth.

But what you have done for me is said, let's put these up there, let's ask that question, let's go after the research and education in order to try to figure out how to really understand those tradeoffs. So I commend you for what you've done.

Your question, are we jumping the gun, I think what your paper does is answer that question and says that no, we're not too early; if anything, we're too late.

MR. SMITH. Response?

MR. BUTTEL. If I would have had time, one of the things I was going to mention in my remarks is that imagine 1920, when we had had about ten years of work on hybrid corn, we were well into the chemical fertilizer revolution, and let's just say that in 1930 we were taking stock of where we had come, and it didn't look very profitable. In other words, to use Ross Perot's term, this is simply irrelevant. Once you put a very substantial amount of research investment equivalent to that

which we put into the now dominant technologies, then we can make this assessment. In other words, there's just been a pittance of money put into sustainable research. In fact, because of the sort time frame, our best success stories are those that come out of farmer-to-farmer networks, those that are immediately available.

Our worst failing is that we have let basic research come to be seen as coterminous with molecular biology. We have given up there. We need to keep the pressure on in terms of the work we're doing, expand it to take advantage of our farmer colleagues, who do a lot of good things, plus, most importantly for the 21st century, we have to fight the fight with regard to what is considered basic research.

MR. SMITH. Does any other panel member want to take a shot? Question?

MR. LEVINS. Dick Levins, University of Minnesota.

First, Jim, out of all the horrible things you have accused everybody of, the only one I can really defend myself against is being young.

[Laughter.]

But I do have a question for Dana, though. Dana, in your paper you talk about the sustainable agriculture movement has not brought forth many new systems. I would like you to expand on that a little bit. To me, it seems a bit unreasonable to position yourself as a researcher who is waiting for farmers to bring forth new systems.

I was in a meeting with some farmers just last week on manure application, and one of the farmers had designed a low application, home-made system that seemed to work. Now, I don't know what else he can do. You know, he hasn't got zillions of dollars to do anything else with it, but yet he had done it. It's hard to get it to the next farmer, maybe. But are you realistically expecting that there's some sort of grassroots movement out there that's going to do your job or what?

MR. HOAG. No, the opposite. If you want to talk about sustainable agriculture, like John Ikerd described it as a system, where we don't do so much component research, if you want to describe it that way, then I think we have failed to do very much of that. For example, on-farm research I think is a good idea, maybe going to a farm and getting several experts together, looking at all the problems with the farmer, understanding his real problems, not sitting in our office, that makes a lot of sense in doing systems research. I didn't address this in this talk because I didn't have enough time.

If you look at the funded research of a sustainable ag program, I haven't calculated the exact proportion but not all of it is systems research. Of that which claims to be systems research, I don't think much of it really is a true system. What I really simply meant was the words "sustainable ag" or the effort called "sustainable ag" isn't what's making these farmers come up with these new systems, or researchers. I have come up with some innovative ideas, I know other people who have, I know you have, and I know farmers have. We all need to. But I think that's more from the environmental pressure than it has been

from somebody ... in my state, for example, sustainable ag is just not used much. There are some groups where it works well. But a lot of farmers have done things like sustainable ag, worked with groundwater or whatever, because of other pressures. Waste management is a big area. But yes, I didn't mean to imply it in the way you're saying.

MR. FOX. Michael Fox of the Humane Society of the United States. Just a few comments, and I would love for you to respond.

I guess defining sustainable agriculture is a little bit like shaking a kaleidoscope and whatever you see you can believe in. I think it's more important to consider this in an ecological framework. The burning need is to start reintegrating livestock, humane animal husbandry practices, with ecologically sound crop production.

I would like to clarify a point you made, Dana Hoag. The LD-50 test for safety of a pesticide or herbicide is a very crude test, and it's only a single test. It doesn't look at teratogenicity, carcinogenicity and all the other "icities" that we really ought to be looking at.

A recent article in *Choices*, authored by Dr. William Brown, Jerry Skeiz, and other agricultural economists, states very clearly that government policies encourage farmers to use more chemicals, to cultivate or graze fragile land, to exploit aquifers, and to discourage crop rotations. I think these are some of the core issues that we need to look at holistically in this ecological way, not get trapped in semantics, and also perhaps discuss the social justice issues as well.

I missed some of the earlier hearings, which I deeply regret, because I think this is pivotal for the sustainable economy of this Nation. But to quote from Mark Ritchie, who I'm sorry is not here, looking at the point of view of trading with other countries and importing agricultural commodities into the United States that have been produced at greater social or environmental cost, I think if we're going to have a secure, sustainable, ecologically sound agriculture in this country, we have to look at how our imports are being accepted. Ritchie, for example, notes that in the name of free trade, agribusiness in the United States has sabotaged the farm support system that, since the 1930s, protected farmers from the vagaries of the market. In its place, a system of deficiency payments has been introduced which benefits grain corporations rather than farmers.

The recent signing of the North American Free Trade Agreement by Canada, Mexico and the United States has taken the process a step further. Measures to protect small farmers, consumers and the environment in all three countries are likely to be abolished. So we're dealing with a very complex global economy and the possibility of this country assuming a leadership role. I think we have the opportunity now only if we acknowledge that we do, indeed, have an agricultural crisis on our hands.

Thank you.

MR. SMITH. Thank you. Any comments? Jim Worstell.

MR. WORSTELL. Just one thing. I think you're right about NAFTA. Though, it doesn't look like it, from looking at the debates, I think if it could be phrased differently, maybe there is a way of getting everybody to agree. I don't think any farmer wants to compete with another farmer raising the same crop in Mexico that can use DDT and can treat his workers like slaves basically. From the information I have—and I have traveled in a lot of underdeveloped countries and have seen the way workers are treated and have seen the chemicals they use—that's what is going on. American farmers shouldn't have to compete with that. Let's make a level playing field. That means we don't import any produce from other countries where DDT was used, or any of the other chemicals that were used that we can't use here, and don't import it if their treatment of workers is way worse than we treat them here. We just shouldn't be importing any of that stuff until they can show they're doing it right.

MR. SMITH. Bill Liebhardt.

MR. LIEBHARDT. I would like you to tell your colleagues in North Carolina that when we did our study on rotational grazing, some of the case studies—and that's where we got most of our information—where there were droughts, those farmers said they were able to harvest something, whereas if they had to go out with a bailer, they wouldn't have gotten anything. So what I'm saying is that the case studies to me demonstrate not only do we have to look at how we produce and the ecology of system, but I think we have to look at the ecology of our mind. How do we know what we know.

I think a problem we have within science, because of the way it's organized, is that we put great emphasis on replicated research plots—which are fine. I have done a lot of these myself. But they are only one form of information, and that on-farm studies and other kinds of information is just as valuable. We need to make use of all kinds of information, not just replicated studies on experiment stations.

It seems to me that in this quest towards sustainability we have to open up our minds. You know, if we jump out of an airplane with a parachute and it closes, we don't go very—well, we go damned fast. We have to have open minds about things. I think that is one of the problems I run into consistently.

I will say there is a big difference between California and North Carolina. Of course——

MR. HOAG. We hope so.

[Laughter.]

Just kidding.

MR. LIEBHARDT. With our farmers, we can have a meeting and call it sustainable agriculture and we'll have two-three hundred people show up. Our farmers are moving very rapidly to change, because the handwriting is on the wall. I've had farmers say that you're either in transition or you're out of business in the next five years. That's the way the climate is.

I also brought our newsletter and a thing called "What is Sustainable Agriculture" with me. People can take it with you.

MR. HOAG. I should have read that before I came.

MR. LIEBHARDT. That would have been helpful.

But I will say this. I don't think sustainability is a goal. It's a journey. I don't think anybody call pull something off the counter and say this is what it is. We're all struggling with what it means in different ways. But it's clear that if we continue in the track we're on, we aren't going to be sustainable.

MR. HOAG. With regard to my colleagues in North Carolina, who will remain nameless—I don't want to get them in trouble—I asked them point blank, do they think rotational grazing is profitable in North Carolina, like you've said, and they've said yes. I said, well, do people use it? They said no. Why don't they? What do they tell you? You know, you're telling me that this benefit or that benefit is helpful. That's part of the education process.

MR. LIEBHARDT. Right.

MR. HOAG. But convincing me isn't going to help. I'm sitting behind a desk. This goes back to what was mentioned earlier about farmers. We have to be working with farmers. Also, the comment right before you, too, about the LD-50s, we move in steps.

MR. LIEBHARDT. Absolutely.

MR. HOAG. We do a step at a time. Each time I find out a new step, we go another step further.

The only thing, I guess, that they took issue at all with what you said was this idea that, if you go to a rotational grazing system, you can't use BST because you can't use concentrate. What they were arguing is that in North Carolina, to make it more palatable, they have argued to go to some rotational grazing, keeping the concentrate, and that farmers will find it more acceptable. But, still, we're not getting massive—

MR. LIEBHARDT. There is nothing that would preclude somebody from doing both. I mean, you could go to rotational grazing and use BGH. There's nothing that would stop that.

MR. HOAG. I would like to bring up a question to you, too. When we talk about farmers—and I hear this all the time, that we need to work more with farmers, and I do all the time. But this is a case, a good example, where these guys claim they have this rotational grazing system that is more profitable and that it has less labor, but when they meet with farmers, the farmers reject that. Where is the breakdown? I mean, that would help me, I guess, or maybe clear up some of this. I have the perception that I do work with farmers, I guess.

Why don't farmers accept rotational grazing?

MR. SMITH. Jim Worstell.

MR. WORSTELL. Well, it's fencing. That's where the problem lies. If you want to get down to brass tacks, it's fencing. It's the lack of availability of low-cost fencing. In Kentucky, I think we've got a lot of peo-

ple accepting rotational grazing because we've got one entrepreneur, a farmer, who got into it, went way past Extension. They helped a little bit, but he'll tell you that he doesn't talk to Extension any more. They're learning from him. The researchers are bringing him in to give talks. But he found out all the manufacturers, got all the stuff, is bringing it in real cheap. So we have a lot of people interested in rotational grazing, not as many as in other States. He sells a whole lot more of his fencing materials to Indiana and Ohio than he does in Kentucky. So there are other problems there. You have a different social climate and you've got Extension agents that just don't want to change. They want to stick with the same old stuff.

Dana, I would like to throw it back at you and get your response to my proposal, that what has to happen with Extension is they've got to change or they're going to be out of business. They are getting their budgets cut all the time and they'll be lucky to be in business ten years from now, I think. But they need to change. What they need to do is become sources of information on rural development and environmental kinds of problems and how farmers can get around that, and they need to facilitate farmer-to-farmer networks, not just within States but across State borders, and also farmer researcher networks.

If the present Extension Services aren't willing to do that, why not privatize the deal and open it up to nonprofits? So I would like to get your response on that.

MR. HOAG. As an economist, I have to agree that privatizing is as good idea, but I don't want to lose my job. I think you're exactly right. I think more of that is happening than perhaps you do. Maybe, it's just starting to happen and we're only seeing it on our own sides. We have been trying to do a lot of that work, and I totally agree.

The hardest thing is multidisciplinary research. When I went up for tenure, when I was in Extension, I was the greatest thing, with every year a raise, you're doing a fine job. When I went up for tenure, it was where are your journal articles, the economics journals. Journals on soil and water conservation, what's that? Is that reviewed? Those comments.

I had letters from other departments, from farmers, from Extension people, saying that I was an economist they could finally understand. I felt real good about that. But it didn't buy me anything in my tenure decision. I think hearing it from farmer coalitions like your group, putting pressure on the university, is a wonderful thing. That's how it's going to change. It's the "old boy" network that needs to change.

MR. SMITH. We are running out of time. Are there questions or comments in the back? We'll allow only about three minutes.

MS. MELLON. My name is Margaret Mellon. I'm with the National Wildlife Federation.

I'm at a loss to understand the resistance to the term and the concept "sustainable agriculture" among the grower community. I mean, why wouldn't people want lower input costs, higher profits, and a farm

that they can give to their kids, with water they would want to drink? I can see there are practical problems with it, but in concept, I cannot understand what I hear all the time—and I absolutely believe—that somehow the word enrages people. That's my first question.

MR. HOAG. In a nutshell, they think they're already doing that. They think how can you, as an outsider from fish and wildlife, a city girl, as maybe you've seen some of that sort of farmer attitudes—

MS. MELLON. Very much.

MR. HOAG. How can a city girl come out and tell them that they've been farming and it's their income and their—

MS. MELLON. Because we're drinking their water.

MR. HOAG. But, you see, they're going to argue that that's my interest. I have my own interest. That's really the bottom line.

MS. MELLON. Well, we will accept that that's a tension that we'll all operate with for a long time.

My second point is on the relationship between research and results. I'm not surprised at all that after a short period of four or five years that we don't have results to show for a move, a big shift in the direction of sustainable agriculture, because, in fact, the research base on which it's going to have to depend—really, the research hasn't moved. The research is still 95 percent committed to another world view of agriculture. Until it changes, I think it's premature to ask questions. You know, where are the results?

At the same time, I think that it's very important, for all of us who have an interest in agriculture—and by that I mean people in the environmental community, or at least the smart ones, I think are beginning to understand that it is one of our biggest environmental issues, that we need to step back from the line of a farmer's field in which we metaphorically have said quit using pesticides, back five steps, to support of a research agenda that will make it possible in ten or fifteen years for every farmer out there to have profitable alternatives to using pesticides.

We haven't been heard at the agricultural research level. I think that's our fault and we have to change if we would like to see the differences made in the future that we would like.

Thank you.

MR. SMITH. We may get a comment to that later, but let's hold that for now.

John Ikerd.

MR. IKERD. John Ikerd, University of Missouri.

I kept hoping that somebody else would say this, but since they did not, I wanted to get in a few responses to Dana.

The term "sustainable agriculture" is not a matter of either this or that. It's not a matter of profit maximization; it's not a matter of environmental degradation, minimization. It is all of those things. That's an important concept.

I think Suzanne Smalley—I can't remember who you said told you this—but what we're talking about here is an approach to management that's very much like managing a household. If you're a housewife or a househusband, you have to feed the family, clean the house, wash the clothes, raise the kids, be a wife or a husband, a spouse, and you have to do all of those things. Housewives or husbands have been doing those things for a long time. We say that's too complicated and we don't want to work with it.

We don't have the luxury of changing the question to fit what we want to work on. We have to learn how to deal with the multiple objective problems with which we're faced. Otherwise, we become irrelevant.

From the standpoint of policies, I don't know what the policies are for the future, but we need to quit supporting the policies that are clearly in conflict with the goals of sustainability. From the standpoint of risk, if you want to make profits, you have to take risks.

I've moved five times, five different career changes. Now, I'm not rich, but I'm making a good living and I'm doing what I want to do, what I'm excited about. I have had tenure at three institutions. I don't have tenure now. I raise half of my money from the outside. If farmers aren't willing to take the risk, then they're not going to be able to do the things that they want to do.

Finally, our responsibility I think is changing. Our responsibility is to provide opportunities, not solutions. We're not talking about development and transfer of mass technology. We're talking about empowerment of individuals to meet their own end in the public's interest.

Thank you.

MR. SMITH. Unless somebody really has a comment, we will call this panel to a halt. I thank you very much. We will take a ten minute break and be back here a little before 25 after.

[Recess.]

MR. SMITH. Could we reconvene, please. Could Mr. Chuck Hassebrook, Dr. Hathaway, Dr. Nipp and Dr. Painter come up here, please.

The fifth panel focuses more directly on the policy implications of what we've been talking about so far, which basically is what policies we need to shift more activities back at the farm, to get more return back to farm management and farm labor.

Chuck Hassebrook, from the Center for Rural Affairs, will give the paper. Chuck is leader of the stewardship technology and world agriculture program at the Center, which is engaged in on-farm research on sustainable agricultural practices and policy analysis in the area of agriculture research, commodity, conservation, and trade policy. Chuck also serves on the coordinating council of the Midwest Sustainable Agriculture Working Group, and he serves on the National Sustainable Agriculture Coordinating Council, which he helped form to link the efforts of the regional sustainable agriculture working groups and other like-minded organizations. Chuck graduated from the University of

Nebraska, is a native of Platte Center, NE, where his family is engaged in farming.

To his left is Dale Hathaway. Mr. Hathaway is an old policy hand here in Washington, who currently is director and senior fellow at the National Center for Food and Agricultural Policy, and president of Hathaway International, Inc. He served as Undersecretary of Agriculture for International Affairs and Commodity Programs in USDA, from 1977 to 1981; he was chief negotiator on the US/USSR Grains Agreement on the Tokyo Round of trade negotiations in agriculture, and on agricultural agreements with China, Mexico, Venezuela and Nigeria. In that post, he also oversaw all domestic commodity programs, agricultural export credit programs, and agricultural marketing development programs. He received his Ph.D. from Harvard, and received a doctorate in public administration, was an agriculture economist at Michigan State University for a number of years, and served as chairman of that department. He is the author of many books, including one of the first agricultural policy books that I read.

Terry Nipp is president of AESOP Enterprises, a consulting firm that specializes in science and policy issues, particularly in the area of agriculture and the environment. He works very closely as a project director with the National Association of State Universities and Land Grant Universities. He has worked with the Congressional Office of Technical Assessment and has been a staff associate to the Board of Agriculture of the National Academy of Sciences. He received his Ph.D. in crop science at Oklahoma State University.

Finally, Kathleen Painter recently received a Ph.D. in agricultural economics from Washington State University, where she currently is a post doc. Her research has focused on the farm level economic and environmental impacts of farm policy, with particular emphasis on the potential of sustainable agriculture systems.

We are pleased that all of you could be here today. Mr. Hassebrook, you can start us off, please. We will have the green light on for 25 minutes, and then give you five minutes to wind up after you see the red light.

PANEL 5

PUBLIC POLICY AND AGRICULTURE STRUCTURE: IMPACTS AND CHOICES: PRESENTED BY CHUCK HASSEBROOK, CENTER FOR RURAL AFFAIRS

MR. HASSEBROOK. Thank you, Stewart. I appreciate the opportunity to speak here today. I also would like to commend Stewart and the Committee for pulling together this symposium to help focus attention on issues both of environmental quality and also the future of family farm agriculture.

I think American agriculture is at a critical juncture today, particularly with respect to the future of family farming. By that I mean that the decisions that we make today and over the coming decade will shape

agriculture for decades to come and for a generation to come, I think. Today, roughly half of the Nation's farmland is operated by farmers who are over the age of 55 and likely to retire within the next ten years. At the same time, we're seeing the number of people starting farming fall. When you put together the coming turnover in farm assets with the decline in farm entry rates, we see a fairly dramatic potential consolidation in agriculture in the near term and a permanent loss of a substantial share of the Nation's farm opportunities unless the forces shaping agriculture are changed.

I think that last phrase is the key point that I want to get across today, because the demise of family farming, in my mind, is not inevitable. Rather, it's a result of public policies and economic forces that are put in place by people and are subject to human control. As said by Dr. Don Paarlberg, professor emeritus at Purdue University, and the former chief economist at USDA, we can have whatever system of agriculture we want if we put in place the public policies to make it possible. Nor must we sacrifice efficiency to have family farm agriculture. In fact, the research suggests that farms can reach full economies of size at a fairly modest scale, at least if we focus on production efficiency and disregard the volume discounts and volume bonuses that have more to do with economic power than with efficiency.

Nonetheless, I think the decline of family farming has been fostered by forces inherent to capitalism. As said Dr. Harold Breimyer at the University of Missouri, wealth begets more wealth in a capitalist economy. Those with an initial advantage can pyramid ever greater amounts of wealth upon their initial advantage until economic control rests in a few hands and the free enterprise system destroys itself, absent countervailing policy measure to prevent excessive concentration of wealth.

It seems to me that U.S. agricultural policy has failed to provide that countervailing force. Instead, in many respects, it is biased toward bigness and has subsidized the use of capital to replace people in agriculture and thereby fostered industrialization. It need not be that way.

For example, publicly funded agricultural research, I think, is one of the most powerful policy forces shaping agriculture. In a sense, agricultural research is a form of social planning. By that I mean the decisions we make about where we put our agricultural research dollars, what types of farming systems we focus on in research, what types of technologies we develop, what types of systems we improve—those decisions go a long way, it seems to me, in shaping the options that farmers have available to them and shaping how we farm.

The public agricultural research system, it seems to me, has historically pursued efficiency through an industrial paradigm. By that I mean putting a focus on using capital, using products purchased off the farm, to replace people in agriculture and to override nature, in a sense. In other words, if nature resists, for example, a monoculture of continuous corn, then we develop a product and the farmers buy that product to overcome the way nature resists that—things like corn rootworms, nutrient shortages, what have you. That approach has mount-

ing environmental costs and also I think it has some ominous family farm implications.

As Stewart pointed out this morning, as we increase the use of those inputs, we are simply shifting income and opportunities off of farms, out of rural communities, and into the input sector. I think it's possible to reverse that trend without sacrificing efficiency, but to do that we have to change the way that we pursue efficiency in agriculture. Where under the old paradigm we have tried to increase efficiency by finding ways we could invest a dollar of capital to replace two dollar's worth of people's time, if we want to reverse that result, it seems to me we need to use research to develop systems that enable us maybe to use a dollar's worth of the farmer's time in management and skills to replace two dollar's worth of capital and inputs. In short, we need to design systems that build on the principal strengths of family and owner operated farms. I think among those principal strengths I would list primarily the presence of a highly motivated, experienced work force in the field and in the barn to exercise judgment in the field and barn. So we need to develop farming systems to provide them an opportunity to earn a return by applying those management skills. I think we need to design farming systems that work more in concert with nature to avoid some of the kinds of pest problems, nutrient shortage problems, what have you, for which we currently use purchased inputs.

In general, that is the approach that has largely been taken in the on-farm research efforts associated with sustainable agriculture. I think it is significant that recent research of sustainable farmers in four States—Iowa, Minnesota, Montana and North Dakota—shows that, in fact, the farmers that are using sustainable agriculture approaches have, in fact, managed to capture a larger share of the farm dollar and return a larger segment of the value added process in agriculture back to the farm. In fact, the research also shows that the use of those strategies of sustainable agriculture is correlated with moderate sized, owner operated farms.

But if those systems are to change the larger course of agriculture, I think it's clear that they're going to have to be able to earn a comparable economic return to conventional systems. I think we have seen some mixed results in that regard, but clearly John Ikerd's research at the University of Missouri shows that currently at least modest moves in the direction of reducing input use can result in both economic gains and environmental gains. I think, to realize the full economic potential of shifting towards reduced input use, we are going to need to address the research imbalance that exists between conventional agriculture and sustainable agriculture.

You know, we've spent billions of dollars for decades in research on trying to refine and improve the conventional approach to raising food and fiber. We have spent a lot of money developing varieties to fit those systems and management regimes to fit those systems. It seems to me, if the lower input approach is to become economically advantageous, more broadly we're going to need to address that imbalance and

begin to start matching the research commitment that's been made over the decades to the conventional approach. In fact, I think the 1990 Farm Bill does take some tentative steps towards addressing that imbalance and redirecting agriculture research to address those kinds of environmental concerns and family farm and rural economic opportunity concerns.

The most significant of the research provisions I think in the '90 Farm Bill are what's called the research purposes provisions, which articulate the purposes to be served by federally funded agricultural research, including environmental objectives and the objective of increasing economic opportunities in rural communities, as well as the more traditional objectives like increasing productivity. When you think about it, that's pretty significant, because I think one thing that you could clearly say about agricultural research over the last 20 or 30 years, or even longer, is that what it hasn't done is increase economic opportunity in rural communities—certainly not in agricultural communities. If, in fact, that is now an objective and we fulfill that objective, it means a significant change in the way we do agricultural research and the objectives of doing agricultural research.

The Farm Bill also directed the National Research Initiative, the new \$100 million competitive grants program run by USDA, to emphasize sustainable agricultural research. Now, the language in the Farm Bill, of course, is just words on paper and the proof is in the pudding. In fact, I think the progress in implementing these directives at USDA has been mixed. On a positive note, the National Research Initiative has begun to evaluate competitive grants proposals in part according to the contribution they make to the research purposes. Now, the process by which they do that could use some improvement, I think, but nonetheless, that's a significant first step toward directing agricultural research toward achieving rural community economic opportunity objectives as well as broader environmental objectives.

I think the most disappointing aspect of the National Research Initiative, however, has been the language of the request for proposals. I think that language clearly fails to reflect the emphasis on sustainable agriculture called for by the Farm Bill. We had hopes that would improve with the new request for proposals, but frankly, it didn't improve much at all. In part, in response to the initial language, last year the Center for Rural Affairs convened a group of leading researchers in sustainable agriculture to develop a set of recommendations to the National Research Initiative on how they should rewrite the request for proposals so that, in fact, it would reflect an emphasis on sustainable agriculture and fulfilling the research purposes. If you haven't seen that and would like to get a copy, come up to me afterward and let me know, or talk to Elizabeth Bird, and we can get that to you.

I think the most positive response to the Farm Bill directives in USDA has been in the Sustainable Agriculture Research and Education program. In spite of its meager appropriation, that program has taken some very meaningful steps to evaluating proposals based on their con-

tribution to broad objectives like environmental quality, like increasing economic opportunities in rural communities and family farming. It has, in fact, certainly in our region, and I think elsewhere, emphasized the farming systems that will help farmers, empower farmers, if you will, to reduce their use of purchased inputs and to capture a larger share of the farm dollar. Nonetheless, the funding for that program remains at about \$6.7 million, which is about half of one percent of the annual federal investment in agriculture research. I think that's just too little for this program and it is vital that that be increased.

Unfortunately, USDA's efforts elsewhere in implementing these directives have been disappointing. There have been no Department-wide guidelines that would inform researchers of these new directives and that would establish rewards and incentives for researchers to respond to these directives, in spite of the fact that the report language of the Farm Bill, as well as the report language of the recent appropriations bill, explicitly called for USDA to develop such guidelines to implement these purposes.

I think, maybe, the most troubling aspect of USDA's failure to fully implement these guidelines is in the Agricultural Research Service. I guess about a year after the Farm Bill passed, the Agricultural Research Service came out with a new six-year plan and in its mission statement made no mention whatsoever of addressing rural economic opportunity concerns and farm opportunity concerns, in direct contradiction to the Farm Bill. So I think it's fair to say that we need to have a more serious effort at USDA to implement these directives, but I think some important first steps have been taken toward moving agriculture research toward addressing both environmental concerns as well as economic concerns.

I want to shift gears a little bit and now talk about another area of federal agricultural policy, and that is the federal farm commodity programs. It seems that the federal farm commodity programs probably provide the clearest example of a public policy working in direct contradiction to its stated purposes, both respect to the structure of agriculture purposes as well as to environmental objectives.

When I think about what the farm program says to me as a farmer in northeast Nebraska, from which I hail, basically the farm program says the bigger I grow, the more money I get. The 1990 Farm Bill worsened that bias and under that farm bill the Nation's largest farms will receive a bigger share of the farm program deficiency payments than they were getting before that. I just don't think that makes any sense—if we're talking about trying to enhance economic opportunity in rural communities, and we're facing budget cuts, to change the program so that a bigger share of the benefits goes to the largest and wealthiest farms.

If you recall the passage of that legislation, there was a very contentious debate over several proposals that would have cut benefits to large and high-income farms, a debate in which the Agriculture Committees prevailed and defeated those proposals. Probably the best of those proposals was something called the Conte Amendment, authored

by the late Silvio Conté of Massachusetts, which would have eliminated the so-called "three entity rule." The "three entity rule" essentially makes the \$50,000 payment limitation a \$100,000 payment limitation because it provides that if you have a large farm and you want more than \$50,000 worth of payments, you can subdivide your farm on paper into multiple entities to get around that limit. You can, in fact, get \$100,000 of farm program payments.

In fact, under the 1990 Farm Bill and the '90 budget agreement, many of the Nation's largest farms took no cuts whatsoever, while small and moderate-sized farms are about to face their second cut under that legislation in 1994. That's because those big farms that were getting \$100,000 before the Farm Bill passed and the budget bill passed will still get \$100,000 this year and can still get \$100,000 in 1994, after which moderate sized farmers will have taken their second cut under the terms of that agreement.

It seems that, if we want family farms, that is no way to run a farm program. That is simply not a family farm oriented policy. If we want that policy to support family farms, it seems to me that we need to start by focusing the benefits on a volume of production that provides for a viable sized operation, support that amount of production, but then stop providing more and more support to keep getting bigger. The place to start, it seems to me, is in the 1994 budget, because 1994 is the year in which that second round of cuts for moderate sized farmers would be put into effect.

We propose, for example, that moderate sized farmers should be protected from that additional cut on a modest volume of production, say for corn, that they wouldn't take any cuts on their first 40,000 bushels of corn, that we would, instead, make up the revenue and provide the budget cut by going after provisions like the "three entity rule," and cutting back on the payments going to the Nation's largest farms and using some related measures like that to redirect those payments.

I think it's also vital in federal commodity programs that we address the stewardship penalty in these programs. By that I refer to the reduction in benefits that accrue to farmers who use practices like crop rotation to reduce their input use and reduce adverse impacts on the environment. Those penalties were particularly severe under the 1985 Farm Bill and they stem from several sources. Probably the most important of those is that the farm program disproportionately supports certain crops. For example, in my part of northeast Nebraska again, basically the farm program says to people that the more corn you grow, the more money you get. If you reduce your corn acreage to add a resource conserving crop like alfalfa to your rotation, which may substantially reduce soil erosion, substantially reduce your need to use chemical inputs, if you do that and go to, say, an oats, alfalfa, corn, soybean corn rotation, you do so at the cost of giving up half of your farm program benefits. Now, there is no good rationale for a policy penalizing that a rotation that's beneficial on environmental grounds, beneficial from a supply control perspective, but yet the program does that.

The second source of the programs' stewardship penalty is the bias towards reducing the amount of land used in agricultural production rather than decreasing input use. That really stems from the way in which the program attempts to control supply by removing land from production. It would make perfect economic sense, if we have supply control objectives in a farm program, and we want to stop overproduction, it seems that it would make good environmental sense and good economic sense to allow farmers to make their contribution to supply control by setting lower yield goals and then cutting back on input use accordingly, using less nitrogen fertilizer, maybe less pesticides, accordingly, achieving a lower yield but using all of their land, and maybe doing it at a little bit lower cost of production. You can't do that under the farm program, at least not the general farm program.

The 1990 Farm Bill did make some modest steps in that direction that I think are important first steps, but have some serious limitations. I think the potentially most significant of those in the long term was the creation of the Integrated Farm Management Program Option. That program provided that farmers who implement a plan to put 20 percent of their base acres for program crops into a resource conserving crops—say, convert some of your corn to alfalfa or a small grain/alfalfa mixture, something like that—would have certain options that other farmers don't have under the farm program. They could harvest some of these resource conserving crops from the acres on which they would receive payments for growing corn and they could also harvest certain resource conserving crops from their set-aside acres in recognition of the fact that they made their contribution to supply control by using a less intensive rotation.

Nonetheless, there have been some very serious problems and limitations with that program. The first of those began before that program became law, in that there were some pretty severe restrictions put on harvesting resource conserving crops under the program that were both complex and restrictive, particularly on haying and grazing under that program, that make it a lot less attractive than it would otherwise be. Furthermore, the administrative rules and policies that USDA has used in implementing the program in many respects violate both the letter and spirit of the law and make it less attractive than it would otherwise be.

We had hoped that these problems were largely taken care of when Congress passed the technical corrections bill about a year ago clarifying what it meant for USDA, but yet, almost a year later, USDA is still dragging its feet on implementing some of those changes suggested by the technical corrections bill, particularly with the most important problem, and that is changing something called the "Underplanted Acreage Rules." Without going into the complexity of them, USDA was interpreting these rules to mean that farmers would actually get a payment cut for going into this program relative to what they would have gotten in many cases by not going into the Integrated Farm Man-

agement Program and growing the same crops. I think it would be hard to argue that that was the intent of Congress.

We have also had a lot of problems with USDA's failure to educate its local offices on the program. In fact, many farmers who have been interested in the program have gone into local offices and found that the local officials were in many cases just uninformed on the program and uninterested, and in some cases actually discouraged them from participating. It just doesn't need to be that way. I mean, there are ways that we can make these commodity programs work in concert with environmental objectives rather than against them.

First, I think USDA needs to rewrite its rules and its handbook for the Integrated Farm Management Program and use all of its discretion to make the program more flexible and attractive, as well as educate its local offices on it. Beyond that, I think we need to revisit that program in the '95 Farm Bill to make it less restrictive and more flexible, particularly with respect to haying and grazing, so that it works for more farmers who are trying to diversify and improve their environmental performance.

I think we also need to look beyond the Integrated Farm Management Program to make the broader farm program more supportive of environmental objectives. You know, one place to start would be by beginning to merge some of our environmental objectives with the supply control provisions. A simple change would be to allow farmers to meet their set-aside requirements by setting lower yield goals and reducing input use. There is a pilot program written into the '90 Farm Bill to allow people to meet those requirements by reducing their bushels of production, but USDA just hasn't implemented it.

I think the potential for that, in the long term, would be particularly great if it's applied to something called the targeted options payment program, another program of the '90 Farm Bill that hasn't been implemented by USDA. Essentially, the program provided that farmers could get a higher deficiency payment if they increased their set aside—in other words, idled more land. Now, if you targeted the supply control objectives of that program to environmental land diversion—things like contoured grass strips for erosion control, farmed wetlands, what have you—and also allowed you to use it for reducing your yields by reducing input use, the program could provide real positive incentives for farmers to take environmentally beneficial actions like reducing input use, like protecting wetlands, restoring wetlands, like putting in grass strips to reduce erosion, et cetera.

I'm about out of time, but before closing I want to talk a little bit about federal tax policy. I think in the late 1970s it would have been fair to say that federal tax policy was one of the key policy forces driving the industrialization of agriculture. That changed in the late 1980s, particularly with the '86 Reform Act and some subsequent tax bills. But I fear we're about to revert to the mistakes of the past. Certainly, in listening to the presidential campaign, both major parties—maybe, I should say all three of the major parties—are talking about reinstating

tax subsidies for investment. Unfortunately, they're not talking about the implications of that for agriculture.

Let me talk about three principles that I think illustrate the implication for agriculture if we return to a sort of tax shelter economy where we use tax subsidies and tax shelters to induce all kinds of investment in farming.

First is that when we make farming a tax shelter, by its very nature it becomes less profitable. That's because a tax shelter is like a magnet for investment. If you create a tax shelter in agriculture, you're going to get more investment there. If you get more investment there, say more hog buildings, more dairy buildings, more breeding stock, what have you, you're going to get more production and you're going to get a lower price for it. That's just the way it works.

The second of those principles, a very closely related one, is that when you make agriculture a tax shelter, it changes the rules of the competition in agriculture, such that those who gain only a little from the tax break are put at a competitive disadvantage relative to those who gain a lot. If you want to compete in a tax shelter industry, it's not enough to produce efficiently; you have to be able to effectively exploit the Tax Code.

For example, we estimated that the capital gains provision, passed by the House of Representatives in 1989—it didn't become law, but it was passed—we estimated that the after-tax value of that provision to, say, an owner of a hog operation who was in the top income tax bracket, the after-tax value was worth the equivalent of about a 62 cent per hundredweight increase in hog prices for that individual. But to the farmer in the lowest tax bracket, 15 percent bracket, it was worth the equivalent of about a 17 cent per hundredweight increase in hog prices. That 17 cents may have looked good to that lower income farmer in the short term, but the long term implication is that the people getting 62 cents are going to find it more profitable, they are going to expand production, and pretty soon that 17 cents is going to be lost, and then some, in lower prices as production is increased.

The third and final principle I want to talk about is that, when we make agriculture a tax shelter, it changes the way we produce. The simplest example is the investment credit. When we had the investment credit, we essentially had a policy of subsidizing the use of capital in agriculture to replace people. That gets back, I think, to the issues that Stewart raised this morning in his presentation.

Well, the potential implications of the renewed interest in tax subsidies for agriculture I think is exemplified well, ironically, by the long-term urban aid package recently passed by the House of Representatives. In spite of it being a long-term urban aid package, it provided tax subsidies for investment in enterprise zones, not only in urban areas but also in rural areas. Under this provision, certain areas that met characteristics of having declining economic activity, losing employment, low income, what have you, boundaries would be set up and you would get tax breaks for investing in that area. But the way the tax

breaks were set up, they were biased in favor of high-bracket taxpayers at the expense of low-bracket taxpayers. For example, they provided a capital gains exemption. They were biased against self-employment.

Now, if National Farms, one of the Nation's largest corporate hog producers, went into an enterprise zone and set up a hog operation, it would get a tax credit for every person that it hired to work in its hog factory, probably at about four bucks an hour. By contrast, if a young person creates his or her own job by establishing a new farm or ranch, he/she gets no tax credit. It was biased in favor of corporations creating jobs and it was biased against self-employment.

Second, it favored corporations over sole proprietorships. The legislation provided a special deduction for investing in corporate stock in enterprise zones, but it provided no break for investing in sole proprietorships, which are the predominant form of business organizations for family farms and small business. I think the impact of that legislation would have been particularly severe in the livestock industries because they're the most mobile. Basically, what it would have done would be to subsidize corporations to subsidize livestock operations in enterprise zones, and it would have shifted livestock production into those operations and off of family farms dispersed around the country. Ironically, in this case, the result of the long-term urban aid package, passed in response to the Los Angeles riots, would have been to increase rural poverty as we shifted the hog or other livestock sectors from providing middle class types of economic opportunities for family farmers to providing very low paying jobs on corporate farms.

Now, the good news is that the legislation was amended before it was passed. I guess we still don't know whether it's going to be signed into law, but either way, it was amended to prohibit the application of those provisions to large farms. But I think it sends sort of a warning shot about what's coming if we get into this cycle of providing tax subsidies for investment to stimulate economic activity.

Again, it doesn't have to be that way. We can stimulate new economic activity by encouraging the creation of new family farms. We don't have to encourage concentration in agriculture. A good example, I think, of a type of policy that takes a very different approach and has a very different impact is a concept called "individual development accounts," which has been touted by the Corporation for Enterprise Development. Under this provision, low and moderate income people could put money into these accounts, the money would be tax free—in other words, any income they put in one of these accounts they would not be taxed on—and depending on their income, the government would match some of their savings going into that account and then later they could withdraw money to invest in education or to invest in starting a small business.

Now, that approach focuses on creating opportunities for people rather than focusing on subsidizing capital. If what we want are opportunities in agriculture and in rural communities, that's the way we need to stimulate economic opportunity, not be subsidizing corporate farms.

Well, I will close with that. I guess the key point I would make is if the family farm system of agriculture is to survive in this country, I think we need to institute a broad set of public policies explicitly designed to enhance economic opportunity in agriculture. The free enterprise system, by itself, is not going to create those kinds of opportunities. I think it has a tendency of its own toward the concentration of wealth. The continuation of current policy certainly isn't going to maintain family farm opportunities. If we want to make the change, I think the time is short and we need to act soon.

Thank you.

[The paper presented by Mr. Hassebrook, together with an attachment, starts on p.160 of Submissions for the Record:]

MR. SMITH. Thank you, Chuck.

Dale Hathaway, please proceed.

**RESPONSE STATEMENT OF DALE HATHAWAY, DIRECTOR AND
SENIOR FELLOW, NATIONAL CENTER FOR FOOD AND
AGRICULTURAL POLICY; AND PRESIDENT, HATHAWAY
INTERNATIONAL, INC.**

MR. HATHAWAY. Thank you, Stewart.

I would agree with the speaker's general position that federal policy affects farm size, the way people farm, what they produce, and the methods they use to produce. I think, however, that it may be a mistake to assume that it is always the overriding factor, and I think it would be an equally grievous mistake to assume that some new federal policies, which I thought just lurked beneath the surface here, would, in fact, be either desirable or achieve what they want to achieve.

First, just a general observation on the previous panel's discussion of why don't researchers deal with farm problems. Well, I tend to agree. It seems to me that a lot of the previous panel's testimony was about incentives. If you get the incentives wrong, you will get results that you don't like. That's what the problem is in most of what we've been discussing—the incentives are wrong. If you create incentives for college professors to get refereed journal articles in exotic journals, that's what they will do. They will do a lot of it, and nobody will read it except the referees, because it is all written in algebra—in my field, at least—but they get promoted on these articles. If, however, you want college professors to do other things, they pay them and promote them on other criteria.

I think it's not all that complicated. If you can break the system, good luck. This comes from a former university administrator. That's enough of that.

Now, basically, though, I think there's a little misunderstanding that has run through this testimony on the U.S. research establishment. Basically, I do not think that research policy was to substitute capital for labor. It was to reduce cost. Some labor in our agriculture has been high cost for a long time, compared to Mexico's or India's. We have

always been a labor scarce economy. Given that fact, there has been a lot of emphasis from producers on reducing costs through labor-saving devices, or through yield-increasing devices. But there has also been a lot of emphasis on increased yields, which is basically land saving. Yield increasing is not a labor saving; it's land saving. Irrigation is a land saving practice. Not all innovation has been in terms of saving labor. It has, I think, had one constant, and that is that farmers, or whomever, have asked for a reduction in costs.

Now, one final point on research policy. It seems to me that some of the issues you're talking about may well be solved, or complicated, however you look at it, by the fact that research programs in the public system may become increasingly irrelevant. If, as I suspect, more and more of the technical research comes out of the private sector, as it is now happening, it will be consumer driven. The consumers, in this case, will be agricultural producers. In that event, you don't have the problem of peer review being the main criterion by which researchers operate.

Monsanto and Upjohn don't pay their staff to get peer reviews. Regardless of the results, the realities are that they turn out research because they think that the vast majority of farm producers out there are willing to pay for this information. So they are a consumer-oriented and a producer-driven system. In fact, if you can make it so that farmers' demands are made known to researchers and that researchers respond to that demand—some of the kinds of things that you're asking for—it seems to me, you're very likely to get useful research results out of the private-sector system fairly quickly.

Now, to my first love, which is basically farm programs, you're absolutely right. The way farm programs are written and administered affect what farmers do. You did not mention what I consider to be one of the more interesting aspects of farm programs, and that's the marketing loan, which in my view was designed primarily as a method of escaping the payment limitations and allows some of the largest-scale corporations in the United States to get huge payments in a couple of industries, namely, cotton and rice, where there are very large-scale producers.

Some of the things that you were talking about, in my view ... well, I don't question what you say about the way farm programs are run. I would just make this point. Most of what happens, happens because somebody who is likely to hold hearings in this building or the one next door wrote it into law. You get 1,700 page farm bills because somebody out there comes in with things that won't let the Department of Agriculture administer the programs in a rational way. Having tried to run those programs, I can tell you that it sometimes is very hard to follow the twists and turns of farm program laws.

Now, I thought that the Republican administration had a pretty good proposal for flexibility when it was proposed at the time of the '90 Farm Bill, that would have allowed a lot of farm producers to do a lot of the things you were talking about. What happened? Producers of

all sorts of crops came in here and killed flexibility; absolutely killed it dead. That's where a lot of the things that you object to in commodity programs come from—producers of other commodity groups, producers in other regions.

When I was in the Department, one of my favorite springtime pastimes used to be spring haying. We would ban haying and grazing; we would announce it resolutely and steadfastly at the request, and under the pressure of the cattlemen. That usually lasted 60 days, sometimes as long as 65 days, but never longer than that, and then the other pressures came in.

All I'm saying is that these kinds of things basically are the result of conflicting pressures within the agricultural industry. Therefore, it seems to me that trying to do what you're trying to do through farm programs is the wrong approach.

I have a suggestion. It's not very complicated. Go immediately and directly to decoupled payments. Then you get rid of all of the problems you have dealt with, let farmers grow what they want to grow on their farm. You can give the decoupled payments in any size, in my view, on any criteria, whether it's the color of your eyes or the size of your farm, whatever. But you get rid of most of these problems.

Now, there was a proposal for decoupled payments. The last I knew, farmers almost universally hated it. But it would do most of what you want. I do not think that you can achieve most of what you want by the kinds of ways that you are suggesting. I don't know how you would administer a program that said farmers can use different practices and lower yields. This implies you've got to be able to measure everybody's yield accurately every year. I'm sorry. It's too complicated to administer.

Finally, before we get the impression that size is totally a function of farm programs, I would point out to you that, in my view, the largest and heaviest concentration in terms of size are in areas that have had no farm programs. They are in large-scale fruits and vegetables where farms are a huge size. They have had some water subsidies, but farms are large even where they haven't had water subsidies. Farms are large in poultry, turkeys, and increasingly in hogs. These are not farm-program induced. They might be, however, tax-policy induced.

I agree with you thoroughly that the tax policy should not encourage outside investment in an industry, certainly not in agriculture, and it ought to be neutral in terms of size of enterprise. All I'm saying is that there's a lot going on that is not a function of farm policy, and in many cases, where farm policy has operated the least, you have had the greatest concentration. Indeed, you could almost argue that where farm policy is operated the most—which is tobacco and peanuts—you've had the least concentration. There you are. The question is, don't blame farm policy for everything, although it has a lot of blame that it should get.

MR. SMITH. Thank you, Dale.

Terry Nipp, please proceed.

**RESPONSE STATEMENT OF TERRY NIPP, PRESIDENT,
AESOP ENTERPRISES, LTD**

MR. NIPP. I've worked with the research and the Extension directors for a number of years, and consequently, I'm going to focus my response to the area of research, research and extension.

A couple of years back, I brought a proposal to some of the directors, where recommendations were being made by a coalition of environmentalists as to how priorities ought to be set differently, or how funding ought to be reallocated, in order to address a new array of issues. The response from several of the directors, in all candor, was "who were these people, who are not part of our family, who are not part of the agricultural community, to come and tell us how to do our business, when no one but us knows how to do our business."

I think the answer highlights the fact that there has been a long time where the agricultural research, education and extension community has been ignored by everybody else. We have been out there doing what we do, working with the farm community, working with commodity groups, working with different farm groups, and more or less left on our own to do what we do.

We were very surprised to discover that anybody else cared. After we discovered that, we have gone through a fairly difficult transition, and I'm not going to begin to suggest that there's any homogenous consensus within the agricultural research system as to how we ought to move forward into the next generation.

There have been some very vigorous debates, but I will say that a consensus has emerged within the leadership of the directors, that they do need to aggressively address environmental and consumer interests. What that means and how you do it is also being fairly vigorously debated, but there is a recognition that there is a new legitimate clientele that has to somehow be addressed, while we continue to address the concerns of our old friends and families.

This puts us in a very awkward situation and we're going to be in a very awkward situation for a number of years, because, politically and economically, we will continue to be responsive to real world production concerns, the concerns of people who are willing to invest in research, which means a certain amount of leverage coming from the private sector, and a certain amount of family relations, shall we say, with our old friends and families from years of association. At the same time, there is a recognition that in order to survive, we are going to have to go through a reconfiguration. We're going to have to go through some amount of reallocation, and we're going to have to be able to show some level of relevance to a new generation of problems. This strikes at the very heart of a very philosophical debate within the research community.

The points that Dale made earlier, with regard to rewards and incentives, I think, are absolutely and completely true. The problem is figuring out who has responsibility for the incentive system being the way that it is. If you talk to heads of departments, they can't do anything about it because it's something that the school does. You talk to the deans and well, it's not our school, it's the other schools. You talk to the other schools and it's the president. And if you talk to the president, it's the journal editors. You can go around and around and around in this debate about the fact that we need to change the incentive systems. And everyone agrees. That's the hilarious thing. No one in the system or the status quo disagrees. But no one feels that they have the responsibility to change it.

One of the things that is going to have to be addressed is how do we all take one step forward together at the same time, because nobody gets to take a step by themselves. The researchers are not going to move their agendas dramatically when the reward systems from the journal editors remain what they are. The journal editors are not going to change at all by themselves. So at what point do we get the deans, the directors, the Department of Agriculture, NSF, the Academy, the journal editors and everybody, to sit down and say we're going to take one step together in the same direction so that nobody gets left out. If that quantum leap does not change, we will never get there in increments. That's going to be a remarkable challenge for all of us.

I deeply appreciate an inherent compliment in Chuck's presentation. The research community still hasn't gotten quite used to the fact that other people have opinions about how we set our priorities, or how we determine what we do is relevant. But there is the inherent compliment that agricultural research is, in fact, relevant, that it could, in fact, do something worth doing; that we could, if we put our minds to it, actually do something that will help solve these problems.

Now, I do not believe that agricultural research and extension, all by themselves, are going to drive a major social transition, because we do have to address all the other factors that have been mentioned already, in terms of incentives for the producers, the overall economic structure of the country, the whole array of topics that have been discussed today. But I do believe it is an essential component that research and extension be a part of designing a new system and that it itself is redesigned in order to be responsive to the parameters of the new system. That, in itself, is a very difficult and new concept for the research establishment, because we have understood through time that we are supposed to design things that, as was suggested, lower costs, make production more efficient, that allow farmers to do what they need to do in terms of reducing labor inputs, if that's the issue, or whatever else. But our whole approach has always been to solve the problem in the context of the system that we've been given to work within.

Redesigning the system was not an option that we thought we had. It's an option that society, as a whole, is now going to have to face, as

we look at scarce budget resources, the reduction of the commodity programs, and a host of new issues that will be before us.

There is not time to talk about a number of pertinent issues. Structural barriers within the whole research system need to be addressed. The philosophical issues I have only touched on very lightly, and many of you are familiar with the debate on where do you fit in, in this continuum, from basic to applied, to systems integration research. That's something we're collectively working with.

There are political barriers. There are political challenges. We're caught between several constituencies. We're going to have to advance for several years to come. There are the economic realities, the lack of available resources. It's easy to talk about reallocating funds from section of this budget to another, but we experience the same problems that Congress does. You can identify the most trivial and esoteric research and suggest eliminating that program, and it's just amazing what political friends and influence the supporters of that program can suddenly surface out of a vacuum. We are going to have a real struggle to get through the reallocation process, and a number of people feel that they've already done it.

Another critical issue is the fact that the Federal Government does not own the land grant university system or the state research system. In many instances, the states put in four to five times the amount of money that is available from the Federal Government to address sustainable agriculture or water quality or food safety. So when the Federal Government comes and says this is the new mandate and this is the new program, there is a certain amount of amusement and indifference to the new federal mandate. It's now that you're here and you intend to lead, how much money are you willing to cough up to buy your share into this program. There's going to be dynamic tension here, as well.

Having said all of that, though, I do believe we are on the verge of some very new possibilities. There is a recognition that we have to sit down and work out some negotiated understanding between the old clients and the new clients. We have experienced some of that in trying to implement the provisions of the 1990 Farm Bill, where we sit down with the advocates of sustainability, where we sit down with some advocates of the traditional farm groups, and say look, we've got inconsistent, contradictory and unmanageable legislation here. What did you mean by putting these provisions into law, and what did you mean by putting these provisions into law. Given that Congress could not resolve it, what do you expect us to do with this? That, I think, has laid a foundation that we have to continue negotiations and debates over the next several years.

The last and critical point is that if we do dismantle the commodity programs as a result of declining budget resources, we have to capture some of those resources and make sure that the decrease is structured in such a way that the small and the family farms, the noncorporate farms, somehow survive this transition—and that won't take a lot of

money—and also, at the same time, that the resources are invested to develop the tools that we need five, ten, fifteen years down the road, in order to address the problems that have been raised here today. We are way behind in terms of capital investment and it's going to be a long fight. We have to be about it.

MR. SMITH. Thank you, Terry.

Kate Painter, please proceed.

RESPONSE STATEMENT OF KATHLEEN PAINTER, WASHINGTON STATE UNIVERSITY

MS. PAINTER. Thank you.

I'm handing out a paper that I'm going to address. I describe here the consensus that current farm policy really is no longer valid to handle the problems we're looking at today and it's time for a change, as Clinton keeps telling us, and I agree.

I also am glad to hear that a lot of people feel the way that I do, that we need to look at things from an institutional framework in terms of investment incentives, tax structures, things like health insurance in rural areas, which are really important.

Let me start out by discussing my paper a little bit and my research. I began my dissertation research by interviewing farmers that were using sustainable practices, alternative practices, in the Pacific Northwest Palouse, the dry land grains region. We tried to identify farmers doing things that were addressing the most pressing environmental concern in this area, which is soil erosion, and also making money. After we interviewed about 26 farmers, I developed some budgets and this appears in my mathematical programming model. I looked at a lot of different farm policies and the impact on farmers.

One of the most interesting questions we asked these farmers was how did they feel about farm policy in terms of their sustainable type operations. It was almost unanimous that they hated participating in the farm programs; they would love it if they did not have to comply with all the base rules. They felt these rules really were biased against doing the right thing in the Palouse, but they couldn't do without them because of the income support that was needed.

A lot of the farmers that were doing great things, that were rotating grasses, using green manures, this type of thing, these farmers were penalized in terms of the commodity program payments. To me, the farmers that were doing the most amazing things were farmers that were wealthy enough to be able to sacrifice some income, whose farms were paid for basically. So it was like a luxury good, having this environmentally sound agriculture.

Just to look at the results of my research, I also did another case study in the North Carolina coastal plain. In that area, I felt the most pressing environmental problem was water pollution, agrichemical leaching, particularly of nitrogen. In looking at the paper, I have my results on page 13 and page 14.

I tried to look at social welfare impacts. The first column, column one, looks at what's happening to optimal returns to management, which is optimizing returns to the farm manager using various policies. In this table it tells you the change relative to the 1990 Farm Bill under a variety of alternative policies. So the first column looks at returns to management, and once I got those optimal returns—and this is for a representative farm that is family-farm sized—I did a bunch of calculations to see what happens to returns to land, to the consumer food price—this is in terms of dollars per acre, so there is a very small food price impact—taxpayer cost, which is just basically deficiency payments, offsite erosion damage in the Palouse, on-site erosion damage, and then I added these pluses, these positives, to see what was happening, trying to get at more things than just profits. I had to put some dollar values on the environmental damage, which people will probably criticize me for, especially in the North Carolina area, where there isn't very much research on this.

Here people wanted me to talk about the impacts on the family farm. You can see that we have all rotations, which is the A's. That includes alternative farms, alternative rotations. Recoupling increased returns to management. But if you look over at the last column, which is more of the whole society impact, it's a negative result here. So there are various tradeoffs. Farmers might lose in some aspects, taxpayers might gain in other aspects, and environmental things will change. But there wasn't a lot going on, there wasn't a lot of big changes. In fact, we would be best off without programs, it looks like, especially if you included the administrative costs of farm programs, where no programs would probably be the most beneficial in this area. In other words, it is time for a change in our farm policy. It's not really doing a very good job.

If you turn the page, you can see what's happening in North Carolina. Here I did some funny things, putting in the nitrogen leaching penalty on the different rotations, so you've got some bigger numbers. But basically, recoupling did really well, and also the 1990 administration proposal does very well according to my research results, which I won't go into because I don't have time. The red light is on.

A couple of important points. There are a lot of regional differences. In North Carolina, policy reform could help in terms of the total economic and environmental results, with the technology they have right now. In the Palouse, we need more basic research on alternatives, in addition to policy reform.

A quick point on the Integrated Farm Management Program Option. I modeled this option and I cannot find a way that this is going to be helpful. It doesn't come into the bases. It doesn't seem to be profitable. The only people that it would help would be those who are currently farming with base acreage that they would like to convert to resource conserving crops, that they wanted to do this maybe for noneconomic reasons, and they would get some income benefits from that.

I have put a couple of papers outside on some of my other research on looking at case studies of sustainable farming versus conventional farming. It basically shows that farm programs have been biased against people trying to do better things environmentally.

Also, I don't think that promoting sustainable agriculture, per se, will help the family farm necessarily. It depends on the region. In some areas I think we have to have less extensive farming to have sustainable agriculture, and that means it will take larger farms to make the same income.

Going back to hay and livestock, there are poor returns and high labor costs. I just don't see how you could make a living doing that in this area, unless you had some institutional change where you had better marketing for range-fed livestock, which I would love to see.

I think that some recoupling strategy is the way to go. I think you should allow market signals to dictate the production of crops. We live in a world economy, after all, and this would ensure the best use of our scarce resources that we value in the market. For those scarce resources not traded in the marketplace—water quality, human capital, quality of life—we need programs specifically designed for these purposes. Taxpayer dollars should be spent to subsidize practices like soil conservation, the use of cover crops to decrease nitrogen leaching, grassing out steep and vulnerable areas, planting trees, filter strips, no till and investment in rural communities, and infrastructure, especially health insurance, job creation. I think we need more off-farm labor opportunities in the rural areas, and more dollars for LISA.

I don't think that the land grant institutions should be criticized too much. I have known so many researchers with wonderful LISA proposals that don't get funded, so I think we need more money in the LISA program.

[The paper referred to in Ms. Painter's response statement was not supplied for the record:]

MR. SMITH. Thank you.

Chuck Hassebrook, do you want to comment before we open up the questions from the audience?

MR. HASSEBROOK. Just briefly.

You know, I certainly would not suggest that commodity programs are the only factor driving family farm decline. I'm not anti-commodity program. I would agree that that would be happening in their absence, maybe even faster. I'm not sure about that. But I would say very strongly that if the objective of farm programs is to prevent family farm decline, then they're not designed very well. So I'm not an advocate of eliminating farm programs, but I am an advocate of changing the way they work and the incentives they send, both environmentally and with respect to farm size.

By the way, I'm not sure that farmers killed the idea of flexibility. Every poll I saw of farmers during the Farm Bill debate indicated that it was at the top of their list—that is, the general farm population—of

the changes they wanted to see in farm commodity programs. Now, there were a lot of concerns about the specific decoupling proposals, for various reasons. Suffice it to say that I don't think that what happened in 1990 should be read to mean that farmers don't want more flexibility in programs in order to allow them to change cropping practices, because I think they really do.

I think one response to Terry about the question of who needs to change the incentives and reward system, I would simply say that I think it does need to start with representative bodies like Congress and State legislatures. After all, agricultural research and the objectives towards which we aim agricultural research in a democratic society ought to be decided through democratic channels. For example, the USDA acting on directives already gotten from Congress ought to be changing rewards and incentives. In other words, in response to the Farm Bill, they ought to be changing requests for proposals in the national research initiative. That provides a very strong incentive. They ought to be changing the peer review process in their own institutions, like the agricultural research service, to reward scientists who respond to congressional directives and social and environmental challenges. That's not happening. I think there is a real vacuum in the leadership within the Department, frankly.

MR. SMITH. Okay, quickly, Terry.

MR. NIPP. Very quickly, I would not and do not want to suggest at all that there ought not to be leadership at the federal level in regards to beginning to address these issues, not at all. But I do need to put on the table that, in and of itself, even that won't be enough simply because the federal Government is only a player, and not always the major player.

MR. SMITH. Dale Hathaway?

MR. HATHAWAY. My guess is that your survey and my view are both absolutely right. Every farmer wants a farm bill that gives him flexibility and keeps those other suckers from getting into his crop.

[Laughter.]

MR. SMITH. From the audience?

QUESTIONS AND ANSWERS

MS. VANDERMAN. Ann Vanderman from the Economic Research Service, a comment and a question, I guess.

I find it hard to believe that agreement is unanimous in overchanging the incentive structure. In universities, like the gentleman was speaking about this morning with respect to how do you get people to change to rotational grazing, there is asset fixity. You have a lot of people who are very heavily invested in the present incentive structure, and you've got some pretty powerful incentives. I mean, 1.2 million bucks sitting there every year for the lucky Nobel Prize laureate. There are a lot of people in universities who are striving for that. So that's a lot to fight against.

Kathleen started to talk, at the very end, about the structure of agriculture and how that's related to sustainable farming. In a way, I feel like we've side-stepped that whole issue today. I mean, we've talked about sustaining family farms and we've talked about sustainable agriculture, but still, where do these two things come together when agriculture is concentrated, the majority of production, on relatively few farms, and then you have a large number of small- and middle-sized farmers. It seems like mostly what we've been talking about is how to change the production practices of those small- and medium-sized farmers, to make them sustainable without really dealing with the production practices of those relatively few large farms who account for the majority of production.

The same way again with the fruit and vegetable producers. This sector within agriculture does not fit your model of family farming, and even on a small scale won't because you're highly dependent on hired labor. I don't know where that fits in exactly, but it seem like at some point we need to address that.

MR. SMITH. Would anyone want to comment on that?

MR. NIPP. I chose my words very carefully, and they have to be, because when I suggested there is a consensus, I mean only that there is a consensus that we do respond to the incentive structure that exists and that is somebody else's problem if you're going to fix it. So that is the consensus.

Among those in the leadership of these institutions, who recognize there's a need to change, I think even there, there is a consensus that we're going to have to somehow come to grips with this. But, by and large, I think most of the research community would very much appreciate it if the rest of the world would quit asking these annoying questions and give them the money they ought to be allowed to have to do whatever it is they've been doing—thank you very much—and we would very much like you to recognize that whatever we do is inherently good and will be a value at some point in the future to somebody, so we should be allowed to do it.

Now, economic realities are about to force on us a reckoning we have not had to deal with, and we're going to have to come to grips with the fact that that basic investment in science and knowledge is going to have to be better linked to some product delivery and problem solving and the multidisciplinary team approaches to solving problems. There is not a consensus on how we're going to do that, and there is only a consensus in the leadership that we're going to have to.

MR. HASSEBROOK. One reaction to your comment about the relationship between sustainable agriculture and the structure of agriculture. You know, I don't think that it's automatic that addressing environmental problems in agriculture is going to be good for family-sized farms. I think that they only merge if we have explicit policies to make them merge, and explicit research strategies to make them merge. I think that the strategy of developing farming systems that reduce the

need for purchased inputs, that use more cover crops, things like that, does, in fact, have potential to merge those objectives.

There are other ways you can address environmental problems that would have adverse family farm impacts, in my view, so I think it has to be a conscious policy to try to address those things simultaneously. The comment in the previous discussion about the definition of sustainable agriculture having all of these different aspects, and how do we trade one off against another, I think, misses the point. The point is that that was in the research title, and we need to try and design research strategies that pursue those goals simultaneously, and try to develop farming systems that pursue them simultaneously, instead of pursuing one problem in a way that works against the other problems. So again, I don't think it's automatic.

One other thing I would add, one of the critical issues is if we simply pursue environmental issues by trying to develop a new generation of products that are at least ostensibly safer than the ones we use now, then it's not going to have positive family farming impacts. I mean, when we talk about the private sector, the input sector, driving research decision making more and more—and I think you're right, that it's doing that—certainly that doesn't address my concerns. What it means is that the kind of research that doesn't create a product to sell to farmers isn't going to get done, or the research that provides farmers the knowledge they need to become less dependent on purchased inputs so that they can get a bigger share of the farm dollar gets left out. That's one of my concerns about where we're heading.

MR. SMITH. Tom?

MR. GUTHRIE. I just had a comment for Kathleen, and this may end up being a push for LISA, too. I just read a bunch of preproposals for some things, for some funding they would like to receive, and some of those were very good proposals. It's unfortunate that some of those may not get funded.

But you talk about the uniqueness of the regions. But if you go beyond that and look at the uniqueness of each farm operation, there is so much diversity within the farm operation. It depends on when that farmer was born, how old he is, how much did he have when he started, and where does he intend to go. In order to write policy that addresses all of those situations equally is very, very difficult, needless to say.

Incentives, I think, come to me as a farmer in many different ways. It might come through the Farm Bill, but it might come through the Clean Water Act, that makes me more environmentally aware that I'm going to have to change some things that I do. Maybe, that's the incentive coming in the back door. So just those comments, I guess.

MS. PAINTER. I wanted to add one comment to the last question. I think that agricultural policy is going to be looking more at regulation, instead of the way it's been structured in the past. Deficiency payments leave a whole lot of people out of the loop and do not allow us

to look at some of our environmental hazards. I think it's going to be more of a regulation thing, trying to encompass some of these water quality issues. I think it's going to change in that direction.

MR. SMITH. Grant Buntrock, did you have a comment or question?

MR. BUNTROCK. Just a short comment or two, and a question possibly.

I guess I would comment on the discussion of the farm programs, in terms of the impact of programs on farms, the size of farms, and so on. Also, on the comments regarding decoupling.

First I think it's important that we all remember that farm programs have always been geared to production—in other words, the commodity—as opposed to a farmer, *per se*. When you're talking about decoupling, you're talking about a very basic change in agricultural policy, because we have never, in the history of farm programs, explicitly supported the farmer. We have supported the production on that farm. If he's got 50 acres or 1,000 acres or 10,000 acres, it's on an acre-for-acre basis on the production of the farm.

Of course, what has happened in recent years, with the higher dependence on payments, it exacerbates or makes it more apparent of the bias towards the larger farms, because it's on production. It's just that simple.

Dr. Hathaway indicated that farmers, by and large, are opposed to decoupling. I think that's very true, because when you talk about decoupling, I think we all have in mind payments. Of course, if you talk in terms of some a farm policy, where you make farmers less dependent on payments, I don't think you have much problem, at least in theory, in talking to farmers. But this term "decoupling" becomes more prominent the more dependent you are on payments for a living, Government payments.

It seems to me that a part of the problem is that we made a very explicit choice in our Government policy to lower market prices. The 1985 Farm Bill I think was aimed directly at lowering market prices. The 1990 Farm Bill follows that. By lowering the price support levels, by using export subsidies, et cetera, all of these provisions were designed to lower market prices. Of course, it drives up the cost of the programs and so on, without going into any more of that.

It seems to me that we need to be looking at some manner of farm policy—and I disagree a little bit in terms of doing away with commodity programs. I think we have to find new ways to have policies, compared to what we've been doing. But as long as you have even 50,000 producers out there that are trying to make a living in agriculture, as opposed to other types of production activities, you've got a problem, as an individual, in responding to a market. You just simply don't have that impact as one individual. So we need ways of addressing that from the standpoint of farm producers.

One of the things that has not been mentioned, when we talk about the structure and the well-being of agriculture, is our dependence in

this country on international markets and what we're doing with these. I think this has a very important bearing on some of the things that Stewart Smith referred to this morning, in reference to farm activities, jobs, et cetera.

I am very surprised that, when we talk about farm activities and so on, that we don't spend more time in terms of research and more effort in finding ways in value added. I know this has been referred to a discussed a lot. But we seem a little bit cavalier and nonchalant in negotiations that are going on now in the North American Free Trade Agreement and other activities. For years we have had a positive balance of agriculture trade, and yet that positive balance is quite small when you look at the value of production in raw material versus the value of that production, if you put in the value added. The Europeans have been very good at that. But I'm surprised that, when we talk about enterprises and entrepreneurship, jobs and so on, that we just agree that a lot of these jobs are going to go to Mexico in the North American Free Trade Agreement, in terms of processing and so on, and that there isn't a little more discussion and more emphasis placed on the potential to possibly triple the value of our agricultural production domestically if we followed more along that line. So I guess my question really deals more with that part of it.

MR. SMITH. Does anybody want to respond to that?

I think there has been concern on that issue of value added. I guess there is some implicit understanding that we could expand the value of exports if we provided more emphasis on value-added exports. But you're right, it wasn't made explicit as far as something we should have gotten into.

I'm going to take one more, and then, as a wrap up, I want to ask the staff members from the Agriculture Committees to give us just a quick wrap up before we leave. One more question.

MR. DEICHMAN. Did I understand Dale Hathaway correctly to say that if farmers, as research consumer, were to demand certain types of research from private research providers, those types of research would follow quickly? I think that's a "yes" or "no" question.

MR. HATHAWAY. That's what I said.

MR. DEICHMAN. Well, I would just ask you, to whom, then, should I go? If I were a dairy farmer that was wanting to acquire research results on rotational grazing, what private research provider would I go to?

MR. HATHAWAY. There you have an interesting point which I think is one that was glossed over this morning. I don't think that's a technology. I think that's a management system. Therefore, what I was talking about are technologies, particularly biotech. You will get, I think, a more responsive system out of the private sector than trying to make the public.

But on the management side, that's a good question. I don't know the answer to that. But there is very little private sector management

research for agriculture. What you're asking, I think, is basically a management organizational question, not a technology question.

MR. SMITH. Okay, to quickly wrap up, I would like to ask if Chip Conley, who has been on the staff of the House Ag Committee for some time, if he would care to make a few comments on how he sees the policy environment.

MR. CONLEY. Thanks, Stewart.

I don't know that I have the time for the cathartic experience that I think I need at the moment, but just grab me and pull me off when I've gone on too long.

[Laughter.]

Stewart asked me to suggest a little reality therapy, so I will be brutally frank. I may be disabusing you on the notion that the interests that you've been discussing today were not at the top of the policy list of priorities when the Farm Bills of 1985 and 1990 were written. Let me go on to say that Dale Hathaway and I were talking about the 1,700 page Farm Bill. The interests that you have talked about will probably add another 200 pages to the next farm bill in 1995, to the degree that people in Congress are successful in including them.

It is precisely because of competing interests that we have the contradictions that Chuck Hassebrook was mentioning. I should state first of all that all Members of Congress on the Agriculture Committees want to save the family farm; they all want farm incomes to go up, not down; they all are for motherhood and apple pie and everything else. But there are some competing factions here.

A number of the things that Chuck Hassebrook discussed in terms of farm policy that discouraged people from pursuing more sustainable practices were written not because they wanted to discourage people from pursuing sustainable practices, but because of those other greedy sons of bitches out there who were milking the farm programs for all they were worth. That's why you have bases and yields.

Now, I should also throw the caveat in that farm bills are usually written to address policies that occurred when the last farm bill was written. Maybe the best thing you can say about the 1985 and 1990 Farm Bills is that we screwed things up so badly with the 1981 Act that there were still problems left over from that, which we could appropriately address—the erosion of export markets, et cetera.

In terms of sustainability, we probably did take a step forward in 1985—perhaps Chuck would disagree with this—by freezing yields, so you were encouraged to throw more inputs on in order to drive your incomes up. It's true, farm programs do favor larger farms, but the only way your farm can get larger now for more payments is by buying more acreage that has base on it and program yield on it. You can't go out and engage in practices that will increase your payments because of that.

We did put in the integrated farm management program, and I will tell you, when it was being discussed in private by Members, the Con-

gressmen who offered it said, "Listen, people who want to engage in these rotational practices should at least be able to keep the same level of deficiency payments they had." Another Member said, "Well, God knows, I don't know why they would want to do that. But sure, let them, if they're willing to accept no more payments than they already have. They can grow these other things and maintain their base."

We did, in technical corrections, try to fix the bias that was made towards program crop productions, such that you would not lose base acreage by growing resource conserving crops. I'm disappointed to hear the Department hasn't implemented that.

Perhaps, in my mind, the most important thing that can come out of this is that it has been my feeling for some time that it would be useful for farmers to be aware of other management practices such that when market conditions were terrible, it might make more sense, and they might gain more net income, if they reduced their input purchases and applications and thus saved some of the expenditures from their net income, from their gross income, and even in the face of perhaps producing a little bit less and having a little bit less gross, that their net income might be greater, that their input expenses would decline by more than their gross income would. It seems to me this is sort of what the rotational grazing gets at. It seems to me that this is appropriate research to be engaged in, so that farmers have other options to look at, at different times.

One of my hopes from the 1990 Farm Bill is that the requirement to keep records on chemical applications will bring to farmers' attention exactly what they're applying. Are they applying as much as they need to? Are they applying too much? Can they cut this by a large amount or a partial amount and still get the yields that they're used to getting, or not get a great diminution in their yields? I think it's the thing that will focus farmers' attention on the practices they have.

I think I have exhausted myself with that.

MR. SMITH. Chip, thank you.

And for a perspective of the Senate Ag Committee, Pat Westhoff.

MR. WESTHOFF. I'll be much briefer, since I wasn't here in 1990, and therefore I can't be blamed for any of the provisions of the 1990 Farm Bill.

I just want to mention one thing in looking to the future, the immediate future, 1993. If you're looking for changes in agricultural policy in 1993, I'm not sure you're going to get a lot. But if you're going to get something, it may well be budget driven. So if you're talking about the incentives that cause farmers to do things you see as not being sustainable or are biased against the small family farm unit, your best possibilities in 1993 may be to make sure that whatever cuts are made in agricultural programs in 1993 are done in such a way as to get rid of some of the negative biases you see in existing programs.

That's all I have.

MR. SMITH. Thank you, Pat.

I appreciate all of your participation. It has been helpful. The full record will be part of the Committee hearing. As Chairman Hamilton said, we had three hearings preceding this, and this is the fourth and final hearing. It will give the Committee, I think, a sense of some of the problems and challenges facing them as they make some recommendations on how to achieve an agricultural system which is internationally competitive, environmentally benign, and promotes family farming. But you have given, I think, some testimony here today that will be helpful in that area, and also in defining the federal policy we need to support that system.

Thank you. The hearing is closed.

[Whereupon, at 4:45 p.m., the Committee adjourned, subject to the call of the Chair.]

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SUBMISSIONS FOR THE RECORD

PAPER PRESENTED BY STEWART SMITH: FARMING ACTIVITIES AND FAMILY FARMS GETTING THE CONCEPTS RIGHT

[The author's views do not necessarily reflect those of the Chairman
or any other member of the Joint Economic Committee]

The Joint Economic committee is interested in finding agricultural systems which are internationally competitive, environmentally benign, and promote family farming. While the three goals are interrelated, this paper addresses the goal of promoting family farming, and rather than debating the definition of family farms, it focuses on the promotion of farming as an activity. Increased farming activity promotes family farms by providing opportunities for farm family employment, even if it also promotes opportunities for farmers not meeting the definition of family farm.

The development of U.S. agriculture into an increasingly industrialized system has resulted in a substantial shrinkage of the role of farming in that system. This is somewhat reflected in the decline in farm numbers but obscured since that decline is achieved by "larger farms" absorbing "smaller farms". We are falsely comforted that most exiting farmers sell to neighbors who continue to operate those farms. It is often suggested that the amount of farming has been maintained even while farm numbers are being decreased.

This paper looks at farming, as distinct from number of farms, and finds that farming, as an activity, has diminished along with farm numbers. Indeed the loss of farming drives the reduction in farm numbers, not vice versa. The distinction is important because the policy response to loss of farming seems to be more definable, and maybe more achievable. I will discuss the importance of the loss of farming as an activity and the policy response necessary to reverse it. First, I offer a definition and measure of farming as part of the agricultural system. Second, I discuss the process by which farming activities are lost to the nonfarm sectors. Third, I look at policies which contribute to that loss, and fourth, how those policies might be changed.

I. DEFINING AND MEASURING FARMING ACTIVITY

The inability to find a universal term to represent the agricultural system, as distinct from farming, has blurred the distinction between the two and impeded the ability to address the farming loss issue. For example in a recent analysis of the North Atlantic Free Trade Agreement (NAFTA) the USDA states on the same page that:

"(The) percent of labor force in agriculture (in the) United States (is) 1.3%," and

"About 21 million people work in some phase of agriculture from growing food and fiber to selling it at the supermarket." (USDA, 1991)

USDA means farming in the first case (1.3% of labor force or 2.1 million employees), and both farming and the marketing components (21 million employees) in the second. If you confuse agriculture with farming during this presentation, you will be in common company, but we'll have a difficult experience communicating.

The agricultural economics profession is equally negligent. One of the discipline's elder statesmen explained it as a generation problem, suggesting that the icons of the discipline grew up in a time when farm and nonfarm agricultural interests were more equally balanced and their interests were perceived to be mutual. There was no purpose for making a distinction.¹

I view farming as one of three components of what I shall refer to as agriculture, or the agricultural system. The other two components are the input sector, primarily suppliers of goods and services to farmers, and the marketing sector, which includes processors, distributors, transporters and retailers among others. (Fig. 1) What I call agriculture was termed "agribusiness" in a 1957 seminal piece by Davis and Goldberg, who argued that agriculture was much more than farming and should be viewed as a system which had an upstream component, the input sector, and a downstream component, the marketing sector, as well as farming. (Davis & Goldberg, 1957) Agribusiness has come to mean only the nonfarm components, or if farming is included, only large farms which are directly linked to those nonfarm firms, and in some cases has assumed a pejorative connotation. The USDA uses the term, "food and fiber system", which is also identical to my use of the term agriculture or agricultural system. and does not include wood or synthetic fibers, major components of the total fiber system. (Lee, et al., 1987) Others use the term "food and agricultural system". All are compatible with my use of the terms agriculture or agricultural system.

Measuring the Farming Component. While there is general agreement that farming has been altered as agriculture has been industrialized, there is less agreement on how best to define and measure that alteration. I define it with a concept similar to that used by USDA and Goldberg, where industrialization represents the proportion of total system activity performed by the nonfarm sector. Thus if there is no farming, the system is totally industrial, and if all agricultural activity is conducted on farms, the system is totally nonindustrial, or totally agrarian to use common terminology. In the real world it is between those poles. I measure industrialization as the amount of economic activity performed by the nonfarm firms as a portion of total system economic activity, which is measured as total food sales. I estimate the share of economic activity of each sector as the amount of value added contributed by that sector.²

Value added can be thought of as the amount of returns paid to participants in an economic system as a reward for their contribution.³ This definition of value added is different from the common usage which applies value added to a product. If milk is processed into cheese the difference between the value of the cheese and the value of the milk is commonly referred to as value added. While the two concepts are related, the use here refers to the performer of the activity and not to the product.

Figure 2 shows the three components of the agricultural system from 1910 to 1990. (Fig. 2) As can be seen, the farming sector has experienced a significant erosion of activity (from 41% to 9%) to both the input sector (which increased from 15% to 24%) and the marketing sector (which increased from 44% to 67%). During this time many of the economic activities that used to be done by farmers shifted to nonfarm firms. Those shifts can be more easily grasped by showing the shares as linear trends over time, as shown in figure 3, which eliminates some of the price volatility effects that may obscure changes in structure. (Fig 3) While these graphs are not explanatory, they can be insightful. For example, when we were told that all those farmers moved off the

farm because we were getting more efficient and didn't need them any longer, we were told only half the truth. The whole truth was that much activity performed by those exiting farmers was assumed by nonfarm firms and not passed on as system efficiencies. While those shifts were obvious during the "mechanical revolution" where tractors replaced animal power, or the "chemical revolution" where pesticides replaced crop rotations and mechanical tillage, they apply to practically all technologies adopted by farmers in this century, including the forthcoming "biotechnology revolution". The likely adoption of BST offers a current example. Some analysis indicates that over one third the loss of dairy farming (and dairy farms) will result in an increase of nonfarm activity and costs rather than an increase in system efficiencies (Marion, 1990).

Not only did the farm share decline as a proportion of the total system, the absolute value of farming actually shrank during that time. (Fig. 4) In real terms from 1910 to 1990, the value of the marketing sector grew from \$34.5 billion to \$216.3 billion, the input sector from \$12.6 billion to \$57.9 billion, while the farm sector shrank from \$24.2 billion to \$22.6 billion. The absolute values of the market sector and the input sector increased 627% and 460%, respectively, while the value of the farm sector declined over the same time period. The industrial component of that system reaped the benefits of the increased growth in the agricultural system at the expense of the farmer.⁴

The 1980s Exception. From 1981 to 1990 the producer's share of the food and agricultural system decreased substantially. This decrease was primarily absorbed by the input sector, which dropped from 31.1% in 1980 to 18.9% in 1990, losing a substantial portion of its gains through the previous seven decades. While this paper makes no attempt to determine the precise causes of the decline, several forces could be at work. The value of purchased intermediate inputs per unit of production declined during the decade, which could have been caused early in the decade by price declines in some inputs, by farmers postponing or skimping on inputs due to the tight farm incomes of that period, or by farmers adopting less input intensive farming systems. Only the last would reflect a change in farm structure. Towards the end of the decade the 1986 tax reforms were in place, reducing pressures to purchase equipment and other inputs, and interest in more sustainable agricultural techniques may have had an effect, although it seems doubtful it would have been adequate to affect national input uses. Whatever the causes, that decline seems to have leveled off the past two years. While it warrants additional study, it is left here for later analysis.

II. THE PROCESS OF FARMING ACTIVITY LOSS

Technology is the linchpin to the process of farming activity loss. Most technologies adopted by farmers result in a shift of activity from the farm to the nonfarm sectors. That shift of activity results in a loss of returns per unit of production and leaves the farmer with excess management capacity if production is not increased. A common example of that shift is replacing farm activity with purchased inputs. As farmers adopted pesticide protocols during the past forty years, they reduced the need to rotate crops and mechanically till, greatly simplifying the management requirements of producing the desired cash crop. Commercially purchased fertilizers allowed crop farms to spin-off animal enterprises, simplifying their operations but not necessarily increasing their efficiencies.

The marketing side offers similar examples. Maine farmers who used to pack their own potatoes but now deliver to a central packing shed or food processor, have spun off marketing services to the nonfarm sector. Relieving farmers of these activities allows them to focus more of their capital and management capabilities on producing commodities, but at a reduced margin since they are getting rewarded for less activity per unit of production. Farmers who adopt technologies that simplify management usually expand production to utilize their newly gained management capacity and offset lost margins. They will expand as long as their net return from doing so is positive. Limits are imposed by the using up of their management capacity, limitation on the acquisition of capital, or the increase in their per unit explicit costs exceeding the decrease in their per unit implicit costs.

Explicit costs are those paid by farmers that enter the bookkeeping ledger, e.g. fertilizers, fuel, and paid interest costs. Implicit costs, although just as real, do not show up on the books. The most prominent are opportunity costs, the cost to the farmer of his own time and money devoted to the business. If that time and money were directed to a different activity, it would provide a return to the farmer. The loss of that potential return is a cost farmers attempt to recover in their operation. By increasing output those opportunity costs are spread over a greater number of units, decreasing the return needed per unit. Farmers have an incentive to expand until the decrease in implicit costs per unit is exceeded by an increase in the explicit costs per unit.

In this case farmers do not expand to reduce explicit costs, but rather to increase net income. Understanding that process helps explain why farm enterprises are constantly pushing beyond the size of lowest explicit production costs. As they spin off economic activities, they reduce their returns that cover their opportunity costs. Expanding output allows farmers to recapture lost returns even if explicit costs per unit increase.

The private but well distributed annual Northeast Farm Surveys from the Farm Credit Banks of Springfield demonstrate this phenomenon. As seen in the 1990 survey of dairy farms (Fig. 4), when considering explicit costs only, the smallest sized herds are the most efficient.⁵ However, if substantial opportunity costs are included, the larger farms are more efficient. In terms of transforming inputs to outputs, society would be better off with the smaller farms, provided those farmers could use their excess management capabilities to recover their opportunity costs with activities other than increasing production of commodities, including providing more marketing services or displacing inputs. Recovering opportunity costs with a diversity of activities is a key to the economic viability of many alternative farming systems, including sustainable agriculture.

The loss of farming activity process also provides insights into the size bias charge often leveled at land grant university (LGU) research. Since its inception and more recently since the publication of *Hard Tomatoes, Hard Times*, critics and defenders of LGU research have debated its impact on the farm sector. (Hightower, 1973) Critics often charge that LGU research is biased towards larger farms, while defenders argue their technologies are scale neutral and that larger farms simply have better managers more attuned to adoption. I suggest that both sides have the argument wrong. It is not that LGU research is de facto size biased, but rather it is sector biased. Most agricultural research results in more nonfarm activity at the expense of farm activity. That results in a reduction of returns to cover opportunity costs and requires farmers to either

increase the number of units produced or utilize their management and labor in endeavors other than commodity production to recapture lost returns⁶. Indirectly the technology results in fewer and larger farms (in terms of commodity production) and more part time farms, but the reason is the sector bias and not direct scale bias.⁷

III. POLICIES THAT ERODE FARMING ACTIVITIES

Because technology is the primary cause of farming activity loss, farming loss policies must be directed to the two forces which drive technology adoption, first the availability of technologies, and second, the incentives to adopt.

Technology Availability. Technology availability depends on technology development which is determined by both the public research system, especially the land grant universities, and the private research system, which is located in nonfarm agricultural firms. Both public and private research organizations develop similar technologies, consistent with Ruttan's induced innovation concept that both technologies and organizations which develop them are guided by price relationships of inputs. (Hayami & Ruttan, 1985). With only a few exceptions, technologies developed by both the public and private systems have shifted activities away from farms, an outcome not dictated by the induced innovation model. It seems to be driven, rather, by two other forces: first, the source of public research funding and second, the phenomenon of the revolving door of research scientists.

Despite the preponderance of public funding, public research is strongly influenced by private funding. As universities, and especially their agricultural colleges, feel squeezed by diminished funds from the public sector, they rely increasingly on private sector soft monies. Private funding supports both basic (disciplinary) research in the area of interest to the private funder and applied research aimed at products that can be used directly by the private firm. Many LGUs are willing to participate with private firms developing products and processes that can be privatized by patents and other legal protections. Biotechnology, with its ability to engineer materials that can be protected as private property, will likely increase the amount of research that is privatized and its corresponding influence on the LGU research agenda. (Buttall, 1986)

The phenomenon of the revolving door of research scientists is imbedded in the stronger professional relationship that LGU faculty have with private sector scientists than with farmers. Most private research scientists in agriculture work for nonfarm firms; few are employed by farmers. It is not surprising that faculty professional ties are closer with nonfarm colleagues than with farmers. Faculty who take positions in the private sector do so in firms which employ disciplinary colleagues. They are unlikely to take professional work on farms which are considered outside their discipline (Busch & Lacey, 1983; Hadwiger, 1982).

Technology Adoption. While researchers determine which technologies become available, the private sector does the adoption. Farmers adopt technologies to increase their net returns, which are influenced by a number of factors including the prices of output, prices of inputs, production and market risks, transactions costs and certain tax liabilities, to name a few. It is quickly seen that these influences are affected by public policies.

Commodity policies tend to reduce price risks, and sometimes enhance prices, of specific commodities. Farmers are provided an incentive to specialize in production of those commodities and are discouraged from using more inte-

grated farming systems which provide more value added to the farming sector. **Input Subsidies** encourage farmers to use more purchased inputs than they otherwise would. Subsidies range from assistance to nonfarm firms in developing and testing inputs (e.g. chemicals) to the public absorption of external costs of input use. These are both environmental, like water quality, and social, like dislocation costs of deteriorating rural communities. **Tax policies**, like cash accounting, encourage farmers to increase the size of their operations and to purchase more inputs than they otherwise would, although stronger incentives like accelerated depreciation and investment tax credits were eliminated in the 1986 tax reforms but may return. **Technical assistance** that provides farmers more information on the use of purchased inputs than the use of their own resources encourages farmers to use more nonfarm goods and services and less farm produced goods and services. I do not argue that these policies are, on balance, socially good or bad. I simply point out that all these programs provide incentives for farmers to demand and adopt technologies that shift activities from the farm to the nonfarm sectors, resulting in a reduction of farming activities.

Changing the Policy Environment. Redirecting technology development towards increasing farming activity involves a social equation. The reduction of farming activities resulting from technology development and adoption might be socially desirable if those systems were more efficient than alternative systems. There is emerging evidence, however, that this is not the case. Farming case studies conducted by my students a few years ago included a dairy farmer who resisted production expansion as a means of increasing net income. As an alternative, he converted to an intensive rotational grazing system, in spite of being discouraged—in his view—by the public agencies. According to DHIA records he maintained his production and halved his purchase of grain concentrates, adding nearly 25% to his net income. In this case rotational grazing was competitive with concentrate feeding and casual evidence suggests it may represent a general case. It is also my understanding that rotational grazing is incompatible with bST, which requires high concentrate feeding. If that is the case general adoption of bST forecloses the possibility of general adoption of rotational grazing. Adoption of bST will result in substantially less farming activity and more nonfarm activity, whereas a significant shift to rotational grazing would result in more farming with no increase in the price of milk.

Those interested in maintaining farming activity must ask: What would have been the outcome if the money spent on bST research had been spent on rotational grazing research, for example finding legumes and handling systems to make that technology even more efficient. My guess is that it would be a very competitive system with more farming and more farms. It is no mystery why that alternative research was not conducted. There was no private sector to contribute funds to public research or to conduct its own research. But if there is a societal objective of maintaining farming, farms, and farming communities, we should have devoted public research to that alternative technology. This also suggests that if we want to maintain farming we must maintain publicly funded applied research directed at technologies that enhance farmers' value added activities.⁸

Alternative Forces. The Committee has heard witnesses describe forces to counter this trend away from farming. Each of the so called "alternative agriculture" techniques are based on farmers recapturing activities that conventional farmers spin off to the nonfarm sectors. Direct marketing is obvious on

its face. For cases my students evaluated, direct marketing was a profitable alternative for several farmers. Developing product diversity to capture economies of scope, many farmers may find it profitable to provide more marketing services and less production services.⁹

Sustainable agriculture necessarily involves more farming activity.¹⁰ Farmers practicing sustainable agriculture must develop systems that allow farming activity to displace purchased inputs. Pesticides will be displaced with crop rotations and other IPM techniques. Purchased fertilizers will be replaced by rotations or locally produced nutrients, from both animals and plants. Many sustainable farmers will be diversified vertically as well as horizontally, providing marketing services as well as production services of a wider variety of output products. Economies of scope will offset economies of scale.

IV. POLICIES TO REVERSE FARMING LOSS

None of these alternatives will develop without a change in the LGU research agenda and in other public policies towards agriculture. Support of a farming based agenda is a research imperative for the LGUs, which must find a way to assess their research projects with respect to sector bias. They should direct public funds away from technologies that shift activity from farmers to nonfarm firms, unless there is no alternative technology that might be developed which would be generally of equal efficiency.

LGU administrators may find it advantageous to demonstrate how research funds can be directed to supporting farming, rather than nonfarming, activities. While not a central issue currently, it has been raised indirectly during the past two farm bill debates regarding funding sustainable agriculture research. In all likelihood, the issue will be raised again in 1995, possibly more directly than in the past. LGU administrators may want to consider hanging their hats on that budget hook.

Changing the LGU research agenda will not, by itself, change the course of farming activity loss. As noted earlier the private sector, which now expends more funds on agricultural research than the public sector, will continue to develop products and processes to displace farming activity. If the current policy environment is not changed, the Committee has been told, many of those technologies will be adopted by farmers. The Committee has received a number of policy suggestions.

Commodity programs encourage specialization that results in farming activity loss. Basing financial assistance to farms on how it is farmed rather than on what it produces might prove to be more socially desirable. Technical assistance to those adopting systems which promote farming activity, especially sustainable agriculture, and financial assistance to support conversions to such systems should maintain a larger farming base than the same level of support through the current commodity programs. Some witnesses have suggested that government policy should be less concerned with what farmers produce and more concerned with how they produce it. The JEC objectives might better be achieved by income transfers based on farming practices rather than on commodity production.

We heard a number of other, sometimes aggressive, policy suggestions. Tax policy encouraging the expenditure of funds for adopting sustainable systems or environmentally benign practices could have more social payoff than encouraging the purchase of more production inputs. Eliminating direct input subsidies would reduce their use and result in greater social efficiency. Inter-

nalizing the external costs of purchased inputs, either through regulation or input taxes, would reduce their overuse and make their allocation more efficient from a socioeconomic perspective. These policy suggestions give a flavor of some of the bolder concepts that the Committee has heard.¹¹

If economic activities are shifted back to the farming sector, more families will have employment opportunities on their farms. From what the Committee has heard to date, federal policies will need to be addressed if those shifts are to be achieved. This symposium should help us understand if more farming activities are desirable and possible, and what federal policies are necessary to assist making those shifts.

ENDNOTES

1. James Hildreth, personal conversation.

2. While the definition is precise, its measurement is less so. A common measure of agricultural industrialization developed by Wimberly, using twenty indicators describing farm size, ownership, operator tenure, operator characteristics and labor requirements, more precise but is based on a less precise concept. (Lobao, 1990). The measure used here is specific to its purpose and is developed directly from published data series rather than calculated from input/output (I/O) matrices as utilized by Goldberg and currently by USDA. National I/O coefficients are calculated from survey data and are relatively obsolete by the time they become available, thus not necessarily reflecting current structural relationships. Direct use of survey data can better represent current industry structure. (Lee et al., 1987)

This particular measure also differs from others in the items included (or excluded) as farming value added. Since it is designed to show the proportion of farming within the system, it includes only those items which represent farming activities in the system, specifically net farm income, capital consumption, non-contract wages and property taxes. It does not include direct government transfer payments (deficiency payments) to farmers which are independent (at least in the short run) of the system and payments to nonfarm land-owners and farm lenders. Most value added measurers consider land ownership a farming activity, regardless of the occupation or location of the owner. This analysis views the provision of land similar to the provision of other inputs. Its value is contributed to farming only if it is provided by a farmer. Rents that go to a city dweller, for example, are not considered a return to farming. Most farming value added measures also assign the interest paid farm lenders to farming activity. From a structural perspective that makes little sense today although it may have when creditors were local and the returns stayed in the local community. I suspect that Indiana Congresspersons vote for farm programs to support Indiana farmers and not necessarily the Bank One home office in Ohio. (Hansen, 1991; Stanton, 1991)

3. Value added does not necessarily reflect the time and effort contributed. A business owner can work 16 hours a day, seven days a week, but if there is no great demand for her services or product and low revenues leave little left over, her value added contribution is less than someone who works half that time but at well paying activities that provide rich rewards. Likewise, farmers who work long hours and long weeks may be part time farmers if their value added contribution does not reflect full time work.

4. The decline in total farming activity is even more extreme since these estimates do not consider food production for onfarm consumption which required substantial farming activity in the early part of the century. Food produced for on farm consumption has gone from 30% of farming activity in 1910 to 5% in 1990. The inclusion of home production would have shown a decline in the value of the farm sector from \$36.5 billion in 1910 to \$28 billion in 1990, substantially steeper than that shown without considering production for onfarm consumption.

5. On a per cow basis the smallest size farms are more efficient than all other size farms. On the basis of value of output, the smallest size farms are more efficient than the two mid size groups, but somewhat less efficient than the largest size farms. However, the differences are not great enough to drive farm expansion.

6. This is consistent with the notion of cannibalism and the treadmill offered by Cochrane but recognizes the policy distinction between explicit and implicit costs. (Cochrane, 1979)

7. Most technologies result in reduction of both implicit and explicit costs and include system efficiencies as well as shifts to the nonfarm sectors. The above discussion, which focuses on the farming activity loss caused by a shift to the nonfarm sectors, does not represent the comprehensive influence of farm technology adoption.

8. While it may seem ludicrous at this time to suggest there will be no farming in the agricultural system after the year 2020, or thereabouts, the notion is not totally far fetched. Although technological alternatives that could reverse the trend of farming loss are emerging, I am not at all confident they will be adopted. Indeed my crystal ball suggests the opposite. The dominant forces in technology development and adoption will continue to drive activity from the farm to the nonfarm sector, probably at an even faster rate. Those forces are rooted in biotechnology, which some claim holds the potential of a competitive non-soil based agriculture. The underlying technique for this agriculture is the economic decomposition of biomass into constituent components for use as inputs to food manufacture. Goodman, Sorj and Wilkinson, economists from Great Britain and Brazil, conceptualize a system of agriculture where biomass production feeds extraction factories which decompose plant material into component parts that supply food and drug manufacturers. With those manufacturers closely aligned with plant breeders and input suppliers, crops will be engineered for use by specific manufacturers. The farming component will require very little activity, primarily reseed- ing the perennial plant crops occasionally and providing harvesting services if the extraction factory chooses not to do so itself. It would not provide adequate value added activity to support a system of full time farmers. (Goodman, et.al., 1987) Thomas Urban, Chairman and President of Pioneer Hi-Bred International, Inc., describes a similar system based on the marketing sector's desire to control the production of market segmented products created by genetic engineering. (Urban, 1991)

Rogoff and Rawlins are biologists and U.S.D.A. research administrators who provide the scientific basis for much the same system. They visualize a three step system for which the technology will be available early in this decade. Their system requires, first, the reduction of feedstocks into syrups by enzymes, which are on the verge of availability. Second, major food components are produced in vitro. This step, unlike soil based agriculture, produces no wasted portion of plant material, providing the system its basic efficiency. Third, these components are converted to aesthetically acceptable foods similar to the current biotechnical production of physiologically active peptides and proteins for nonfood use. They advocate this system, ironically, as a step towards sustainable agriculture. (Rogoff & Rawlins, 1987)

While Rogoff and Rawlins' economics is not sophisticated, their projected outcomes are insightful. In terms of value added activity they project an 86% decline in farming and a 20% decline in marketing. Rogoff and Rawlins seem insensitive to the maintenance of farming as a social goal. In response to a charge that they are careless regarding the socioeconomic impact of their proposal, Rogoff explains that he and Rawlins were attempting "to identify the most useful role of biotechnology to assure a stable food supply" and was "quite surprised when the first response was essentially drawn along sociological lines." While Rogoff and Rawlins are cited here primarily to demonstrate the technical case for a non-soil based agriculture, the attitude toward the social aspects of biotechnologies by USDA research administrators is instructive.

9. The utilization of parcel post, which is competitive with the specialty food system and the grocery market system in some urban areas, opens up direct marketing avenues to entrepreneurial farmers who are located away from urban areas. Inventory

management programs that run on personal computers and can satisfy FDA standards for tracking even low acid foods suggests small scale food processing opportunities.

10. Organic production techniques, as currently practiced, generally favor more farming and less nonfarming activity. However, that may not always be the case. It is not difficult to foresee a system where farmers meeting organic standards rely on inputs purchased from non-farm firms as much as conventional farmers do, especially with the development of biotechnology products that meet organic standards.

11. Much of the blame for farming loss policy can be laid at the feet of my own discipline, agricultural economics. While the physical scientists' insensitivities to the issue of industry structure, as demonstrated by Rogoff and Rawlins, can be excused professionally as being outside their responsibility, economists enjoy no such defense. Economists are insensitive to industry structure for a number of reasons, some cited earlier in the paper, but the bulk of the responsibility must be directed to the profession's reliance on the neoclassical paradigm. While I have great respect for that paradigm (didn't we all get our PhDs pursuing some minute piece of it?), its severe limitations have been only quietly discussed for some 40 years until quite recently. The revival of institutional economics reminds us that economic participants really do function in a world with bounded rationality, rather than the sufficient knowledge the neoclassicist has to assume, and that all our transactions take place in an institutional setting.

All markets function within laws, customs and relationships that have been established over relatively long periods of time. This is being clearly demonstrated in the difficulties of converting the planned economies of Eastern Europe and the republics of the old Soviet Union into market economies. A recent press account of the travails of the free market in Armenia, noted that because of "...highway robbers, self-styled customs posts and militia-enforced blockades, many farmers here found they could deliver their tomatoes, grapes and eggplants no farther than a mile or two from their homes..." (*Washington Post*, October 3, 1991, p.A16.) Clearly, the unfettered market outcome in this situation will be vastly different from that of the United States with its long history of well establish commercial laws and relationships. Any neoclassical solution is only valid for a particular institutional setting. Another setting will generate a different result.

In our particular case, the institutional setting of concern involves the relationships between the public research organizations and their private counterparts. Those relationships determine the research undertaken. While the resulting research may meet the objective standard of maximizing returns with a given set of input prices, it does so for those involved in the process. If different participants were involved, different research would be accomplished with an equally high payoff but to different participants. The institutionalist does not refute the notion of induced innovation, but correctly notes that the research results depend on the institutional setting, not just input prices.

The bounded rationality limitation of the institutionalist is equally applicable in this situation. If the LGU system got it wrong—that is, it intended its research to assist farmers and farming activity when in fact it has done the opposite—then no one can get it right within the neoclassical paradigm. The neoclassicist would describe the error as an information market failure, but I would argue that under the neoclassical constraints no one can get it right because the model is flawed. One can assume that the LGU system contains some of the best minds in the world, has the best or nearly the best computers and has access to as much global data as possible. If that expertise can't get the information right, the fault is in the paradigm, not the market participants.

We can, as economists, get it right if we recognize the institutional settings in which our agricultural system has developed and the bounded rationality with which we all must function. In this case it is proper to define the social objectives to which we aspire, and find the most efficient way to achieve them. In the case of maintaining a viable farming base with family farms and farming communities, that may require breaking down the institutional relationships between the LGU system and its private

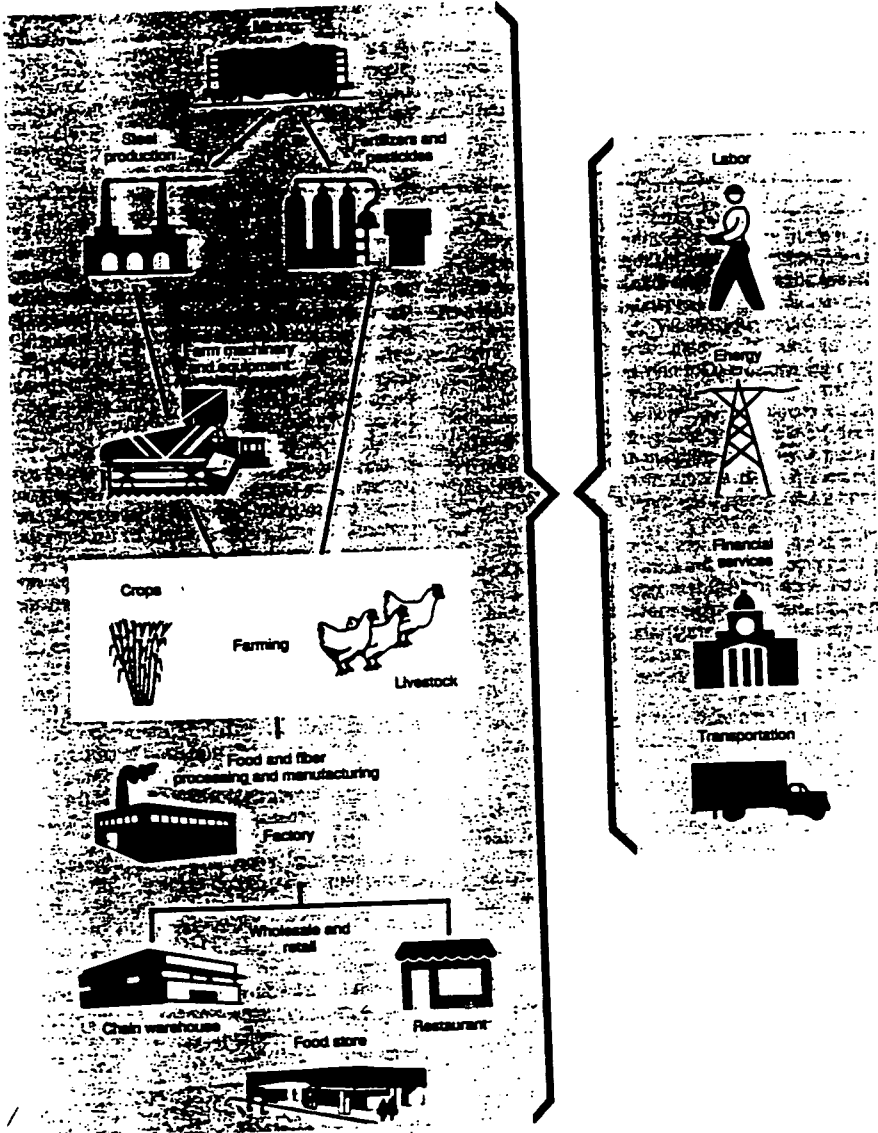
counterparts and building new ones. It means finding agricultural systems which increase the farming share of the agricultural pie and are as efficient, considering external as well as internal costs, as those which would develop if the current institutional arrangements were left in place. When considering the social preference for maintaining farms and farming and the environmental gains from reduced input applications, systems which promote farming activities can be more efficient, resulting in increased economic opportunity as characterized by Bromley. (Bromley 1989)

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Figure 1
The Agricultural System



Source: Lipton & Manchester, "From Farming to Food Service", 1992.

Figure 2
Marketing, Input, and Farm Shares

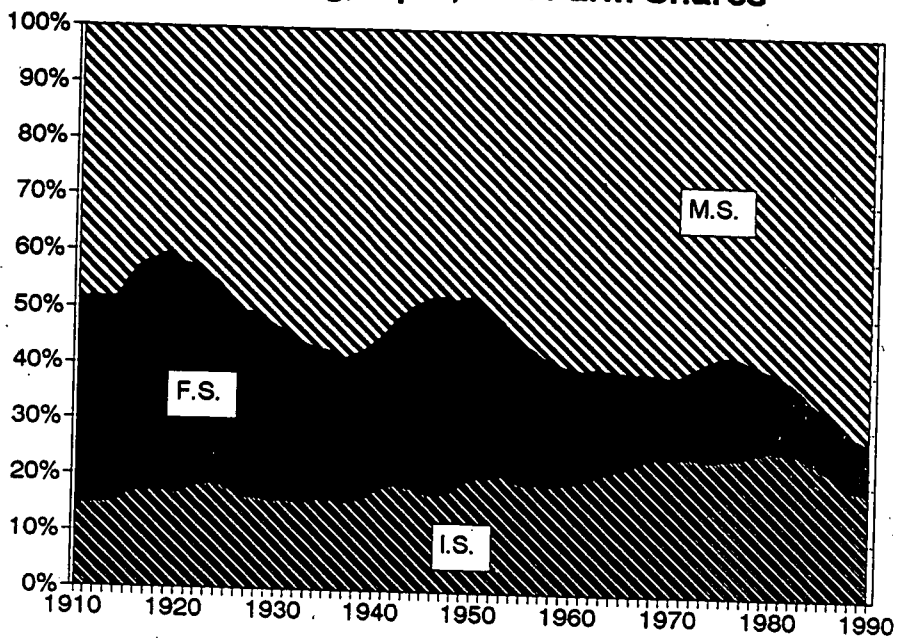


Figure 3

Marketing, Input, and Farm Shares

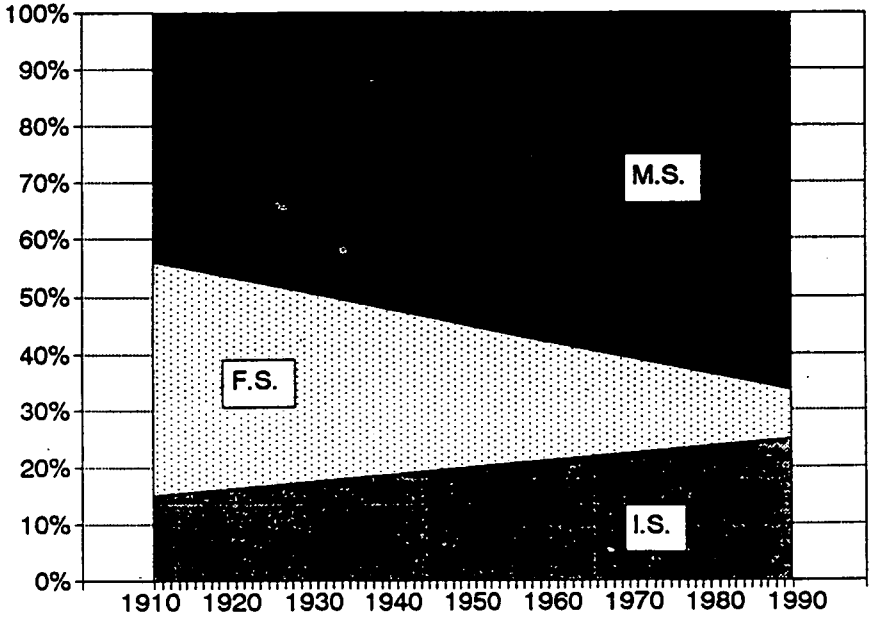


Figure 4
Marketing, Input, and Farm Totals

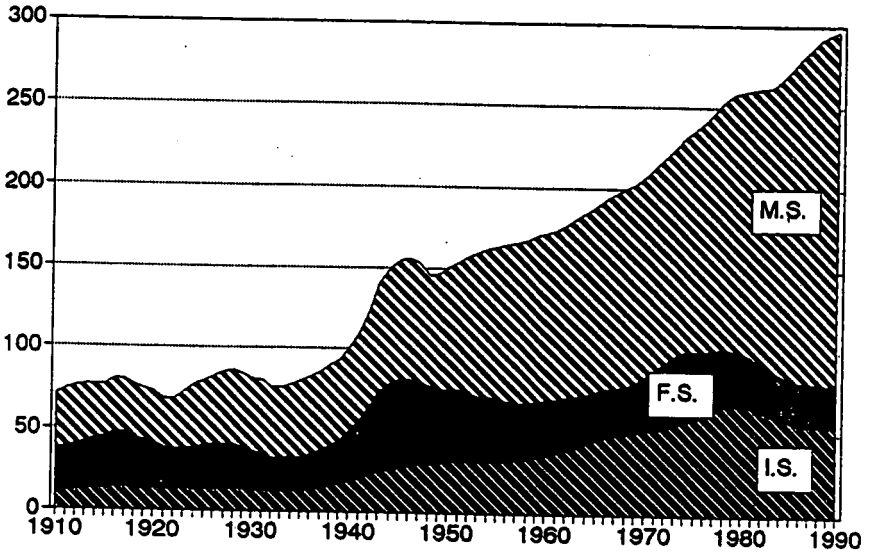


Figure 5

Explicit and Implicit Costs by Size of Farm
Northeast Dairy Farms
1990

	Herd Size			
	59 Cows or Less	60-89 Cows	90-119 Cows	120 Cows or More
Average number of cows	47	72	102	194
Net worth/cow	\$6,845	\$5,762	\$5,508	\$4,848
Value of Production/cow	\$2,687	\$2,872	\$2,908	\$3,207
Cash operating expense/cow	\$2,053	\$2,275	\$2,333	\$2,481
Purchased Inputs/cow	\$1,848	\$1,965	\$1,990	\$2,029
Depreciation/cow	\$253	\$224	\$233	\$215
Adjusted Farm Operating Expense/Cow (Explicit)	\$2,306	\$2,499	\$2,566	\$2,696
Opportunity Costs (Implicit)				
50% of net worth @ 8%	\$274	\$230	\$220	\$194
Labor and management @ 35,000	\$745	\$486	\$343	\$180
Total explicit and implicit costs/cow	\$3,325	\$3,215	\$3,129	\$3,070

Source: The Northeast Dairy Farm Summary, 1990, The Farm Credit Bank of Springfield, Springfield, Massachusetts.

PAPER PREPARED BY WILLIAM C. LIEBHARDT:

HORMONES, GRASS & MILK: BGH, ROTATIONAL GRAZING AND YOU

EXECUTIVE SUMMARY

This study compares the relative merits of two distinctly different technologies being promoted for dairy farmers, bovine growth hormone, or bGH, and rotational grazing. BGH is a genetically engineered hormone which can be injected into dairy cows to increase their milk production. Rotational grazing is a flexible system of pasture grazing that promotes sustainable pasture management, decreases or eliminates confinement feeding, and shifts the work of harvesting and maintaining soil fertility back to the animal. The University of California Sustainable Agriculture Research and Education Program organized a multidisciplinary team of researchers who compared the effects of the two technologies on animal and human health, consumers, the environment, the economics of dairy production, and the viability of family farms and rural communities. This analysis reached the following conclusions:

Animal Health

- BGH almost doubles the period of catabolic stress, when the cow uses her own body tissues to make more milk, increasing the risk of infertility and disease. A Technology Assessment Panel of the National Institutes of Health (NIH) stated in 1991 that further research is needed to define and characterize stress in dairy cows. Recently available information suggests that protracted infertility, infectious diseases, especially mastitis, and higher culling rates in bGH-treated herds will require herd health management programs superior to those currently available.
- Rotational grazing improves herd health in comparison to confinement-feeding systems. Properly managed pasture feeding minimizes mastitis-caused bacterial infection that contaminates milk and results in economic losses for dairies. Pasture-grazed cows also tend to have higher reproductive performance, reduced lameness from leg or hoof problems and fewer metabolic and digestive disorders.

Human Health And Consumer Response

- Greater use of antibiotics to treat extra mastitis (inflammation of the mammary gland caused by infection) in bGH-treated cows may threaten human health, according to a report of the General Accounting Office (1992). If extra drugs, especially unapproved antibiotics, are used in bGH-treated cows, more extensive and expensive milk monitoring programs may be required.
- BGH releases another protein-hormone, called insulin-like growth factor (IGF-1), in cows and increases its concentration in milk. The 1991 NIH Panel stated that further research is needed to determine the acute and chronic local actions of IGF-1 in the upper gastrointestinal tract, especially in infants.
- BGH itself has been declared biologically inactive in humans, primarily based on its effects on growth and sexual maturation. BGH's potential for immunologic and allergenic effects, like those induced by human growth hormone (hGH) in humans, has not been sufficiently studied. Immune responses to human growth hormone are greatly increased by one extra amino acid. Of the four synthetic bGHs being developed,

three have extra amino acids and therefore may be more immunogenic than natural bGH.

- In assessing the impact of bGH on the composition of milk, bGH proponents have focused on the nutrient composition. This distracts attention from the non-nutrients in milk, notably increases in the synthetic bGHs, IGF-1 and secondary drugs, such as antibiotics. Further, in assessing nutrient composition, the data used by bGH proponents emphasizes the magnitude of initial changes in milk. Nutrient composition is altered during the first several weeks of bGH treatment, reflecting the cow's use of her body tissues to make extra milk. Then, nutrient composition reverts to normal. bGH proponents average these data then compare results to the large range of milk composition in healthy cows.
- Surveys show that consumers want bGH-treated milk labeled and approximately 15 to 40 percent would reduce their milk consumption if synthetic bGH were used in its production. Consumers are most concerned about the safety of the bGH-treated milk for humans and the effect bGH technology will have on cows, farmers and rural communities.
- Milk produced by a system of rotational grazing poses no unusual risks to human health.

Economic Impacts

- bGH and rotational grazing each have the potential to improve the profitability of a dairy operation under the right conditions and circumstances. The analysis suggests that a feasible alternative to bGH exists in the form of rotational grazing. This may present a real alternative to the "technology treadmill." A producer would not be precluded from adopting both bGH and rotational grazing at the same time.
- bGH and rotational grazing bring with them different economic risks and uncertainties. bGH aims to increase productivity faster than it increases feed and drug costs, but its profitability depends on the price of milk and the cost of bGH, as well as on the herd's response rate to its administration. It has been estimated that synthetic bGH will increase milk production by an average of about 12 percent per cow. However, field studies show that in an individual herd, production may actually range from an increase of 1 percent to 26 percent. Research trials show that one-third of the bGH-treated herds are likely to fall below the lower limit of 10 percent extra milk suggested by the manufacturers. Rotational grazing emphasizes the reduction of feed costs at a constant level of productivity, but its economic potential depends on pasture fertility and the ability to maintain milk output.
- At the farm level, rotational grazing is increasingly competitive with bGH under the following conditions: lower milk prices, high feed costs, high interest rates and capital costs, high bGH costs, and low bGH response rates. The opposite conditions would make bGH increasingly competitive.
- Many of the attributes of bGH and rotational grazing are similar. For example, both can increase profit, decrease feed costs and increase days in milk. Case studies of rotational grazing systems indicate that it benefits farmers in the following ways: decreases feed costs by as much as 35 percent per hundred weight; decreases energy costs by as much as 75 percent; increases the grazing season by as much as 100 days; increases

milk percentage protein; reduces labor for feeding hay, spreading manure and putting up forage as hay or green chop; increases the value of the pasture by as much as five times; improves herd health; results in cost savings of up to \$18 per cow per month (up to \$270 per year); and improves farm family lifestyle.

- Widespread adoption of bGH would lead to overproduction increasing government purchases to be paid for by taxpayers and dairy farmers. Although bGH could create economic advantages for larger herds in the West, rotational grazing is a feasible alternative to those in the Northeast and Midwest with small dairies and high pasture productivity.

Economic And Social Viability Of Rural Communities

- A review of eight major studies predicting the economic and social impacts of bGH indicates that bGH adoption rates will vary by farm size, with larger farms being most likely to reap early adopter benefits. Like other production-enhancing technologies in the past, bGH will put dairy farmers on a technological treadmill that will cause a decline in the number of mid-sized dairies. A long and well-established literature has demonstrated that the presence of these mid-sized farms is vital to the social and economic health of many rural communities. Because of this, bGH will do little if anything to aid rural communities, and will likely contribute to rural-community decline, especially in dairy-dependent localities in the Midwest.
- Because it helps maintain the profitability of small to mid-sized family dairies, rotational grazing preserves existing community jobs and encourages farm children to continue in farming. It encourages community self-reliance by relying on existing human and natural resources rather than purchased inputs which drain capital from the community.
- Case studies show that rotational grazing improves quality of life for farmers. The flexibility of a rotational grazing system allows farmers to accommodate personal goals and spend more time with family and in community activities. It also supports the continued existence of a thriving, diversified rural landscape, a less tangible but equally significant benefit of rural living.

Environmental Consequences

- If, as expected, widespread use of bGH contributes to the loss of small and mid-sized farms, it would 1) accelerate land reversion to brush and the visual degradation of rural landscapes; 2) increase the risk of nitrate, herbicide and insecticide contamination of water due to the increased cultivation of feed grain; and 3) contribute to the concentration and homogeneity in the dairy industry, thereby making society more vulnerable to natural or human failures.
- Rotational grazing would reduce farm-related environmental problems, resulting in 24 to 31 percent less soil erosion and 23 to 26 percent less fuel use in crop production.
- Rotational grazing would increase pasture acreage and decrease grain crop acreage. Pastures have about double the organic matter content of land devoted to grain crops. Soil organic matter is a reservoir for carbon (carbon dioxide) and nitrogen (nitrates). Thus, land devoted to pastures indirectly contributes to improved soil, air and water quality.

Social Context

- Individual decisions about the use of either technology can have a collective impact. People make choices by interpreting the emotional and social impacts of their actions. Scholars have shown that risk includes not only considerations for human safety and economic success, but also perceptions of who shares these risks. In the name of "progress" and "economic survival" these legitimate concerns are often dismissed. Many argue that even if bGH increases dairy profits and lowers consumer prices, its use will reduce individuals' ability to participate in important personal and collective decisions.

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RESPONSE STATEMENT OF GEORGE W. BIRD

As Director of the Sustainable Agriculture Research and Education Program of the U.S. Department of Agriculture, and Professor of Nematology at Michigan State University, it is a pleasure to respond to Dr. Liebhardt's paper entitled, "Dairy Farmers and Consumers at Crossroads: BGH and Rotational Grazing". When I assumed the duties of my two-year assignment with USDA, I believed that I would spend most of my time dealing with environmentally sound farming practices. The majority of my activities, however, deal with social issues such as the quality of life of U.S. farmers and ranchers, members of rural communities, and society as a whole. As an individual raised on a poultry-dairy farm in southeastern Vermont, but one who spent the last 32 years working on pest management aspects of crop science, I had to relearn animal agriculture. The following are my observations. They are primarily in support of the potential of rotational grazing as an important integrating opportunity for 21st Century Family Farms.

During the past year I have seen rotational grazing on commercial farms in Vermont, New York, Wisconsin, and Virginia, and witnessed testimonials about this type of farming from Tennessee and South Carolina. When an agricultural practice works in this many places, you begin to believe it is a sound concept. On a recent visit to a dairy operation in northern Vermont; the farm family began their story by saying, "before we changed, we had already called the auctioneer". At a public hearing sponsored by the Southern Region Sustainable Agriculture Administrative Council, a South Carolina farmer indicated that changing to rotational grazing "significantly increased his net profit". At a major conference in Memphis, I saw a Tennessee farmer proudly describe his rotational grazing system to 250 members of the agricultural community. These are important indications of initial progress in sustainable agriculture.

From my travels, I conclude that there are currently three basic farming system models in U.S. agriculture. These include the Industrial Agribusiness Farm, the 21st Century Family Farm, and the Part-Time Farm. For your information I have described the major attributes of these systems (Table 1). The Industrial Agribusiness Farm Model is compatible with the use of bovine growth hormone (BGH). The 21st Century Family Farm is extremely well designed for rotational grazing. Each of these farming systems, however, requires separate policy initiatives, different research agendas, and individually targeted education-outreach programs; if they are to thrive as individual entities, or in harmony with each other. Policy for U.S. agriculture for the 21st Century must include an overall goal. The concept of sustainable agriculture presented in Section 1603 of the Food, Agriculture, Conservation and Trade Act of 1990, is an excellent candidate for this goal. It and can be readily accepted by most farmers and other components of society.

In conclusion, last summer I attended a meeting of the Northeastern Sustainable Agriculture Administrative Council in Grafton, Vermont. One evening I borrowed a New Hampshire farmer's automobile and made a 29 mile circular drive by the site of the "old home farm". During my childhood there were approximately 24 family farms on this route. During my 1992 trip throughout this rural area, I was only able to locate one commercial farm. The 21st Century Family Farm Model has outstanding potential for playing a major role in continuation of the "American Dream". This will, however, require innovative pol-

icy, research and education initiatives designed to foster this specific type of agriculture and quality of life.

**TABLE 1. ATTRIBUTES OF THREE TYPES OF U.S. FARMING SYSTEMS:
WITH SPECIAL REFERENCE TO THE PROGRESSIVE FARMER.**

INDUSTRIAL AGRIBUSINESS FARM MODEL

- Centralized management
- Emphasis on specialization
- Hired worker days exceed owner(s) on-farm work days
- Separation of management and labor
- Technology used to minimize labor inputs
- Heavy reliance on purchased inputs
- Technology designed to minimize real-time in-field decision-making
- Emphasis on standardized farming practices

21ST CENTURY FAMILY FARM MODEL

- Owner-operated farm
- Hired worker days should not exceed farm family worker days
- Usually a maximum of a three family partnership
- Joint management-labor relationship
- Farm families usually live on the farm
- Diversified farm
- Emphasis on use of on-farm resources
- Common use of site-specific and real-time decision-making
- Diverse set of enterprise statements

PART-TIME FARM MODEL

- Off-farm income exceeds net farm income
- Farming practices frequently consist of a small-scale version of the industrial agribusiness model
- Practices, however, may consist of those of a certified organic farm, or various options between organic agriculture and the industrial agribusiness farm model.

PROGRESSIVE FARMER

- A progressive farmer is an individual that develops and successfully implements a new attribute of one of the above three models, or borrows a component from one model and successfully uses it in an alternative farming system.

PAPER PRESENTED BY JOHN E. IKERD:**MARKETING ACTIVITIES IN SUSTAINABLE AGRICULTURAL SYSTEMS:
ANOTHER PIECE OF THE PROFITABILITY PUZZLE**

Sustainable agricultural systems must be profitable, even though many profitable systems may not be sustainable. There is no consensus on a specific definition of sustainable agriculture. But there is a growing consensus that sustainable agricultural systems must be profitable and productive as well as ecologically sound and socially supportive. Changes in public policies may be required to resolve inherent conflicts between long run ecology and short run economics. But by one means or another, farming systems that are capable of sustaining society over the long run must be capable of sustaining individual farmers in the short run.

Much of the economic emphasis in sustainable agriculture up to now has been on reducing farmers' costs of purchased inputs. Economic comparisons of conventional and sustainable farming systems, for example, have assumed that farmers will continue to produce the same basic commodities for sale in highly competitive national and international agricultural markets. Yields and costs per unit of production are compared for conventional and alternative systems (Ikerd, Monson and Van Dyne, 1992; Repetto and Faeth, 1990; Pimentel, et al., 1991). Any differences in commodity prices among alternative scenarios are attributed to differences in production levels and market supplies (Knutson, et al., 1990). For example, organic price premiums are either ignored or treated as transitory advantages that will be eliminated by competition (Dobbs, Leddy, and Smolik 1988; Dobbs and Cole, 1991). However, greater market value may be even more important than lower costs in making ecologically sound systems of farming both economically viable and socially supportive.

Conventional farmers, for the most part, have limited their activities to production and marketing of raw agricultural commodities. Over time, many farmers have expanded their operations horizontally, producing more on larger farms, as profit margins per unit are squeezed by increasing competition. On the other hand, an increasing number of non-conventional farmers are finding ways to expand vertically rather than horizontally. Those who expand vertically widen their operation margins by moving the point of first sale upward toward the ultimate consumer, through activities that add value, and moving direct costs downward, through activities that reduce purchased inputs. The number of farmers able to compete in large-scale production of raw agricultural commodities will continue to decline in the foreseeable future. The economic future for most farmers, then, will depend on their ability to expand vertically rather than horizontally.

Past government programs have supported an industrial approach to farming by facilitating specialization and large-scale production. Past farm programs have also supported an industrial approach to marketing agricultural commodities. The new public agenda for agricultural sustainability, however, will require government programs that support an entrepreneurial approach to marketing food and fiber products. Product marketing will not necessarily replace commodity marketing. Both approaches can quite likely exist side-by-side far into the future. But farmers who choose to expand vertically into niche markets, rather than horizontally into mass markets, will need a level "policy playing field" on which to compete with their industrial minded neighbors.

Farm Policies and Farm Profits

The primary public mandate for U.S. agriculture throughout this century has been to support industrial development of the U.S. economy. Industrialization required "manpower" to run the factories and discretionary consumer income to buy the things that factories produce. At the turn of the century, a large proportion of the U.S. workforce was engaged in farming and a large proportion of consumers incomes was spent on food and fiber. Agriculture had to be made more "efficient" to reduce agriculture's claim on consumers' incomes and to free farmers and their families to work in the factories and offices of an industrial economy.

Government programs for agriculture were focused on increased agricultural productivity. Commodity programs created a stable market environment which encouraged specialization and investment in specialized facilities and equipment. Research and education was funded to develop new technologies that would substitute mechanization and commercial inputs for farm labor and management. Profits motivated farmers to adopt these new technologies. However, profits accrued only to the early adopters. Production increasing technologies reduced farmers' costs, leaving a profit gap between production costs and prices. But as more farmers adopted a given technology, production increased and prices fell, first squeezing and then eliminating the previous margins of profit. The incentive for later adopters was survival rather than profitability, and those who adopted too late didn't survive. This is the process by which farmers were "freed" from farming so they could pursue other occupations.

As each new round of profits per bushel or per hundredweight became smaller, farmers had to increase production more and do it more quickly in order to maintain their previous total profit levels. All but a few farmers now find themselves "running faster and faster just to stay in the same place." Farmers are forced to buy out their faltering neighbors just to stay in business themselves. As the gap between increasing input costs and falling prices narrows, this vicious cycle becomes even more vicious. Margins between input costs and commodity prices have been squeezed to the point where there is now very little left to be squeezed out.

Agriculture has fulfilled its public mandate for the twentieth century. Workers have been provided for factories and offices. Expenditures on food have dropped. A century ago, the 1890 U.S. Census indicated that more than approximately 22 million people, 40 percent of the population, lived on farms. A hundred years later, only 4.6 million people, less than 2 percent of total U.S. population, live on farms. In addition, those living on farms today earn more than half of their income from non-farm sources. Food production probably claimed close to 50 percent of the nation's resources in 1890 with resources used in transportation and marketing added to those in farm production. A hundred years later, food costs amount to less than 12 percent of average consumers incomes.

Farmers receive only about 20 cents of each dollar spent for food. The rest, 80 cents, goes to marketing firms. In addition, farmers get to keep only about half of what they receive, or 10 cents of each dollar that consumers spend on food. The other 10 cents go to pay for purchased inputs including rent, hired labor, and interest on borrowed money. The farmer's share of total consumer expenditures, including food and all other items, is less than 1.5 percent.

Society now appears to be giving agriculture a new, much broader mandate for the future. The new mandate is to develop a food and fiber system which will continue to be productive but will also be ecologically sound, economically viable, socially supportive and, thus, sustainable. Consumers don't want their food costs to climb back to percentage levels of a few decades ago, but society as a whole has very little left to be gained from further increases in the productivity of agriculture. If the efficiency of farm-based production activities were increased by an additional 50 percent, total costs of food production would drop by only 5 percent. Agriculture's claim to total consumer expenditures would drop by less than 1 percent. Rising environmental and social costs of further agricultural industrialization must now be weighted against potential efficiency gains much smaller than those of the past.

The new social mandate for U.S. agriculture represents new challenges for farmers. But with the challenge comes new opportunities. Farmers, like consumers, have relatively little to gain from further increases in productivity. The odds of squeezing profits out of the 90 percent of food costs currently accounted for by input and marketing costs seem much better than the odds of squeezing still more profits out of the 10 percent that currently goes to farmers. The new challenge to farmers is to widen, rather than narrow, the gap between the cost of purchased inputs and the value of their products.

The Fundamentals of Marketing

Agricultural marketing includes all the various activities involved in the transformation of raw farm commodities into finished food and fiber products. The most obvious aspect of this transformation is a change in physical appearance or form. Form changing activities for agricultural commodities range from washing and grading apples to processing wheat into Wheaties. Another important marketing function is transportation. Agricultural commodities must somehow get from the farms where they are grown to the homes where they are consumed, in some cases moving across a country or half-way around the World. Time is another important aspect of marketing. Many agricultural commodities must be harvested at a specific time, but can be stored for later use and in some cases be consumed year-round. Finally, in a specialized economy, most consumers are not producers. Marketing involves the transfer of ownership or possession from those who produce, ultimately, to those who consume.

Market transformations (changes in form, place, time, and ownership) affect the value of commodities as they move through the marketing system. Each of these functions also has an associated cost. Profits result whenever the value added by marketing functions such as processing, transportation, storage, or brokerage, is greater than the costs of performing those functions. These basic principles of marketing may seem simplistic; however, they are the fundamental concepts upon which profitable vertical expansion of farming operations must be built.

Marketing, to most farmers, means commodity marketing. They produce commodities such as corn, wheat, hogs, or cattle. One farmer's No. 2 grade yellow corn is pretty much like any other farmer's No. 2 yellow corn. One cattle feeder's 1100 lb. Choice steers are a lot like steers of a similar weight and grade from any other feed lot. Thus, the commodities one farmer has to offer for sale are freely interchangeable with commodities offered for sale by many other farmers, oftentimes including farmers on another continent. Commodity markets tend to be highly competitive because there are many buyers and sell-

ers of the same basic commodity. Price differences among different market locations rarely exceed transportation costs and price increases after harvest tend to just about equal storage costs.

Commodity marketing decisions are primarily limited to decisions of timing. Farmers can forward price their commodities through private contracts or futures markets, attempting to get a price higher than market prices at time of delivery. Or they can store commodities for later sale, hoping that market prices will rise more than their costs of storage. In either case, farmers are matching wits with speculators who make their living buying, pricing, storing, or selling commodities. Most conventional farmers are not particularly good marketers. They make a living by producing commodities well suited to their resource base, keeping their costs competitive and, thus, being able to stay in business at competitive market prices.

Product marketing is different from commodity marketing. Commodities are alike, but products are different. In marketing jargon, products are commodities that have been differentiated to give them distinct quality characteristics and, thus, distinct market values. These differences may be tangible in nature (as in nutrient values of foods) or intangible (as in consumer acceptance created by brand advertising). Differentiation creates a more or less unique market niche for a product, taking it out of direct competition of other products. The greater the differentiation, the greater the potential for profits. Products that have a few good substitutes may command a substantial price premium over less acceptable alternatives. However, consumers will not pay much more for a product that has many good substitutes.

Products may be differentiated with respect to anything that affects value including form, time, place, and possession. Processing, for example, adds value by changing the form of raw commodities. Some processing activities, cattle slaughter for example, result in a different form of generic commodity, such as Choice beef. In other cases, however, processors are able to transform commodities into distinct products such as producing unique wines from grapes. Many relatively small wineries have been very successful because they developed a product that is perceived to be different, and more valuable, by a sufficient number of wine drinkers to create a profitable market. Processing is not the only means of changing the form of a commodity. Fruits sorted for uniformity of size and color, for example, may sell for a premium over the same fruit sold without sorting.

Products may also be differentiated with respect to time. In mid-winter, local greenhouse tomatoes in the Midwest may command a substantial premium over tomatoes from California or Mexico. However, tomatoes from those same greenhouses may have no advantage over local vine-ripe tomatoes in mid-summer. Winter price premiums reflect the lack of good substitutes at that particular time. Vine-ripe tomatoes out-of-season are a product, but in-season tomatoes are a commodity. An ability to provide products on time, continuously over time may also differentiate one farmer's products from the others.

Location is another factor which differentiates the value of products. Farmers near population centers have a distinct advantage in most direct marketing strategies. Pick-your-own fruit, vegetable, or berry farms, for example, must be located within reasonable driving distance of a significant population center. Farmer's markets are also logical market outlets for producers of fresh produce from a fairly limited geographic area. Modern product handling and transpor-

tation methods, however, have reduced the significance of location, either as an advantage or as an obstacle in marketing.

Market advantages associated with ownership or possession are perhaps less obvious, but no less important, than those associated with form, time, and place. Different individuals, or groups of individuals, value the same products differently. In other words, the same form or quality of product may be valued differently by two different groups of people at any given time and place. Thus, a farmer who offers his or her products to an individual or group who value it more than the common market place can command a higher price. Products that are carefully tailored to meet the specific needs of narrowly segmented markets may command a significant price premium over mass-produced commodities that meet the same generic need. Matching products to the tastes and preferences of specific consumer groups is the essence of successful niche marketing.

Many of the farmers who exemplify sustainable agriculture produce and market products rather than commodities. Many of those farmers market at least a portion of their products directly to consumers as certified organic produce or as products produced without pesticides. Many others make smaller, diversified farming operations economically viable by performing processing, transporting, storing, or merchandising activities in addition to production. Still others have found profitable niche markets for commodities that can be produced without significant environmental risks. Many nonconventional alternative farmers sustain their operations by practicing the principles of good marketing.

Marketing and Sustainable Agriculture – The Agripreneurs

Three farmers told their stories at a recent niche marketing workshop for extension agents at the University of Missouri-Columbia. Each of these farmers relies heavily on different marketing strategies in sustaining their farming operations. These are but three among a multitude of farmers who have learned to rely on marketing to make ecologically sound farming operations economically viable.

Ray Evans owns and operates the Evans Funny Farm at Holts Summit, Missouri. Ray has a full time job with the Missouri Conservation Commission in nearby Jefferson City. The Evans Funny Farm actually occupies just under 18,000 square feet in Ray's back yard. Some people think the Funny Farm is a hobby until they are told that annual gross sales from the farm average about \$2 per square foot, or about \$36,000. Net returns to Ray's labor and management amount to about half of his gross sales. The average net cash return for Missouri farmers overall was reported in the 1987 Census of Agriculture as \$7,821 with an average farm size of 275 acres. Ray keeps his input costs to a minimum through very intensive management of a small space. But he makes his money by marketing what he produces.

The primary customers of the Funny Farm are local restaurants. About ten or twelve restaurants account for most of his sales, and Ray's objective is to have fewer customers who buy more produce rather than to have more customers in total. Ray delivers to the customers' back door on a regular schedule. He supplies his customers with a range of items from vine-ripe tomatoes to edible flowers. He identifies the specific product niches he can fill. Ray often offers his customers new items free of charge until he has proven that a particular item will serve the needs of the customer. Once the sales volume is es-

tablished, he asks for a standing order. He picks up and gives credit for anything that doesn't sell.

How can Ray afford to provide all this service? He charges for it. Restaurateurs can't afford to disappoint a customer even once because they have skimmed on quality and freshness. Chefs are paid to create dining experiences, not rotate stock and make out orders. The cost of produce is a small fraction of a restaurant's menu prices. Cheap produce that distracts the chef or disappoints a diner is very expensive. Ray's produce isn't cheap.

Jack and Suzanne Frazier's Ozark Exotica operates out of Theodosia, MO, about 100 miles southeast of Springfield. Ozark Exotica specializes in organic herbs and high quality produce. Their primary customers are commercial kitchens and supermarkets in Springfield. Jack and Suzanne's operation is much like Ray's in some respects as they provide excellent customer service. However, Jack has developed a unique packaging and merchandizing program that sets Ozark Exotica apart from its competition. The competitive difference is quality, convenience, and shelf-life.

After the produce is picked, every broken leaf or stem and piece of foreign matter is removed. This removes the source of most initial decay. The fresh produce goes into a commercial salad spinner which washes and spin dries items such as spinach and herbs without damaging the delicate leaves and stems. Next, the herbs are placed in specially designed clear, dish-like plastic bubble packs. Each bubble is flooded with carbon dioxide before it is sealed. Carbon dioxide, being heavier than oxygen, can be released into each bubble, much like filling a dish with water. A lid identified with the Ozark Exotica label and trademark is then sealed in place, trapping the carbon dioxide inside.

Ozark Exotica's products remain clearly visible, bright, and crisp long after their competitor's products have wilted and become unsalable. Products with the Ozark Exotica label go directly from the bubble to the table. There is no need to rewash the produce because they are clean when sealed. There are no damaged leaves and stems to remove, because none were packed and the packaging protects against damage from handling. How can they afford all this processing and packaging? They charge for it. Their spinach sells at a large premium over their competition. But there is no waste or cleaning work for the consumer and there is rarely anything to throw out at the grocery store. Their fresh herbs are still fresh when the package is opened.

Ozark Exotica is not a large operation. Jack and Suzanne farm about two acres of raised beds and do much of the work themselves. They have relied on marketing ingenuity and entrepreneurship to make their chosen way of life economically possible.

The Shepard farm near Clifton Hill, Missouri is a different story. Shepard Farms is a larger operation covering several hundred acres near the town of Moberly in north central Missouri. Dan Shepard and his father have pieced together a profitable puzzle with Gamma grass, pecans, and buffalo. The pecan orchard was established years ago by Dan's father. The Gamma grass and buffalo have been added more recently to more fully utilize the land. There is no plowing of the soil, little fertilizer, few pesticides, very little direct input costs of any kind. The operation would certainly appear to be sustainable from an ecological standpoint. The challenge was to sustain it economically.

The Shepard's are not located near a major population center. In fact, they never see most of their customers. They merchandize their products by mail

but deliver direct to the customer's door by using commercial carriers. They got into the mail order business through their pecan operation. Pecans and pecan products were fairly easy and practical to pack, store, and ship. Selling buffalo meat by mail was a natural extension of their mail order business, although a bit less traditional and more complex. The Shepards can use their natural resources sustainably because they have learned to market their products across the country and around the world.

These are just three examples among a multitude of farmers who have made ecologically sound farming systems economically viable through successful niche marketing strategies. Such examples are easy to find in all parts of the United States. Many of these stories are already documented. A *Farmer-to-Farmer* video series produced by Rodale Institute, for example, includes an excellent tape on "High Value Marketing" as a strategy for sustainable agriculture. Ron Macher of the *Small Farm Today* magazine refers to these farmers as "agripreneurs." He characterizes them as risk takers who are not afraid to try new things or to try old things in new ways. They are always searching for solutions and are willing to learn from others. They are salesmen; not just growers. They make commitments to deliver on schedule and put the needs of their customers ahead of their own convenience. They have learned how to set prices for the things they produce rather than accept whatever the market offers.

Macher has observed that agripreneurs often are people who want a better life for their children, a place where the children can develop a work ethic and a set of values, and an opportunity for the family to work and play together. They do not consider hard work to be a degrading way of life. He also outlines some basic principles of agripreneurship. First, there are no outside experts who have all the answers or new technologies that can make farms profitable. Profitability is the responsibility of the agripreneurs. Gross income may determine the size of the business, but net income determines the size of its profits. A little business with wide margins can make just as much money as a big business with narrow margins. And there is a lot less risk of total failure when the margins are wide. Total production may be determined by "how much" land is used, but productivity is determined by "how well" land is used. In the long run, the land will sustain society only if farmers are able to sustain the productivity of the land. And society must be sustainable if farmers are to be able to sustain the land.

The important point, from a policy perspective, is that these agripreneurs have had to develop their production and marketing systems pretty much on their own. Their conventional farming neighbors, on the other hand, have had a multitude of government programs ranging from the Market News Service to the Export Enhancement Program to help keep them competitive in global commodity markets.

Policies to Level the Playing Field for Niche Marketers

The public sector has a legitimate role in facilitating the marketing process. Efficient markets are not a natural consequence of the free enterprise system. Government programs related to grades and standards, market statistics, market news reporting, and regulation of commodity futures trading, for example, can all be justified in terms of public benefits. The public has a stake in maintaining competition in the market place. Up to now, the government has accepted at least some responsibility for maintaining competition among buyers and sellers of specific agricultural commodities. However, there are few poli-

cies to ensure that smaller producers and niche marketers have a "level playing field" on which they can compete with large-scale, industrial-minded commodity producers.

Traditional public markets for agricultural commodities are rapidly disappearing as they are replaced by contractual arrangements between large processors and large-scale, specialized producers. Processors would prefer to deal directly with a few large producers on a regular basis rather than deal with a large number of smaller producers either individually or through public markets. In many cases, long-term production contracts have totally eliminated market transactions between the processor and the producer. As processors have become larger and fewer and public markets have closed, many smaller producers have been left without markets.

Farmers' markets are perhaps the most common example of a government sponsored marketing program for small-scale producers. In the past, farmers' markets have been used frequently as a means of pacifying vocal groups made up of smaller farmers and urban consumers who want access to farm-fresh produce. Few agriculturalists have considered farmers' markets to be a significant aspect of the serious business of marketing agricultural commodities. Successful farmers' markets have been established in several major cities including Atlanta, GA, Saint Louis, MO, and Raleigh, NC. However, relatively little attention has been given to the potential role of farmers' markets in replacing the public commodity markets that have been lost to agricultural industrialization.

The Farmers' market of the future may require farmers to deliver products that are more nearly consumer-ready, with some of the traditional marketing functions performed on the farm. Alternatively, farmers' markets may need to provide facilities for processing, transportation, packaging, or storage in addition to providing a place for buyers and sellers to meet. In some cases, farmers' cooperatives may be needed to support joint advertising, brokerage, or processing operations. Farmers' markets may or may not be an appropriate marketing model for a post-industrial, sustainable agriculture. But as traditional commodity markets disappear, farmers' markets are certainly worth a new, much more serious look as an alternative form of public market.

Concentration of agricultural processing into larger and larger operations is one reason for the decline in public markets. A revival of smaller-scale processing could reestablish markets for smaller or more diversified farming operations as well. But, how can small scale processors compete? Toffler and other futurists contend that the large industrial operations will lack the necessary flexibility to adapt to the accelerated changes in needs and desires of society in the twenty-first century. Those who succeed in the future will need to tailor their products to specific market segments. In fact, over the past ten years, about two-thirds of all new non-farm jobs have been created by small businesses rather than by the large industrial firms. The cost economies of large scale processing may be more than offset by greater flexibility and adaptability of smaller operations in the years ahead.

Small-scale agricultural processing in the U.S. may be limited more by an industrial mind-set than by economies of scale in larger operations. Even the apparent lack of small-scale, modern technology may be a perception ungrounded in reality. European governments have become strong supporters of small scale processing in recent years. Large trade shows in Europe attest to the availability of small-scale equipment for almost any desired processing func-

tion. Targeted technology transfer programs could bring this technology to the U.S. as well. Various state programs in the U.S. have proven that small scale production can be a viable alternative when given a favorable economic and policy environment in which to grow. Many states, for example, have thriving small scale wineries and micro breweries that compete successfully with Gallo and Anheuser Bush. They are successful because they use relatively efficient technology to produce differentiated products in a favorable legal environment.

A biodiesel processing facility in Austria provides an impressive example of how small-scale processing and agricultural sustainability can be complementary. A group of some 300 farmers, with help of the Austrian government, formed a cooperative to construct and operate a processing facility that crushes canola and sunflower seeds to produce a diesel fuel substitute and a high quality livestock feed. Cooperative members bring in their crops for processing and take home the biodiesel and feed to be used on their farms. They have created a market for their crops by producing their own fuel and processed feed. As a result, their operations are less vulnerable to erratic world markets for oil seeds and energy. They increase profits by selling higher-valued livestock rather than lower-valued oil seeds.

Catalog sales were once the merchandizing tool of the mass marketers, including Sears, Roebuck and Co. and Montgomery Ward. Mail order sales have more recently become an increasingly popular tool for the niche marketers. Some of these niche marketers are relatively large firms that sell to fairly narrow segments of very large markets. Others, however, are very small operators who develop and distribute their catalogues collectively. The Best of Missouri Hands program, for example, brings together local craftspersons for the purpose of collective marketing. This program is a modern-day version of the craftsmens' guilds of earlier times as they set standards of quality that must be met to belong. However, this modern day guild merchandises crafts through a slick-page, full-color catalog that is distributed throughout the U.S. and even around the World. The catalog is a public market place for those who can meet its standards of quality.

Electronic information networks could have a greatly expanded role in public markets of the future. Electronic marketing has received some attention among those concerned with commodity markets. However, its potential is still largely unexplored in marketing differentiated agricultural products. Virtually anything that can be offered for sale on a public bulletin board, in a catalog, or through direct mail solicitation can be offered for sale through the electronic media. Shopping networks on cable television offer merchandisers an alternative outlet for a wide range of consumer products. Global market information networks, such as those maintained and drawn upon by the Foreign Agriculture Service, provide up-to-date information on agricultural commodities that are traded in world markets. Extension's Going Global program exemplifies the use of electronic information as a means of matching buyers and sellers in world markets. Similar methods might well be used to create new public markets for use by smaller producers of agricultural commodities and for merchandising value-added products at the regional, state, and local levels.

Successful family farms of the future may be quite different from family farms of the past. The major distinctions between the two will be in their ways of thinking. Farmers with a conventional mind-set will continue to produce basic commodities for many years to come. However, the most successful new

farmers of the twenty-first century may be the agripreneurs. Perhaps the most common piece of advice given to those who would be agripreneurs is "don't think like a conventional farmer." Agripreneurs think in terms of producing value rather than growing crops or livestock. This same advice may well be most appropriate for those who would devise marketing policies to support agricultural sustainability. "Don't think in terms of conventional agricultural programs or policy." Sustainable agriculture, like agripreneurship, is part of new paradigm for agriculture. New paradigms require rethinking and sometimes a whole new beginning.

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RESPONSE STATEMENT OF THOMAS L. DOBBS

Dr. Ikerd has made a very valuable contribution to the issue of making sustainable farming systems profitable to farmers by focusing on **adding value**, rather than just **reducing costs**. His conceptualization of the issue helps to clarify thinking about the range of policy possibilities. This thinking leads John to identify several needs and opportunities which are worth briefly reemphasizing:

1. **Agripreneurialism.** Yes, farmers of the twenty-first century will need to be more entrepreneurial. This will be true for the non-farm portion of society, as well. Fewer people will be able to spend their careers in the formerly secure environment of a major corporation. Modern society must implement macro policies that both foster entrepreneurialism and provide adequate family security. National health care and transferable pension plans are two such policies.

2. **New support for old institutions.** John indicates that farmer cooperatives may be needed in some instances to support the marketing activities of these agripreneurs. I agree. We are seeing this in the Northern Plains. The Northern Plains Sustainable Agriculture Society (NPSAS) has established a Marketing Task Force—with members from Minnesota, North Dakota, and South Dakota—to explore alternative marketing structures, including cooperatives, for organic produce of its members. North Dakota State University has been providing some support the NPSAS in its efforts to explore marketing alternatives. However, there are few remaining research or extension faculty in the Nation's Land Grant Institutions who have expert knowledge and experience in planning and organizing agricultural cooperatives. Profitable and sustainable farming in the next century may call for renewed Land Grant and U.S.D.A. support for some old institutions—such as local agricultural cooperatives.

3. **Small-scale processing.** John also sees a role for more small-scale agricultural processing, as a means of leaving more value added in farmers' hands. I have been skeptical of some past public sector attempts to "promote" certain kinds of small-scale processing, such as with the late-1970s and early-1980s attempts with fuel ethanol (Dobbs, et al., 1984). I continue to believe that caution and sound economic judgment are imperatives for any public policies for small-scale processing. Nevertheless, there are some grounds for optimism, in line with Ikerd's views. Public policies which would most support small-scale processing are ones which force processing facilities of all sizes to internalize all of their external environmental costs, since I suspect that, on balance, large-scale facilities produce disproportionate externalities.

While I am largely in agreement with the views expressed in Dr. Ikerd's paper, I do have concern with the implications of some of the points he raises. One of these points is the emphasis on niche—including organic—markets. I think we need to be cautious in our assumptions about the potential for organic markets to provide **general and significant** income support for agriculture. We at South Dakota State University (SDSU) have monitored the organic premiums received during the last 3 years by an organic farmer in east-central South Dakota whose farming operation is being compared with that of a neighboring conventional farmer. During the period 1989-1991, organic premiums have added from 2% to 9% to the farmer's whole-farm gross income and from 12% to 29% of his income net of all costs (except for a pure "management" charge). The 3-year weighted average increase attributable to organic

premiums was 2% of gross income and 23% of net income. However, in only one of the 3 years (1989) was inclusion of organic premiums sufficient to make the organic farm as profitable as the matched conventional farm (Dobbs, et al., 1991b; unpublished SDSU data). This matched comparison is in a corn-soybean area. In some other SDSU case studies in wheat-growing areas of South Dakota, where there appear to be smaller differences in the profitability of low-input/sustainable farming systems and conventional systems, we found that organic premiums are more likely to be sufficient to push the profitability of organic systems above that of matched conventional systems (Dobbs, et al., 1991a).

Thus, at present, organic premiums are sometimes sufficient to make certain sustainable systems as profitable, or more profitable, than conventional farming systems in the same area. However, the organic markets are highly variable and subject to rapid price declines as more producers move into those markets. A widespread shift to more "agripreneurial" farming could cause substantial reductions in the premiums now available due to limited supplies.

John rightly emphasizes policies to "level the playing field for niche marketers. However, we must recognize that there would be a difficult adjustment process for agriculture associated with such policies. Present organic and other niche producers would be among those facing difficult adjustments, precisely because they would be facing new competitors in their markets.

In an excellent recent review article, Bruce Gardner (1992) argues that there really is no longer a sector-wide "farm income problem" in the U.S. Moving to a more entrepreneurial agriculture and leveling the playing field by gradual removal of commodity-oriented income supports are among the possible policy implications of Gardner's conclusions. However, that alone would not assure either **environmentally sound farming systems** or a **moderate-size family farm structure of agriculture**, both of which are prominent goals of many sustainable agriculture advocates. Accomplishing those goals will require continued government involvement in agriculture, but an involvement which somehow (a) compensates farmers for some of the income sacrifices associated with their use of environmentally sound farming practices, (b) effectively targets moderate size farms, and (c) avoids simply capitalizing the income transfers into permanently higher land values.

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PAPER PRESENTED BY DANA L. HOAG:

**ECONOMIC LIMITATIONS OF SUSTAINABLE AGRICULTURE:
HAVE POLICYMAKERS JUMPED THE GUN?**

Why sustainability

Dr. Smith and others (Daberkow and Reichelderfer) have effectively shown that "farming," that part of production added by the farmer, has dramatically declined over the last 80 years. Ironically, it is not poor economic conditions that have led to this decline but it is our ability to enhance technology. With a 2.5- 3.0-fold increase in agricultural production since World War II one might not question whether the current condition is bad or good. Certainly we enjoy the benefits of low-cost, high-quality food. But have the costs in changed farm structure, or hazardous environmental externalities, been too high?

Sustainable agriculture (SA) interest groups have noted the same phenomenon as Smith. They are concerned that efforts should be redirected toward research and education aimed at "farming" rather than technology. Small farm, labor and management intensive technologies are consistent with SA objectives, including the adoption of systems that are less harmful to the environment. These groups have been successful in changing the focus of certain farm policies, in persuading the federal government and many states to spend more research and education dollars on SA, and in gaining widespread support for the concept.

My role here today is to discuss the rise of SA and to review whether it can be used to bring about more "farming" and less technology. As you have probably guessed from my title, I plan to suggest that we have jumped the gun with programs that lack substance and that do not accomplish what they were intended to. However, before I go on, let me make my position on the environment and the efforts of SA advocates clear.

I am encouraged by efforts to elevate environmental concerns into agricultural decision making. In some cases, there appear to be significant gains to reducing pollution without significant losses in profits. However, profit losses from environmental controls can also be substantial. By challenging certain aspects of SA I do not mean to imply that the concerns of its proponents are invalid. **They are not.** I hope to stimulate thought about when and where SA program efforts will be effective. It is not the objectives that I'm am challenging, but rather the methods and some of the beliefs about available technologies, market and farm program incentives, and farmer motivations toward adoption.

What is sustainability

There seem to be as many SA definitions as there are people who discuss it. To many this is not a problem. They conclude that SA is a philosophy, a way of thinking about agriculture, and should not be held to rigid definitional requirements. This is fine when speaking broadly, and it promotes unity around the concept. Who could argue against "an integrated system of plant and animal production practices having a site-specific application that will, over the long-term..satisfy human food and fiber needs,.. enhance environmental quality.. make the most efficient use of nonrenewable resources.. and integrate, where appropriate, natural biological cycles and controls.. sustain the economic

viability of farm operations.. and enhance the quality of life for farmers and society as a whole" (U.S. House of Representatives)?

For many others, including me, the lack of definition causes serious problems. The SA objectives are vague and often inconsistent. For example, there is often a tradeoff between protecting the environment and profitable production, and between the environmental objectives themselves. SA definitions offer no guidance about socially optimal tradeoffs. Measurement of environmental impacts are difficult and uncertain at best. Even if environmental impacts were known, values differ across individuals. One individual may be willing to give up \$5/acre to adopt a soil conserving system, while another farmer may consider the lower profits unsustainable.

Consider the attached figure. In a study I conducted for 36 agricultural systems in North Carolina, I compared profitability, soil erosion, excess nitrogen, and pesticide leaching (Hoag, Doherty and Roka). I chose only four systems to show in the figure: the most profitable, the least erosive, the lowest producer of excess nitrogen, and the lowest pesticide leacher. Which of these systems is sustainable? Could everyone in this room today agree? No single definition can be inclusive about all possible multiple objectives without attaching a subjective value to each potential outcome. This gives rise to the question, should the SA definition be refined or abandoned?

Without a more detailed definition, how do we know where we are going and when we have arrived? How can individual farmers know whether their systems are sustainable? Virtually every farmer meets one or more of the objectives identified in the SA definition above. Is one enough? Integrated pest management (IPM), for example, results in more use of pesticides (Table 1); a result that confounds those that promote it to reduce pesticide use. Can increased pesticide use be considered sustainable when IPM also promotes more careful use of pesticides? The answer lies partially in a better definition of SA. Of course, there will be some systems that can advance one goal without losses to the others, and therefore we are not dependent on the definition of SA to determine if an advancement has been made.

I have focused on the environmental aspects of SA, but a complementary effect of many environmental solutions is less reliance on off-farm technology and increased value added at the farm. It is often difficult to discern the difference between which is the objective of SA advocates. Are small farms with more value added by the farmer an objective of SA or simply a consequence? If it is the former, attention to farm structure will be needed, since policies to reduce environmental degradation on farms may not be neutral as they affect farm size.

SA was originally called low input sustainable agriculture. The low input part of the title was eventually dropped because it was controversial. Low input was challenged because people knew what it meant, not necessarily because it was an invalid objective. SA enjoys much less objection, but only because no one really knows how it affects them. What we should focus on is our specific objectives (water quality, soil conservation, profits, etc.) and measure how they are traded for one another so society can choose among the options.

What do we know about sustainability

Agricultural research and education programs to mitigate environmental pollution have existed for some time. The SA movement has played only a small part in motivating new, innovative systems. Substantial gains were already

made in reducing soil erosion, reducing nitrogen use, reducing the use of hazardous pesticides, and adopting agronomic practices such as cover crops to reduce environmental degradation. Progress may appear sluggish but it has been a relatively short time since the agricultural sector began to be seriously criticized for its role in polluting the environment. Gains will initially lag behind public concerns due to the complexity of required research to identify environmental relationships such as fate and transport of chemicals into groundwater and streams. Generally, we simply do not know enough to be sure where pollution comes from, how it is caused, what effects it has on the environment, which systems and at what costs would alleviate problems, or how effective policies could be designed. Of course, we can take action in many specific cases where enough is known.

On the whole, tradeoffs between SA objectives are inevitable. Exceptions will be found however since research and careful attention to management can reduce undesirable tradeoffs. For example, tillage is a substitute for pesticides in weed management; farmers either till or apply herbicides. However, reduced tillage, which controls erosion, does not lead to increased input use in certain cases. Nevertheless, new technology is not costless to develop or to adopt, and underlying physical and economic forces will likely preclude generalization of individual gains to other areas. Therefore, even if exceptions are more profitable, they are exceptions for a reason. We will explore some possible explanations in the following section.

Will farmers adopt sustainable systems

Aside from definitional problems and uncertainty about the environmental values of "sustainable" systems, there are strong economic hurdles to overcome before these systems can be widely adopted. Most researchers and farmers conclude that sustainable systems on average are less profitable than conventional systems (Daberkow and Reichelderfer; Hoag and Pasour). The General Accounting Office reviewed the literature and concluded that studies "on the economic performance of alternative agriculture, are few, methodologically limited, and enterprise-specific" (p. 36). They could not conclude based on the literature that alternative systems were either more or less profitable than conventional systems but did conclude that farmers felt the systems were less profitable and that they "will naturally be reluctant to change existing production practices without convincing information regarding profitability" (p. 39). They also concluded that farmers they interviewed "believe that adopting alternative agriculture practices may require greater management skills and cause greater weed problems, lower yields, and lower profits" (p. 70).

The most compelling evidence that SA systems are not generally perceived to be profitable is that they are not widely adopted. In 1988, Youngberg stated that he believed that only 1 to 2.5 percent of farms use or plan to use no agricultural inputs (GAO). Considerably more farmers are using integrated pest management, conservation tillage and other subsets of SA. It is presumed that where these systems are used they are profitable, but there is no conclusive evidence one way or the other to suggest these systems are sustainable since they may result in increased pollution, increased use of pesticides, or other non-sustainable results.

Dr. Smith and Dr. Liebhardt have shown how technology can be equalized or outweighed by farm management techniques designed to add proportionately more value at the farm¹. Rotational grazing and other techniques show promise but Daberkow and Reichelderfer conclude that more profit, or equal profit, is not necessarily enough to sway farmers to change their production systems.

There are several reasons a farmer might not adopt an equally profitable SA system. First, SA substitutes labor and management for off-farm inputs like fertilizers and agri-chemicals. A farmer's time is valuable and he may be able to hire labor to utilize the off-farm inputs at low cost. I suspect that most farmers would think that it is easier and less costly to adopt Bst than to manage a rotational grazing system.

Second, associated with the first problem, is the increased risk associated with adopting a new system. This risk is higher for an intensive management system than for a generic technology like Bst. The best example I can think of is nitrogen. Nitrogen is an important pollutant and many researchers have shown that farmers use more than is "economically" justified and that there are alternative sources to commercial fertilizer such as manure and legumes in rotation. However, until recently, a quick and economical test for soil nitrates was not available. Producers had to guess about their needs. Under such uncertain conditions, commercial fertilizer offers a less expensive and more certain form of insurance that nitrogen needs are met than manure or crop rotation.

Several more barriers are identified by GAO in Table 2. Most of these point to a perceived difficulty in using the SA systems. For example, the top concerns were greater management needs, lower yields, more weeds, lower profits, and insufficient labor.

Another important barrier identified by GAO is government commodity programs. These programs support monocultures in a few large, and chemical intensive, crops. Overall, commodity programs do seem to provide disincentives to SA systems, although results are somewhat ambiguous. Farmers think commodity programs impede adoption but ranked their importance as a barrier below difficulty in managing the new systems (Table 2). In addition, Young and Painter found that commodity programs could both increase and decrease the profitability of SA systems relative to conventional systems. While commodity programs probably yield a net disincentive to utilize SA systems, their elimination would not necessarily result in large increases in SA since conventional systems may still maintain a profitability edge.

Finally, it is important to assess how much of the adoption problem lies on education and research. Many extensionworkers have observed that farmers will attend a meeting about best management practices while they will not attend a meeting about sustainable agriculture. On the flip side, they cannot find very many researchers with answers about SA when a farmer is interested. It is not surprising that research has not provided the desired information given the loose definition of SA and the comparative advantage of researchers to develop high input technologies. Extension personnel have coped by meeting their clientele in terms they can understand, avoiding the SA label.

¹ More effort needs to be given to the question of independence between the two technologies. I will assume for now that they are mutually exclusive and only one or the other can be adopted.

Have We Jumped the Gun?

Policymakers appear ready to promote the use of SA to reduce environmental damages from agriculture, yield higher profits, and promote less reliance on chemicals while boosting value added by the farmer. I have outlined several reasons why our efforts may not yield anticipated results. First, and most important, we do not have a clear direction of where farming is and where it should go. SA provides a framework to consider some of the problems but offers little detailed direction. For example, is IPM desirable or undesirable if it results in increased pesticide use?

Second, information about sustainable agriculture is ambiguous. More research is needed to determine when and where it is profitable and what external benefits it provides. An education program is just as likely to decrease as to increase its acceptance if educators are not confident and specific in their recommendations. A recent study done in North Carolina showed that farmers, classified as SA on the basis of reduced chemical farming practices, had less farm experience, relied less on Extension agents for information, and had lower farm incomes (Anderson). As Anderson points out, if these farmers' production choices are rooted in values that are not shared by most farmers, then making more technical information available or removing policy barriers will not be sufficient to effect widespread changes in farming practices among most "conventional" farmers.

Third, SA advocates have focused on finding examples where SA systems are as profitable as conventional systems. They have not adequately dealt with the transferability of these systems to other farms. In addition, profitability is only one of the barriers to SA adoption. The SA movement has not produced many new systems. Most of the technologies associated with SA (other than in the strictest organic since) have long been addressed by Extension, the Soil Conservation Service and others. Farmers have therefore had the option of adopting SA-type systems. This implies that farmers were either unaware of the systems or that they did not consider the effort to adopt them worthwhile (Daberkow and Reichelderfer). Perhaps farmers have already rejected systems that promote more value added at the farm because they prefer labor saving technology. If farmers seek to reduce labor at the farm level, then policy would have to increase the value of their farm labor relative to other alternatives in order to encourage adoption of SA systems. Sustainability could advance further if transferability and farmer goals for labor and management use were more carefully addressed.

I do not want to end on a negative note. There are hundreds of exciting and promising technologies of all kinds that will reduce agricultural pollution while maintaining profits. Some involve chemicals. A new herbicide, Accent, reduces leaching risk in one part of North Carolina by over a 100 fold—by a measure a colleague and I have developed that considers toxicity and leaching rate—because it is applied at about one ounce per acre and is three times safer to eat than table salt. Other solutions reduce chemical use. In the Midwest, the increased awareness of nitrogen pollution has led to large reductions in nitrogen use with no appreciable loss in profits. Therefore, education can and does have a positive impact on the environment, especially where excesses are rooted in outdated tradition.

In closing, the definition of SA needs to be made more clear or eliminated entirely. Clear unambiguous objectives should be identified, and guidance pro-

vided when tradeoffs are encountered. For example, in some areas soil erosion is relatively more important than groundwater contamination by pesticides while the reverse is true for other areas. Therefore, more freedom should be given at the local level to identify and solve problems than SA appears to offer. Research and education programs should be funded to develop and transfer new technologies that meet the social agenda. While it could be improved, the research and education system we already have should not be abandoned since it already provides incentives and opportunity to conduct meaningful programs.

Finally, elimination or major changes in commodity programs might help encourage adoption of more environmentally friendly systems. I would discourage too much effort in programs that provide incentives for SA, however. Such programs have a way of costing too much, not providing the intended results, and being impossible to eliminate. The sugar program, for example, costs an average of \$260,000 for each farm annually (Ives and Hurley, p. 22). I doubt if this is what program creators had intended, but the program has become too far entrenched to make adjustments easily.

Further Readings

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Which is Sustainable

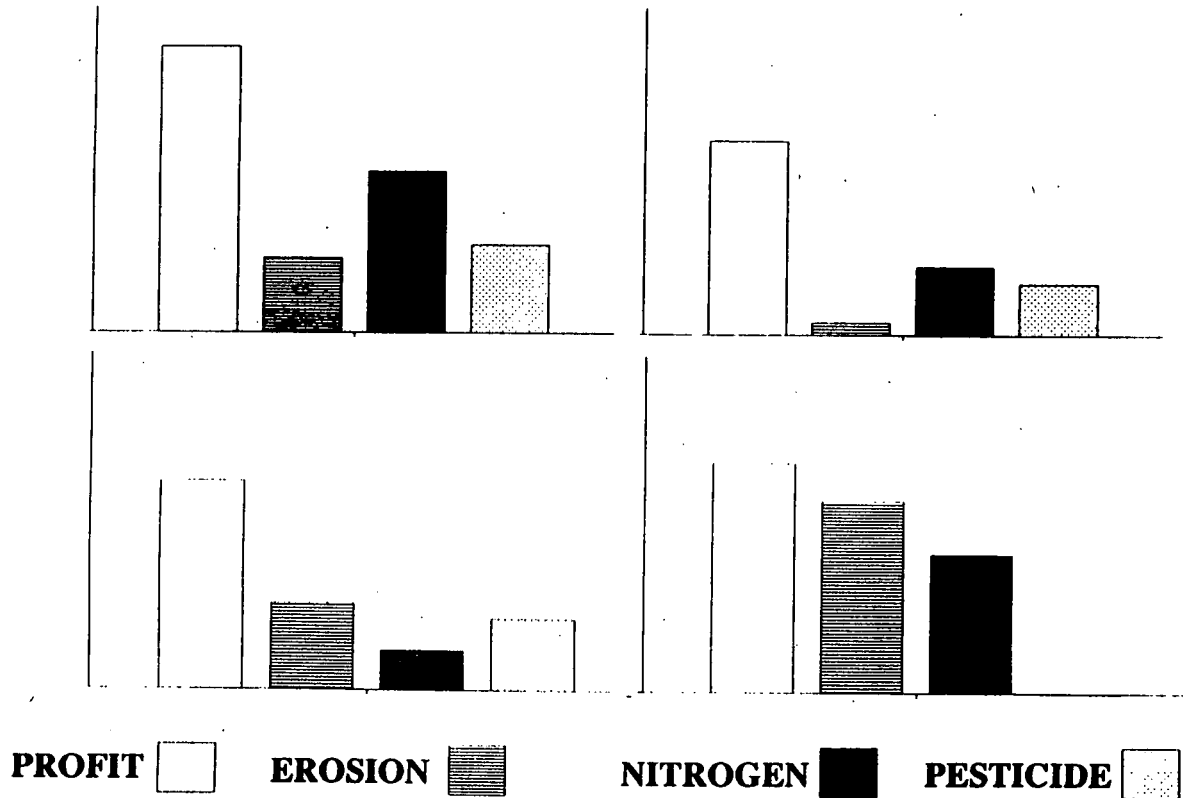


Table 1: Percentage increase in Yields, Crop Values, Pesticide Applications, and Pest Control Costs for IPM Users Compared to Non-users. (National Research Council, p.210)

Crop/State or Region	Yield/Acre	Dollar Value/ Unit of Production	Pesticide Applications	Pest Control Costs/Acre (Including scouting)
Alfalfa seed/Northwest*	+17	+3	+107	NS
Almonds/California	+118*	NA	NA	NA
Apples/Massachusetts	+12	-8	-4	-23
Apples/New York	+21	+3	+15	-6
Corn/Indiana	+10	+4.5	+41	+45
Cotton/Mississippi	+20	NS	NA	+32
Cotton/Texas	+30	+5	NA	+40
Peanuts/Georgia	+11	NS	+10	-11
Soybeans/Virginia	+9	+4	+38	+23
Stored grain/Kentucky	NR	NS	NA	-14
Tobacco/North Carolina	+0.5	NS	-17	NS

NOTE: This study surveyed 3,500 growers. NA = Not available. NR = Not relevant. NS = Change not significant, less than 1 percent.

*Northwest includes Washington, Idaho, Oregon, Montana, and Nevada.

†Three-year average.

‡Compared with low IPM users.

SOURCE: Adapted from Allen, W. A., E. G. Rajotte, R. F. Kazmeirczak, M. T. Lambur, and G. W. Norton. 1987. The National Evaluation of Extension's Integrated Pest Management (IPM) Programs. VCES Publication 491-010. Blacksburg, Va.: Virginia Cooperative Extension Service.

Table 2: Barriers to the Adoption of Alternative Agriculture (General Accounting Office, p. 70)

Potential barrier	All	Specialized	Diversified
Greater management is required	1.61	1.63	1.59
Yields may decline	1.66	1.56	1.76
Weeds may increase	1.76	1.86	1.66
Profits may decline	1.89	1.80	1.97
Farm labor is unavailable	1.89	2.06	1.71
Need to maintain crop acreage base	1.90	1.80	2.00
Workload may increase	1.96	2.09	1.82
Current system works well	1.99	2.09	1.88
Lack of information	2.11	2.14	2.09
Loans are more difficult to get	2.13	2.23	2.03
Loss of federal benefits	2.39	2.54	2.24
Markets are not available	2.43	2.40	2.46
Rotations are not allowed in program	2.49	2.23	2.74
Livestock will be needed	2.53	2.26	2.80
Alternative techniques are not allowed on rental land	2.87	2.47	3.26
Crop insurance may be more difficult to get	2.77	2.94	2.60
No vacations will be possible	2.91	3.34	2.45
Neighbors "won't understand"	3.27	3.29	3.26

*Barriers ranged from 1 = strongly agree through 3 = least neutral to 5 = strongly disagree

PAPER PRESENTED BY CHUCK HASSEBROOK:

**AGRICULTURAL INDUSTRIALIZATION AND FAMILY FARM DECLINE:
THE ROLE OF FEDERAL POLICY**

The future of the family farm system of agriculture is in great jeopardy. Its demise is not inevitable, but it is the predictable result of the continuation of the forces at work in agriculture today. Federal policy has done little to deter it and in many cases is a significant contributing factor. If we are to maintain a broad base of economic opportunity for people in agriculture and enable the people who work on farms to own and control them, we must act quickly to enact a broad set of public policies that support those ends.

American agriculture is at a critical juncture. Today, roughly half 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 farmers. 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.

The loss of those opportunities will be felt not only by would-be farmers, but also by farm communities, particularly in agriculturally dependent areas. The adverse impacts of concentration in agriculture on the economic vitality and quality of life of farm communities 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 incomes, high levels of poverty, low education levels, social and economic inequality between 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 laborers, and virtually no middle class. The absence of a middle class at the community level has a serious negative effect on both the quality and quantity of social and commercial service, public education, local governments, etc. (MacCannell, 1983)

The demise of family farming and farm communities is neither inevitable nor necessary to maintain a productive and efficient agriculture. Rather, it is the result of public policies and economic forces that are subject to human intervention. As said former USDA chief economist Don Paarlberg, we can have what ever 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 Vision*, by Marty Strange) Nonetheless, 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 economies. Those with existing wealth can pyramid ever greater amounts of wealth upon their initial advantage until economic control rest in a few hands and free enterprise destroys its

self—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 them and ultimately shaping agriculture, the rural environment and life in farm communities.

The public agricultural research systems supported by those funds has largely pursued efficiency in agriculture through an industrial paradigm, by using capital not only to increase 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 agricultural had fallen to five percent, less than one fourth of its 1910 level, according to a recent *Choices* article by Stewart 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 trend without sacrificing efficiency and competitiveness? I believe it is, but only if we change the way that we pursue 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 workforce, by providing opportunities for them to earn economic returns by exercising management and applying skills in the field and in the barn.

This is generally the strategy being pursued by the advocates and practitioners of sustainable agriculture. Recent research in Iowa, Minnesota, Montana and North Dakota indicates that farmers in those states practicing sustainable agriculture are in fact using more operator and family labor and management

per acre to reduce input purchases and capture a larger share of the farm dollar. (See the attached *Which Row to Hoe?*) It is noteworthy that while the sustainable farms generally use more labor per acre than conventional farms, they use less nonfamily hired labor. Consistent with increased labor requirements and reliance on family labor, sustainable farms are smaller than conventional farms in three of the four states, though farmers practicing sustainable agriculture are no less reliant on farming for their income. The limited data on farm income suggest that sustainable farmers are earning more net income per acre farmed, but less total net income than larger conventional farmers. Though more detailed findings from this research are forthcoming, the initial findings suggest, in short, that use of sustainable agriculture strategies is correlated with moderate sized family farms and may have the potential to enhance family farm opportunities. If that approach to family farm revival is to succeed, however, the long standing research imbalance between conventional and sustainable agriculture must be corrected so that the full economic potential of sustainable systems can be realized.

In spite of that research imbalance, however, analysis by University Missouri Agricultural Economist John Ikerd suggests that modest changes in the direction of sustainable agriculture are economically advantageous today, as well as environmentally beneficial. 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 seven 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 (FACTA), which took some modest but historic steps toward redirecting federally funded research toward enhancing environmental quality and family farm and rural opportunities. FACTA 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.

Modest 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 FACTA. That review could be strengthened by explicitly defining the purpose of increasing rural economic opportunities and enhancing quality of life to include family farm objectives. That would be consistent with the definition provided during consideration of FACTA on the floor of the House, as well as the Report of the Managers for the 1993 Appropriation Bill. It is also important the proposal review panels include persons qualified and experienced in assessing the socioeconomic impact of proposed research. Finally, it is critical that the NRI Request for Proposals (RFP), that 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. The new RFP released last month showed only minor improvement. USDA has received de-

tailed recommendations in this regard from a group of twenty leading researchers in sustainable agriculture and we had been hopeful that more significant changes were forthcoming.

The most positive responses to FACTA have been in the Sustainable Agriculture Research Education Program (SARE) and the Agricultural Science and Technology Review Board. In spite of its meager funding, SARE has been the most forthcoming of all USDA research programs in explicitly evaluating proposals for their impact on family farm opportunities and emphasizing research that enables farmers to cut input costs and capture a greater share of the farm dollar. The Agricultural Science and Technology Review Board was authorized by FACTA to conduct technology assessments and assist USDA in identifying the research directions likely to make the greatest contribution to the research purposes. After some delay, the members of the Board were appointed last month and the Board immediately commenced its work.

Unfortunately, USDA's performance elsewhere in implementing FACTA's research directives has been disappointing. The Report of the Managers on FACTA, as well as the 1993 Appropriations Report, 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. Nonetheless, no Department-wide guidelines have been developed. It is particularly troubling that the six 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 Recommendations

- *USDA should fully implement the research purposes of FACTA. The NRI should be written to include all emphasis on sustainable agriculture and 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. Persons experienced in sustainable agriculture and persons experienced and qualified in evaluating socioeconomic impacts should be included on proposal review panels. As directed by the Report of the Managers for the 1993 Appropriation Bill, the NRI should fund technology assessment research aimed at evaluating the societal impacts of alternative research directions and identifying those research directions with the greatest potential to advance the research purposes. The ARS six year plan should be revised to address the full range of FACTA's research purposes, including family farm and rural community opportunity objectives. Proposed Department-wide guidelines implementing the research purposes should be published in the Federal Register.*

- *Congress should increase funding 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 back on use of purchased inputs. The current funding level of \$6.7 million amounts to less than one-half of one percent of annual federal expenditures on agricultural research. Funding should also be provided to the Extension Service for sustainable agriculture education and training, as authorized by FACTA.*

- *Congress should strengthen the research purposes provisions in the 1995 farm bill. Family farm objectives and implementation procedures should be made more explicit. Rewards and incentives should be provided to researchers for aiming their research at fulfilling family farm objectives, together with the other social, economic and environmental objectives addressed by the research purposes.*

Federal Farm Commodity Programs

The rules by which federal farm 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 commodity.

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 effect less than one percent of deficiency payment recipients.

This big farm bias was worsened by FACTA 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 effect 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 deficiency payment cuts 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 sized 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 support a volume of production sufficient to allow for efficient production and to provide a decent family income—but no more. So structured, the farm program 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 the 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 it 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 Northeastern Nebraska, the farm program's basic message has been "the more corn you grow, the more 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 farm program is biased toward reducing the amount of land involved in crop production and increasing the use of yield enhancing purchased inputs. This bias stems from the way in which the farm program attempts to prevent over production of farm commodities—by requiring farm program participants to idle 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, FACTA took some modest but important steps toward reducing the commodity program bias toward increased 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 payments as if they had planted the program crop. In addition, they may harvest certain resource conserving crops from land they would otherwise be required to idle, in recognition of the contribution of resource conserving rotations to reducing grain surpluses.

IFMPO has had its 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 deficiency payments.

Furthermore, there have been major problems with USDA's implementation of the program. Though a number of these problems were corrected by passage of the technical corrections bill late last year, others remain. Most significantly, USDA continues to implement the IFMPO's "Underplanted Acreage Rules" in a way that in many instances imposes a payment penalty for enrolling in IFMPO. USDA has used its discretion in a number of other smaller ways to make the program less attractive than it would otherwise be. For example, IFMPO participants are required to sign-up for the federal commodity program for three years, without knowing its future provisions. Nonparticipants can sign-up one year at a time. Furthermore, 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 family farms and for environmental incentive payments. (see the attached) 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 limitation on the volume of production on which deficiency payments may be received. The savings should be applied in part to exempting owner operated farms on a modest volume of production fro. the deficiency payments cut scheduled for 1994. A portion of the savings should be used to pay farmers for environmental protection practices that reduce production.*

- *Within USDA, revise administrative rules and the handbook used by county offices to make IFMPO more flexible and farmer friendly. Most importantly, revise the underplanted acreage rules to remove the payment penalty for participating in IFMPO. Educate county officials on the program to enable them to better assist farmers in enrolling.*

- 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. Overhaul the program to make it more flexible and farmer friendly.

- 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. However, sentiment is growing in some quarters to reinstate investment tax subsidies, including the platforms of both major political parties.

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 increased investment results in increased levels of production, 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 competitive advantage while those who gain only a small tax break or no 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.

The application of these principals to recent enterprise zone legislation, as passed initially by the House of Representatives last summer, illustrates how investment tax subsidies often have the unintended consequence of undermining the family farm system. First, the provision providing a 15 percent employer tax credit on up to \$20,000 of wages per employee in enterprise zones was biased against self employment. Corporate farms would have been subsidized to expand and add employees. But beginning family farmers who create their own job opportunities by establishing farms and ranches would have received no subsidy.

Second, the provision providing a capital gains exemption on certain investments in enterprise zones would have encouraged unproductive speculative investments and granted a competitive advantage to high bracket taxpayers who can most effectively exploit the tax break. For example, capital gains realized by speculative investments in farmland in enterprise zones would have been tax favored. Such investments create no new economic 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 capital 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 to livestock producers, 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 have granted a special deduction for investment in corporate stock in certain qualified businesses, if the proceeds were reinvested in depreciable property. That provision was biased against sole proprietorships, 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, that provision would have provided a subsidy to invest capital in agriculture to replace people beyond the level justified by efficiency.

Taken together, these three provisions would have had a marked negative effect on the social and economic well being of agricultural communities. They would have subsidized the replacement of family farmers by capital, favored high bracket taxpayers over farmers of modest means, and advantaged corporate farming operations over smaller sole proprietorships. The impacts would have been most profound in the livestock industry, which would have been 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 have been deterioration of social conditions in farm communities, increased rural poverty, greater inequality and shrinkage of the rural middle class.

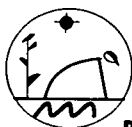
In response to these concerns, the legislation was amended prior to final passage to prohibit application of these tax subsidies to farms with assets of over \$500,000. Nonetheless, the issues it raised about the impact of federal tax policy on the structure of agriculture and the fate of small owner operated businesses will be back before us as the new Congress convenes, regardless of which party is in control of the White House.

Tax Policy Recommendations

Generally, avoid creation of new subsidies in the tax system for investment in agriculture. If congress desires to subsidize investment in new family farms, it should carefully target the benefits so that they do in fact support establishment of new family farms rather than expansion of established farms or creation of large industrialized farming operations. Some of the best means of targeted support for beginning farmer investments fall outside of the tax policy arena—such as the new Farmers Homes Administration down payment loan program for first time land purchases. Potential tax policies supportive of creation of new family farms include carefully crafted "individual development accounts", that subsidize savings for investment in new self employment ventures through tax breaks and matching contributions and a capital gains exemption for landowners who sell land to beginning family farmers. If Such policies are adopted, it is vital that the benefits be carefully targeted to beginning family farmers with limited resources so that well established farms, corporate farms and investors are not disproportionately subsidized to grab land and opportunities that would otherwise be available to small and beginning farmers.

Conclusion

If family farm agriculture is to survive, we must adopt a broad set of public policies carefully crafted to enhance self employment opportunities in agriculture. The free market 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. Time is short.



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TARGETING FARM PROGRAM BENEFITS

TO PREVENT FURTHER PAYMENTS CUTS ON MODERATE SIZED FARMS

The loss of moderate sized family farms is accelerating, driven by declining profitability and increasing competition from larger operations. This loss will be further accelerated in 1994 by the additional cuts in deficiency payments scheduled under the 1990 budget agreement. These cuts will be imposed by changing the way in which deficiency payments are calculated. Currently, deficiency payments for most commodities are determined according to market prices during the five months following harvest, when prices are lowest. Beginning in 1994, deficiency payments will be based on the 12 month average price. For corn, the projected reduction in deficiency payments is 10 cents per bushels.

This will be the second cut borne by family farmers under the 90 budget agreement. They have already lost payments on 15 percent of their production. By contrast, the nation's largest farms, whose production exceeds the amount covered by the maximum \$100,000 deficiency payment, are taking no cuts. The following proposal would change that. It would protect farmers from the 1994 cut on a volume of production typical of moderate sized farms and offset the cost by closing payment limitation loopholes and targeting payments to family farms. Since we do not yet have official revenue estimates on this proposal, it may have to be adjusted later to make the savings cover the costs.

Base Deficiency Payments on a Limited Volume of Production on the Five Month Average Price, Rather Than the 12 Month Average Price, to Protect it From the 94 Cut - Use the five month average price in calculating deficiency payments on a limited volume of farm operators' production. Specifically, the five month period would be used in determining payments on the first 40,000 bushels of corn production, 27,500 bushels of wheat, 76,000 bushels of oats, 42,000 bushels of grain sorghum, 49,000 bushels of barley, 10,500 cwt. of rice or 151,000 pounds of upland cotton. The limit would apply to the amount determined by multiplying permitted acres by the established yield. For producers of ELS cotton and producers of multiple commodities eligible for deficiency payments, deficiency payments would be based on the five month period for the first \$110,000 worth of production (determined by multiplying permitted acres by established yield multiplied by target price). For each bushel/pound by which program crop production exceeds the amount of production protected by this provision, that amount would fall by a bushel/pound.

Create a New Limit on the Volume of Production Covered by Deficiency Payments. The limit would be 120,000 bushels for corn, 126,500 bushels for grain sorghum, 82,500 bushels for wheat, 140,000 bushels for barley, 227,500 bushels for oats, 452,500 pounds for upland cotton and 31,000 cwt. for rice. For producers of ELS cotton and producers of multiple commodities eligible

for deficiency payments, deficiency payments would be made on only the first \$330,000 of production.

Deny Deficiency Payments to Persons Who Do Not "Materially Participated in the Farm. - This requires that farm program participants be involved in the management of the farm on a substantial and continuous basis, with the exception of share-rent landlords. Material participation is already required for taxpayers to deduct farm and business losses from other income.

Repeal the Three Entity Rule and Instead Attribute Farm Program Payments Made to Entities to Real Persons. - The three entity rule allows people affected by payment limitations to subdivide their operation into up to three legal entities and receive payments through each. Its effect is to raise the \$50,000 payment limit to \$100,000. This proposal would change that. Payments received by legal entities would be attributed to individual stockholders in applying the payment limitation, making the \$50,000 payment limitation a real \$50,000 limit. Entities would be eligible to receive payments only to the extent their owners are eligible to receive deficiency payments, based on their material and active participation and "at-risk" investments. Families wishing to combine operations could do so. Three brothers farming together would be treated as three separate persons to the extent each materially and actively participates in the farm and has investments at risk.

Payments to Farm Operator Under 90 Budget Agreement and Targeting Proposal*

<i>Busbels of Corn Produced (Estb. yield x pmtd. acres)</i>	<i>Deficiency Payments Received</i>	
	<i>90 Budget Agreement</i>	<i>Targeting Proposal</i>
40,000	\$13,333	\$16,667
60,000	\$20,000	\$21,666
80,000	\$26,667	\$26,667
120,000	\$40,000	\$40,000
240,000	\$80,000	\$40,000

* Assuming 50 cent payments based on 5 month price, 40 cent payments based on 12 month price, corn on 15% unpaid mandatory flex, and use of 3 entity rule. Some of these numbers will change, if the official revenue estimate indicates that the proposal must change to make the savings offset the costs.

Conservation Based Supply Control Program. - A portion of the savings from these measures would be devoted to a conservation based supply control program to enhance environmental quality and ensure that every acre lost from set-aside due to these provisions is replaced. No less than twenty percent of the savings from the revenue raisers would be used to compensate farmers for practices that both protect the environment and reduce production. These payments would come in two forms, including diversion payments through the Paid Diversion and increased deficiency payments through the Targeted Option Payment Program (TOPS). TOPS was created by the 1990 farm bill but has not been implemented by USDA. It provides that farmers who increase their setaside are to be compensated by higher deficiency payments. Under

this proposal, eligible diversions would include contour grass strips for erosion control, filter strips, rotated legume/grass soil building crops, farmed wetlands, etc. Farmers could also participate by setting lower yield goals and applying only the nitrogen and inputs needed to realize those lower yields.