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What's Inside?

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IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Conservation Tillage and Farm Programs

(Bruce A. Babcock, 515/294-5764)
(Nabil M. Chaherli, 515/294-6273)
(P. G. Lakshminarayan, 515/294-6234)

One of the major environmental initiatives of current commodity programs is Conservation Compliance, a provision that requires highly erodible land to be cropped according to a locally approved conservation plan. Farmers who fail to carry out the directives of conservation compliance can lose their program payments. It is widely accepted that increased adoption of conservation practices over the last ten years has resulted in fairly large reductions in soil erosion. As Congress considers 1995 farm bill options, a key issue is the extent to which these erosion reductions can be attributed to conservation compliance. If farmers have adopted conservation practices solely to remain eligible for program payments, then large reductions in payment rates from cuts in the federal budget will likely lead to large increases in soil erosion rates. However, if farmers have adopted soil-conserving practices because they are more profitable than traditional practices, then reduction or elimination of payments will have little effect on soil erosion rates.

Clearly, crop residue management is an important aspect of most approved conservation plans. According to Keith Collins, acting chief economist of the USDA, nearly 75 percent of acreage subject to conservation compliance will use some sort of crop residue management. In general, increased residue results in decreased erosion. Crop residue management is accomplished by varying tillage practices. Alternative tillage practices include conventional tillage, reduced tillage, and no-till. While conventional tillage involves extensive field cultivation with minimum residue cover (less than 30 percent), conservation tillage (reduced tillage and no-till) is characterized by minimum soil disturbance and increased residue cover.
(Continued, page 10)

Recent CARD Publications

Working Papers

95-WP 131. "Optimal Design of a Voluntary Green Payment Program Under Asymmetric Information." **JunJie Wu** and **Bruce A. Babcock**. February 1995.

95-WP 132. "Net Returns of Alternative Crops on Flood-Prone Land: Louisa County, Iowa, and Saline County, Missouri." **John Kruse, Paul Mitchell, Aziz Bouzaher,** and **Darnell Smith**. February 1995.

95-WP 133. "Transport Costs and Rural Development." **Maureen Kilkenny**. April 1995.

95-WP 135. "Managing Sustainable Agriculture." **Stanley R. Johnson**. May 1995.

95-WP 136. "Program Participation and Farm-Level Adoption of Conservation Tillage: Estimates from a Multinomial Logit Model." **Bruce A. Babcock, Nabil M. Chaherli**, and **P.G. Lakshminarayan**. May 1995.

95-WP 137. "An Economic and Environmental Evaluation of Farm Bill Policy Options Using the CEEPES-FAPRI Modeling System." **P.G. Lakshminarayan** and **Bruce A. Babcock**. June 1995.

95-WP 138. "Agriculture and Agribusiness Reform in the CEE Nations and NIS: Issues and Opportunities." **Stanley R. Johnson**. August 1995.

Briefing Papers

95-BP 6. "Renewing CRP: Results from a Study of Alternative Targeting Criteria." **Bruce A. Babcock**. February 1995.

95-BP 7. "The Budgetary and Resource Allocation Effects of Revenue Assurance: Summary of Results." **David A. Hennessy, Bruce A. Babcock**, and **Dermot J. Hayes**. February 1995.

95-BP 8. "FAPRI Examination of Farm Bill Alternatives." **William H. Meyers** and **Darnell B. Smith**. May 1995.

95-BP 9. "Meat Exports or Soybean Exports? An Iowa Perspective." **Dermot J. Hayes**. August 1995.

FAPRI Outlook Publications

#1-95. "FAPRI 1995 U.S. Agricultural Outlook." **FAPRI Staff**. June 1995.

#2-95. "FAPRI 1995 International Agricultural Outlook." **FAPRI Staff**. May 1995.

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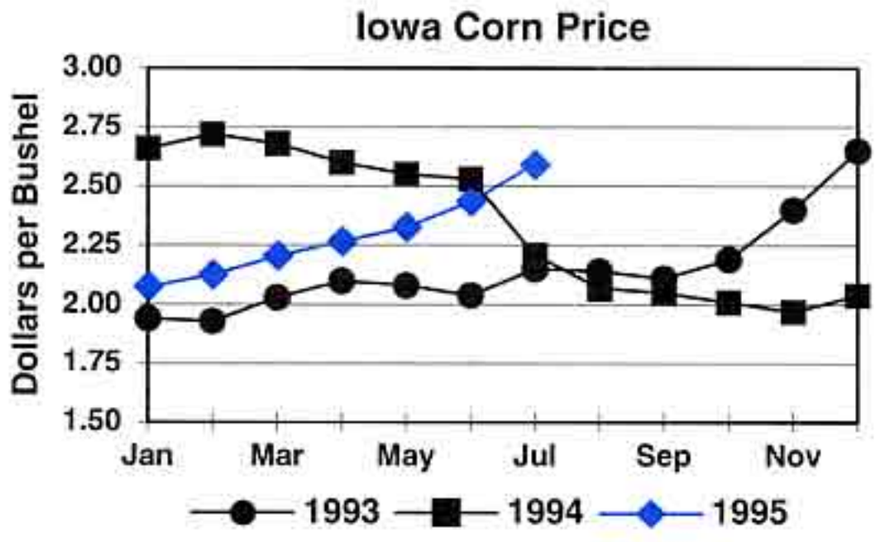
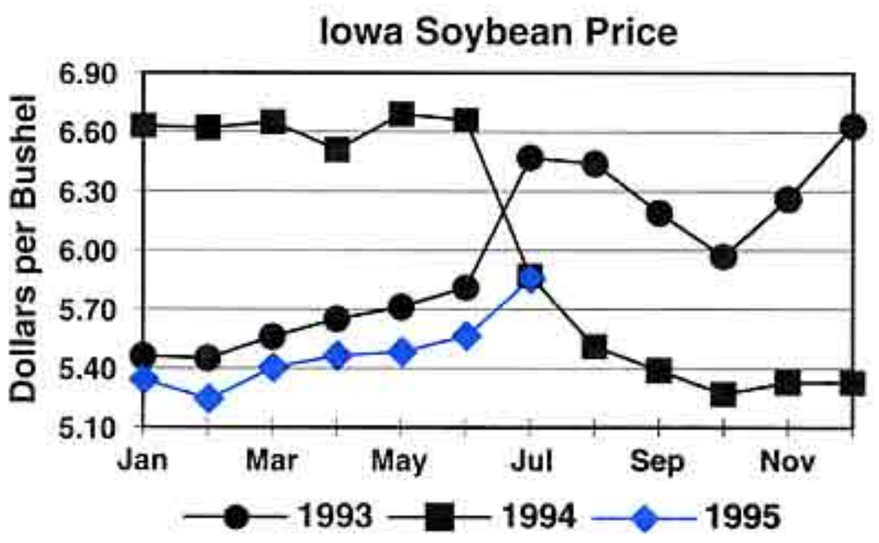
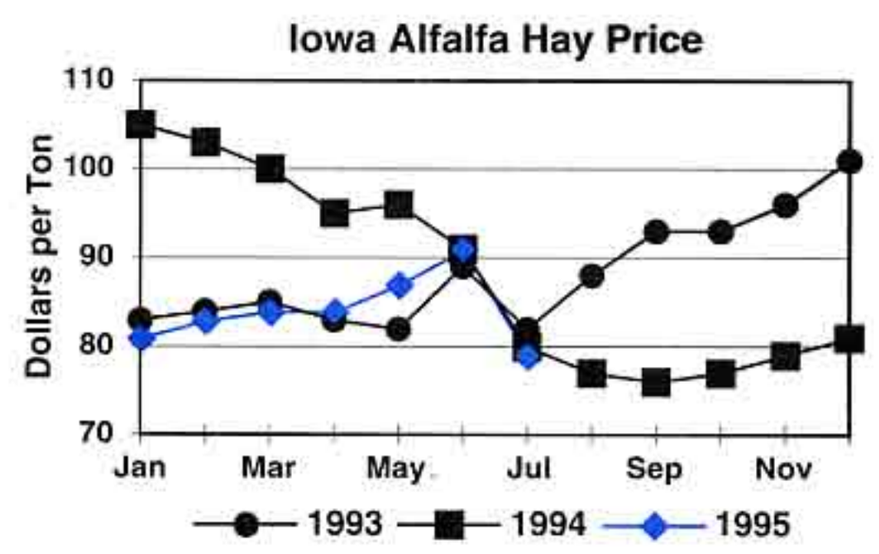
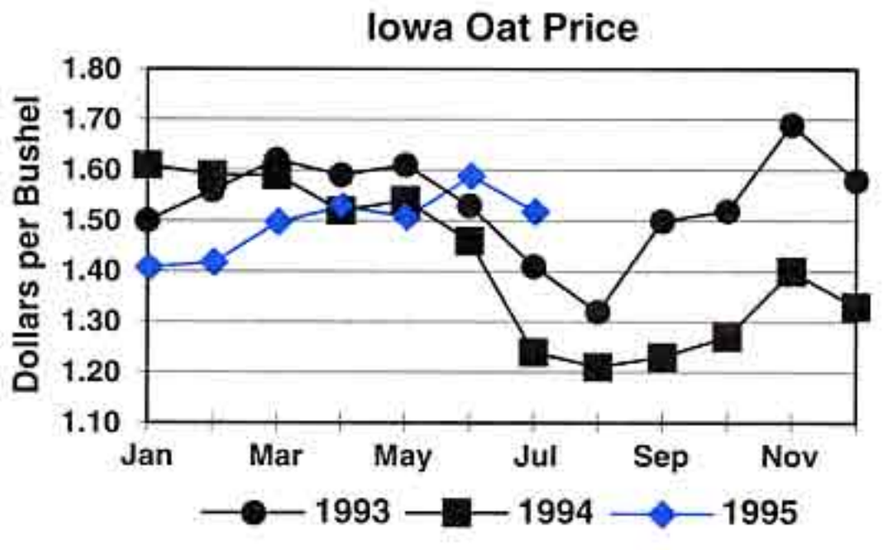
CARD/FAPRI
Iowa State University
578 Heady Hall
Ames, Iowa 50011-1070









The Current Situation In Iowa

Weather Shocks, Iowa Agriculture, and Agricultural Policy

(Darnell B. Smith, 515/294-1184)
(Steven L. Elmore, 515/294-6175)

Volatility in Iowa agriculture, especially in yields and prices of corn and soybeans, has been increasing over time and indications are that increases in volatility are likely to continue in the future. Two primary reasons underlie probable increases in this volatility: (1) Increasing yields through plant development implies that regional weather shocks have an increasing effect on production supply, and (2) Levels of buffer stocks are so low that there are limited price stabilization effects due to changes in stockholdings. Figure 1 shows historical yields for Iowa corn and illustrates that yield deviations have been steadily increasing over time. Stocks-to-use ratios presented in Table 1 show declines in projected values.

FAPRI Baseline Projections and Weather Shocks

This volatility has important implications for FAPRI projections of market prices and expected deficiency payments — the FAPRI baseline assumes "normal" weather (see article on weather volatility and farm bill options). Increasing volatility also has important implications for the efficacy of alternative agricultural policies as discussed in the article on "Income Support or Subsidized Risk Management" by Bruce Babcock.

Spring 1995 exhibited a weather pattern that, once again, was not favorable to row crop production in the Midwest. The cool, wet weather during the planting season either delayed planting, caused a change in planting intentions or, in the worst cases, made planting impossible. With low levels of carryover stocks, this weather shock has led to rapid market price increases with the result that FAPRI projections for market prices are underestimated and feed-grain deficiency payments for the 1995/96 crop years are overstated. Even though projected 1995 corn deficiency payments are at $0.10 per bushel as of August, they could be close to zero for the current crop year if prices stay high.

The futures market prices have risen in anticipation of a lower supply of corn and soybeans with demand remaining nearly constant. The price of the new crop futures (December for corn and November for soybeans) has risen to reflect the decrease in supply for these commodities. The January 5, 1995, commodity

market closed at $5.89 per bushel for soybeans and $2.51 per bushel for corn. On July 6, the futures market closed at $6.22 for soybeans and $2.85 for corn. For corn, that meant an increase of 34 cents or 13.5 percent, and an increase of 33 cents or 5.6 percent for soybeans.

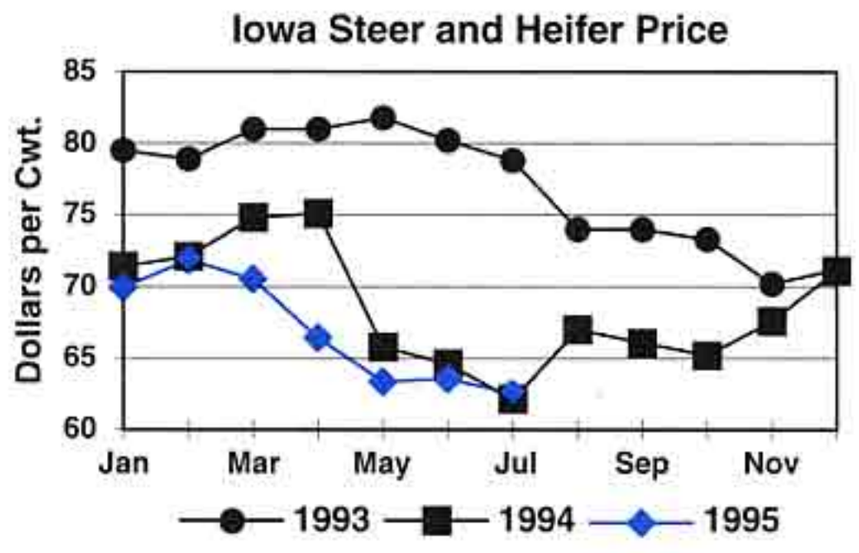
Table 1. FAPRI Projections and USDA Estimates (June and August) for U.S. Corn and Soybeans, 1995.

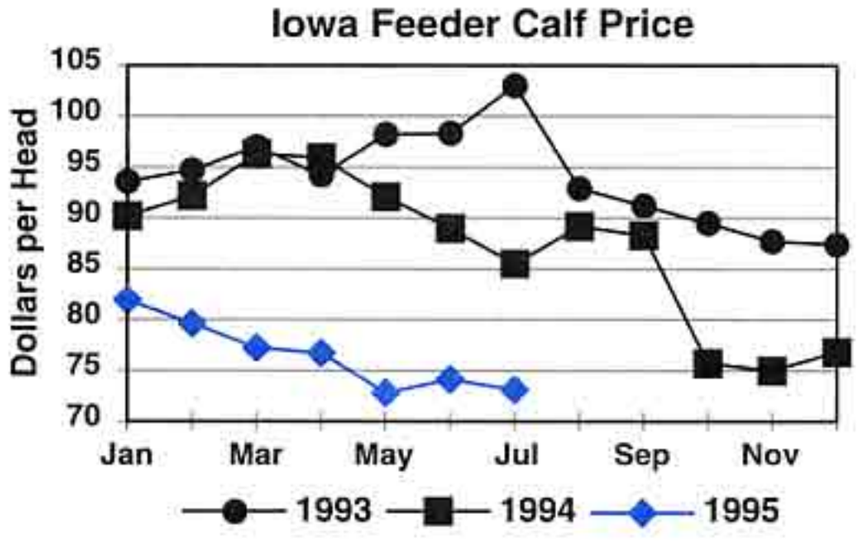
	FAPRI*	June	August
CORN		*(Million Bushels)*	
Production	10,103	7,900	8,122
Use	9,258	8,700	8,800
Ending Stocks	1,700	748	787
		(Percent)	
Stocks-to-Use	16.3	8.60	8.94
		(Dollars Per Bushel)	
Market Price	2.31	2.65	2.65
Deficiency Payment	0.44	0.10	0.10
SOYBEANS		*(Million Bushels)*	
Production	2,558	2,210	2,246
Use	2,263	2,150	2,306
Ending Stocks	509	355	325
		(Percent)	
Stocks-to-Use	22.94	16.51	14.09
		(Dollars Per Bushel)	
Market Price	5.48	5.75	6.00

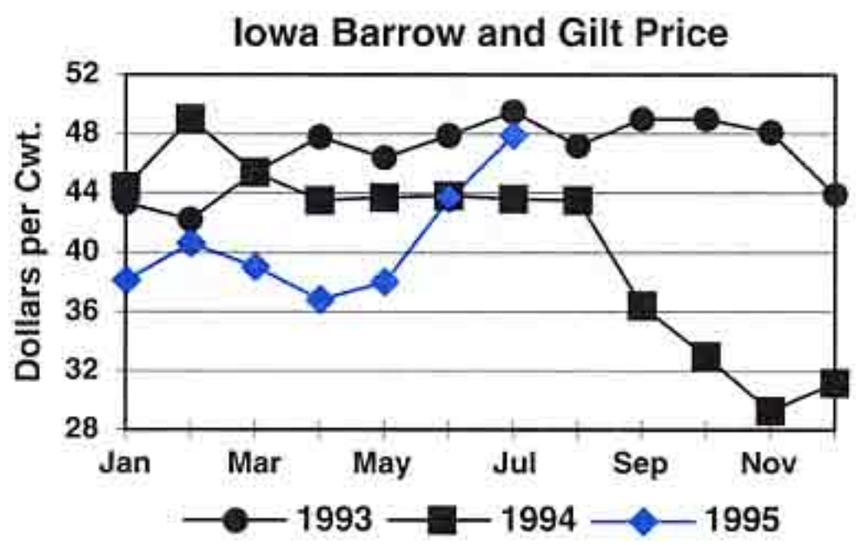
* Mid-January 1995 projection with normal weather.

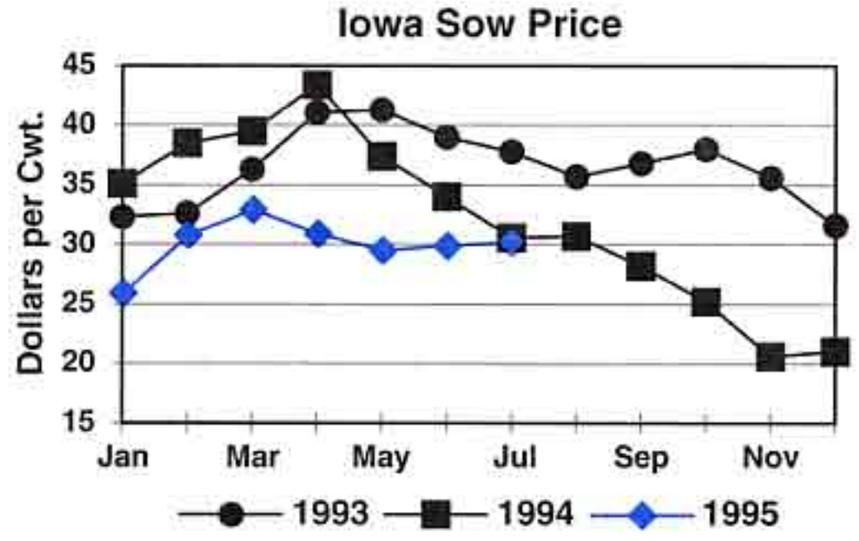
The reason for the price increase was the unforeseen bad weather during the planting season. In January, the FAPRI baseline projected that 10,103 million bushels of corn would be produced, 9,258 million bushels would be used, and 1,700 million bushels would be in ending stocks. Soybean production was projected at 2,558 million bushels, use at 2,263 million bushels, and ending stocks at 509 million bushels (Table 1). These projections were based on the best available information at that time with the assumption that weather conditions would be normal. With abnormal weather in the planting season, the early projections now overstate what we see occurring for 1995 crop production.

The USDA releases monthly estimates of supply, demand, and utilization of agricultural commodities. August's estimates may be a good indication of the rise in prices. The estimates show the effect of the late spring weather pattern. A decrease in corn production to 8,122 million bushels and a decline to 2,246 million bushels for soybeans were predicted by the USDA. This signals likely reductions of 2,246 million bushels and 312 billion bushels, respectively.





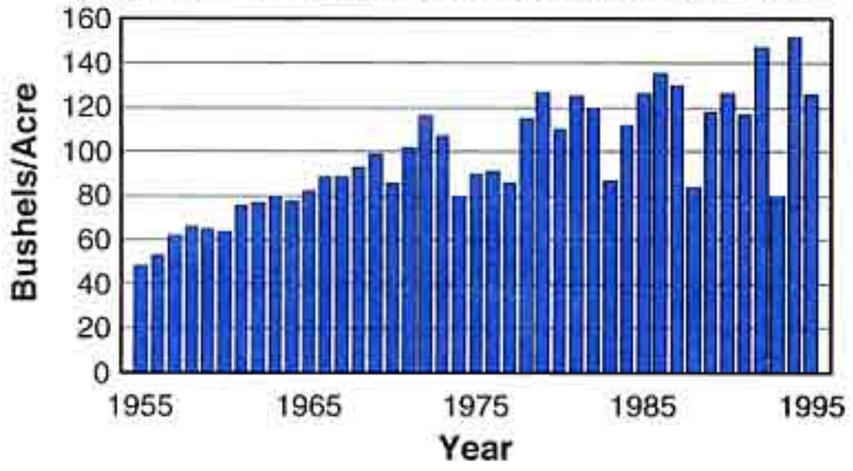




Even with the drop in production and increases in price, projected use shows only moderate changes. Projected use of corn declines by 625 million bushels while soybean use is expected to increase by 43 million bushels. These moderate changes in use coupled with a larger decrease in production have caused the projections of ending stockholdings of corn to decline by roughly 50 percent to 787 million bushels. Soybean ending stock projections decline to 325 million bushels from the 509 million bushel figure projected in January. These developments are summarized in the low stocks-to-use ratios that are shown in Table 1.

Low stocks-to-use ratios may or may not be a short-run, one-year situation. If next year brings a bumper crop, stockholdings should increase and market prices should decline. If, however, we again find commodity utilization outpacing production with even further declines in stockholdings, then prices would go even higher. Uncertainty in crop prices not only affects crop producers but impacts Iowa's livestock industry as well. Increases in feed cost this year will significantly affect the profitability of Iowa's livestock production. Only time will tell the full story, but it is clear that for Iowa agriculture, these are volatile times.

Figure 1. Iowa Corn Yield.
(Actual for 1955-94, August USDA estimates for 1995.)



Increasing Volatility And Agricultural Policy

A direct conclusion from increasing volatility in Iowa agriculture is that the management of risk becomes much more important for individual producers. It also implies a rethinking of agricultural policy objectives and of the tools used to implement that policy. Bruce Babcock, in this issue, points out differences in agricultural policy objectives of income enhancement as compared to emphasis on risk management.

Babcock also discusses how various tools of U.S. agricultural policy have been employed to achieve those objectives (e.g. nonrecourse loan rate programs and federal crop insurance act to minimize price and yield risk respectively and independently, while deficiency payments primarily aim for income support). Ideal for Iowa's farmers would be a situation where all objectives could be achieved. Unfortunately, the current federal deficit pressures imply that federal dollars will be tight and that difficult choices among policy alternatives or emphasis will have to be made.

The value of benefits that a farmer derives from alternative programs depends upon the individual producer's personal circumstances and aversion to risk. However, even holding personal circumstances constant, this year's weather illustrates the increasing variability and risk in Iowa agriculture. With indications of increasing volatility in Iowa agriculture and consequent increases in future cash flow risk, a re-evaluation of policy emphasis and the tools of policy takes on even greater importance for the 1995 Farm Bill debate.

Iowa Farm Income Indicators

	1995	1994	1993
		(Million Dollars)	
Crop Cash Receipts Jan - April Total	1,285	830	1,137
Livestock Cash Receipts Jan - April Total	1,182	1,170	1,231

Average Farm Prices Received By Iowa Farmers

	June 1995	May 1995	June 1994
		($/Bushel)	
Corn	2.44	2.33	2.53
Soybeans	5.57	5.49	6.66
Oats	1.59	1.51	1.46
		($/Ton)	
Alfalfa	91.00	87.00	91.00
All Hay	87.00	83.00	88.00
		($/Cwt.)	
Steers & Heifers	63.70	63.50	64.60
Feeder Calves	74.30	73.00	89.00
Cows	38.80	37.70	44.00
Beef Cattle	60.00	60.10	62.70
Barrows & Gilts	43.70	38.10	43.80
Sows	30.00	29.60	34.00
Sheep	28.90	28.40	32.40
Lambs	87.20	80.40	66.40
		($/Lb)	
Turkeys	0.39	0.39	0.40
		($/Dozen)	
Eggs	0.33	0.30	0.45
		($/Cwt.)	
All Milk	11.90	12.30	12.10

CARD/FAPRI Analysis

Farm Bill Options and Iowa Agriculture

(Steven L. Elmore, 515/294-6175)
(Greg Pautsch, 515/294-6296)
(Darnell B. Smith, 515/294-1184)

The 1995 Farm Bill debate is heating up. The conclusion of the policy discussions will impact the future of the agricultural community as well as those businesses that have a stake in the agricultural and rural economy. The last two Farm Bills (1985 and 1990) had five-year time limits. Now that we are in the last half of 1995, the agricultural lobbies are focusing on new omnibus legislation to further their agenda for the future of conservation, consumer programs, credit, crop insurance, food aid, income support, research, rural development, and trade. This may be a harder task in 1995 than in the past because of the budget constraints proposed by Congress. A heavily agricultural state such as Iowa has a large stake in the outcome of the current debate. The Center for Agricultural and Rural Development (CARD) at Iowa State University examined three different policy alternatives to determine their effects on Iowa agriculture. These three discrete proposals offer very different courses for U.S. farm policy:

1. 25 Percent Flex. This policy is the closest to the current program. It increases the Normal Flex Acres (NFA) from 15 to 25 percent. If the current feed-grain program is to be maintained, NFA will have to be increased so that the costs of the current program fall within the new budget constraints. (FAPRI estimates a budget savings of $6.4 billion over five years.)

2. Revenue Assurance. This alternative would do away with target prices, marketing loans, Acreage Reduction Programs (ARPs), and 0/50-85-92. Instead, producers would be ensured of receiving 70 percent of revenue, based on a five-year moving average of county price times a producer's five-year average yield. In addition, transition payments would start at 80 percent of historic deficiency payments in 1996 and decline to 0 percent by the year 2000. (FAPRI estimates a budget savings of $19.2 billion over five years.)

3. No Program. This program eliminates the existing structure of target prices, deficiency payments, loan rates, export enhancement, and dairy price supports, as well as many specialty programs such as cottonseed oil and sunflower. It also eliminates ARPs and the 0/50-85-92 programs. (FAPRI estimates a budget savings of $37.6 billion over five years.)

In all scenarios, the Conservation Reserve Program (CRP) follows the Congressional Budget Office (CBO) projection. While nationwide CRP is assumed to decline by slightly over 50 percent, it is not expected to decline by that same percentage in Iowa. Currently, about 22 percent of the enrolled CRP land has corn or soybean planted base; but under the CBO projections that proportion will rise to 30 percent across the United States. So, in corn and soybean areas of the country, such as Iowa, CRP is not projected to decline by 50 percent; but the CRP in wheat areas of the nation would decline by over 50 percent. This would be a movement of the majority of the acres from areas close to the eastern slopes of the Rocky Mountains to the corn belt region of the United States.

Comparison of Policy Options on Aggregate Farm Characteristics

When compared to the FAPRI baseline, the estimated effects on selected variables, as illustrated in the following table, show significant early variation across the alternatives but also show that farm income generally tends to converge toward the end of the period.

Crop receipts from farm marketings and CCC expenditures are the highest under the baseline (where the current programs and budget are maintained). The other three program options rank in different orders, depending on the year. Total production expenses are similar, but differences can be seen in the Net Farm Income category.

Net farm income is highest under the current program and a program that increases the flex requirement up to 25 percent. The Revenue Assurance option falls between the 25 percent Flex option and the No Program option from 2000 to 2004. The Revenue Assurance option includes transition payments to lessen the sharp impact of commodity programs elimination.

Under the policy options, farmers would try to recoup the loss in total net returns by expanding planted acres, increasing crop rotation, and producing crops on what was formerly CRP land. With the end of some of the program entitlements, even in the baseline, the relative returns of corn to soybeans become closer. This would cause more soybean acres to be planted. Total soybean acres would exceed 9.5 million acres in Iowa for all options, except the baseline. The increase is seen in the final three years of the projection period. Corn acreage follows a horizontal time path from 1996 to 2001. With soybeans picking up acres, corn would

lose acres in the final three years. Total corn and soybean acres would increase from 2001 to 2004 as farmers try to capture more market derived net farm income. The acres that they put into production come from the land leaving the CRP.

Average Annual Effects of Farm Bill Options on Selected Variables in Iowa

Corn and Soybean Planted Area		
Crop Years	*96/97-00/01*	*2003/04*
	(Thousand acres)	
Baseline Value	21,841	23,064
- 25 percent Flex	Up 221	Up 335
- Revenue Assurance	Up 600	Up 429
- No Program	Up 323	Up 176
Corn Planted Area		
Crop Years	*96/97-00/01*	*2003/04*
	(Thousand acres)	
Baseline Value	13,085	13,533
- 25 percent Flex	Down 157	Down 180
- Revenue Assurance	Up 166	Up 3
- No Program	Down 57	Down 138
Soybean Planted Area		
Crop Years	*96/97-00/01*	*2003/04*
	(Thousand acres)	
Baseline Value	8,756	9,530
- 25 percent Flex	Up 378	Up 514
- Revenue Assurance	Up 434	Up 426
- No Program	Up 379	Up 313
Crop Receipts		
Calendar Years	*1996-2000*	*2003*
	(Million)	
Baseline Value	$4,908	$5,689
- 25 percent Flex	Up $28	Up $75
- Revenue Assurance	Up $134	Up $244
- No Program	Up $155	Up $231
Government Payments		
Calendar Years	*1996-2000*	*2003*
	(Million)	
Baseline Value	$869	$728
- 25 percent Flex	Down $142	Down $116
- Revenue Assurance	Down $384	Down $554
- No Program	Down $608	Down $554
Net Farm Income		
Calendar Years	*1996-2000*	*2003*
	(Million)	
Baseline Value	$1,349	$1,171
- 25 percent Flex	Down $142	Down $83
- Revenue Assurance*	Down $320	Down $136
- No Program	Down $526	Down $334

**Net Farm Income under Revenue Assurance contains Revenue Assurance benefits paid to the farmer by the Federal Government.*

Planted area is higher under Revenue Assurance and the risk component of agriculture is reduced, relative to the other options, so banking institutions would be willing to lend more money for operating expenses.

No Program and 25 percent Flex are in the middle range of planted area for all the years. The difference occurs when flex is increased and farmers leave the program because the perceived benefits are less than the perceived costs. With the 25 percent Flex option comes a reduction in payments, and thus the program may not prove to be worth the costs of compliance. The lowest planted area shows up in the baseline, where net returns are the highest and ARPs are in effect. The corn and soybean plantings rise across all scenarios in the final three years of the baseline projection period because of the expiration of the CRP.

Budget Impact on Programs

In evaluating the previous results, it is important to note that the baseline scenario is under full CCC funding over the time period. The current budget resolution calls for a nationwide reduction in CCC funding of $8.4 billion over five years and $13.4 billion over seven years. This would be the contribution of agriculture programs to achieve a balanced budget.

Farmers would derive numerous indirect benefits from deficit elimination that are not included in the above analysis. Interest rates should be lower because the government will not demand money in the form of loans from commercial banks. The regulatory environment may not be as stringent on agriculture. If such benefits from a balanced budget are realized, farm production costs would decline and net farm income would be higher.

Each of these policy options will have a different impact on the future of Iowa agriculture. The underlying question of what impact the Farm Bill policy will have on the financial picture of the Iowa agricultural economy will not be determined for years. This analysis provides a look at some of the variations that may occur if certain policy options are enacted into law.

Weather Volatility and Farm Bill Options

(William H. Meyers, 515/294-1184)
(Darnell B. Smith, 515/294-1184)

To provide additional insight to the agricultural policy debate, FAPRI has introduced weather volatility into its analysis of three alternative farm program designs. The three scenarios were previously studied and presented to Congressional staff under the assumption of "normal" weather. The extended analysis, discussed in this article, incorporated weather volatility that was experienced in the 1980s into the 1995 FAPRI baseline

and the three options presented in the last issue of this publication. The three alternatives evaluated are:

- **No Program** (NP) — elimination of all budget driven agricultural policies
- **Marketing Loan** (ML) — conversion of current programs to marketing loans
- **Revenue Assurance** (RA) — provides producers with safety net on revenue

Among other differences, the export enhancement program was eliminated under the NP and ML scenarios and was retained under the RA option. More complete details of the three options are discussed in the June issue of *Iowa Ag Review*.

Considerable volatility exists in U.S. agricultural crop production. The vagaries of weather, the export market situation, and shifts in government policy contribute to large year-over-year shifts in production, utilization, and prices of agricultural commodities. In reality, weather induced supply shocks carry forward into future behavior impacting acreage planted, livestock production, and end-of-year stockholdings. Because assuming normal weather precludes evaluation of how volatility impacts these variables, an analysis highlighting recent weather shocks was deemed advisable.

The analysis assumed that the weather of the 1980s repeats, beginning with the 1996 crop year projections. Weather for 1996 is assumed to be identical to the weather of 1982. Thus, the drought of 1983 affects 1997 yield projections and the 1988 drought decreases projections of yields for 2002. Individual crop tables are not shown, but corn yields, for example, fall below expected yields by 33.6 and 34.4 bushels per acre for the years 1996 and 2002, respectively. Over the full analysis, yield changes vary considerably by crop and region. While corn yields were largely down in 1997, wheat yields were above trend for that crop year. Cotton had yield decreases in 1997 and 2000, but was above trend for 2002.

Among other things, this study was undertaken to answer several fundamental questions:

1. How does weather uncertainty affect FAPRI baseline values, especially key aggregates?
2. How do alternative programs compare in terms of volatility of prices to consumers, volatility of net farm income to producers, and volatility of program costs to the government?

Weather impacts under the baseline are compared in terms of average levels and variability of key aggregates (Table 1). Here standard deviation over the period is used as the measure of volatility. To illustrate results, baseline crop receipts are, on average, at higher levels with weather variability increasing from $97.61 billion to $98.95 billion. Crop receipt volatility is also slightly higher with variable weather as standard deviation increases to 6.88 from 5.48.

Table 1. Impacts of 1980s Weather on Baseline (Current Program) Projections that Assumed Average Weather.

	Average Weather		1980s Weather	
	Mean	Standard Deviation	Mean	Standard Deviation
	(Billion Dollars)			
Crop Receipts	97.61	5.48	98.95	6.88
Livestock Receipts	96.35	6.52	97.22	7.21
Feed Expense	24.07	1.09	25.24	2.85
Total Production Expenses	172.50	7.15	174.38	9.13
Net Farm Income	47.46	4.93	46.57	7.23
Net CCC Outlays	7.63	0.95	6.68	2.08
Total Food Expenditure	541.82	47.66	544.12	48.99
Meat Bundle Price	1.78	0.03	1.80	0.04

In general, for baseline comparison purposes (question one above), the results indicate that inclusion of weather variability tends to result in slightly higher prices on average and increased volatility. The largest percentage effect was to CCC expenditures as they were reduced by 12.5 percent on average and volatility nearly doubled. Weather variation provided slightly lower estimates of farm income with volatility, again measured by standard deviation, increasing by nearly 50 percent from 4.93 to 7.23. Interestingly, consumer food expenditures showed less than a 0.5 percent increase from weather variability with only a slight change in volatility as measured by standard deviation.

Table 2. Impacts of 1980s Weather on Key Aggregates Under Alternative Policies.

	Net Farm Income		CCC Outlays		Consumer Expenditure	
	High	Low	High	Low	High	Low
	(Billion Dollars)					
Current Programs	57.52	33.10	9.32	3.39	624	472
Marketing Loan	55.20	31.44	10.52	2.82	622	472
Revenue Assurance	56.25	34.40	7.48	1.80	623	472
transition payments			5.06	0.00		
revenue assurance			1.50	1.28		
export programs			0.92	0.52		
No Program	54.40	27.40	3.49	0.08	622	470

In comparing the volatility of key aggregate variables across alternative farm programs, Table 2 shows that the high and low values for consumer expenditures were quite similar over the ten-year projection period. As expected, continuation of current programs showed the highest farm income with the NP scenario having the lowest levels of income. Extremes in farm income

(the range between the high and low values) were lowest under RA and largest under NP. The range of CCC expenditures was largest under ML, implying that if certainty of federal budget exposure is important, this ML option does not perform well. CCC outlays under RA are separated into these categories, since transition payments and export subsidies are on a fixed and declining schedule. The cost of the revenue assurance indemnities, however, do vary from year to year; but the variation over this period is less than $250 million.

A general conclusion of this study is that if consumer price stability is one of the objectives of farm programs, then the current program structure is not contributing significantly to this goal. The inclusion of weather variability showed little difference between the current programs and that of other scenarios in consumer expenditure variation analyzed. The results also indicate only a slight reduction in net farm income volatility due to changes in policy structure. Differences between high and low values varied only slightly across current programs, ML, and RA, although it was significantly larger under NP. While this study compares only a few options, it indicates that there are other program designs that perform as well or better in stabilizing net farm income and consumer expenditures.

How Revenue Assurance and Yield Insurance Stack Up: A Cost Comparison

(Chad E. Hart, 515/294-6307)
(Darnell B. Smith, 515/294-1184)

What percentage of expected revenue would be assured to agricultural producers if government yield insurance was transformed into a revenue assurance type of safety net program? Recent interest in a potential dual federal crop insurance program that would offer producers the option of yield or revenue insurance at the same level of U.S. government subsidy prompts this question. Here, we illustrate what level of revenue insurance coverage might be obtained given a fixed amount of government expenditure. We have assumed that average U.S. Federal Crop Insurance totals $0.5 billion per year — the formulation of this dollar amount is described later. We then estimate the level of revenue insurance obtainable with the given expenditure level. The reader is forewarned that several assumptions are crucial to the estimates provided below.

Estimating Revenue Assurance Costs

For the FAPRI Weather scenario presented in the previous article, the shocks are induced into the weather variables which in turn affect yields and other explanatory variables used in the FAPRI system. Because detailed weather information is not readily available at the state level, translation of the shocks from the USDA cost of production regional level to the state level is performed using yield deviations. Revenue per acre is computed as the product of farm price and yield for each state.

In the Average Weather Revenue Assurance scenario, gross revenue is taken to be normally distributed and non-negative. Cost of revenue assurance per acre for each state and crop combination is estimated by evaluating the probability of realized revenue falling below a threshold proportion of expected revenue. This fixed cost per acre is then multiplied by acres planted by state to derive an aggregate U.S. cost.

For the Variable Weather Revenue Assurance scenario, the cost is estimated in each simulation year using the average of the previous five years of revenues as the mean revenue. Thus, revenue assurance costs per acre for each state and crop combination are updated in each simulation year in the Weather scenario.

Comparing Revenue Assurance/Yield Insurance Costs

Average historical crop insurance costs for each crop, and in total for 1989-1994, are computed as the total of the average government total premium subsidy, average excess loss, and a 30 percent reimbursement of average total premiums to private insurers over the time period. The sums of these cost estimates are used as the benchmark government funding amounts assumed for yield insurance. As a result, they can then be used for the revenue assurance comparison.

Given these figures, the percentage of revenue that could be ensured is varied to equate the average payout with Revenue Assurance under the Weather scenario for 1996-2003 to the average crop insurance costs for 1989-1994 by crop and in total. Preliminary results are given in Table 1. With the 1994 Federal Crop Insurance reform that replaced disaster payments with low catastrophic coverage, this is likely to be a conservative estimate of future yield insurance cost. The following notes list estimation caveats:

- FCIC overhead and administration costs are not included in the average crop insurance cost estimates.

- Revenue assurance covers many more acres than were covered by crop insurance from 1989-94.
- The revenue assurance figures do not include any administration or private insurer reimbursement costs since administration costs are not included in the crop insurance cost estimates and the role and reimbursement of private insurers under a revenue assurance plan have not been communicated to us.
- Reimbursement to private insurers is roughly approximated in this analysis at 30 percent of total premiums.
- All excess losses (i.e., losses over and above total premiums) are assumed to be paid for by the government.

Table 1. Average Crop Insurance, Average Revenue Assured, and Average Payouts under the Weather Scenario from 1996-2003.

Crop	Average Crop Insurance Costs 1989-1994	Average Percentage of Revenue Assured under the Revenue Assurance Program for the same cost under the Weather Scenario 1996-2003	Average Payouts under 70 Percent Revenue Assurance under the Weather Scenario 1996-2003
	(Million)	(Percent)	(Million)
Barley	$ 11.31	61.0	$ 18.98
Corn	$ 134.43	53.9	$ 470.44
Upland Cotton	$ 110.40	53.2	$ 240.28
Oats	$ 5.91	40.5	$ 21.81
Rice	$ 9.74	61.0	$ 19.43
Grain Sorghum	$ 23.06	54.1	$ 58.22
Soybeans	$ 62.47	59.0	$ 170.77
Wheat	$ 152.57	52.3	$ 393.96
Total	$ 509.89	54.3	$1,393.89

Results

Given the assumptions on average yield insurance costs shown in Table 1, the proportion of average expected revenue that could be ensured for the same government cost varies from 40.5 percent for oats to 61 percent for barley and rice.

If all crops are ensured at the same percentage level, and with the assumed average total crop insurance costs of $510 million, 54.3 percent of average expected revenue could be assured for the same cost. The 54.3 percent lies between the 30 percent of revenue covered with current Catastrophic Coverage and the 70 percent that was assumed in FAPRI Revenue Assurance analysis. Our previous work estimated a government cost for 70 percent Revenue Assurance of $1.4 billion. The results above are preliminary in nature; however, they provide a rough guide as to how yield insurance costs compare to revenue assurance costs.

Farm Freedom or Freedom to Farm?

(William H. Meyers, 515/294-1184)
(Darnell B. Smith, 515/294-1184)
(Steven L. Elmore, 515/294-6175)

Two proposals have surfaced in the U.S. House of Representatives with similar names but very different implications. The "Farm Freedom Act of 1995," introduced by urban members as H.R. 2010, is essentially a phase-out of current programs over five years. It reduces target prices to 4 percent below the preceding year's "established price" from 1997 to 2000, eliminates payments to persons with more than $100,000 in adjusted gross income from nonfarm and nonforestry sources, and eliminates target prices and acreage reduction programs in 2001. It places a cap on the total deficiency payment outlays to cut projected expenditures by $786.7 million in FY 1996, $1.96 billion in FY 1997, $3.26 billion in FY 1998, $4.15 billion in FY 1999, $5.14 billion in FY 2000. This cuts farm program outlays by about $15.3 billion over five years.

The "Freedom to Farm Act of 1995" is not yet a formal bill, but is taking shape among majority members of the House Agricultural Committee. It would eliminate target prices and acreage reduction programs in 1996 and institute decoupled direct payments to replace deficiency payments. The level of these payments would be cut proportionally to achieve outlay reductions of $8.4 billion by FY 2000 and $13.4 by FY 2002. This proposal would retain the 9-month nonrecourse loan program with lower loan rates and continue the EEP program.

The two proposals will impact Iowa differently. While formal analysis is not yet completed, an indication of government payments to Iowa can be estimated by assuming that the payments are set in proportion to the deficiency payments received over the last five years.

Non-CRP government payments to Iowa farms proportionate to aggregate budgeted expenditures under the two proposals and a baseline projection:

Year	Farm Freedom*	Freedom to Farm	Baseline
	(million dollars)		
1996	$ 522	$ 524	$ 593
1997	$ 497	$ 556	$ 710
1998	$ 385	$ 567	$ 727
1999	$ 266	$ 514	$ 666
2000	$ 150	$ 499	$ 651
2001	$ 0	$ 402	$ 601
2002	$ 0	$ 383	$ 577
Total	$ 1,821	$3,445	$4,525

** Farm Freedom is based on a target price concept, but it places a cap on the payments. The cap is what is reported above.*

Special Articles

Conservation Tillage and Farm Programs

(Continued from page 1)

Soil erosion benefits attributable to conservation tillage are significant. However, the economic benefits of conservation tillage have not been conclusively determined for all crops. Adoption of conservation tillage typically involves some substitution of herbicides for mechanical weed control. The reluctance of some farmers to adopt conservation tillage is believed by some analysts to be due to the lack of adequate information regarding its economic benefits.

Evidence about the extent to which conservation compliance has influenced the adoption of conservation practices is also inconclusive at best. It is in this context that CARD researchers in the Resource and Environmental Policy Division conducted a farm-level study of the relationship between adoption of conservation tillage practices and participation in government programs. The study is CARD Working Paper 95-WP 136, "Program Participation and Farm-Level Adoption of Conservation Tillage: Estimates from a Multinomial Logit Model" by Bruce A. Babcock, Nabil M. Chaherli, and P. G. Lakshminarayan. The central question addressed in the study is: if future farm program benefits are not tied to conservation practices, will there be a significant decline in the use of conservation tillage?

Features of the Model

The study considers tillage adoption as a choice by farmers from among three types of tillage practices: conventional till, reduced till, and no-till. The three tillage systems are defined by the amount of crop residue left on the field. Conventional tillage is any system that leaves zero to 30 percent residue in the field, reduced tillage leaves 30 percent to 70 percent residue, and no-till leaves more than 70 percent residue. Farmers' observed choice of tillage practice is related to the crop they grow, whether they rotate crops, whether they participate in government commodity programs, and whether they farm on soil that has been classified as highly erodible. The statistical technique used to establish the relationship is known as "multinomial logit."

The data used in the study is taken from the Cropping Practices Survey, an annual USDA survey of farmers that collects information on production practices and behavioral practices such as program participation. Data is used for corn and wheat in the major producing states from 1990 to 1994. These two program crops accounted for between 70 and 80 percent of government payments over this period. Fully 75 percent of the corn and wheat conservation compliance plans emphasize residue management.

Table 1 reports the fraction of sampled corn and wheat fields under each of the tillage systems as well as the fraction that was enrolled in the commodity program, the fraction that was under crop rotation system, and the fraction that was classified as being highly erodible. Use of conservation tillage (reduced-till and no-till) is much more widespread on corn (37 percent of sampled corn fields vs. 19 percent of wheat fields). Both corn and wheat farmers enrolled a high percentage of their fields in the government commodity programs. About 60 percent of sampled corn fields were in a corn-soybean rotation, and 56 percent of wheat fields were in a wheat-fallow rotation. And wheat was more likely than corn to be grown on a field classified as being highly erodible. Wheat is generally considered to be less erosive than corn, which perhaps explains why the frequency of planting wheat on highly erodible fields is higher than for corn.

Table 1. Summary of 1990-94 data*

Tillage System	**Corn**	**Wheat**
Conventional till	.63	.81
Reduced-till	.23	.14
No-till	.14	.05
Other Variables		
Program participation	.81	.90
Crop rotation	.60	.56
Highly erodible land	.20	.34

*Fraction of sampled fields

Estimation Results

Insight into the determinants of tillage adoption can be obtained by estimating the relationship between adoption decisions and the factors that affect adoption. To determine this relationship, we estimate how crop rotation, participation in commodity programs, and a field's soil erosion potential affect a farmer's tillage adoption choice. In addition, a time trend is included to capture possible "demonstration effects" that may increase the probability that a nonadopter of a technology adopts in a given year, independently of the other explanatory variables. The demonstration effect can be an important factor influencing adoption decisions because a new technology's feasibility is increasingly demonstrated as adoption rates increase over time.

Table 2. Factors that Affect Adoption of Tillage Practices on Corn and Wheat Fields

Variable	Conventional Tillage	Reduced Tillage	No-till
	Change in percentage of adopting		
Corn Fields			
Program participant	-10.3	9.5	0.8
Crop is rotated	7.0	-15.0	8.0
Field is highly erodible	-12.4	0.5	11.9
Time trend	-5.3	2.8	2.5
Wheat Fields			
Program participant	2.4	0.2	-2.6
Crop is rotated	-6.0	1.2	4.7
Field is highly erodible	-5.5	4.5	1.0
Time trend	0.3	-1.0	0.8

How each of these factors influence farmers' adoption decisions is shown in Table 2. The reported results are the estimated difference in the likelihood of adopting a particular tillage practice between (a) a participant and a nonparticipant, (b) a field that is grown in rotation vs. one that is not, and (c) a field that is highly erodible vs. one that is not.

Effect of Program Participation
For corn, there does not seem to be any difference between participants' and nonparticipants' likelihood of adopting no-till. However, there is strong evidence that participation increases the likelihood of reduced-till adoption. The effect of participation is to increase the probability of using reduced tillage by about 9.5 percentage points. And participants in the corn program are about 10.3 percentage points less likely to use conventional tillage practices.

For wheat, program participation actually decreases the likelihood that a farmer adopts no-till. In addition, the results indicate that program participation has essentially no effect on reduced-till adoption.

Effect of Crop Rotation
For both corn and wheat, farmers who rotate crops are more likely to adopt no-till than those who plant corn and wheat continuously. And crop rotation on corn is also associated with increased use of conventional till. But planting corn in a corn-soybean rotation is not likely to be associated with a reduced-till system. These results support the notion that no-till tends to yield the best results when a corn-following-soybeans rotation is adopted and that reduced tillage works best with continuous corn.

Planting continuous wheat is likely to be associated with conventional tillage and a wheat-fallow rotation tends to encourage the use of no-till.

Effect of Highly Erodible Fields
The results in Table 2 indicate that corn and wheat farmers who grow crops on highly erodible fields are more likely to adopt reduced-till and no-till than those farmers who do not. The effect is especially pronounced for corn. A separate set of unreported results demonstrates that this result holds even for nonparticipating farmers who are not subject to conservation compliance provisions. In other words, our research suggests that farmers are not looking primarily to the government to tell them how to farm. Rather they are looking at their own farming situation to determine the most appropriate farming practices to adopt.

Farm Policy Implications

The central issue facing Congress is the extent to which use of soil-saving tillage practices would be reduced if commodity programs were eliminated or made significantly less attractive. As shown in Table 2, participating farmers in the corn program were significantly more likely to adopt reduced tillage practices between 1990 and 1994 than nonparticipants. But program participation had little, if any, impact on adoption of no-till. Furthermore, a separate set of results not reported here suggests that the effect of program participation is the same whether or not highly erodible fields were being cropped. Thus our results suggest that any reductions in soil erosion from conservation compliance are due to an increase in adoption of reduced tillage by program participants. With regard to increases in adoption of no-till corn, these increases cannot be attributed to conservation compliance. Rather it appears that farmers have increased no-till use because of its direct benefits. Thus, we conclude that increased erosion on corn fields from elimination of conservation compliance would result only from decreased use of reduced-till in the production of corn.

The story is different for wheat farmers. From 1990 to 1994, wheat farmers who participated in commodity programs were actually less likely to have adopted soil-saving tillage practices. Conservation tillage practices on wheat farms are not beneficial unless farmers rotate wheat with fallow. These results suggest that wheat farmers who adopted conservation tillage to satisfy conservation compliance after the 1990-94 period would be less likely than corn farmers to revert to conventional tillage if commodity programs were eliminated.

Our results also imply that because most wheat farmers do not find either no-till or reduced-till profitable, the cost of conservation compliance plans that include conservation tillage might be quite high.

In summary, there is some evidence that there would be a significant decline in reduced-till on corn if farm program benefits are reduced. There is no evidence, however, that adoption rates for no-till would be similarly affected. For wheat, the results imply that conservation tillage practices are costly and not widely used. However, there is some evidence that program participation actually reduces adoption of no-till by a small amount in favor of conventional till. This result would indicate that elimination of government programs would increase adoption of no-till on wheat. And, for both corn and wheat, if program modifications include increased planting flexibility, then no-till adoption should increase as farmers move away from continuous corn and continuous wheat.

CARD researchers continue to explore the factors that influence tillage adoption. The analysis reported in this article is being extended to look at how geographic differences affect the results. Preliminary findings indicate that there may be significant differences in adoption patterns across production regions. These early results indicate that the costs and benefits of complying with conservation compliance provisions may vary significantly across production regions.

Emerging Issues

Income Support or Subsidized Risk Management? Two Agricultural Policy Approaches

(Bruce A. Babcock, 515/294-5764)

As Congress prepares to adopt a new set of agricultural commodity programs, farmers are debating among themselves about the proper role of government in agriculture. Fundamental questions include:

- Should government be in the business of supporting farmers' incomes?
- Should government be restricted to supporting income only when times are rough, providing an income "safety net?"
- Or should the U.S. government limit its involvement in agriculture to facilitating private provision of risk management tools?

These issues have come to the forefront because a group of Iowa farmers has proposed scrapping the current loan rates and deficiency payments in favor of revenue assurance, which would pay farmers only when revenue falls below a predefined threshold, whether triggered by low yields, low prices, or a combination of the two.

The premise of the Iowa group is that current government programs are set up largely to transfer income to farmers and that government programs should reduce risk, not increase income. Opponents of revenue assurance claim that the current set of programs provides an efficient set of risk management tools, so why should they be replaced by a new, untested program? A better understanding of what actually characterizes an income support program relative to a risk management program should help clarify the issues surrounding this debate.

Risk Management vs. Income Support

As all farmers know, farming is quite risky. Crops are subject to the whims of nature, and prices are subject to both supply shocks, such as drought and flood, as well as demand shocks, such as a change in trade policy. Most farmers invest heavily in establishing their crop before the outcome of the demand and supply shocks are known. The risk that matters to these farmers is that the eventual returns from the market may not cover expenses. A risk management program is one that helps farmers cope with this risk by providing payments when market revenue is low. Examples of risk management tools include crop insurance that pays out when yields are low, an option on a futures contract that pays off when price is low, and revenue insurance that pays off when market revenue is low.

- The transfer of wealth to farmers is the central objective of an income support program. That is, payments under a pure income support policy arrive even when farmers are not under financial stress. Probably the best example of an income support policy is the deficiency payment program as it was run in the mid-1980s. For most program crops, the target price was set well above the market price so that payments were made even when market price was higher than average. In addition, the number of bushels on which deficiency payments were made was fixed at a farm's program yield. As a result farmers received large deficiency payments even in years when prices and yields were better than average.

Improved timing of government payments so that they are received when farmers need them most, could greatly improve the efficiency with which commodity

programs are run. That is, there is room for increasing the value to farmers of agricultural support at the same or lower cost to the U.S. taxpayer.

Willingness to Pay for Program Payments

The value a farmer places on the benefits from participating in a government program is an important factor determining the efficiency with which the program is run. A measure of this value is the amount a farmer would be willing to pay every year to qualify for an average program payout of one dollar. That is, the "program premium" is the amount a farmer is willing to pay to receive a one-dollar expected indemnity from the program. The actual forms of the producer's "payment" for benefits received under current programs are additional costs to satisfy Conservation Compliance, lost income because of acreage set-asides, and less than optimal planting decisions made to preserve or build base acres.

The program premium for a pure income support program may be close to one dollar for most producers. There are few additional benefits from a program that pays off to all farmers regardless of their financial circumstances.

The benefits of risk management programs, on the other hand, are most valued by those farmers least able to withstand the consequences of poor market years. Such farmers place a higher value on a program that pays off only in bad years than do producers who have better financial resources. The program premium for vulnerable producers may be substantially greater than one dollar, whereas the premium would be close to one dollar for more fortunate producers who can survive a season of significant revenue loss. Put another way, those producers who are more averse to risk would be willing to pay more than a dollar for an average payment of one dollar if payments arrive when the farm is experiencing financial distress.

The willingness to pay more than a dollar premium for a dollar of indemnity is the primary reason why there is an insurance industry. The difference between the insurance premium and the expected indemnity is the source of profits to the industry.

Current Farm Program Characteristics

Current farm programs have both risk management and income transfer characteristics. Deficiency payments are still largely an income support program because payments often come when market returns are adequate. But there is a risk management aspect to deficiency payments as well. When price is low, the per-bushel payment rate—the difference between the target price and the market price—goes up, thereby offsetting the negative consequences of low prices. But often price is low because yields are high, and farmers are not financially stressed. Thus, the risk management attributes of the deficiency payment program are limited.

The loan rate program acts largely as a price insurance program. Producers are guaranteed a price at least equal to the loan rate regardless of how low market prices fall. Thus the program premium for the loan rate program is likely to be more than one dollar for many producers. But there are some drawbacks to relying solely on the loan rate program as a risk management tool. First, a farmer must have a crop to put under loan in order to benefit from the program. That is, the loan rate program does not insure against yield risk. Second, the loan rate program may be used by farmers with bumper crops who are under not financial stress.

The first weakness of the loan rate program can be fixed by purchasing federal crop insurance, another federally subsidized risk management program. When combined with the loan rate program, farmers who purchase crop insurance and who participate in commodity programs have some degree of protection against low prices and low yields. For some producers, this combination can be a very cost-effective management strategy against poor market returns.

Opponents of revenue assurance argue that the combination of price and crop insurance provides all the risk management tools that farmers need. Why eliminate a program that provides good risk management benefits in addition to the income support benefits of the deficiency payment program?

One argument against maintaining the current structure of commodity programs is that future budget levels will likely not be adequate to maintain both income support and risk management programs. If the primary goal of federal intervention in agriculture is to provide risk management benefits, then jettisoning the deficiency payment program will free up enough funds to adequately fund risk management programs.

Proponents of revenue assurance maintain that their program is the purest and most efficient risk management program that can exist because it pays off only when revenue (the product of price and yield) is low. And the primary beneficiaries of revenue assurance will be those producers who are under the greatest financial stress. But how much more efficient can

revenue assurance be in providing risk management benefits than a combination of price and yield insurance?

Results from a recent study conducted by the author demonstrate that for between 10 and 20 percent less money, revenue assurance can provide the same level of farmer benefits as a combination of price and yield insurance. The efficiency gains arise because the combination of crop insurance and price insurance may pay off even when a farmer is not in dire need of funds. The unneeded payoffs come about either because crop insurance pays off when prices are extraordinarily high, or price insurance pays off when yields are extraordinarily high. Revenue assurance only pays off in years in which the product of price and yield is low.

As public support for farm programs dwindles, farmers are faced with the difficult task of deciding which program alternative is the most desirable. Should they lobby for a continuation of current programs that both support income and provide risk management benefits, or should they lobby for a well-funded program that focuses only on risk management? It is beneficial for both sides in the policy debate to understand who the primary beneficiaries are for both types of programs and the source of those benefits.

Fall Ag Policy Conference to Focus on the Livestock Industry

Participants at CARD's 1995 Fall Agricultural Policy Conference will hear farmers, industry executives, economists, and legal experts explore all aspects of the livestock industry and its impact on rural areas. "Changes and Choices for Agriculture and Rural Communities," to be held December 13, 1995, at Kirkwood Community College in Cedar Rapids, Iowa, will feature 20-minute presentations by 11 different speakers with divergent perspectives.

Neil Hamilton, director of Drake University's Law Center, opens the day with a session on "Agricultural Production and Environmental Policy." He is followed by Ray Bjornson, Director of Pork Operations for Hormel Foods Corporation, speaking on "Developing New Uses for Agricultural Products." Tom Stein, president of Knowledgeworks, a Minneapolis-based livestock technology software company, and radio commentator, will predict "The Future of Livestock Production and Management Control Systems." David Johnson, director of product research for Des Moines' Meredith Corporation, will offer some insights on "Consumer Trends: Implications for the Agricultural Processing Industry."

Varel Bailey, farm owner and operator and legislative aide to Representative Greg Ganske, will discuss "The Role of Government in Agriculture." Another farm owner and livestock producer, Marlyn Jorgensen, tackles the topic of "Community Entrepreneurship."

Mike Duffy, a well-known Iowa State University Extension economist and associate director of the Leopold Center for Sustainable Agriculture, will share some of the recent findings on "Beginning Farmers: Who Will Farm the Land?" "The Quality of Life in Rural Communities" is the subject of the presentation from Cornelia Butler Flora, director of the North Central Regional Center for Rural Development.

Two CARD staff members will participate in the program. Dermot J. Hayes, head of the Trade and Agricultural Policy division and expert on meat export issues, will address the issue of "Global Market Forces." CARD's director, Stanley R. Johnson, is slated to discuss "Large-Scale Landscape Management: New Approaches to Rural Development."

The registration fee for the conference is $35 before December 6 and $40 after December 6. Advance registration is recommended. The fee includes the day's sessions, meal and refreshment breaks, and a packet of materials. The event begins at 8:30 am and runs until 4:15 pm with two breaks and a noon luncheon.

If you would like more information on the conference, call Judith Pim at 515/294-6257. For registration information, call Cheryl Achey at Kirkwood Community College, 319/398-4944.

Meet The Staff

Darnell B. Smith, managing director of FAPRI at Iowa State, came to CARD in January 1993 from the University of Nebraska. A native of the Kearney, Nebraska, area, Darnell taught courses at both the University of Nebraska's Lincoln and Kearney campuses and worked on the Rural Policy Research Institute's Nebraska project in Lincoln. His experience as an analyst of Nebraska's economy and business trends while on the staff at Nebraska's Bureau of Business Research helped prepare him for the rigors of administering the day-to-day operations at FAPRI.

Darnell Smith

In addition to staying on top of the constant flow of information at FAPRI, Darnell's job is to make sure that FAPRI's models stay on the cutting edge of new theory and technology. He also oversees the networking with the FAPRI unit at the University of Missouri-Columbia, as staffers work toward faster transmission not only of data, but also of models and analysis. Analysts can now access centrally managed databases, create specialized databases for analytic model development, and store results of analysis for publication use in a central location—all without ever leaving their personal computers. According to Darnell, this capability has allowed full respecification of the international oilseed and dairy models with other livestock and crops models presently being restructured and updated. As he puts it, "The data management work is tedious, but we are finding efficiency gains to be dramatic."

No stranger to the challenges of modern agriculture, Darnell grew up on a 600-acre farm in central Nebraska ("near the bend in the Platte River"). He describes it as the ultimate in diversified farming, producing corn, soybeans, sorghum, hogs, sheep, and cattle. His rural background makes him well aware of policy impacts at the farm level. Darnell is currently heavily involved in directing the analysis FAPRI is providing to lawmakers and commodity groups on the legislative policy options that will carry American agriculture into the next century.

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Contact Betty Hempe for a free subscription, publication information, and address changes, at
Iowa Ag Review, CARD Publications, Iowa State University, 578 Heady Hall, Ames, IA 50011-1070;
Phone 515-294-7519, Fax 515-294-6336, e-mail CARD@card.iastate.edu, WWW http://www.ag.iastate.edu/card