PURDUE AGRICULTURAL ECONOMICS REPORT

SEPTEMBER 1998

Land Values Continue Rise

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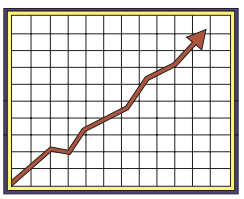
The 1998 Purdue Land Values survey indicates that the value of an acre of average bare Indiana cropland was $2,155 per acre in June 1998, $55 more than the all-time peak reached in 1981. This is an increase of $158 per acre, or approximately 8 percent, over the value reported in 1997. In each of the past five years, annual increases in the value of this land have ranged from about $100 to over $200 per acre, resulting in an increase of 65 percent for the five-year period. Cash rents rose from 1997 to 1998 on average land by a little less than 2 percent to $112 per acre. While rents continued to move upward setting new highs, the rate of increase was significantly less than the 6-percent increase reported in 1997. The increase in cash rents for the past five years has been only 26 percent, in contrast to the 65-percent increase in average land values.

Statewide Land Values

For the six months ending in June 1998, the value of bare tillable land was reported to have increased 1.9 percent on top land, 2.2 percent on average land, and 2.3 percent on poor land (Table 1). While land values for all three types of land moved higher, the rates of increase were much less than the rate of increase reported for this same period in 1997. Slightly more than half of the respondents, 52 percent, reported that some or all classes of land went up from December 1997 to June 1998, whereas 68 percent of respondents reported an increase last year. Thirteen percent of the respondents indicated that some or all classes of land fell in value during that same six-month period, compared to 3.9 percent of the respondents the previous year.

The statewide 12 month increase in the value of average land from June 1997 to June 1998 was 7.9 percent (Table 1). Top quality land (151 bushel corn yield rating) was estimated to have increased by $166 per acre, to $2,715 (Table 1). Average land (123 bushel corn yield rating) was valued at $2,155 (up $158), while poor land (95 bushel corn yield rating) was estimated to be worth $1,632 per acre, up 9.3 percent for the year. All three classes of land values were above their 1981 peak.



The land value per bushel of corn yield rating also increased this year, but at much lower rates than reported last year. For top quality land, value per bushel of yield was $18.02, up by 5.7 percent. Average quality land value was $17.59 per bushel, while the poor quality value was $17.12 per bushel. (Table 1). The percentage increases were 7.5 percent on average land and 8.1 percent on poor land. These per-bushel figures were $0.97 higher than last year on top land, $1.23 higher on average land, and $1.29 higher on poor land.

The value of transition land moving into non-farm uses increased 7.1 percent in the 6-month period ending in June, to $6,149 per acre. On a year-to-year basis, the averages

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* *J.H. ("Jake") Atkinson has formally retired from the Department of Agricultural Economics. Jake expresses his personal appreciation to the respondents who make this report possible, especially to those who respond year after year. Refer your questions arising from this article, and those concerning future surveys to Craig Dobbins.*

Table 1. Average estimated Indiana land value per acre (tillable, bare land) and per bushel of corn yield, percentage change by geographic area and land class, selected time periods, Purdue Land Values Survey, June 1998.

Area	Land Class	Corn bu/A	Land Value: Dollars Per Acre: June 1997 $/A	Dec. 1997 $/A	June 1998 $/A	Land Value: % Change: 6/97-6/98 %	12/97-6/98 %	Land Value/Bu: $ Amount 1997 $	$ Amount 1998 $	% Change 6/97-6/98 %	Projected Land Value: Dec. 1998 $	% Change 6/98-12/97 %
North	Top	154	2,494	2,532	2,533	1.6%	0.0%	16.35	16.47	0.7%	2,557	0.9%
	Average	120	1,788	1,875	1,893	5.9%	1.0%	14.91	15.71	5.4%	1,881	-0.6%
	Poor	90	1,261	1,351	1,375	9.0%	1.8%	14.18	15.32	8.0%	1,383	0.6%
Northeast	Top	144	2,428	2,548	2,602	7.2%	2.1%	16.70	18.08	8.3%	2,559	-1.7%
	Average	120	1,887	1,980	1,996	5.8%	0.8%	15.62	16.67	6.7%	1,961	-1.8%
	Poor	94	1,403	1,507	1,522	8.5%	1.0%	15.21	16.26	6.9%	1,492	-2.0%
W. Central	Top	155	2,821	2,896	2,939	4.2%	1.5%	18.07	19.00	5.1%	2,901	-1.3%
	Average	127	2,307	2,404	2,432	5.4%	1.2%	17.85	19.20	7.6%	2,405	-1.1%
	Poor	100	1,726	1,793	1,824	5.7%	1.7%	17.26	18.27	5.9%	1,803	-1.2%
Central	Top	156	2,886	2,962	3,026	4.9%	2.2%	18.60	19.44	4.5%	3,006	-0.7%
	Average	129	2,354	2,449	2,529	7.4%	3.3%	18.28	19.65	7.5%	2,503	-1.0%
	Poor	104	1,821	1,920	1,963	7.8%	2.2%	17.78	18.91	6.4%	1,968	0.3%
Southwest	Top	156	2,384	2,632	2,646	11.0%	0.5%	16.00	17.01	6.3%	2,646	0.0%
	Average	123	1,754	1,899	1,935	10.3%	1.9%	14.82	15.79	6.5%	1,953	0.9%
	Poor	91	1,214	1,301	1,332	9.7%	2.4%	13.40	14.62	9.1%	1,324	-0.6%
Southeast	Top	136	2,024	2,053	2,183	7.9%	6.3%	15.07	16.06	6.6%	2,248	3.0%
	Average	111	1,595	1,664	1,781	11.7%	7.0%	14.59	16.05	10.0%	1,831	2.8%
	Poor	87	1,295	1,355	1,461	12.8%	7.8%	15.10	16.85	11.6%	1,514	3.6%
Indiana	Top	151	2,549	2,665	2,715	6.5%	1.9%	17.05	18.02	5.7%	2,707	-0.3%
	Average	123	1,997	2,109	2,155	7.9%	2.2%	16.36	17.59	7.5%	2,146	-0.4%
	Poor	95	1,493	1,595	1,632	9.3%	2.3%	15.83	17.12	8.1%	1,633	0.1%
	Trans.[1]		5,764	5,743	6,149	6.7%	7.1%				6,219	1.1%

1 *Land moving out of agriculture*

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show a 6.7-percent increase (Table 1); however, due to the wide variation in estimates (from $1,625 to $25,000 in June, 1998), the median value may give a more meaningful picture than the arithmetic average. The median value of transition land in June, 1998 was $5,000 per acre, the same value as reported in June of 1997.The median value of individual home sites up to five acres was $5,000 per acre, the same as last year, and sites of 10 acres or more suitable for residential sub-divisions were valued at $4,500 per acre, up from $ 4,000 last year.

Statewide Rents

Cash rents increased statewide from 1997 to 1998 by $5 per acre on top land. Average and poor land increased by $2 per acre (Table 2). The estimated cash rent on average land was $112 per acre, $140 on top land, and $86 on poor land. Rent per bushel of estimated corn yield was $0.93 on top land and $0.91 on average and poor land, up five to six cents from last year. Cash rent on top land in 1998 exceeded by $3 the record 1981 level of $137 per acre. Average land exceeded the 1981 value of $106 per acre by $6, while rents on poor land exceeded by $8 the 1981 level of $78 per acre.

Statewide, cash rent as a percentage of estimated land value declined for the seventh consecutive year, to around 5.2 percent (Table 2). Greater increases in land values than in cash rents continue to cause these declines, but the percentages statewide were still slightly higher than the 5 percent levels of 1978-81.

Area Land Values

Increases in the value of farmland in the six different geographic areas of Indiana (Figure 1) from December 1997 to June 1998, ranged from 0.0 percent to 7.8 percent (Table 1). Nearly all areas reported a greater percentage increase for poor land than for top and average land. Only

the Northeast reported a larger increase in top land. The Central region reported the same increase for top and poor land, but a larger increase for average land.

For the year ending in June 1998, the greatest increase in top farmland was the Southwest (11.0 percent). The Southeast had the greatest increase in average and poor farmland, 11.7 percent on average land, and 12.8 percent on poor land. The Southwest also exhibited a fairly strong market, with double-digit increases for top and average land types. However, the Central, West Central, Northeast, and North regions, which saw double-digit increases for nearly all land qualities in 1997, had smaller increases this year.

The highest valued top quality land was again in the Central and West Central areas, around $3,000 per acre. The next highest values were in the Southwest ($2,646), Northeast ($2,602), and the North ($2,533). Reported values for average quality land were $2,529 in the Central and $2,432 in the West Central areas, but only around $1,700 to $2,000 in the other areas. Some of these area differences in values between land in the same productivity class are associated with differences in respondents' estimates of corn yield ratings. For example, average land in the Southeast had a corn yield rating of 111 bushels per acre and in the North, 120 bushels; however, the land values per bushel of corn yield estimates were about the same in both areas.

Land values per bushel of estimated average corn yield (land value divided by bushels) on top land were in the range of $18.00 to $19.50 for the Northeast, Central, and West Central regions (Table 1) and $16.00 to $17.00 for the Southeast, North, and Southwest. Land values per bushel declined as land quality (corn yield estimates) declined in all areas except the West Central, Central, and Southeast.

Respondents were asked to estimate rural home sites that had no accessible gas line or city utilities and were located on a black top or well maintained gravel road. The median value for five-acre home sites was $5,000 in all areas. For the Northeast, Southwest, and Southeast areas, there was an increase in the median value. For the other regions, there was no change from values reported last year. Estimated per-acre median values of the larger tracts (10 acres) ranged from $4,000 to $5,000, except for the $3,000 estimate in the Southeast.

Shown in Table 3 are median values for home sites under five acres and 10 acres or more, in 1996, 1997, and 1998.

Table 2. Average estimated Indiana cash rent per acre (tillable, bare land) 1997 and 1998, Purdue Land Value Survey, June 1998.

Area	Land Class	Corn bu/A	Rent/Acre 1997 $/A	Rent/Acre 1998 $/A	Change '97-'98 %	Rent/bu. of Corn 1997 $/bu.	Rent/bu. of Corn 1998 $/bu.	Rent as % of June Land Value 1997 %	Rent as % of June Land Value 1998 %
North	Top	154	139	138	-0.07%	0.89	0.90	5.6	5.4
	Average	120	107	107	0.0%	0.87	0.89	6.0	5.7
	Poor	90	78	79	1.3%	0.86	0.88	6.2	5.7
Northeast	Top	144	124	132	6.5%	0.80	0.92	5.1	5.1
	Average	120	102	102	0.0%	0.81	0.85	5.4	5.1
	Poor	94	78	80	2.6%	0.77	0.85	5.6	5.3
W. Central	Top	155	152	154	1.3%	0.92	0.99	5.4	5.2
	Average	127	129	126	-2.3%	0.94	0.99	5.6	5.2
	Poor	100	101	101	0.0%	0.96	1.01	5.9	5.5
Central	Top	156	152	151	-0.7%	0.93	0.97	5.3	5.0
	Average	129	125	125	0.0%	0.92	0.97	5.3	4.9
	Poor	104	99	98	-1.0%	0.92	0.94	5.4	5.0
Southwest	Top	156	130	138	6.2%	0.82	0.88	5.5	5.2
	Average	122	98	107	9.2%	0.80	0.88	5.6	5.5
	Poor	91	69	75	8.7%	0.80	0.82	5.7	5.6
Southeast	Top	136	102	109	6.9%	0.74	0.80	5.0	5.0
	Average	111	80	89	11.3%	0.70	0.80	5.0	5.0
	Poor	87	61	70	14.8%	0.67	0.80	4.7	4.8
Indiana	Top	151	135	140	3.7%	0.87	0.93	5.3	5.2
	Average	123	110	112	1.8%	0.86	0.91	5.5	5.2
	Poor	95	84	86	2.4%	0.86	0.91	5.6	5.3

Area Cash Rents

Cash rents for top land increased by $7 - $8 per acre in the Southeast, Southwest, and Northeast areas, $2 in West Central Indiana, with a slight decline ($1) reported for the Central and North areas (Table 2). Last year cash rents increased in all areas and for all three productivity classes except for poor land in the Southwest. This year the North, Northeastern, West Central, and

Table 3. Median estimated Indiana land values for small and large rural homesites 1996-1998, Purdue Land Values Surveys.

Area	Median Value: Under 5 Acres 1996 $/A	Under 5 Acres 1997 $/A	Under 5 Acres 1998 $/A	10 Acres & Over 1996 $/A	10 Acres & Over 1997 $/A	10 Acres & Over 1998 $/A
North	4,000	5,000	5,000	4,000	4,250	4,000
Northeast	4,000	4,250	5,000	4,000	4,000	4,000
West Central	4,000	5,000	5,000	4,000	5,000	4,700
Central	5,000	5,000	5,000	5,000	4,500	5,000
Southwest	4,000	4,250	5,000	4,100	5,000	4,500
Southeast	4,000	4,000	5,000	3,000	3,500	3,000

Central regions reported a mixture of small increases, and in some cases, small declines or no change in rental values across productivity classes. The one exception was the $8 increase for top land noted in the Northeast region. The Southeast and Southwest regions reported increases of $6 to $9 per acre (Table 2). The highest percentage increase was for poor land in the Southeast (14.8 percent).

Cash rents were again highest in the West Central and Central areas, at $154 and $151 per acre, respectively, for top land, and $126 and $125 per acre, respectively, for average land. Cash rents of around $1.00 per bushel were also highest in these areas. The per-bushel rent for top land was 92¢ in the Northeast, 90¢ in the North, 88¢ in the Southwest, and 80¢ in the Southeast. In all areas except the Northeast and Southwest, rates per bushel within areas varied by 2¢ or less by land quality.

Except for poor quality land in the Southeast, cash rent as a percentage of land value declined or remained the same for all land classes. This rate on top and average land was in the range of 4.8 percent to 5.7 percent in all areas.

Respondents' Outlook

Respondents continued to be less optimistic about further price increases for the year ahead. Last year, 54 percent of the survey respondents expected some or all classes of land to increase over the next 12 months, but that figure dropped to 28 percent this year. Last year 6 percent of the respondents expected a decline in values. This year, this increased to 26 percent. About 39 percent expect no change in the year ahead, compared to 38 percent last year.

Respondents were also asked about their expectation of land value changes over the next six months. Decreases were expected in the Northeast, West Central, and Central areas. Expected land value increases in other areas, except for the Southeast, were under 1 percent (Table 1). The expected change in land values over the next six months for the Southeast ranged from 2.8 to 3.6 percent. These projections in the past have been in the right direction, but have not been a good indicator of the actual magnitude of change. This year there is not a strong indication regarding the future direction of land values. It would appear that the short-term future may be one in which the steady upward march in land values is curbed.

When asked about their longer-run expectations over the next five years, about 65 percent of the respondents predicted that land values would increase. The remaining 35 percent were divided between expecting a decline (21 percent) or no change (14 percent). On average they expected a small increase of 4.4 percent for the five years, which is less

Figure 1. Geographic Area Used in the Purdue Land Values Survey

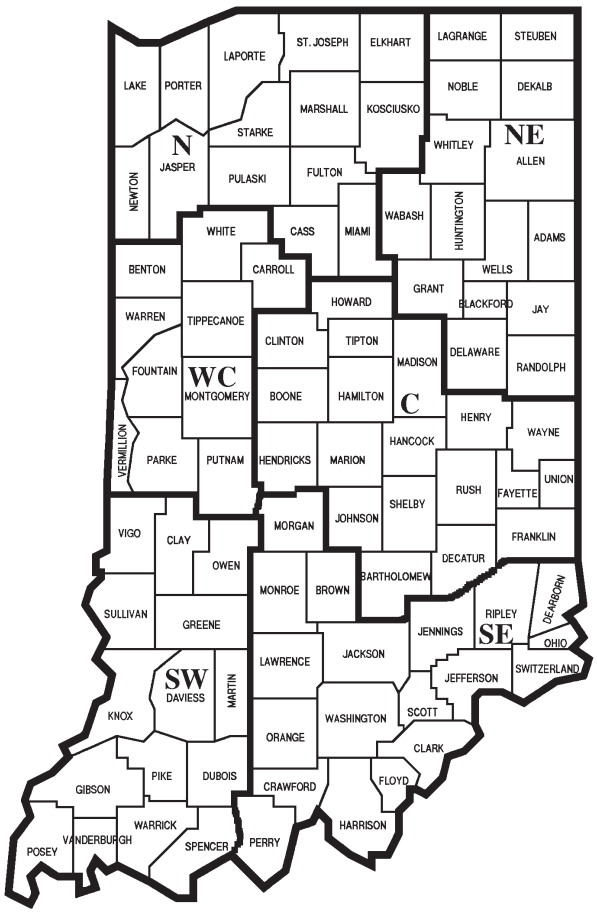


Table 4. Average expected corn and soybean prices, interest rates, and inflation rates for the next five years (annual averages), 1984-1998 Purdue Land Values Surveys.

	Respondents' Projections			
	Prices, $/bu.		Rates, %/yr.	
Year	Corn	Beans	Interest	Inflation
1984	$3.13	$7.35	13.3	6.5
1985	2.70	6.13	12.3	5.1
1986	2.32	5.43	11.0	4.2
1987	2.16	5.62	10.7	4.5
1988	2.50	6.82	10.9	4.6
1989	2.48	6.55	11.0	4.7
1990	2.61	6.22	11.0	4.6
1991	2.47	6.07	10.4	4.2
1992	2.52	6.04	9.5	3.8
1993	2.35	5.96	8.7	3.8
1994	2.48	6.18	8.9	3.8
1995	2.50	6.02	9.2	3.9
1996	3.01	6.63	9.2	3.7
1997	2.72	6.81	9.0	3.4
1998	2.54	6.34	8.6	3.1

than half of last year's projection of 10 percent for the five-year period.

Respondents were asked to estimate annual average prices over the next five years for corn and soybeans, the farm mortgage interest rate, and the rate of inflation. The projections they have made since 1984 are shown in Table 4.

This is the seventh consecutive year that expected farm mortgage interest rates have remained under 10 percent and inflation under 4 percent. An 18¢ decrease occurred in the expected price of corn. The $2.54 per bushel estimate is 3¢ less than the average for the 15-year series. This year the soybean price declined 47¢, ending two years of increases. Gross revenue expectations for 125 bushel corn yields and 45 bushel beans in a 50-50 rotation declined $22 per acre from last year. To the extent that land market participants have similar reduced expectations, this reduction in revenue expectations could exert downward pressure on land values. Combined with other factors like an increase in land on the market in response to lower capital gains tax and reduced transition payments, a leveling off of land values seems likely. If this year's crop results in increased supplies or export demand remains soft, putting additional downward pressure on prices, a decline in land values might occur.

Land Market Activity

The number of farmland transfers in the six months ending in June compared to a year earlier is estimated to be up by 34 percent of the respondents versus 30 percent last year. No change in the number of transfers was reported by 47 percent of the respondents, while 20 percent indicated a reduction in the number of transfers. More land was thought to be on the market now by 19 percent of the respondents, versus 12 percent a year ago and 16 percent two years ago.

Respondents were asked their perception of items that might be influencing the supply of land on the market. The changes in capital gains taxes were thought to have increased the supply of land on the market by 48 percent of the respondents. A group of 51 percent reported that this tax change had no impact. The number of retiring or retired farmers selling land was identified by 42 percent of the respondents as a supply-increasing reason.

Expectations about the future play a major role in both the decision to sell and purchase land. The expectation that land values had peaked was listed by 37 percent of the responds as the reason for an increased supply of land. This was followed by 26 percent listing a reduced profit expectation and 25 percent indicating a reduced profit expectation relative to other investments.

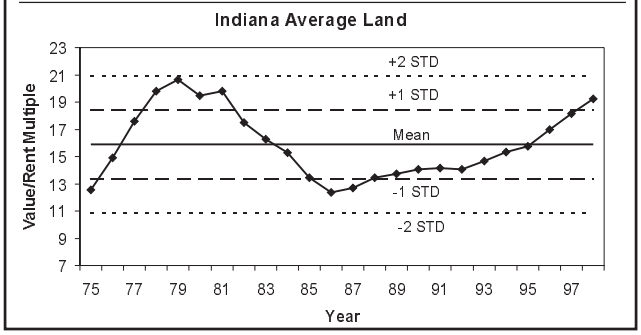
Respondents were also asked about their perceptions of how the purchasers of farmland had changed from a year earlier. Demand from farmers was said to have increased by 39 percent of the respondents, while 16 percent of the respondents indicated that farmer demand had declined. Nearly everyone (84 percent) indicated an increase in demand for rural homesites. Only 1 percent of the respondents indicated a decrease in this demand, while 15 percent indicated no change. Thirty-two percent of the respondents indicated that individual nonfarm investors in farmland had increased, while 13 percent indicated that this source of demand had decreased. The purchase of farmland by pension funds and other large investors is always a topic of discussion. Twenty-three percent of the respondents indicated that, compared to a year ago, demand from this source had declined, 5 percent indicated an increase, and 72 percent indicated no change.

Land Value/Cash Rent Multiples

The fact that average Indiana farmland values increased again for the year ending in June 1998 (up about 50 percent over the past 5 years) and the earnings expectations among respondents drifted lower gives rise to the question, "Will land values decline?" But viewed alone, the fact that land values have risen rapidly is not sufficient justification to suggest that they are too high—returns to land investment must also be considered. Over the past five years, cash rents (a measure of returns) have increased 19 percent, only about one-third as much as the percentage increase in land values. Stock market analysts often refer to the "price/earnings ratio." In a similar way, a land value/cash rent multiple can be calculated. For example, data from the Purdue survey indicates a value/rent multiple of $19.29 ($2,155/112 = $19.2) of land value per $1 of cash rent, for 1998. Is this figure abnormally high, thus suggesting that land values are too high? To answer this question we need to have an estimate of what is "normal."

For the period 1975 to 1998, the value to rent multiple has ranged from a low of 12.4 in 1986 to a high of 20.6 in 1979 (Figure 2). At the peak, there were four years, 1978 to 1981, when the value to rent multiple varied by only 1.2 before rapidly declining. At the bottom, 1986, there

Figure 2. Indiana Average Cropland Value to Rent Multiple, 1975-1997, Purdue Land Values Survey



were five years from 1985 to 1989 in which the value to rent multiple varied only 1.1 before beginning the recent rise. These two turning points suggest that there are periods of stability in the value to rent multiple before a new direction is established.

Over this period the value to rent multiple averaged 15.9, with a standard deviation of 2.5. At a multiple of 19.2, the value to rent multiple is about in the same range as in the 1978 to 1981 period. If one assumes that the value to rent multiple is normally distributed, this means there is only a 10-percent chance that a higher value will be achieved. Or looking at it from the other side, there is a 90-percent chance of a lower value to rent multiple. Since 1975, the land value/rent multiple has exceeded 19.2 in only four years (1978-1981).

High hopes of continued large grain exports to Asia in the near-term have disappeared, calling into question once again just what size this export market might be over the longer term. Government transition payments will decline in 1999 and the following years and then may be discontinued. The idea of a new higher plateau price level for corn and soybeans is being tested by the current low prices. A decline in farm profits is expected for 1998. Could these events trigger a down-trend in land values which might continue for several years? If so, and if land values declined faster percentage-wise than cash rents, the value/rent multiple would decline toward more "normal" levels. While making a firm prediction of a decline in land values and the multiple based on this analysis may not be justified, it does suggest more caution than in the past be used in land purchases.

[Editor's Note: Farmland values may be positively influenced by provisions in the federal estate tax law. Special valuation (Section 2032A) of farmland permits the reduction of landowner estates by up to $750,000. The new, family-owned business interest deduction (Section 2057) excludes business interest in amounts up to $675,000. These two provisions (and others in income and estate tax law) encourage family-operated land and other business assets to remain in estates, and in existing families. While difficult to measure, these provisions would decrease the supply of land on the market.]

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The land values survey was made possible by the cooperation of professional farm managers, appraisers, brokers, bankers, county extension educators, and persons representing the Farm Credit System, the Farm Service Agency (FSA) county offices, and insurance companies. Their daily work requires that they stay well informed about land values and cash rents in Indiana. The authors express sincere thanks to these friends of Purdue and Indiana agriculture. They provided 356 responses representing most of Indiana's 92 counties. We also express appreciation to Sandy Dottle and Carolyn Hunst of the Department of Agricultural Economics for their help in conducting the survey.

Ag Outlook '99

Farmers and agribusiness managers know that making good decisions is at the core of their business success. To make the best decisions possible they need the best information available. Information for decision making is what **Ag Outlook '99** provides.

Everyone is encouraged to attend an **Ag Outlook '99** meeting at a nearby location. The Purdue Agricultural Economics staff provides their best forecast of what the coming year will hold.

We will provide you with our answers to many of the critical questions that are being ask such as: Will the general economy continue to roar to new heights, closing the century with the longest period of growth on record? When will agriculture exports and farm incomes recover from the Asian financial flu? How will the politicians deal with unrest in the country side over low farm prices and incomes? Should Washington alter the current course toward a market oriented farm policy? How big are the farm financial problems in Midwest agriculture? What are the best bets for marketing grains and livestock? How much will cash rents and land values change in 1999. What business strategies will really work for farmers and agribusinesses?

Purdue Educators in the following counties will be hosting an **Ag Outlook '99** session. Watch for a local announcement or please contact the Cooperative Extension Service Office for the location and exact time.

County	*Date*	*Time*
Adams	9/17/98	Dinner
Allen	9/22/98	Lunch
Bartholomew	9/16/98	Evening
Benton	9/15/98	Breakfast
Blackford	9/22/98	Evening
Boone	9/15/98	Dinner
Carroll	12/1/98	Afternoon
Cass	9/16/98	Breakfast
Clark	12/15/98	Breakfast
Clay	9/14/98	Evening
Clinton	9/21/98	Breakfast
Crawford	12/15/98	Dinner
Daviess	9/15/98	Breakfast
Dekalb	9/22/98	Dinner
Fulton	9/17/98	Breakfast
Grant	9/14/98	Lunch
Hamilton	9/14/98	Breakfast
Hancock	9/14/98	Breakfast
Harrison	12/15/98	Dinner
Howard	9/15/98	Breakfast
Huntington	9/17/98	Breakfast
LaPorte	9/15/98	Evening
Lawrence/Orange	12/14/98	Evening
Madison	9/18/98	Breakfast
Montgomery	9/14/98	Breakfast
Newton	9/15/98	Dinner
Orange/Lawrence	12/14/98	Evening
Porter	9/9/98	Lunch
Posey	9/23/98	Dinner
Pulaski/Starke	9/16/98	Breakfast
Putnam	9/16/98	Breakfast
Rush	9/24/98	Dinner
Scott	12/14/98	Breakfast
Shelby	9/15/98	Evening
St. Joseph	9/15/98	Evening
Starke/Pulaski	9/16/98	Breakfast
Sullivan	9/22/98	Breakfast
Tippecanoe	9/16/98	Breakfast
Tipton	9/18/98	Breakfast
Warrick	9/24/98	Breakfast
Washington	12/16/98	Breakfast
Wayne	9/16/98	Lunch
Wells	9/18/98	Breakfast
White	9/17/98	Breakfast

New Generation Cooperatives

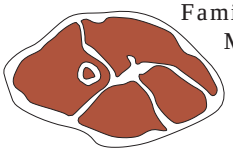
Joan Fulton, Assistant Professor; Brian Jones, Graduate Student; and Lee Schrader, Professor Emeritus

The changing face of agriculture, often referred to as the industrialization of agriculture, is causing increased vertical coordination in virtually all sub sectors of the food system. Increased concentration and increased vertical coordination in agriculture are occurring because businesses are trying to increase efficiencies, relay information more quickly, and take advantage of profits at other stages of the food chain. Many agricultural producers are responding to these changes by investing in value-added agribusinesses. One particular business organizational structure that has received considerable attention with respect to vertical coordination is the New Generation Cooperative (NGC). The specific organizational aspects of the New Generation Cooperatives, involving production contracts and tradable delivery rights and shares, evolved in response to challenges with the traditional cooperative organizational structure. The following section presents an historical perspective of NGCs, along with a discussion of an Indiana NGC. We also discuss the strengths and weaknesses of this business organization structure.

Growth/Development

The origin of NGCs can be traced to the early 1970s, when the sugar beet producers in the Red River Valley region of North Dakota and Minnesota decided to buy a processing operation using the cooperative organizational model. NGCs have become very popular in the last few years and are currently in, or being explored in, many sectors (e.g., wet corn milling, hog production, pasta production, egg production, and beef processing) of agriculture throughout the United States and Canada. Recent references to this resurgence in cooperative development have been referred to as "cooperative fever," "hype," and "getting on the value-added bandwagon." This hype has been concentrated in North Dakota and Minnesota. An article in *Milling and Baking News* in 1997 reported that over 50 cooperative projects had been created in Minnesota and North Dakota since 1990. In addition to the Minnesota and North Dakota expansion, producers in other regions of the country, including Indiana, are becoming increasingly interested in New Generation Cooperatives.

The first Indiana NGC is Indiana Family Farms Pork Marketing Cooperative (IFF) established in 1997. IFF's purpose is to operate a live hog marketing facility and a slaughtering and processing facility. The cooperative plans to reactivate the former Emge pork plant in Anderson, Indiana. IFF currently has pork products in retail markets under their own label, with member's hogs slaughtered and processed under a contract arrangement with other firms. Members using the slaughter and processing track must purchase stock commensurate with their right and obligation to deliver hogs of acceptable quality to the cooperative. Membership is limited to Indiana producers, and Indiana Family Farms pork products are marketed under that name. Although IFF has experienced the challenge of obtaining adequate equity, that is common to many NGCs, they have been successful in placing Indiana Family Farms pork in grocery store meat sections.



Structure

The organizational features found in NGCs are not new. Many of the features can be found in traditional cooperatives. However, it was not until the development of the NGC that all the features came together in one organizational form of business.

Some distinct features of New Generation Cooperatives include:

1. Linking of producer equity contributions and product delivery rights,
2. Tradable equity shares and delivery rights,
3. One-member, one-vote,
4. Earnings distributed to members on the basis of their patronage,
5. Value-added processing of members' commodities, and
6. Significant equity investment by members.

In general, NGCs are involved in value-added processing of commodities. Unlike traditional cooperatives, NGCs rely on strict delivery contracts to assure a match between product flow and processing capacity. This strict delivery contract is proportional to the shares of equity purchased by each member. Linking equity shares to product delivery rights has many advantages. The members of the cooperative are the patrons, and each of them has a substantial investment in the business. This ownership provides the incentive for the members to behave in a manner that promotes the success of the cooperatives, including meeting delivery requirements and monitoring how management is operating the business. Another important element is that the equity received from the members is available to the cooperative from the beginning. Members can exit the cooperative by selling shares at a price that reflects the value of the cooperative. These tradable shares allow for a more secure capital base for the cooperative business and capital appreciation if the cooperative is successful in obtaining higher returns for members.

Why the Cooperative "Hype"?

There are many factors that have been cited as contributing to this cooperative "fever." Some authors have argued that the reduction and phasing out of agricultural support programs is leading farmers to look for alternatives that will decrease the volatility of farm income. To reduce this volatility, many farmers are considering the contractual arrangements of NGCs.

Social and economic conditions in rural areas prompted rural development programs to aid in new business development in North Dakota in particular. However, throughout the country, federal, state, and local governments are becoming more receptive to rural development issues, and NGCs are viewed as an opportunity for continued rural development. Financial grants, to help in the development process, are becoming available from various government sources. In addition, many farmers feel that if they don't participate in rural development projects, their rural communities will be in serious financial trouble.

It has also been suggested that farmers are currently better off financially and can therefore afford the equity investment in NGCs. Finally, the success of the early sugar beet cooperatives in the Red River Valley region has undoubtedly supported the current wave of cooperative development. These early successes provided a positive, historical perspective as well as knowledge and experience of this new form of business organization.

Strengths of New Generation Cooperatives

NGCs have provided an opportunity for producers to become part of an integrated food system. By integrating, these producers receive a share of the earnings generated from the cooperatives' processing operations. A second point relates to the issue of market power. Sexton's research reveals that in food and tobacco processing, most industries have experienced increased concentration over time. Cooperatives provide farmers with a mechanism to integrate around the large processors and also serve as a competitive yardstick for the industry.

NGCs have also been able to overcome two key problems that traditional cooperatives have faced. The first problem is the free-rider problem. The free-rider problem exists because, traditionally, the benefits of a cooperative were based only on a person's patronage, not actual ownership of the cooperative. This situation created a disincentive to make an equity investment in a cooperative, although investment was critical for the cooperative's success. NGCs have overcome this problem by tightly linking delivery rights to equity contributions.

The second problem is the horizon problem. This problem refers to the investment perspective of cooperative members. In traditional cooperatives, decisions to make investments are often based on the timing of the expected returns. If an investment is expected to return profits at a future time when a patron is no longer a member, there is very little incentive for that patron to invest in the long-term project. NGCs have solved this problem by allowing tradable equity shares. These tradable shares allow members to capture the value of expected value of the business because the price the shares are traded at reflects the expected future returns of the cooperative (Harris et al.)

Weaknesses of New Generation Cooperatives

It is not surprising to find some weaknesses in the structure of these new business organizations. Since membership in NGCs requires significant up-front equity contribution, there may be many farmers who experience difficulty raising the capital to purchase shares. Inadequate capital can doom a cooperative project to failure. Often, members are required to hold a 40-50 percent equity position. Sometimes this capital requirement is too large, and there is not sufficient membership to support the investment. In these situations the cooperative is never successfully established, even though there is interest among producers.

Farmers who wish to purchase shares after the initial equity drive may have to pay more if the market price of the shares has increased since the initial equity drive. This disadvantage occurs because the market price of the shares (which the producer must buy if he wishes to be a member) reflects the present value of expected returns from future patronage. If the market price of the shares has increased since the initial equity drive, the potential members must not only pay more for the shares, but they are also placed at a disadvantage because they will not receive any gain except that beyond the expectations in place when the shares were purchased (Harris et al.). This disadvantage for prospective members is an advantage for the farmer members who joined the cooperative initially.

There may also be some financial risk implications for producer investment in NGCs. The decision to invest in an NGC from a portfolio perspective can be looked at in the following way. When the producer chooses to become part of the cooperative, a significant up-front equity investment is required. The producer's investment portfolio, after investment in the cooperative, consists of the farm as well as the cooperative. Given, that in the long run, the same fundamental supply and demand drivers shape the profitability and margins in the entire production, processing, and distribution system, the margins from the NGC may be positively correlated with margins from the farm. If risk reduction was the primary objective, the farmer should find an investment where the margins are negatively correlated (and as close to perfectly negatively correlated as possible) with margins from the farm. Investment in a NGC may not provide the best risk reduction opportunities for producers. In addition, if producers use more debt to invest in valued-added activities, they are increasing their leverage position. This leveraged position

increases the producer's financial risk.

A final weakness is one that is not unique to NGCs but is a problem all cooperatives must deal with effectively if they want to be successful. Determining how best to align the goals of the cooperative organization with the goals of its owners can be very difficult. Sometimes traditional profit maximizing goals need to be reevaluated to determine the impact on the members of the cooperative.

Things to Watch for and Potential Pitfalls

Brent D. Bostrom, Chair of Doherty, Rumble & Butler, Cooperative Law Department, and Dennis A. Johnson, President, St. Paul Bank for Cooperatives, have worked extensively with groups of producers as they organized and established NGCs. They outline the following as potential pitfalls and difficulties most often encountered by New Generation Cooperatives*:

- **Lack of a Clearly Identified Mission**

The motives to form a cooperative must be made up of specific goals that seek to accomplish the mission of the cooperative. Careful analysis is essential if the cooperative is to be strategically competitive in the marketplace in which it operates.

- **Inadequate Planning**

In order to accomplish the specific goals of the cooperative, detailed plans must be developed to execute every phase of the cooperative's development process. Knowing who will do what and when is very important to the success of a new cooperative. Poor planning will ultimately lead to the cooperative's failure.

- **Failure to Use Advisors and Consultants**

The assistance of experienced consultants and advisors is very important in overcoming the difficulties associated with starting a new cooperative. Utilizing people from the outside can pay huge dividends in the future. These advisors can provide a strong base of knowledge and information to identify opportunities and threats. Consultants often will provide an honest, unbiased assessment of the potential of the cooperative.

- **Lack of Member Leadership**

Cooperative businesses are much stronger when the leadership comes from one its members rather than from someone outside the cooperative. A member-leader can provide better communication among advisors, consultants, and other members.

- **Lack of Member Commitment**

Cooperatives will only remain strong when they have support from a large percentage of their members. The use of delivery contracts provides a formalization of member commitment in the case of NGCs. However, the strength of a cooperative business depends upon a greater level of commitment than is formalized in a contract.

- **Inadequate Management**

A strong, effective management team that effectively takes care of the ongoing business activities is essential to the success of every business. An important role of the Board of Directors is to choose the manager and outline goals for the cooperative. The team's job is to follow through to ensure that the goals are executed.

- **Failure to Identify and Minimize Risks**

Because all business ventures involve risk, it is important to first identify and quantify the potential risks. Once the risks are known, steps can be taken to minimize their impact.

- **Overly Optimistic Assumptions**

The formation of a business plan requires making assumptions concerning market projections, operating costs, and government policy influences. It is important that these assumptions be realistic so that the business plan can effectively be followed as the cooperative moves forward.

- **Not Enough Money and Excessive Debt/Equity Ratio**

It often takes longer and more money to get a new venture started than originally thought. An important component of the planning process is to ensure that sufficient cash is available to meet the day-to-day financial obligations as well as maintain a debt/equity ratio that is acceptable to both investors and creditors.

- **Inadequate Communication**

Communication is critical throughout the entire cooperative development process to ensure that organization that evolves is consistent with the expectations of everyone involved. Effective communication must continue as the business begins operation to ensure that the business plan is successfully followed.

- **Problems with the Physical Plant**

The management and directors of the cooperative business must initially monitor the construction phase of the physical plant. The physical plant is a crucial component of the business because value-added processing is often a key objective of the NGC. Monitoring of the construction phase can catch problems like cost overruns, time delays, and building specifications before they become disastrous.

- **Noncompetitve Business Location**

NGCs must select a business location that will allow them to be a competitive player in the industry. The pressures that may come from producers to locate locally to enhance the rural community must be weighed against the need to be competitive with the other agribusinesses in the sector.

** The list included here is a summary. A full list of their comments can be found on the cited web pages.*

Conclusions

The success of NGCs began in North Dakota and Minnesota. This success has resulted in producers across the United States and parts of Canada becoming interested in this new business structure. NGCs provide an opportunity for farmers to increase efficiencies, relay information more quickly up and down the value chain, and take advantage of profits at other stages of the food chain. Unique characteristics of NGCs include tradable equity shares and producer delivery rights that are tightly linked to equity contributions. This has helped NGCs overcome the free-rider and horizon problems that have threatened the success of traditional cooperatives. However, it is important to remember that all business organizations represent uncertainty and risk. Bostrom and Johnson provide an excellent checklist of things to consider when forming a NGC.

References

Bostrom, Brent D. *http://www.mncoop.org/publications-pitfalls.htm*, July 7, 1998.

Cobia, David W. 1997. "New Generation Cooperatives: External Environment and Investor Characteristics." in *Cooperatives: Their Importance in the Future Food and Agricultural System*. Michael Cook, Randall Torgerson, Tom Sporleder, Dan Padberg (Eds.) Publication of proceedings of Food and Agricultural Marketing Consortium January 1997, Las Vegas.

Johnson, Dennis A. *http://www.mncoop.org/publications-financing.htm*, July 7, 1998.

Hackman, Deanne L. and Michael L. Cook. 1997. "The Transition to New Cooperative Organizational Forms: Public Policy Issues." in *Cooperatives: Their Importance in the Future Food and Agricultural System*. Michael Cook, Randall Torgerson, Tom Sporleder, Dan Padberg (Eds.) Publication of proceedings of Food and Agricultural Marketing Consortium January 1997, Las Vegas.

Harris, Andrea, Brenda Stefanson, and Murray Fulton. 1996. "New Generation Cooperatives and Cooperative Theory." *Journal of Cooperatives*. 11, p. 15-28.

Milling and Banking News. 1997. "Industry Activities—Colloquium Speakers See Corn Sweetener Imbalance Into Future," March 11, pp 16-18.

Sexton, Richard J. 1997. "The Role of Cooperatives in Increasingly Concentrated Markets." in *Cooperatives: Their Importance in the Future Food and Agricultural System*. Michael Cook, Randall Torgerson, Tom Sporleder, Dan Padberg (Eds.) Publication of proceedings of Food and Agricultural Marketing Consortium January 1997, Las Vegas.

Food System 21: Gearing Up for the New Millennium - Part II

Introduction

The U.S. agricultural production and food distribution industry is currently in the midst of major structural changes. To assist in understanding the implications of these changes and the future of the industry, faculty in the School of Agriculture at Purdue University in collaboration with industry representatives undertook a study to assess the future of the food production, processing, and distribution system. The results of this analysis are reported in detail in *Food System 21: Gearing Up for the New Millennium*—winner of a Gold Award for editing from the Agricultural Communicators in Education. Congratulations to Laura Hoelshcer, PhD, Editor, Agricultural Communications Service, for this accomplishment.

In this issue and a subsequent issue we will provide summaries of three key chapters of that book: consumer demand for food, the beef sector and the grains and oil seeds sector. These summaries will present the "Key Questions & Responses" section, of each chapter which provides a synopsis of the most important issues discussed in that chapter of the book.

You may or may not agree with our analysis. We encourage you to read the complete analysis in *Food System 21: Gearing Up for the New Millennium* which is available for $29.95 from:

Agricultural Communication Service
Media Distribution Center
301 South 2nd Street
Lafayette, IN 47901-1232
1-888-EXT-INFO
FAX (765)496-1540

Consumer Demand for Food

John Connor, William Schiek, Joseph Uhl, and Stephen Hiemstra

The growth of markets for farm products, intermediate agricultural materials, and finished food ultimately depends on two forces: supply conditions and demand factors. Most of the chapters in *Food System 21* deal with the supply side of the American food system. Over time, increases in factors of production and technological progress shift the supply of food and agricultural products such that output increases and prices decline. However, this chapter explores the economic forces behind trends in the demand for food. These forces on balance also foster increases in the volume of food found in the market place, but they place upward pressures on food prices and contribute to the rising revenues of food suppliers. In sum, one cannot understand the growth of the food system without developing an appreciation for the interplay of shifting demand and supply conditions. Omitting the demand side of the picture in *Food System 21* would be akin to attempting to cut a piece of paper with only one scissor.

The discussion of this chapter provides a few background facts on U.S. food demand; the drivers of food choices and evidence of their effects on physical food consumption; evidence

of actual sales impacts from major and continuing trends in food purchases or food industry sales.

Key Questions & Responses

➢ **Are consumers consistent/predictable in their food choices?**

Many individual consumers are not, and most (to put a charitable twist on it) are fickle. However, in the aggregate, groups of consumers do act as if they plan their purchases with due consideration of their ability to pay, the relative costs of all items they must buy, their household's structure, and the many pieces of information bombarding them daily on food-health connections.

➢ **Why is a downward revision in the Consumer Price Index relevant?**

A downward revision in the CPI explains why the effects of income increases on food choices (trading up) are so strong. The CPI as currently measured makes personal income growth appear to be more anemic than it really is. Consumers can afford to be more fickle than previous generations.

➢ **What are the key drivers of aggregate food demand?**

Income growth has surpassed population growth, but these two factors are the greatest forces explaining long-term changes in total food expenditures. The increasing cheapness of food was always a weak explanatory factor, and it is fading further. However, prices still strongly affect the mix of foods purchased, generic-type (unbranded) foods, and all the purchases of low income households.

➢ **What role do demographic changes and consumer preferences play in food choices?**

Along with relative prices, demographic and attitudinal changes play strong roles in the mix of foods being purchased at retail. While aging, dual-career families, ethnic composition, nutrition concerns, and beliefs about food-health relationships are each important determinants of food choices, many have conflicting or offsetting effects on food expenditures.

➢ **How important are vegetarianism, biodegradable packaging, organic farming, animal welfare concerns, direct farmer marketing, or home gardening as drivers?**

These are important issues to small slices of the consuming public, but in the aggregate most farmers, processors, and distributors can ignore them when making major investment or strategic decisions.

➢ **Are consumer desires for fresh-tasting low-fat, low-sodium, ethnic-identity, snack-type, and convenience foods just fads?**

Over the next decade or so, producers and food companies that ignore these drivers do so at their peril. Consumers are willing to pay more for food products that incorporate one or more of these value-added features. But products that are merely novel or sacrifice storability, palatability, or other features that consumers have come to expect will flop.

➢ **Is the FDA-USDA Food Pyramid a good road map to the future?**

Except for its pinnacle, the pyramid is a good general descriptor of long-term consumption trends. Consumers are buying more starch foods, fruits, and vegetables, and they are shying away from meat and dairy fats. Unfortunately, they are buying more vegetable oils and sweeteners as well, driving up the average calorie count to unhealthy levels.

➢ **Do consumers want more government involvement in the U.S. food system?**

When it comes to protecting the U.S. food supply from toxins, bacterial hazards, adulteration, or unsafe processing practices, public support seems almost unlimited. Information about nutrition, ingredient composition, and health linkages is also popular, whether from government, industry, or nonprofit organizations.

Consumers seem to be indifferent about approval of more food additives or government grading systems.

➢ **Will food expenditures continue to decline from today's average 15 percent of the total?**

The rate of decline is slowing, so by 2010 the ratio may drop to 14 percent, but no lower.

➢ **Is it possible that the consumer's share of the food dollar spent on foodservice will rise to more than 50 percent in the future?**

Yes. Retailers are fighting back, but a percentage in the 50-55 range seems likely by 2010 if the U.S. economy continues its robust growth path of the last 15 years. If a serious recession hits, the figure will drop but still hover near 50 percent.

Grains and Oil Seeds Sector

Craig Dobbins, Howard Doster, John Lee, Jess Lowenberg-DeBoer, George Patrick, and William Uhrig

The production of corn, soybeans, and wheat represents a significant proportion of the value of U.S. farm production. In 1995, the sales of these commodities resulted in cash receipts of $39.4 billion. This represents 21.4 percent of all cash receipts and 39.4 percent of cash receipts from crops. The methods of production, the inputs used in production, and purchasers of these products have undergone many changes in the past few years. Many of these same forces will continue to shape future grains and oil seeds production.

In 1995, 30.2 percent of the coarse grains, 36.6 percent of the soybeans and 58.0 percent of the wheat produced in the U.S. were exported. The internationalization of these markets means that changes in

production, level of consumer income, and trade policies of other countries will have important implications for the U.S.

The international nature of these commodity markets, while important, is not the only factor important in shaping the grain and oil seed sector. Other forces shaping the future of this sector include the development of specific-attribute grains. While this is not a new development, the application of biotechnology to plant breeding promises to increase the speed with which new products are developed. Production technologies will also change in other ways. The development of sensors will result in "smarter" machinery, allowing more precision operation and "on the go" adjustments.

Technologies of the future will be more complex and more information intensive. Information technologies will play an important role in managing the increased quantities of information. While the application of information technologies in the form of site specific or variable rate technologies does not appear to result in reduced input costs, this technology may allow managers to increase their span of control.

Government policies will also continue to influence the direction of the grains and oil seeds sector. Agricultural policy and environmental policy will have important implications for the sector. Some effects of the policies will be direct or intended, but others will be indirect or unintended.

Being a low-cost producer is critical to success when producing commodities such as corn, soybeans, and wheat. While the development of specific-attribute grains will provide early adopters opportunities for a larger margin when compared to traditional commodities, this larger margin is expected to quickly narrow.

Implications discussed in this chapter include the continued consolidation of grain elevators, the continued dominance of bulk commodity production, the continued growth in farm size, the skills needed by farmers to be successful, the ownership of farm assets, the profit level of farming, and changes in land values and cash rent.

Key Questions & Responses

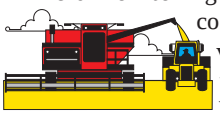
➤ **Will bulk commodities continue to dominate production?**

The application of conventional crop breeding programs and biotechnology will result in an increased number of specific-attribute grains and oil seeds. Those items for which there is a large demand will quickly be treated like today's commodities, resulting in a number of "bulk products." Today's commodity corn, soybeans, and wheat will fall into this category. The use of sensors and information technologies will allow the specific attributes in these grains to be quickly assessed and communicated to producers.

The marketing system will reward those who provide a superior quality product by basing the price on the quantity of the desired attribute rather than the volume of grain delivered. Both contract and non-contract marketing opportunities will be available. For items that have smaller demand or more specific functions, identity preservation will be important. These products will be grown under contract. To successfully compete in these markets, farmers will need to emphasize cost control and continue to strive to be low-cost producers.

➤ **What will be the greatest advantage of variable-rate technologies?**

Yield monitoring will be the first component of the variable-rate technology to become widely adopted. Machinery manufacturers already offer yield monitors as standard equipment on combines. The data that are collected from these tools will allow farmers to observe variability in yields without being on the combine. These data will also allow yield variations to be evaluated with respect to weed pressures, insect infestation, plant population, and rainfall amounts, in an effort to explain differences in yields.



The other aspects of variable rate technology, the variable rate application of fertilizer, seed, and chemicals, appear to provide little cost savings in the production of bulk commodities. Their major advantage will be the ability to provide the farm manager a much larger span of control than can be achieved through direct observation.

➤ **Will fewer grain buyers mean lower prices for farmers?**

During the next decade, the trends of change in the grain industry will be much the same as in the past decade—but the rate of change is expected to accelerate. This consolidation could result in lower prices, especially for smaller farmers and some market areas with only a single buyer. There will be less interest on the part of the larger grain merchandising firms in serving as a point of sale for small producers.

Larger farmers will have a larger number of marketing alternatives, but they will be required to deliver grain to more distant points in order to take advantage of these opportunities. Those farmers who have a volume of production sufficient to afford their own transportation equipment will be able to reach these more distant terminal and sub-terminal alternatives in a cost-effective manner.

Larger producers with substantial grain handling facilities and specialized management will also be able to take advantage of special merchandising opportunities by blending or differentiating their grain. These producers may find a ready market for their grain with large livestock and poultry operations and local grain processors. For small and medium-sized producers to receive bids similar to those of large producers, they will have to coordinate sales with others. This will allow smaller sellers to appear to purchasers as a single large producer.

To be continued in Food System 21: Gearing Up for the New Millennium - Part III.

Global Warming, A Perspective for Indiana Agriculture

Otto Doering, Professor

There has been a lot of hot air generated about global climate change, but very few specifics about what impact it may actually have on us in the future. We really need to consider two distinctly different kinds of impacts. First, there is the direct impact of climate change — the actual change in temperature and other climate factors that may be of direct concern to agriculture. Second, there are the impacts of those things we do in reaction to climate change — things like the carbon reductions planned under the Kyoto accord. For most of the U.S. economy, trying to reduce carbon emissions will have initial greater impact than the actual climate changes that might begin to occur.

U.S. agriculture is in a different position from most of the rest of the economy. Temperature and rainfall are critical, and we are not just talking about amounts, but also about distribution and frequency. If we look at a map of the central U.S., the breadbasket of America, there are two critical gradients (Figure 1). Temperature gets cooler from the warmer South to the cooler North, and rainfall tends to decrease from the Eastern Cornbelt as we move from Ohio and Indiana through Iowa into western Nebraska and Kansas. When we hit the 20-inch rainfall line at about the 100th meridian, the crop mix changes, and we see more in the way of dryland crops. Global climate change has the potential of changing the location of the 20-inch rainfall line and/or changing the character of temperature and incidence of rainfall so that cropping patterns will shift at this critical margin.

Looking at the temperature gradient, if we go from south to north in the Cornbelt, temperature decreases, and we make choices about what we grow based upon this. Farmers in southern Wisconsin may be a little short of degree-days for top yields and are likely to be using short season hybrids. As we go south there are more degree-days, longer season varieties prevail, and we are able to get into rotations like wheat/soybean double cropping. We also have different pest concerns to the north as compared to what we face to the south. The key question for us now is how climate change might upset the current pattern of agricultural activity on the land.

Overall, the areas that will likely have to change the most are the areas that are now fringe areas of climate, like the Western Cornbelt that is at the rainfall limit. The central Cornbelt, where so many conditions are so favorable to the corn/soybean monoculture, will be less likely to have to change cropping systems due to some deterioration of those excellent conditions.

For the last four years a group from Purdue, Indiana University, and the University of Illinois has been looking at what the impacts of climate change might be on Upper Midwest agriculture.

We have been particularly concerned about how farmers might adapt to climate change and maintain the profitability of their enterprises. If climate change were to involve just shifts in the gradient — a bit warmer or a bit dryer or wetter everywhere — then adaptation would be relatively straightforward. However, the climatologists have also talked about some climate changes that would be more unsettling.

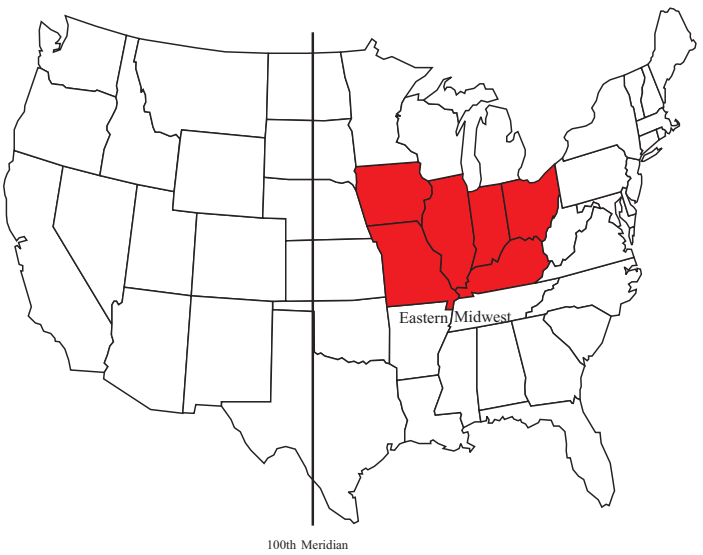
1. The warming in the Northern Cornbelt might be greater than the warming in the Southern Cornbelt.

2. Warming will not be equally divided between summer and winter. Winter will warm more.

3. Most important, there may be greater weather variability. July rainfall might be up 20%. But, more important, it might occur in two storms!

4. Finally, the increased variability might result in “seasonal fuzziness” — a less distinct boundary between seasons or more chance of late frosts in the spring and early ones in the fall, countering

Figure 1. The Eastern Cornbelt and 100th Meridian



what might be a two-week increase in the growing season in the Cornbelt.

What such a future calls for is not a "Chicken Little The Sky Is Falling" approach. What is called for is thoughtful contingency planning for both the private and the public sectors. Chicken Little behavior does not make real world sense, contingency planning and risk management do.

A critical aspect of the contingency planning is time frame. The current wisdom from climatologists looks out 50 to 100 years for significant climate change. Within this time frame it looks as though genetics, pest control, management, and other strategies can bring about successful adaptation for agriculture. As pests move north and are controlled less by winters that are proportionally warmer, the industry believes that it can deal. If the time frame is shortened, to 10 or 20 years, the story would be different.

The time frame also has something to say about who prepares for the contingency. The private sector needs payback on investment in a relatively short period and may be unwilling to risk investment today when the payback is in 50 years. On the other hand, if a change trend looks more certain and clear economic benefit can be derived from a new product or service, the private sector is likely to take the lead.

There is such a high public value in the stability of the food supply and the cost of disruption is so high, that there is an imperative for the public to invest as well, even on a contingency basis. Thus, we should expect the public sector, the Land Grant Universities, and the Agricultural Research Service to begin to think about coping with climate change well before it becomes attractive for the private sector to do so.

As an example of the kind of adaptation that may be necessary, consider the impact of variability that leads to seasonal fuzziness, in this case early frost. Table 1 illustrates the cost of different probabilities of early frost to a large corn/soybean operation in Eastern Illinois and another in Southwest Wisconsin. Note the drop in total returns may not look terribly large. However, the decline in actual profit would be a much greater proportion. A 0.20 probability of early frost carries with it approximately $25,000 of loss in Eastern Illinois and more in Wisconsin. This may actually be a third or a quarter of a farmer's net income. The value of this loss is such that the private sector will ultimately have a real incentive to develop frost tolerant varieties, but a long-range effort is still required to make this genetic trait possible. As the probability of something like seasonal fuzziness changes, so changes the economics of successful adaptation.

The conclusion is that there is a need to have concern about global climate change, but no need to panic. The kinds of costs like 50% decline in farm income that some people are talking about from government intervention are absurd. The concern may be best expressed in terms of contingency planning and good strategic management. Agriculture's concern is probably best focused on climate variability and adaptation to the kinds of changes this might bring. There will be important roles for both the public and the private sector, and producers in their own best interests should encourage both private and public institutions to stay ahead of the curve on this issue.

Table 1. Cost of Early Frost in Reduced Returns

Freeze Probability	Eastern Illinois Returns[1]	Loss vs. No Freeze	SW Wisconsin Returns[1]	Loss vs. No Freeze
0.0	$1,618,372	$0	$1,249,231	$0
0.1	$1,611,041	$7,331	$1,240,487	$8,744
0.2	$1,603,235	$15,137	$1,231,456	$17,775
0.33	$1,593,480	$24,892	$1,220,477	$28,754
0.5	$1,580,347	$38,025	$1,206,790	$42,441
1.0	$1,565,347	$52,807	$1,173,953	$75,278

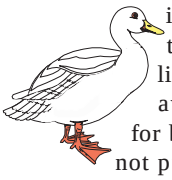
1 Returns are to land, labor, and capital

Economic Impact of Indiana's Poultry Industries

Lee F. Schrader, Professor Emeritus and Kevin T. McNamara, Professor

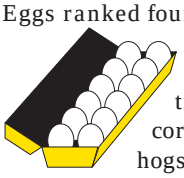
The poultry industries of Indiana, eggs, turkeys, chickens, and ducks, represent a significant proportion of the value of the state's agricultural production. These industries also make a material contribution to the state's economy. The objective of this paper is to document the economic contribution of the poultry industries to Indiana's economy.

Estimation of the economic impact of these industries at state level is limited by the data available. Official data for broilers and ducks are not published for the state to avoid disclosure of the activities of individual firms. Estimates in this study are based on official data supplemented by data gathered in an informal survey by the senior author. The estimates should not be regarded as exact measures but as approximations that reflect the general magnitude of the contribution.



Poultry Production

Eggs ranked fourth in value among major Indiana agricultural commodities in 1996 after corn, soybeans, and hogs, at 5.8 percent of total farm cash receipts. All poultry and eggs represented 9.9 percent of cash receipts of Indiana farms (*Indiana Agricultural Statistics*). Production and farm value of production are presented in Table 1. Farm values are based on standardized prices and do not correspond exactly to cash receipts data that may include the value of some processing services.



Poultry production is concentrated in several areas of the state. The impact of a concentration of poultry production is particularly clear in Dubois, Kosciusko, and Daviess counties, which ranked first, second, and fifth, respectively, in cash farm receipts for 1995.

These industries are major users of locally produced feed ingredients. Rough feed use estimates based on feeding standards are shown in Table 2. Estimates include some poultry feed produced in Indiana for use out-of-state. Local use of corn and soybean meal has the effect of increasing local prices relative to the national averages (increasing local basis).

Indiana's production of egg type chicks exceeds the needs of the state's egg producers by a significant amount. In 1997, Indiana hatcheries produced 85.6 million egg type chicks, an estimated 52 million in excess of in-state needs. The value of the chicks shipped out was about $11.7 million. However, not all the hatching eggs used in the state were produced in Indiana. Approximately 27 million hatching eggs were shipped into the state based on hatching egg use and reported production of hatching eggs in the state.

Broiler slaughter in 1997 included net in-shipment of about 5.5 million live birds with a value of about $6,100,000. Indiana consumes more chicken than is produced in the state but is a net exporter of eggs, turkey, and duck. Substantially all of the poultry and eggs produced in the state are processed in the state.

Product Value

Estimated wholesale value of products processed in Indiana is shown in Table 3.

Economic Impact

The impact of the poultry industries on Indiana's economy extends well beyond the value of poultry products. The value of production represents the direct effect. The activity also stimulates indirect and induced effects. Indirect effects represent the spending of other industries that supply products to the poultry and egg processors. Additional activity generated as a result of added income of employees of these supporting industries is referred to as an "induced effect."

Input-output analysis, a modeling technique, is used to assess the

Table 1. Indiana Poultry and Egg Production and Value

	Number Produced 1997, Thousands	Farm Value 1997 Thousand Dollars	Rank Among States 1997
Table Eggs	5,534,000	244,400[1]	4th
Turkeys	14,200	142,600[1]	7th
Ducks	9,000[1]	44,000[1]	1st[1]
Broilers	26,700[1]	34,400[1]	23rd[1]
Total		465,400[1]	

1 Authors' estimates

Table 2. Estimated Feed Use for Poultry Production in Indiana, 1997[2]

	Tons Feed Used	Bushels of Corn	Tons Soybean Meal
Eggs	906,000	20,885,000	226,000
Turkeys	437,000	8,420,000	113,500
Ducks	62,100	1,441,600	16,770
Broilers	134,200	3,116,000	36,240
Total	1,539,300	33,862,600	392,510

2 Includes feed produced in Indiana that was used out-of-state.

degree of interaction among sectors of the economy. IMPLAN (IMpact Analysis for PLANning) software is used to compute output, income, and employment impacts. Output impacts are the changes in sales or receipts resulting from an initial change in the economy (e.g., increase in poultry and egg processing). Income impacts are changes in household income resulting from the increase in total sales. Employment impacts are jobs added in the economy by firms with increased output or sales. IMPLAN used 1994 Indiana data to derive the appropriate multipliers. These multipliers are used to generate estimates of the impact of the 1997 poultry industry activity (Table 4).

Table 3. Wholesale Value of Poultry Products Processed in Indiana, 1997

	Volume of Product	Product Value
Eggs/Egg Products	461,000,000 dz.	$294,000,000
Turkey, whole r.t.c.	280,750,000 lbs.	$175,000,000
Ducks	43,530,000 lbs.	$53,540,000
Broiler, whole r.t.c.	92,300,000 lbs.	$54,440,000
Total		$576,980,000

Conclusions

Indiana's poultry production represented nearly 10 percent of the farm receipts in 1997. The total value of output associated with poultry and egg production and processing in Indiana is estimated to have been 1.2 billion dollars. These activities produced household incomes of 259 million dollars in the state and provided employment for an estimated 10,839 persons. These estimates imply an average income of nearly 24 thousand dollars per person employed.

Broiler production and processing levels have been increased from those of 1997. Thus the value of production for the poultry industries is likely to be slightly higher in 1998.

References

Minnesota IMPLAN Group, Inc. 1997. IMPLAN *Professional: Social Accounting & Impact Analysis Software.*

Indiana Agricultural Statistics 1996-1997. 1997. Indiana Agricultural Statistics Service, Purdue University.

Table 4. Impact of Indiana's Poultry Industries in 1997

	Output	Employment	Income
Direct	$576,980,000	4,801	$106,889,007
Indirect	$439,969,752	3,216	$87,999,836
Induced	$183,338,280	2,822	$63,077,184
Total	$1,200,288,032	10,839	$257,966,027

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