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# Purdue Agricultural Economics Report

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AGRICULTURAL ECONOMICS DEPARTMENT • PURDUE UNIVERSITY

## Statewide Farmland Values Modestly Higher

*J.H. Atkinson, Professor and Kim Cook, Research Associate*

The Purdue land values survey revealed a statewide increase of 1.5% in the value of average-quality bare tillable land in the year ending in June 1992, about the same as the 2% estimate by USDA for the year ending January 1. The Federal Reserve Bank of Chicago survey of bankers also indicated a 2% increase for the year ending March 31.

According to the Purdue survey, this is the fifth consecutive year of increasing Indiana land values. Top-quality land values are now 40% above the low levels of 1987, according to the Purdue study, but are still 38% below the high of 1981. Furthermore, inflation of about 23% reduces the "real" increase in top and average land values since 1987 to 11%.

### Statewide Land Prices

The survey showed statewide average increases for the six months ending in June 1992 of 1.3% on top land and 1.0% on average and poor land, a little less than the slight increases reported for the same period a year ago. Thirty-eight percent of the respondents reported that most classes of land increased during the six-month period, 6% reported declines, and 52% felt there was no change in land values. These estimates are about the same as last year.

The statewide increase in value for the year ending in June 1992 was 2.4% on top land, 1.5% on average land, and

**Table 1. Average estimated land value per acre (tillable, bare land) and percentage change by geographic area and land class, selected time periods, Purdue Land Values Survey, Indiana, July 1992.**

| Area | Class | Corn bu/A | Dec. 1991 $ | June 1992 $ | Change 12/91-6/92 $ | Projected Dec. 1992 $ | Projected Change 6/92-12/92 $ |
|---|---|---|---|---|---|---|---|
| North | Top | 142 | 1677 | 1692 | 0.9 | 1703 | 0.7 |
| | Average | 112 | 1233 | 1240 | 0.6 | 1245 | 0.4 |
| | Poor | 84 | 869 | 876 | 0.8 | 875 | -0.1 |
| | Transitional[1] | | 2538 | 2571 | 1.3 | 2617 | 1.8 |
| Northeast | Top | 139 | 1503 | 1525 | 1.5 | 1534 | 0.6 |
| | Average | 113 | 1123 | 1118 | -0.4 | 1144 | 2.3 |
| | Poor | 87 | 794 | 796 | 0.3 | 798 | 0.3 |
| | Transitional[1] | | 3010 | 2918 | -3.1 | 2980 | 2.1 |
| W. Central | Top | 148 | 1825 | 1853 | 1.5 | 1860 | 0.4 |
| | Average | 123 | 1414 | 1439 | 1.8 | 1456 | 1.2 |
| | Poor | 96 | 1019 | 1028 | 0.9 | 1032 | 0.4 |
| | Transitional[1] | | 4270 | 4545 | 6.4 | 4610 | 1.4 |
| Central | Top | 148 | 1781 | 1814 | 1.9 | 1842 | 1.5 |
| | Average | 121 | 1418 | 1447 | 2.0 | 1464 | 1.2 |
| | Poor | 96 | 1063 | 1086 | 2.2 | 1091 | 0.5 |
| | Transitional[1] | | 3622 | 3798 | 4.9 | 3919 | 3.2 |
| Southwest | Top | 147 | 1814 | 1827 | 0.7 | 1839 | 0.7 |
| | Average | 118 | 1303 | 1309 | 0.5 | 1320 | 0.8 |
| | Poor | 91 | 864 | 868 | 0.5 | 863 | -0.6 |
| | Transitional[1] | | 2948 | 3005 | 1.9 | 2995 | -0.3 |
| Southeast | Top | 130 | 1096 | 1108 | 1.1 | 1117 | 0.8 |
| | Average | 105 | 851 | 856 | 0.6 | 858 | 0.2 |
| | Poor | 81 | 635 | 638 | 0.5 | 636 | -0.3 |
| | Transitional[1] | | 2224 | 2234 | 0.4 | 2239 | 0.2 |
| Indiana | Top | 143 | 1652 | 1673 | 1.3 | 1691 | 1.1 |
| | Average | 116 | 1252 | 1264 | 1.0 | 1281 | 1.3 |
| | Poor | 90 | 894 | 903 | 1.0 | 905 | 0.2 |
| | Transitional[1] | | 3090 | 3156 | 2.1 | 3221 | 2.1 |

1 *Land moving out of agriculture.*

1.1% on poor land (Table 2). These increases are the smallest since land values turned up in 1987.

Statewide, land rated at a long-term corn yield of 143 bushels per acre had an average estimated value of $1,673 per acre (Table 1) or $11.70 per bushel (Table 3). Average land (116 bushel yield) was valued at $1,264 per acre, while the 90-bushel poor land was estimated to be worth $903 per acre. Land values per bushel of yield were $10.90 on average land and $10.03 on poor land. These per-bushel figures are $.20 higher than last year on top land, $.17 lower on average land, and $.11 higher on poor land.

Transition land moving into nonfarm uses was estimated to have a value of $3,156 per acre in June 1992, about the same as a year earlier (Table 2). Only about 40% of the respondents report on transition land values—the range in estimates is quite wide and the reliability of the averages is not as good as with farmland.

## Statewide Rents Increase Slightly

Cash rents increased statewide from 1991 to 1992 by $2 per acre on top land and average land and $1 per acre on poor land (Table 4).

The estimated cash rent for average land was $90 per acre, $112 on top land, and $68 on poor land. Rent per bushel of estimated yield was $.78 on both top and average land, and $.76 on poor land. Cash rent on average land in 1992 was 15% below the record 1981 level and equal to the 1977 estimate (Figure 1).

Statewide, cash rent as a percentage of estimated land value has not changed for three years. Average figures are 6.7% for top land, 7.1% for average land, and 7.5% for poor-quality land (Table 4).

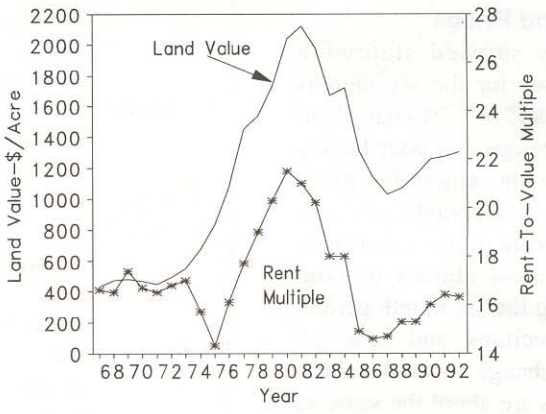
Another useful way to examine the relationship between cash rent and land values is to calculate a rent multiple by dividing estimated land value by cash rent. USDA estimates of real estate tax per acre were subtracted from rent, and multiples calculated as shown in Figure 1 (USDA rent and land value data were used prior to 1976). The estimated multiple on average land in 1992 was 15.6, much lower than the multiple of 21 to

**Table 2. June 1991 and June 1992 average estimated land value (tillable, bare land) and percentage change by geographic area and land class, Purdue Land Values Survey, July 1992.**

| Area | Class | Land Value June 1991 $ | Land Value June 1992 $ | Change 6/91-6/92 $ |
|---|---|---|---|---|
| North | Top | 1645 | 1692 | 2.9 |
| | Average | 1224 | 1240 | 1.3 |
| | Poor | 863 | 876 | 1.5 |
| Northeast | Top | 1467 | 1525 | 4.0 |
| | Average | 1108 | 1118 | 0.9 |
| | Poor | 771 | 796 | 3.2 |
| W. Central | Top | 1797 | 1853 | 3.1 |
| | Average | 1399 | 1439 | 2.9 |
| | Poor | 1020 | 1028 | 0.8 |
| Central | Top | 1767 | 1814 | 2.7 |
| | Average | 1406 | 1447 | 2.9 |
| | Poor | 1067 | 1086 | 1.8 |
| Southwest | Top | 1860 | 1827 | -1.8 |
| | Average | 1331 | 1309 | -1.7 |
| | Poor | 876 | 868 | -0.9 |
| Southeast | Top | 1115 | 1108 | -0.6 |
| | Average | 879 | 856 | -2.6 |
| | Poor | 663 | 638 | -3.8 |
| Indiana | Top | 1633 | 1673 | 2.4 |
| | Average | 1245 | 1264 | 1.5 |
| | Poor | 893 | 903 | 1.1 |
| | Transitional[2] | 3163 | 3156 | -0.2 |

2 *Land moving out of agriculture.*

**Figure 1. Indiana Land Values and Rent-to-Value Multiples**



22 in 1978-81. Land values fell faster than cash rents in the early 1980s, so the multiple fell to around 14 in 1986-87 and has risen since.

## Area Estimates

Farmland value increases from December 1991 to June 1992 were mostly under 1.5% in all areas of the state except central Indiana (Figure 2) where increases were around 2.0% (Table 1).

For the year ending in June 1992, small decreases occurred in all classes of farm land in the two southern areas (Table 2). Increases were noted in all classes of land in the other areas with the greatest at only 4%, or less than half of the greatest increase a year ago. Increases in other areas fill in the narrow range of about 1-3%. Transition land values declined from 3% to over 8% in all areas, except central Indiana where there was an increase of 8.3%, perhaps caused by considerable development activity north of Indianapolis.

The estimated average value of top-quality farm land at $1,853 per acre in the west central area was the highest of all areas. Southwest Indiana was second at $1,827 per acre, followed by $1,814 in the central area. The corn yield rating on top land was practically identical in these three areas, and the estimated land values varied by less than $40 per acre.

The percentage increase from the lows of 1987 has been greater in the southwest than in other areas—51% on average and poor land and 57% on top land. In the other areas, top land has increased 31% in the northeast and southeast, 35% in the central area, 41% in the north, and 46% in the west central area. This range was greater for average land, 27-47%, and poor land, 29-54%. However, these big percentage increases are from a low base. Also keep in mind that the 1992 values in all areas are lower than they were 15 to 16 years ago.

West central Indiana top land with a 148-bushel corn yield rating had an average value of $1,853 per acre or $12.52 per bushel (Table 3). This per-bushel figure for top land was from $11.92 to $12.26 in the north, southwest, and west central areas, $10.97 in the northeast, and $8.52 in the southeast. These per-bushel figures declined as land quality declined.

In all areas except the southeast and west central, per-acre rents for top and average land typically increased $1-2 from 1991 to 1992 (Table 4). There was no change in top land rent in the southeast and on average land in the west central area. Average and poor land rents in these areas declined $1-2.

**Table 3. Land value per bushel of estimated corn yield, Purdue Land Values Survey, Indiana, July 1992.**

| Area | Land Class | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Top | | | Average | | | Poor | | |
| | 1991 | 1992 | % Change | 1991 | 1992 | % Change | 1991 | 1992 | % Change |
| North | 1645 | 1692 | 2.9 | 1224 | 1240 | 1.3 | 863 | 876 | 1.5 |
| Northeast | 1467 | 1525 | 4.0 | 1108 | 1118 | 0.9 | 771 | 796 | 3.2 |
| W. Central | 1797 | 1853 | 3.1 | 1399 | 1439 | 2.9 | 1020 | 1028 | 0.8 |
| Central | 1767 | 1814 | 2.7 | 1406 | 1447 | 2.9 | 1067 | 1086 | 1.8 |
| Southwest | 1860 | 1827 | -1.8 | 1331 | 1309 | -1.7 | 876 | 868 | -0.9 |
| Southeast | 1115 | 1108 | -0.6 | 879 | 856 | -2.6 | 663 | 638 | -3.8 |
| Indiana | 1633 | 1673 | 2.4 | 1245 | 1264 | 1.5 | 893 | 903 | 1.1 |

**Table 4. Average estimated cash rents, bare tillable land, 1991 and 1992, Purdue Land Values Survey, Indiana, July 1992.**

| Area | Class | Corn bu/A | Rent/Acre | | Percent Change | Rent/bu. of Corn | | Rent as a % of June Land Value | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1991 $ | 1992 $ | '91 - '92 % | 1991 $ | 1992 $ | 1991 % | 1992 % |
| North | Top | 142 | 112 | 115 | 2.7 | 0.79 | 0.81 | 6.8 | 6.8 |
| | Average | 112 | 88 | 90 | 2.3 | 0.79 | 0.80 | 7.2 | 7.3 |
| | Poor | 84 | 66 | 66 | 0.0 | 0.79 | 0.79 | 7.6 | 7.5 |
| Northeast | Top | 139 | 98 | 100 | 2.0 | 0.71 | 0.72 | 6.7 | 6.6 |
| | Average | 113 | 77 | 79 | 2.6 | 0.68 | 0.70 | 6.9 | 7.1 |
| | Poor | 87 | 58 | 60 | 3.4 | 0.67 | 0.69 | 7.5 | 7.5 |
| W. Central | Top | 148 | 128 | 127 | -0.8 | 0.86 | 0.86 | 7.1 | 6.9 |
| | Average | 123 | 104 | 104 | 0.0 | 0.85 | 0.85 | 7.4 | 7.2 |
| | Poor | 96 | 81 | 80 | -1.2 | 0.84 | 0.83 | 7.9 | 7.8 |
| Central | Top | 148 | 121 | 123 | 1.7 | 0.82 | 0.83 | 6.8 | 6.8 |
| | Average | 121 | 100 | 101 | 1.0 | 0.83 | 0.83 | 7.1 | 7.0 |
| | Poor | 96 | 79 | 78 | -1.3 | 0.82 | 0.81 | 7.4 | 7.2 |
| Southwest | Top | 147 | 110 | 112 | 1.8 | 0.75 | 0.76 | 5.9 | 6.1 |
| | Average | 118 | 85 | 87 | 2.4 | 0.72 | 0.74 | 6.4 | 6.6 |
| | Poor | 91 | 62 | 64 | 3.2 | 0.68 | 0.70 | 7.1 | 7.4 |
| Southeast | Top | 130 | 83 | 83 | 0.0 | 0.64 | 0.64 | 7.4 | 7.5 |
| | Average | 105 | 66 | 65 | -1.5 | 0.63 | 0.62 | 7.5 | 7.6 |
| | Poor | 81 | 49 | 47 | -4.1 | 0.60 | 0.58 | 7.4 | 7.4 |
| Indiana | Top | 143 | 110 | 112 | 1.8 | 0.77 | 0.78 | 6.7 | 6.7 |
| | Average | 116 | 88 | 90 | 2.3 | 0.76 | 0.78 | 7.1 | 7.1 |
| | Poor | 90 | 67 | 68 | 1.5 | 0.74 | 0.76 | 7.5 | 7.5 |

Both land values and cash rents were highest in the west central area with an average cash rent of $127 per acre on top-quality land or $.86 per bushel. In the north, southwest, and central areas, per-bushel rents for the top land ranged from $.81 to $.86. The estimate for the northeast was $.72 and $.08 less in the southeast. As land quality declined, rent per bushel also tended to decline but by only a few cents per bushel. Budget analysis indicates that in many situations, $.10 per bushel more rent could easily be justified for top-quality land over average-quality land.

Cash rent as a percentage of land value changed very little from 1991 to 1992 (Table 4). There were slight declines for all classes of land in the west central area and increases in the southwest. A mixture of increases, decreases, and no change occurred in the other areas. These area average percentages fell in the range of 6.1% to 7.8% with a tendency for the percentage to increase as land quality decreased. Assuming real estate taxes to be 0.7% of land value, this is a rent multiple of 14 to 18.5.

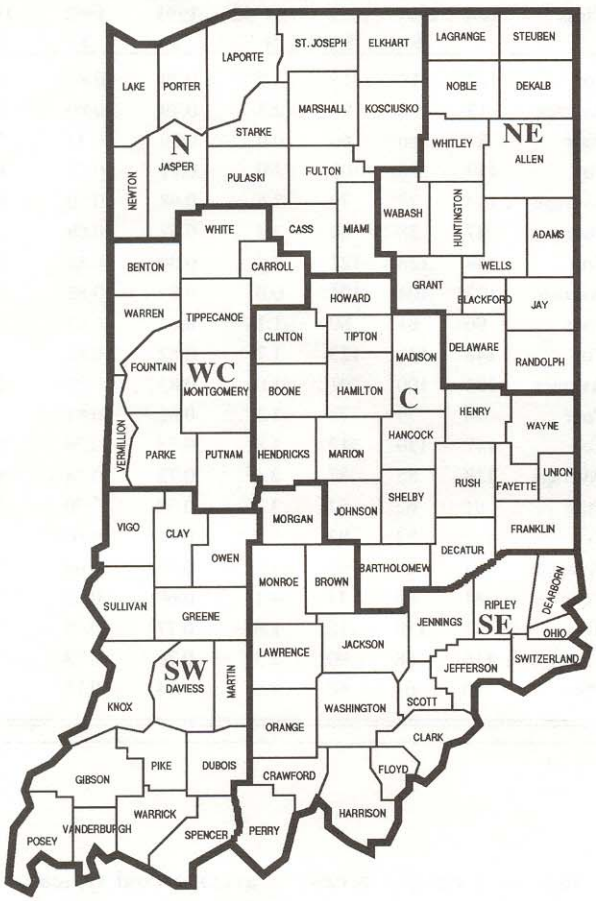
## Respondents' Outlook

There was a decline from last year in expectation that farmland values would rise by year-end. Only a fourth of the respondents expect some or all classes of land to increase, down from 39% last year. The average increase of 1.1% for top land was about the same as last year. Only 7% expected declines in some or all classes of land, while over half expected no change. Increases, mostly under 1.5% on top and average land, were expected in all areas of the state.

Eighty percent of the 1992 respondents expect land values to be higher five years hence, 17% expected no change, and 3% expected decreases. This year, the group expected an average increase of 9% for the five-year period, the same as last year.

Respondents were asked to estimate annual averages over the next five years for corn and soybean prices, the farm mortgage interest rate, and the rate of inflation. The projections they made in each year since 1984 are shown below:

**Figure 2. Geographic Areas Used in the Purdue Land Values Survey**




| | 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 |

The 1992 corn price expectation of $2.52 per bushel was $.05 higher than in 1991 and for beans was $.03 lower. Since 1987 the range in expectations has been only $.11 per bushel for corn and $.78 per bushel for soybeans. Interest rate expectations dropped for the third year in a row by nearly a full percentage point to 9.5%, the lowest level since this question was first asked in 1983. The expectations for inflation declined to 3.8%, in contrast to 6.5% expected in 1984. The difference between the expected interest rate and the inflation rate, sometimes used as a rough measure of the "real" interest rate, was 5.7, down from the narrow range of 6.2-6.4 from 1987-91.

### Our Views of the Future

Our respondents' consensus of a slight increase in land values by the end of the year appears reasonable as a continuation of the recent trend in values. The lowest interest rates in about two decades plus generally good crop prospects, even at lower prices, may provide stimulus for slight increases in land values by next spring, but probably at less than the inflation rate for the year.

Over the next several years, farmers' costs of environmental protection will increase, caused either by increased expenses, lower yields, or both. Interest rates likely will increase a little from present levels, exports of grain will remain sluggish, and government payments to agriculture may decline. These factors, which exert a negative influence on farm earnings and thus on land values, will be at least partially offset by positive factors. Gradual increases in crop yields will continue from application of new technology in plant breeding, weed control, fertilization, and so on. The shift to reduced tillage increases the amount of land that can be farmed in a timely manner and tends to increase the demand for land. Investment in land by pension funds as a diversification strategy may also add to the overall demand for land. Important, but non-revolutionary technology probably will add to farm earnings. Examples are input control systems which permit site-specific placement of fertilizer and herbicides, biological pest control, and herbicide-resistant varieties. Small but continuing increases likely will occur in the use of corn for ethanol production.

Overriding these plus and minus factors in the land market is the distinct probability of a major shortfall in grain and soybean production sometime within the next several years, possibly as early as 1993, according to some "El Niño" observers. When a reduction in world production of grain occurs, stocks will be drawn down, prices will rise, and a more optimistic view of the future of farm profits could develop. Land prices likely would rise in response to higher expected returns. In addition, the rent multiple tends to increase when a definite rising trend in earnings is identified.

The cash rent multiple in Indiana and several other Corn Belt states is well below the recent high records of the late 1970s to early 1980s. Although the multiple is higher than the low levels of 1985-88, it is a little lower than the average of the fairly stable period of 1967-72. Thus, there is the probability that the effect on land values of a few years of increasing returns to land could be magnified by a simultaneous increase in the value rent multiple.

Cautious investors would be well advised to buy and finance land assuming that land values over the rest of the decade will do little more than keep up with inflation (little or no increase in "real" values); however, we believe that there is more upside potential in land values than there is downside risk even though, in the very short run, slight decreases might occur. Remember, too, that because of the imprecise nature of land value estimation, a reported change of 1-3% per year either up or down may simply indicate a stable market rather than a trend.

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*The land values survey was made possible by the cooperation of professional farm managers, appraisers, brokers, bankers, and persons representing the Farm Credit System, the Farmers Home Administration, ASCS county offices, and insurance companies. Their daily work requires that they keep well-informed about land values and cash rent in Indiana. The authors express sincere thanks to these friends of Purdue and Indiana agriculture. They provided over 350 responses representing most of Indiana's counties. We also express appreciation to Sandy Dottle of the Department of Agricultural Economics for her help in conducting the survey, and to Ag Econ Professors Chris Hurt and Mike Boehlje for their review of this report and helpful suggestions.*

## Indiana Agriculture 2000: A Strategic Perspective

***Don't miss out on your chance to learn about the future of Hoosier agriculture!***

As we reported in our June issue, Purdue's Department of Agricultural Economics recently released the study *Indiana Agriculture 2000: A Strategic Perspective*. This 259-page report analyzes issues, industries, and trends that will affect Indiana's food and agricultural sectors through the year 2000.

To order your copy of this study, send your name and address, with a check for $14.70, including state tax, to:

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You can also order a 38-page summary of the report for $4.20, including tax.

Don't miss out on your chance to learn about the future of Hoosier agriculture!

# Agricultural Development in Eastern Germany: Some Early Patterns

*Philip L. Paarlberg, Associate Professor*

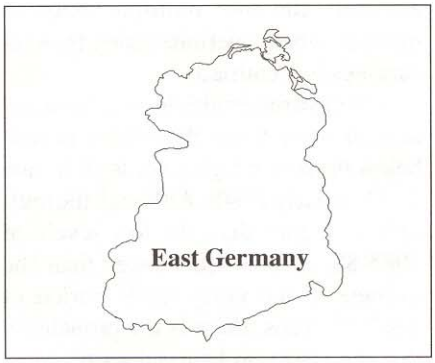
Agriculture in eastern Germany is undergoing enormous changes due to the introduction of market forces and the unification of Germany. The shift of that economy from communism to a market economy has profound direct impacts on U.S. agriculture and provides lessons for other eastern European nations.

This article discusses the eastern German experience during the first two years of economic reform and presents some longer-run influences on U.S. agriculture. To do this, the interaction of agriculture with the total economy is considered. The article begins with a description of the development bottlenecks facing eastern Germany, then covers the policies used to release these bottlenecks. The third section summarizes the initial reaction of the economy to market forces. The final section speculates on how the United States will be affected.

## Development Bottlenecks

The problems facing eastern German economic development with the fall of communism can be grouped into four categories. These are related to one another. The economy needs vast amounts of capital investment as well as a reallocation of labor. These changes can only be accomplished if a completely new system of economic, political, social, and legal rights can be created and preserved. Without these conditions, eastern German firms and farms are unable to withstand competition from western nations.

Driving into eastern Germany, the need for investment is clear. The capital stock is old, worn-out, and the technology outdated. Essentially all houses, buildings, roads, railroads, and other capital must be replaced. The agricultural situation is equally poor. More than one-half of the animals are housed in outdated facilities. These facilities contribute to high production costs as they are labor-intensive and in poor repair. The existing size of units is a serious problem — under central planning, investment was directed into excessively large buildings which cannot be subdivided into the smaller units needed by private farmers. A similar situation exists for machinery as the average age for tractors is 14 years and that for other equipment is 15 years. Estimates of the cost of modernizing the capital stock range from 750 billion dollars and up.




The labor market is a particularly serious development constraint. In the communist period, labor was not paid based on its performance and could not be dismissed. The result was that labor was overpaid and undermotivated with adverse effects on productivity. Estimates of labor productivity with respect to West Germany varied from 30-50%. Firms and farms organized along industrial lines carried more labor than needed and this labor became specialized. A worker who drove a farm truck could not be used in field operations or in livestock facilities. There are no farmers in the western sense and many individuals are reluctant to become private farmers as they lack the knowledge and the willingness to accept risk.

With the opening of the border, eastern Germany faced two problems. First, labor had to be released from overstaffed enterprises in all sectors at the same time. Second, the labor that voluntarily left for the west was generally the younger skilled labor needed to efficiently operate firms. Loss of this labor threatened to damage the economy by creating an unfavorable age structure. Young skilled labor needed to be retained while at the same time sharply reducing the total employment.

A major problem is rebuilding the system of economic rights. This is a complex and difficult task as an entire catalogue of conditions had to be introduced, including private ownership, employment freedom, a functional banking and tax system, investment freedom, and contract freedom. Also, a market economy could not be successfully introduced without an understanding of how such a system functions and what rights and obligations exist. These functions form the essential structure of a market economy. Without these preconditions, other reforms such as price reform, currency reform, and investment aids have limited effectiveness.

These bottlenecks create a competitiveness problem for eastern Germany, as hardly any firm is competitive in international markets and the capability to become so is limited. Analyses of collective farms made before unification predicted negative returns. Introduction of prices as set by the European Community (EC) reduced agricultural income 48%. Without major adjustments in production patterns, inputs, and farm organization, there is little chance for farms to survive.

## Breaking Obstacles to Development

This section describes the comprehensive set of policies used to attack the problems facing eastern Germany following the end of the communist government. The cost to Germany of these measures in 1991 was over 100 billion dollars and spending at that level will likely continue for the next several years.

Rebuilding the economic, social, and political system is being accomplished in the form of four instruments. The first tool is the treaty of economic and monetary union of July 1, 1990. This treaty replaces the existing East German economic system with that of West Germany. The West German mark has replaced the East German mark at an overvalued rate. The EC's agricultural policy has been transferred with temporary special provisions. This treaty also transfers other features of the West German economy, such as labor law and social insurance policies.

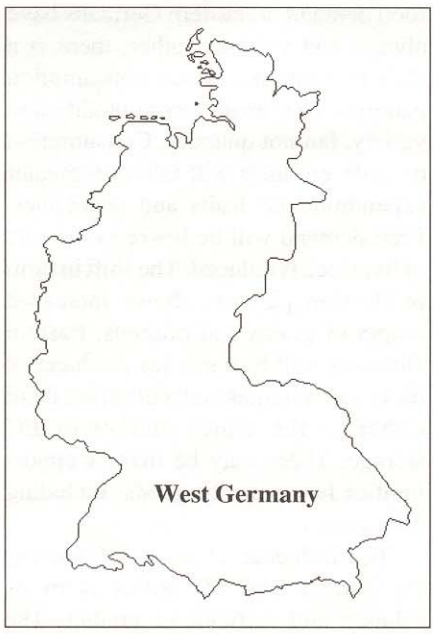
A second treaty of October 3, 1990 transfers the political system of West Germany to the east and created a unified country — at least officially. These treaties create the necessary preconditions for functioning markets.

An important aspect of the shift from communism to a market economy concerns private property. Privatization of state-owned assets is the responsibility of an agency established for that task — the Treuhandanstalt (Treuhand). State-owned assets have been transferred for administration to the Treuhand which is to sell them for profit when a return to previous owners is not possible. Also, the agency is expected to aid the structural adjustment of the economy and to rationalize businesses. These objectives are contradictory and the actions of the agency create much controversy. Since there is an excess of labor, the Treuhand has sharply cut employment and labor groups often see it as hostile to job creation. For farmland under its control the Treuhand operates with leasing agreements. Actual sale is to be spread across decades to avoid disrupting the land market.

Much of the agricultural land and capital officially remained the property of collective farm members without the right to determine its use. This land is shifted from collective farms to private farms through the agricultural adjustment law. The law grants all voluntarily formed business organizations equal competitive opportunities and establishes procedures for transferring collective farms' assets to other forms. A critical feature of the law is that the value of the collective's assets and the debt structure must be established and divided among hundreds of members. Foregone labor and capital payments must be paid from the collective's value. A series of disputes are arising over valuation, division, responsibility for debts, the claims of departing members, EC quota rights, and procedures for dissolution.

The uncompetitive firms and farms in eastern Germany require new capital investment. Labor must be retrained for other jobs. Those are long-run processes, and in the short run, much of the economy cannot compete with western firms. This means liquidity problems for businesses and unemployment. A series of short-run transfer programs are used to give firms and farms liquidity as well as aiding displaced workers. The intention of these programs is to keep as much economic activity underway as possible and to smooth the labor adjustment. There is an extensive number of reeducation and retraining programs. Several forms of early retirement schemes have been introduced. Through the end of 1991, firms were paid to keep unneeded labor on the payroll.

There are a large number of programs offered to eastern Germany with the intention of restructuring and modernizing the economy. These investment aid programs are targeted by activity. Most are indirect subsidies in the form of reduced interest, credit assistance, credit guarantees, accelerated depreciation, and tax credits. They are large in number and in spending, with the expectation that outlays will be required for years to come.




## Actual Adjustments Seen

The patterns of adjustments to a market economy are along the lines expected, but the severity is greater. Unemployment (including short-time labor) rose quickly during the summer of 1990 to over 20 percent. By early 1991, effective unemployment was around 30% and has stabilized at that level since. Of the 850,000 employed in agriculture in 1989, about 250,000 remain. Before the border opened, wages in East Germany were about one-third those in West Germany. With the changes there has been tremendous upward wage pressure, and wages now are about 75% of western levels. The goal of labor unions is wage equalization by the mid-1990s. Wage increases have outstripped productivity increases, thereby raising labor costs for firms with adverse effects on output and employment.

Economic reform in other countries has often been associated with inflation, but this is not a serious problem in eastern Germany. One reason is the monetary overhang and pent-up demand was not as serious as in other nations and was quickly satisfied by imports from western Germany. The German central bank is committed to fighting inflation. The economic and monetary union puts downward pressure on output prices. The average producer price for industrial goods halved from May to July 1990. The pricing structure of the communist government was not one of exclusively low prices. Prices for durable items were kept high so that liberalization allows these prices to fall. The system of consumer subsidies is being removed gradually so that the price adjustment is smoothed. While consumer prices for food are roughly 25% higher without the subsidies, farm prices collapsed with the introduction of EC prices. The East German government followed a food self-sufficiency policy and prices

for producers were excessively high even compared to prices in EC countries.

The output of the eastern German economy has fallen sharply and has shifted its composition. Industrial output is the most serious problem — down 32% in 1990 and another 60% in 1991. The construction, distribution, and craft sectors contracted in 1990, but have been expanding since then. The service sector of the eastern Germany economy has become the winner with an increase of 23% in 1990 and 40% in 1991. It is now the largest sector, whereas before it was about one-third the size of industrial output.

Agricultural output was also adversely affected. In 1990 its value fell 37% and in 1991 another 13%. The downward adjustment in livestock generally exceeded that for crops. In 1990 the cattle herd fell 14% while swine and layers were down 27 and 28%. In 1991 the drop in cattle slowed to 4% (milk cows continued to drop at 17%). Populations of swine and layers continued to drop sharply — 26 and 16%. Crop area adjusted little the first year, with the 19% decline in potato area the exception. Area in 1991 had time to adjust and with the introduction of the EC set-aside more changes occurred. Grain area fell 19%, sugar beet area 23%, potato area 68%. Within the grain area there was a shift away from rye and oats and in favor of wheat and barley. Rapeseed was the winner with a 112% area expansion due to the less severe producer price decline.

***The developments in eastern Germany will influence U.S. agriculture.***

For the 1989-1991 period, some patterns are clear. Livestock inventories fell earlier than did crops and the adjustment was greater. This type of adjustment under EC conditions was expected. The relative shift to EC prices was to the disadvantage of livestock. The old, labor-intensive capital stock was in poorer shape in the livestock sector. Crops could more easily adjust input use and the large crop farms could more easily be divided among individuals. The EC milk quotas and limits in the investment aids programs on livestock investment disadvantaged livestock. Sale of livestock and crop set-aside were attractive to farms in desperate need of liquidity. Finally, the food processing sector of eastern Germany was no longer functional and crops could be more easily sent west for marketing.

## Influences on the United States

The developments in eastern Germany will influence U.S. agriculture. There is the issue of whether eastern Germany will be a market or a competitor. Also, the influence of eastern Germany on EC decisionmaking and policy must be considered. Finally, there are lessons for our development assistance to eastern Europe.

When the Berlin Wall first collapsed, many recalled that East Germany had been a major market for U.S. grains and soybean products in the 1970s. With the economic problems in East Germany, that market had stagnated and shrunk. Could it be that economic reform would expand market opportunities for U.S. farm goods? Given the shifts of the past few years, the answer appears at this point to be no. There is no evidence of an expansion in food demand, as eastern Germans have always had volume; rather, there is a shift to western German consumption patterns. That means more quality and variety, but not quantity. Consumption of grain products will fall with greater expenditure on fruits and vegetables. Feed demand will be lower as the role of livestock is reduced. The shift in farm production patterns shows increased output of grains and oilseeds. Eastern Germany will be a surplus producer of these commodities and will export them either to the world market or EC storage. There may be market opportunities for specialty goods, including corn gluten.

The influence of eastern Germany on German and EC policy is in its infancy and difficult to predict. The development needs and farm structure of the east create a fundamentally different farm policy agenda for German policy-makers. They must deal with a farm structure of tiny farms in the west and farms of thousands of acres in the east. This has put tension into farm policy in Germany and the EC. Whereas initially Germany favored targeting programs to small farmers, that position is gone. The Germans are trying to gain advantages for the east as a special region. The cost of reform in the east also affects the situation. Western German taxpayers are making large transfer payments to the east. The Germans have also been the major contributor to the EC budget. With German unification the German budget situation has become serious. They cannot continue as the paymaster of Europe and actually need an inflow of foreign capital and EC development funds. In the recent EC agricultural policy reform discussion, the Germans departed from their normal policy of opposing price cuts and accepted reform. Yet they fear the effect of reduced prices on the weak eastern farms. This attitude also affects their view of the GATT negotiations. German domestic farm policy and their views on EC policy are presently divided and erratic.

There are several lessons from the German experience. Adopting the mechanics of a market economy without the necessary functioning institutions will have limited effectiveness. Another lesson is the critical role of the labor market to the reform process. Labor market failures in eastern Germany have undermined the development process. The complicated task of restoring private property must be done carefully and quickly. The German court system is overcome by property claims and physical restitution will take decades. This derails the needed investment. The German experience also shows the problems of using investment aids when businesses face liquidity problems and no collateral. Schemes to aid investment when citizens cannot offer collateral and have persistent liquidity problems slows the development process.

# America's Farmers: Environmental Stewards or Ravagers of the Land?

*Stephen B. Lovejoy, Professor and Coordinator of the Center for Alternative Agricultural Systems*

American agriculture is increasingly seen as a major cause of water quality problems. Farm magazines carry stories about water quality problems caused by the production of food and fiber, and the general public is treated to articles and documentaries on the "agricultural" problem. Calls for agricultural production which is more environmentally benign are rampant. These range from calls for tillage changes, to more radical calls to forego all agricultural chemicals and farm organically, or even to return to our days as hunters and gathers. As concern for environmental resources has grown, environmentalists have called for more regulatory control of the production of food and fiber to protect valuable natural resources, including water quality.

As illustrated by Figure 1, Americans have increasingly been suggesting that we have too few regulations in the area of environmental protection. These attitudes toward regulation for environmental protection were increasing even through the early 1980s when the government, with popular support, was deregulating various sectors of the economy.

Recently, there have been suggestions to legislate this control through the Clean Water Act, especially Section 319, which will be reauthorized by Congress. Some environmentalists suggest that America's farmers have had a free ride long enough; other American businesses have been reducing their degradation of water resources while farmers have been conducting business as usual. The logic seems to be that farmers must be coerced into appropriate environmental behavior just as society had to force industries into protecting the environment.

If we examine the behavior of non-farm businesses, utilizing our economic tools, the logic seems to be overwhelming. Businesses are concerned with the bottom line, and externalities like water pollution are imposed upon society without a charge. When the businesses are forced to internalize some of the costs of pollution, they behave more appropriately. When we look at point sources of water pollution, this logic seems impeccable. Industries did little or nothing to reduce their discharges until forced to do so by regulation with the threat of penalty. After two decades of such regulation of point sources of pollution, we have made significant progress in providing Americans with cleaner water.

Now however, many observers suggest that in order to meet our water quality goals, originally established in 1972 as fishable and swimmable, we must regulate nonpoint sources of pollution, especially agriculture. The logic is that we have ignored the role of agricultural producers in water quality and we have arrived at the point where controls on industry can only be made at large unit costs. This logic also suggests that farmers have not sacrificed and now is the time. The assumption in most of this is that farmers have not been performing their role as environmental stewards — in fact, they have been ravagers of our resources much like the non-farm businesses.

But what do we know about water pollution from agricultural operations? According to USDA publications on the Resource Conservation Act (RCA) assessments, between 1977 and 1982 American agriculture increased the number of cropland acres 2% while at the same time reducing the tons of sheet and rill erosion from cropland by over 1% [1,2].

The changes in erosion since 1982 have been much more dramatic. In the 1980s, farmers made significant changes in their cropland production patterns, including less tillage and more rotations. In addition, government programs made other changes attractive, e.g., Conservation Reserve Program (CRP) and Conservation Compliance (CC). Between 1982 and 1990, our research estimates that the erosion was greatly reduced and loadings of sediment into our waters was reduced by 29% [3]. In addition, the phosphorus and nitrogen attached to those soil particles was also reduced by 29%. These estimates include the CRP acreage but not the impact of changes resulting from conservation compliance plans.

By 1995, all conservation compliance plans should be implemented and gross erosion will be further reduced. Our estimate of the impact on the loading of sediment into our nation's waterbodies by 1995 is a reduction of 49% from 1982 levels; similar percentage reductions in nitrogen and phosphorus would be expected [3].

The question becomes how much further should agriculture go, and where is the cheapest alternative for achieving increased water quality — controls on agriculture or additional controls on industries?

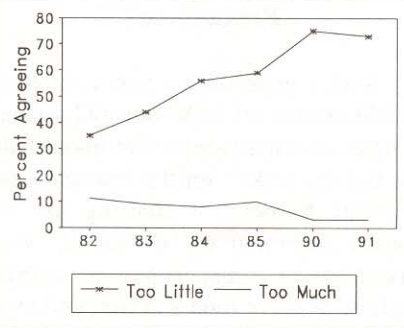
Agriculture has made extraordinary progress without requiring a great deal of regulatory control — certainly agriculture has made more progress without regulation than other industries.

While it is uncertain how much additional progress the agricultural sector can make voluntarily, that should be an empirical issue, not an assumption that America's farmers have done nothing about meeting society's water quality goals.

## References

1. USDA. 1980. Soil, Water and Related Resources in the United States: Analysis of Resource Trends. RCA.
2. USDA. 1989. The Second RCA Appraisal.
3. Lovejoy, Stephen B. Interim Report 3 from Purdue University to USDA, Soil Conservation Service. 1991.

**Figure 1. Too Much or Too Little Regulation in Environmental Protection**



# Indiana Restaurants: A Promising Market for Indiana Aquaculture

*Jean Rosscup Riepe, Research Associate and Marshall A. Martin, Professor*

At the same time that Americans are increasing their per capita consumption of seafood, natural constraints on wild catch are limiting the seafood supply. Aquaculture offers an alternative to fill this gap. Many farmers are seeking profitable alternative enterprises. Some forward-thinking Indiana farmers see aquaculture as a natural fit given their experience with livestock; the abundance of clean water, corn, and soybean meal; and the availability of small ponds or unused livestock facilities. In recent years, Purdue University staff have received numerous inquiries from Indiana farmers interested in starting an aquaculture operation. Purdue has responded by hiring an extension aquaculture specialist and expanding its aquaculture research program. However, little market analysis has been conducted on the potential for farm-raised fish in Indiana. That is the focus of this article.

Lack of market knowledge has been a great source of uncertainty for current and potential aquaculturists in the Midwest. Given the costs and risks of starting up an aquaculture operation, market information is critical. To address this need, a survey of Indiana restaurants' finfish sales and purchasing behavior was conducted in June, 1991. Restaurants were chosen as a key set of potential customers because they often comprise the first successful market for farm-raised fish.

## Survey Description and Procedures

A four-page survey was mailed to 2,864 restaurants in the state of Indiana. These restaurants represent about half of the restaurants on the Indiana Restaurant Association mailing list. A broad definition of "restaurant" was used since many types of establishments serve food and fish, and thus are potential customers for local aquaculturists. The survey contained four sections: (1) socioeconomic classification, (2) current fish suppliers and their characteristics, (3) interest in farm-raised fish species and factors affecting their purchase, and (4) catfish purchasing preferences. After two mailings, a total of 711 usable surveys were returned yielding a response rate of 25%.

## Survey Results

### Characterization of Respondents

Restaurants are not homogenous. The percentages in Table 1 reveal the socioeconomic diversity of the restaurants responding to the survey. Restaurant classifications were made based on type of ownership, style of service, primary sales, size (gross sales level), location in Indiana, and local population. Almost all respondents (90.4%) classified themselves as "independent." About 56% of the respondents indicated their style of service as either family-style or atmosphere table service. The 21.8% classified as "other" are primarily taverns and private clubs. Half of all respondents indicated that they primarily sold food while one-fourth (23.7%) reported primary sales as alcoholic beverages. While all sizes of restaurants are represented among the respondents, 74.1% are of either small or medium size (annual gross

**Table 1. Socioeconomic Characteristics of Respondents, 1991 Indiana Restaurant Survey.**

| Socioeconomic characteristics | Percentage of respondents in category | Socioeconomic characteristics | Percentage of respondents in category |
|---|---|---|---|
| | - - percentage - - | | - - percentage - - |
| Type of ownership | | Size | |
| Independent | 90.4 | Small | 30.5 |
| Regional chain | 2.8 | Medium | 43.6 |
| National chain | 6.8 | Moderately large | 14.8 |
| | 100.0 | Large | 6.4 |
| | | Very large | 4.7 |
| | | | 100.0 |
| Style of service | | | |
| Fast food | 8.1 | | |
| Sandwich shop | 10.6 | | |
| Cafeteria | 3.4 | State location | |
| Table service | | North | 35.5 |
| Family style | 32.8 | Central | 43.2 |
| Atmosphere | 23.3 | South | 21.3 |
| Other | 21.8 | | 100.0 |
| | 100.0 | | |
| Primary sales | | Local population | |
| Food | 50.2 | Under 5,000 | 22.0 |
| Alcoholic beverages | 23.7 | 5,000-15,000 | 19.1 |
| Food/alcohol equal | 21.7 | 15,001-50,000 | 21.9 |
| Other | 4.4 | 50,001-100,000 | 12.0 |
| | 100.0 | Over 100,000 | 25.0 |
| | | | 100.0 |

sales less than $500,000). Twice as many respondents are located in central Indiana (43.2%) as in southern Indiana (21.3%). Just over one-third are located in the northern part of the state. The restaurants are evenly distributed among population centers ranging in size from less than 5,000 (rural) to over 100,000 (major urban).

Since no socioeconomic data are available for all Indiana restaurants, the informed opinions of a Purdue University Restaurant, Hotel, Institutional, and Tourism Management professor and an Indiana Restaurant Association executive staff member were sought to determine the relationship between survey respondents and all Indiana restaurants. These experts noted that the survey group is biased toward restaurants that are independent, are smaller in size, provide table service, and rely on alcoholic beverage sales. More specifically, the experts pointed out that while only about 10% of the respondents indicated any chain affiliation, 50% is probably more accurate. Also, fast food service likely accounts for up to half of all Indiana restaurants rather than the 18.7% that classified themselves as either fast food or sandwich shop. The diversity within the respondent group as well as the differences between the responding restaurants and the entire population of Indiana restaurants must be kept in mind when interpreting survey results, especially for averages across all responding restaurants. Still, the survey results offer useful insights into Indiana restaurants as a potential market for farm-raised fish.

## Likelihood of Offering Fish

About two-thirds (66.8%) of all responding restaurants currently offer fish on their menus, another 10% are considering it, and almost one-fourth (23.3%) indicated that they have no plans to ever offer fish (Table 2). Given the diversity among restaurants, percentages were calculated for the various socioeconomic subgroups.

To establish whether or not there are statistically significant differences in preference for offering fish across socioeconomic characteristics, statistical tests were performed on the cross tabulation frequencies between answers to the question about offering fish and each question about characteristic classification. Only two characteristics were found to be unrelated to a preference for offering or not offering fish: local population and location in the state. This means that a responding restaurant was not more or less likely to offer fish because it is located in the northern part of the state rather than the southern or in a rural area as opposed to a large metropolitan area.

For socioeconomic characteristics for which the preference for offering fish differs significantly (99% confidence), the response frequencies to the question about offering fish are presented in Table 2. Higher percentages in the "Currently" column indicate that restaurants with the associated socioeconomic characteristics are more likely to offer fish than restaurants with characteristics exhibiting lower percentages. Since restaurants that already offer finfish are more likely to become successful markets for farm-raised fish, this information suggests that a marketing plan for farm-raised fish should identify those restaurants that currently offer fish based on observable socioeconomic characteristics.

Results indicate that national chain and independent restaurants have a stronger preference for offering fish than do regional chain restaurants. While independents and national chains both exhibit response rates similar to the average for all respondents, only 35% of regional chains indicated that they currently offer fish, and a large majority (60%) never intend to offer fish. Of all types of restaurants, regional chains are the least likely to offer fish.

The likelihood of offering fish differs by style of service. Cafeterias, followed by atmosphere and family-style

**Table 2. Percentages of Respondents That Are Currently, Considering, or Never Offering Fish on Their Menus by Socioeconomic Characteristics, 1991 Indiana Restaurant Survey.**

| Socioeconomic characteristics | Offering fish | | |
|---|---|---|---|
| | Currently | Considering | Never |
| | percentage | | |
| All respondents | 66.8 | 9.9 | 23.3 |
| Type of ownership | | | |
| Independent | 68.1 | 10.0 | 21.9 |
| Regional chain | 35.0 | 5.0 | 60.0 |
| National chain | 66.0 | 10.6 | 23.4 |
| Style of service | | | |
| Fast food | 40.3 | 12.3 | 47.4 |
| Sandwich shop | 34.2 | 21.9 | 43.8 |
| Cafeteria | 91.7 | 4.2 | 4.2 |
| Table service | | | |
| Family style | 80.5 | 3.0 | 16.4 |
| Atmosphere | 84.8 | 7.9 | 7.3 |
| Other | 49.0 | 15.2 | 35.8 |
| Primary sales | | | |
| Food | 75.6 | 6.2 | 18.1 |
| Alcoholic beverages | 39.5 | 16.0 | 44.4 |
| Food/alcohol equal | 77.0 | 11.2 | 11.8 |
| Size | | | |
| Small | 50.7 | 13.2 | 36.1 |
| Medium | 69.5 | 9.8 | 20.7 |
| Moderately large | 81.0 | 6.0 | 13.0 |
| Large | 90.9 | 4.5 | 4.5 |
| Very large | 81.2 | 6.2 | 12.5 |

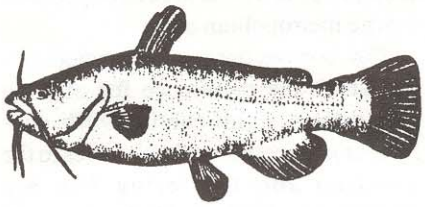
table-service restaurants, are the most likely to offer fish. From 80.5 to 91.7% of the restaurants in these three categories offer fish. These figures are substantially higher than the overall average of 66.8%. The remaining service styles are much less likely to offer fish. Although sandwich shops are the least likely to offer fish (34.2%), they are the most likely to consider offering fish (21.9%). Fast food restaurants are the most likely never to offer fish.

Restaurants responding to the survey differ in their likelihood of offering fish depending on their primary sales item. Respondents who indicated that food sales are either primary or at least as important as alcoholic beverage sales have a much stronger preference for offering fish than do respondents primarily selling alcoholic beverages (Table 2). About 76% of the food-oriented establishments offer fish, while only 39.5% of the establishments that primarily serve alcoholic beverages serve fish. However, restaurants primarily selling alcoholic beverages have the highest proportion considering fish. Restaurants with sales split about evenly between food and alcohol have the lowest percentage indicating that they would never offer fish.

The size of a restaurant, as determined by gross sales, also is an indicator of likelihood to offer fish. The likelihood of offering fish tends to increase with the size of the restaurant (Table 2). Only half of the small restaurants offer fish while 69.5% and 90.9% of the medium and large size restaurants, respectively, offer fish. The percentages are reversed for considering and never offering fish, with small restaurants more likely to consider offering (13.2%) or never to offer (36.1%) fish.

## Most Popular Species

Respondents offering fish were asked to list their first, second, and third most popular finfish species in terms of sales. Cod is the most popular fish in Indiana restaurants, with 48.7% of all respondents listing it as one of their three most popular species. Catfish and perch are the clear second and third most popular species with 39.4% and 27.1% of the respondents listing these species, respectively. These relative rankings hold whether looking at species in terms of being any one of three most popular species or in terms of being ranked as first most popular. Other species in order of popularity are orange roughy, whitefish/pollock, salmon, walleye, swordfish, tuna, sole, halibut, red snapper, and trout.



The high ranking of catfish is rather surprising given that Indiana is not a traditional catfish-consumption area. Apparently the marketing efforts of southern catfish producers and processors have successfully wooed Indiana consumers into trying and liking catfish when they eat out at restaurants. This is an encouraging sign for Indiana producers of catfish and bodes well for the introduction of other farm-raised species into the restaurant market. The high incidence of perch sales by Indiana restaurants can probably be explained as a regional phenomenon associated with availability of freshwater perch supplies from Lake Michigan and smaller local lakes. The Midwestern preference for perch and catfish is corroborated by a national telephone survey completed in 1988 (Engle et al.). While perch was not found to be among the 10 best selling species of fish and seafood in restaurants nationwide, it ranked third after shrimp and cod in the states surrounding Lake Michigan. Consumers in the region ranked perch and catfish as their top two favorite finfish.

## Fish Suppliers

When asked to rank fish suppliers by volume, a substantial majority of the respondents (69%) ranked local wholesalers/distributors as number one. Remaining types of businesses and the percentage of respondents ranking each as first by volume include: out-of-state wholesaler (18.7%), producer of farm-raised fish (3.3%), retailer (2.9%), lake or coastal fleet (1.3%), other (0.7%), and processor (0.1%). Since wholesalers so strongly dominate the fish supply market, perhaps they should be targeted as a likely market for Indiana farm-raised fish. That "producer of farm-raised fish" is the third ranked fish supplier implies that some aquaculturists are already successfully marketing their products. However, some of these producers likely are located outside Indiana.

Survey results reveal that 95.7% of the responding restaurant managers make their own decisions on the selection of fish suppliers. This implies that Indiana aquaculturists should be able to market fish directly to restaurateurs. The only socioeconomic subgroups of responding restaurants in which less than 90% reported making their own decisions are: national chains (71.4%), regional chains (61.3%), fast food style (70.0%), large size (86.8%), and very large size (88.5%).

Restaurant managers were asked to rate the importance of several characteristics in influencing supplier selection, and then to list the three most important. The top five characteristics were rated significantly more important than the others. These top characteristics, along with the percentage of respondents listing it as one of the three most important, include: high-quality product (82.6%), price (57.0%), year-round supply (55.3%), consistent sizing (46.4%), and good reputation (17.4%).

## Farm-Raised Fish

Over half (56.0%) of the respondents who are already offering fish, or are considering offering it, indicated that they are either currently offering or considering offering farm-raised fish on their menus. Responses are statistically different by style of service, primary sales, size, and volume of fish purchases (99% confidence). Socioeconomic subgroups having greater than 60% of the respondents offering or considering offering farm-raised fish include: "Cafeteria" and "Table-service" (family style and atmosphere) styles,

primarily food-offering restaurants, all sizes except "Small" and "Large," all state locations except "North," and respondents with "Medium" or "High" volumes of fish purchases (more than $6,000).

Restaurant managers were asked to indicate their interest in offering several farm-raised species by checking one of four possible responses: "Wouldn't Offer(=1)," "Uncertain(=2)," "Plan to Offer(=3)," and "Offer Now(=4)." Numeric values were assigned to the responses ("Wouldn't Offer" = 1) and averaged across all respondents for each species to obtain an average score for the species. Higher scores indicate higher interest levels by respondents.

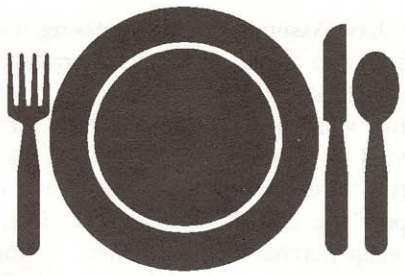
Catfish is currently being offered by 66.4% of the responding restaurants (Table 3). The average score for catfish (3.47) is significantly higher than the scores of other species indicating that respondents are the most interested in offering farm-raised catfish. Trout is the second most popular farm-raised species with 22.1% of the respondents currently offering it and almost as high a percentage, 19.0, planning to offer it. Walleye, perch, and salmon rank third, fourth, and fifth, respectively, in interest of responding restaurant managers. These are followed, somewhat distantly, by large-mouth bass, hybrid striped bass, bluegill, and tilapia.

All but three (walleye, salmon, tilapia) of the farm-raised species included in the survey are being produced in Indiana aquaculture operations (Scott, Swann). Survey results suggest that Indiana restaurants comprise a ready market for catfish and trout, while selling large-mouth bass, hybrid striped bass, or bluegill to the restaurants will be a tougher marketing challenge.

The importance of various factors in encouraging respondents to purchase local farm-raised fish were rated by respondents who were then asked to list the three most important factors. The five key factors, along with the percentage of respondents listing each as one of three most important, include: fish available year-round (60.4%), volume and frequency guarantees (48.8%), fish exhibit higher quality than other sources (46.5%), chef provided with sample to test (41.0%), and producer has good reputation (31.8%). Aquaculture entrepreneurs desiring to successfully market their fish to Indiana restaurants should incorporate these factors into their marketing plans.

## Farm-Raised Catfish Purchasing Preferences

Restaurant managers were surveyed for their specific preferences, when purchasing farm-raised catfish, for product form, product size, frequency of delivery, and volume. This information is vital for anyone desiring to successfully market catfish to Indiana



restaurants. Without this knowledge, a producer might raise fish to the wrong size or have no means of performing needed processing or storage; and consequently could end up with no market. Information on the average price paid by restaurant managers for each product form along with the maximum price they would be willing to pay for Indiana-raised catfish also was requested. Reliable market price information is critical to producers. They must compare market price to their production costs to determine if they can make a profit in the restaurant market.

Frozen fillet is the most desirable product form, followed by frozen headed and gutted, fresh fillet, and fresh headed and gutted (Table 4). These four product forms are highly preferred by respondents relative to the 11 alternative product forms. Prices paid vary considerably among product forms with $1.27 difference between fresh fillet and frozen headed and gutted.

Responding Indiana restaurant managers are not willing to pay more for farm-raised catfish produced in Indiana rather than in other states. This is shown by the small implied premiums for Indiana-raised catfish that are listed in Table 4. As a result of the small premiums, the maximum prices that respondents reported they would be willing to pay for Indiana-raised catfish are only 1.2 to 5.1% above the average prices they have been paying for all catfish.

Survey information on minimum purchase volumes and preferred purchasing schedules provide guidelines to current or potential catfish producers as to how much fish they could be expected to deliver and when (Table 4). For instance, 46 pounds per week of frozen catfish fillets translates into 2,392 pounds of fillets per year or 6,600

**Table 3. Interest in Offering Selected Species of Farm-Raised Fish by Fish-Offering Respondents That Are Now or Considering Offering Farm-Raised Fish on Their Menus, 1991 Indiana Restaurant Survey.**

| Farm-raised species | Average score | Percentage of respondents that offer now | Percentage of respondents that plan to offer |
|---|---|---|---|
| | | percentage | |
| Catfish | 3.47 | 66.4 | 16.4 |
| Trout | 2.46 | 22.1 | 19.0 |
| Walleye | 2.39 | 11.9 | 29.4 |
| Perch | 2.20 | 8.3 | 23.3 |
| Salmon | 2.19 | 13.8 | 16.0 |
| Large-mouth bass | 1.86 | 0.0 | 15.3 |
| Hybrid striped bass | 1.84 | 3.0 | 11.4 |
| Bluegill | 1.79 | 0.0 | 16.1 |
| Tilapia | 1.71 | 6.3 | 4.4 |

fillets. Assuming a 40% dressing loss and two fillets per fish, a producer would need to annually raise 3,300 catfish weighing 1.21 pounds each for a total of 3,993 pounds of fish. At least two-thirds of the respondents prefer to purchase catfish once a week except when purchasing fresh fillets. In this case, slightly over half (55%) still prefer once a week, while one-fourth prefer deliveries every three to four days. One-fourth of respondents indicated that they would purchase frozen catfish products on a monthly basis.

## Summary and Recommendations

Many diverse factors in the U.S. fish market and Indiana agriculture have generated substantial interest in aquaculture among Indiana farmers. Since aquaculture is not a well-established industry in Indiana, starting up such an operation is a risky venture which can require substantial investments in time as well as capital. Marketing is perhaps the greatest source of risk and uncertainty for aquaculturists. The purpose of this study is to provide meaningful, comprehensive data on one of the major markets for food fish in the state: restaurants.

A broad cross section of Indiana restaurants was surveyed for their current attitudes and practices toward offering and purchasing finfish in general, and farm-raised fish in particular. The empirical results presented in this article offer aquaculturists in Indiana and neighboring states useful information with which to develop successful marketing strategies. Fish is a standard menu item in most Indiana restaurants, and indeed one farm-raised species, catfish, is consumed widely across the state.

To increase the probability and ease of penetrating the Indiana restaurant market, aquaculturists should target restaurants that: (1) provide table service or a cafeteria environment, (2) primarily serve food rather than alcoholic beverages, (3) are at least of moderate size, and (4) already have a moderate amount of fish on their menus. The most desirable farm-raised fish species currently is catfish, followed by trout, walleye, perch, and salmon. There seems to be little interest at this time by Indiana restaurant managers in offering largemouth bass, hybrid striped bass, bluegill, or tilapia on their menus. Successfully marketing these four species will be a greater marketing challenge.

When purchasing any fish, Indiana restaurant managers are especially concerned with obtaining adequate, year-round supplies of high-quality, consistently sized fish from reputable sources at appropriate prices. Currently, two-thirds of the restaurant market is supplied by local wholesalers or distributors. Since all but a few of the surveyed restaurants make their own decisions about the selection of fish suppliers, aspiring aquaculturists should directly approach restaurant managers about possible sales. Bringing along a product sample for the chef to test should improve chances for success.

Indiana restaurateurs purchasing farm-raised catfish prefer to buy fresh or frozen fillets and fresh or frozen fish that have been headed and gutted. Size, volume, and delivery preferences all differ by product form, but weekly deliveries are most preferred. Fresh fillets command the highest price, but they also involve more processing costs and waste. Aquaculturists should not expect to obtain a significantly higher price for catfish raised within the state.

Before any private or corporate entity initiates an aquaculture operation, a market feasibility study is critical. This article suggests several key factors that should be incorporated into any restaurant market analysis for farm-raised fish in the Midwest.

## References


Engle, Carole, Oral Capps, Jr., Lynn Dellenbarger, James Dillard, Upton Hatch, Henry Kinnucan, and Robert Pomeroy. *The U.S. Market for Farm-Raised Catfish: An Overview of Consumer, Supermarket, and Restaurant Surveys.* Arkansas Agr. Exp. Sta. Bull. No. 925, University of Arkansas, Sept. 1990.

Riepe, Jean Rosscup, Marshall A. Martin, and Lee F. Schrader. *A Market for Farm-Raised Fish: 1991 Survey of Indiana Restaurants.* Purdue Agr. Exp. Sta. Bull., Purdue University, forthcoming, 1992.

Scott, Nancy A. "Economic Feasibility of Catfish Production in Indiana." M.S. thesis, Purdue University, Dec. 1990.

Swann, LaDon. Personal communication. Aquaculture Extension Specialist, Department of Animal Sciences, Purdue University, Feb. 1992.


**Table 4. Preferred Product Forms and Sizes, Actual Delivered Price Paid, Maximum Price Willing to Pay for Indiana-Raised Catfish, and Acceptable Purchasing Schedules and Volumes for Farm-Raised Catfish Purchases, 1991 Indiana Restaurant Survey.**

| | Preferred product forms | | | |
|---|---|---|---|---|
| | Frozen fillet | Frozen headed and gutted | Fresh fillet | Fresh headed and gutted |
| Respondents choosing form as 1 of 3 most preferred (%) | 67.0 | 44.8 | 42.4 | 34.4 |
| Preferred size (oz.) | 5.8 | 8.0 | 7.4 | 8.9 |
| Average price paid ($/lb.) | 2.97 | 2.20 | 3.27 | 2.27 |
| Indiana-raised catfish | | | | |
| Maximum price ($/lb.) | 3.12 | 2.33 | 3.31 | 2.38 |
| Implied premium ($/lb.) | 0.15 | 0.13 | 0.04 | 0.11 |
| Purchasing schedule | | | | |
| Every 3-4 days | 30(10%)[1] | 39(12%) | 29(25%) | 43(18%) |
| Once a week | 46(71%) | 37(68%) | 53(55%) | 67(70%) |
| Once a month | 139(26%) | 211(27%) | 27(19%) | 89(15%) |
| One month per year | 0 | 0 | 200( 1%) | 0 |
| Once a year | 0 | 0 | 20(1%) | 20(2%) |

*1 Minimum volume (lbs.) and percentage of respondents choosing schedule.*

# Outlook Meetings Schedule

Sponsored by Purdue Cooperative Extension Service

| County | Person | Date | Time and Place |
|---|---|---|---|
| Adams | Schrader | Sept. 15 | 7:30 pm Fairgrounds, Monroe |
| Allen | Schrader | Sept. 15 | Breakfast* |
| Benton | Hurt | Sept. 17 | 7:30 am 4-H Building Fairgrounds, Boswell |
| Boone | Uhrig | Sept. 15 | 7:00 am Fairground Community Building, Lebanon |
| Carroll | Hurt | Sept. 24 | Evening* |
| Clay/Vigo | Atkinson | Sept. 14 | Breakfast* |
| Clinton | Doster | Sept. 16 | Breakfast* |
| Daviess | Foster | Sept. 14 | Lunch* |
| DeKalb | Schrader | Sept. 21 | Dinner* |
| Fulton | Hurt | Sept. 21 | Breakfast* |
| Grant | Schrader | Sept. 17 | Noon Fairgrounds, East of Marion |
| Greene | Atkinson | Sept. 15 | Evening* |
| Hamilton | Schiek | Sept. 14 | Lunch* |
| Hancock | Doster | Sept. 15 | 6:30 pm Fairgrounds, Greenfield |
| Hendricks | Hurt | Sept. 22 | Breakfast* |
| Henry | Uhrig | Sept. 22 | 7:30 am W.G. Smith Building, New Castle |
| Howard | Hurt | Sept. 18 | 7:30 am Kokomo Shrine Club |
| Huntington | Schrader | Sept. 14 | 6:30 pm Huntington College |
| Jackson | Foster | Sept. 15 | 9:00 am Cent. Christian Church, Seymour |
| Jasper | Hurt | Sept. 15 | 7:00 am Fairgrounds, Rensselaer |
| Jay | Schrader | Sept. 17 | 7:00 am Richard's Restaurant, Portland |
| Johnson | Uhrig | Sept. 18 | 7:00 am Franklin College, Franklin |
| Kosciusko | Schiek | Sept. 15 | 7:00 am Shrine Building Fairgrounds, Warsaw |
| LaGrange/Steuben | Schiek | Sept. 15 | 7:30 pm Prairie Heights School |
| Lawrence | Foster | Sept. 14 | Evening* |
| Madison | Uhrig | Sept. 17 | 7:30 am 4-H Fairgrounds, Alexandria |
| Montgomery | Uhrig | Sept. 14 | 7:30 am Montgomery Co. Fairgrounds Exhibit Hall |
| Newton | Hurt | Sept. 14 | 7:30 pm South Newton HS Cafeteria |
| Noble | Schiek | Sept. 14 | 7:30 pm Extension Office, Weber Rd., Albion |
| Perry | Foster | Sept. 15 | Evening* |
| Porter | Schiek | Sept. 16 | Breakfast* |
| Posey | Schrader | Sept. 9 | 5:30 pm M. Redman Farm, Wadesville |
| Pulaski | Uhrig | Sept. 16 | 7:30 am Fairgrounds, Winamac |
| Putnam | Foster | Sept. 22 | 6:30 am Fairgrounds, Greencastle |
| Rush/Fayette | Doster | Sept. 15 | 7:30 am St. Mary's Church, Rushville |
| Shelby | Atkinson | Sept. 14 | 7:30 pm Women's Building Fairgrounds, Shelbyville |
| Sullivan | Atkinson | Sept. 15 | 6:30 am Country Inn, Carlisle |
| Switzerland | Foster | Sept. 16 | Lunch* |
| Tippecanoe | Atkinson | Sept. 16 | Dinner* |
| Vermillion/Fountain/ Parke/Warren | Hurt | Sept. 14 | 7:30 am Beef House, Covington |
| Warrick | Schrader | Sept. 10 | Breakfast* |
| Washington | Foster | Sept. 16 | Breakfast* |
| Wayne | Atkinson | Sept. 22 | 7:00 am Hwy 38, East of Hagerstown |
| Wells | Schrader | Sept. 16 | 7:00 am 4-H Park, south edge of Bluffton |
| White | Hurt | Sept. 16 | Breakfast* |

***Note:*** *Several counties will have Outlook meetings later in the year. If your county is* ***not*** *listed, check with your county agent.*

** Check with your county agent for details on time and place.*

# Agriculture 2000: A Strategic Perspective National Conference

Purdue University has long been committed to working with the agribusiness community. Several months ago, some 40 faculty members in Purdue's Department of Agricultural Economics embarked on a major project intended to provide a better understanding of our food system's future. The project's focus was to identify the major drivers or determinants of change within the agricultural industries and to present a clear vision of the future of the food chain.

The core content of this study has been incorporated into a hard-hitting educational seminar designed for agribusiness planners and managers who are responsible for setting the strategic direction of their firms. The **Agriculture 2000: A Strategic Perspective National Conference** is a one and one-half day program which will be held November 2-3, 1992 at Purdue's West Lafayette campus.

The conference will present a broad overview of the Strategic Perspective project's findings. These findings provide clear, innovative thinking about tomorrow's agricultural marketplace. Program topics include:

- the future agribusiness environment, including developments in international trade, the macro economy, ag policy, and new technology
- changes in food consumption patterns and the implications of these changes for food manufacturing and processing firms
- the emerging structure of production agriculture, including the key drivers of change in both animal and plant production
- implications of a changing consumer and a changing farmer/producer for the strategies of farm input manufacturers and distributors

Sponsored by the Center for Agricultural Business (CAB), the program allows for interactive discussion with Purdue faculty who have extensive experience in executive education and consulting with both industry and government. CAB, a part of the Department of Agricultural Economics, provides continuing education and research focused exclusively on the problems and issues facing managers of agribusiness firms.

The program includes more than 10 contact hours of instruction. Extensive program reference materials, a continental breakfast, daily luncheons, and all breaks are included in the conference fee. Participants are responsible for their own lodging accommodations and evening meal.

For more information about the National Conference, contact Sharie Wall or Betty Ottinger at the Center for Agricultural Business, 1145 Krannert, Room 781, Purdue University, West Lafayette, IN 47907-1145, phone (317) 494-4247, or FAX (317) 494-4333.

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