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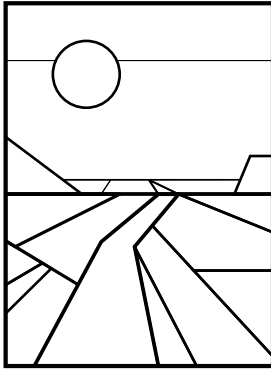
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# PURDUE AGRICULTURAL ECONOMICS REPORT

JUNE 1993

## Top Grain Farmers View Farming in 2000

*Michael Boehlje, Professor and Howard Doster, Associate Professor*

**L**ike all businessmen, farmers must think about the future of agriculture and how their business will change over time. As part of Purdue's Agriculture 2000: A Strategic Perspective project, approximately 100 participants in the 25th annual Purdue Top Farmer Workshop were asked to project various characteristics of their farm businesses to the year 2000. These participants are certainly not typical of all midwestern producers, but they reflect the leading edge of the industry. Although no statistical data is available, it would appear that this group is typical of the more aggressive and progressive grain producers in the Midwest, probably the top 20 to 25 percent of the industry, in terms of their farm management skills.

We list in summary format some of the observations provided by this group, with the data for their responses provided in Table 1.

### 1. Rapid Growth

Acres farmed by this group in 1992 averaged 1,762, with a range from 200 to 4,500 acres. Farm size is projected to increase to almost 2,900 acres by the year 2000 — a 65 percent increase during this eight-year period.

Currently, 36 percent of the acreage farmed is owned, with the remainder rented or custom farmed. This group of producers expects to be farming significantly more acres

by the year 2000, but their ownership percentage is projected to remain about the same, a little over one-third. Apparently, these producers feel that rental or custom farming is a permanent rather than a transitory part of their farming operation.

### 2. More Contracts on Specific End Use Products

At the present time, 15 percent of the acres farmed by the Top Farmer Workshop participants is for a specific end use such as seed corn, waxy maize, white corn, popcorn, etc. By the year 2000, these producers expect the percentage farmed with a specific end use in mind to double to more than 30 percent. Almost 20 percent of the acreage operated by these producers in 1992 was produced with a production contract of some type; that percentage is also expected to double to more than 40 percent by the year 2000.

### 3. Shift to Non-Conventional Tillage

Slightly more than 40 percent of the total corn acreage produced by this group was ridge or no-tilled in 1992; by the year 2000, more than two-thirds is expected to be ridge or no-tilled — a 62 percent increase from 1992. Forty percent of the producers responding to the Top Farmer Workshop Survey currently use a paid crop consultant; this percentage is expected to increase to 75 percent by the year 2000 — almost double the

percentage who use a paid consultant today.

### 4. Bigger Implements, But Little Increase in Power

The producers were asked to project future size and number of corn planters, combines, and tractors they expect to use in their farming operations. In essence, they expect to farm approximately 65 percent more acreage in the year 2000 with only a slight (10 percent) increase in the number of large tractors. They see their largest tractors having the same horsepower in the year 2000 as in 1992. They expect an approximate 10 percent increase in the number of planters with a 35 percent increase in row size per planter and an approximate 15 percent increase in the number of combines with a 25 percent increase in row size of those combines.

Thus, these producers are expecting to farm significantly more acreage with larger planting and harvesting equipment, but only modest increases in the number of planters, combines, and large power units per farm. They will farm the larger acreage with about the same total labor, but will increase labor productivity sharply with the larger sizes of planting and harvesting tools. They apparently also plan to work their machinery faster or more hours per day to get the job done in a timely fashion. The lack of increase in the expected number and size of tractors

is likely related to their transition to non-conventional tillage.

### 5. More Direct Purchase of Inputs

Currently, the Top Farmer Workshop participants were sourcing approximately 20 percent of their crop chemicals from wholesalers and manufacturers, with the remaining 80 percent from a local distributor or cooperatives. By the year 2000 these producers expect to be sourcing over 50 percent of their chemicals from wholesalers and manufacturers — more than a 150 percent increase in direct purchase. This significant shift in sourcing chemicals more directly from the manufacturer or wholesaler has important implications for local dealers and distributors.

### 6. Increased Debt Capital from Input Suppliers

Commercial banks provided almost 57 percent of the total credit used by these producers in 1992, and their market share is expected to be maintained to the year 2000. Almost one-fourth of the credit was provided by the Farm Credit System, and their market share is projected to decline to approximately 17 percent by the year 2000. Probably the most

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**Table 1. Top Farmer Workshop Participant Survey (July 1992)**

	Year	
	1992	2000
1. Acres farmed	1,762	2,899
2. Percent of acres		
owned	36.1%	37.7%
rented	59.6%	55.6%
custom farmed	4.3%	6.7%
3. Grain type (percent of total acreage)		
specific end use (seed corn, waxy, etc.)	15.1%	30.8%
traditional commodity	84.9%	69.2%
4. Grain production contracts (percent of total acreage)	19.6%	41.4%
5. Corn tillage (percent of total acreage)		
conventional	48.7%	23.6%
ridge-till or no-till	41.4%	66.9%
other	9.9%	9.5%
6. Use a paid crop consultant	40.0%	75.0%
7. Machine size and number		
corn planter	1.05 units @ 11.35 rows	1.17 units @ 15.31 rows
combine	1.22 units @ 7.05 rows	1.41 units @ 8.86 rows
largest tractor	1.06 units @ 229.2 hp	1.15 units @ 227.2 hp
8. Source of crop chemicals (percent of total acreage)		
local distributor	46.3%	23.5%
local co-op	33.4%	23.8%
wholesaler	19.6%	41.6%
manufacturer	.7%	11.1%
9. Source of credit (percent of total)		
commercial bank	56.8%	55.1%
Farm Credit	24.3%	17.1%
Farmers Home Administration	4.0%	.3%
input supplier	2.1%	11.2%
insurance company	2.2%	3.8%
other	10.6%	12.5%
10. Debt to asset ratio	32.3%	30.0%
11. Interest rate on production loans	8.56%	10.89%
12. Inflation rate in general economy	3.4%	6.18%
13. Crop price trend compared to inflation (percent of respondents)		
Higher		22.1%
Stable		7.8%
Lower		70.1%
14. Cost per bushel trend compared to inflation (percent of respondents)		
Higher		41.0%
Stable		24.4%
Lower		34.6%
15. Governments influence on your farm (percent of respondents)		
Greater		90.3%
Same		2.4%
Less		7.3%
16. Government payments as a percent of gross revenue (percent of respondents)		
Greater		0.0%
Same		8.7%
Less		91.3%
17. Financial prospects for crop farming in 2000 (percent of respondents)		
Better		47.0%
Same		40.7%
Worse		12.3%

significant change in credit use is for input suppliers. In 1992 input suppliers provided only two percent of the total credit used by the Top Farmer Workshop participants, but they project to be obtaining more than 11 percent of their total credit needs from input suppliers by the year 2000.

#### 7. Stable Farm Financial Position

In spite of significant growth in farm size, the Top Farmer Workshop participants project their debt to asset ratio will remain substantially the same in the year 2000 as today, when a little less than one third of their assets are being supported by debt. (Recall that although these producers are planning to expand their operations significantly by the year 2000, almost two-thirds of that expansion is expected to be on rented acreage rather than purchased land that requires significant debt obligations).

#### 8. Higher Interest Rates and More Inflation

These producers expect interest rates to increase by the year 2000 by approximately 230 basis points compared to the rate they paid in 1992 of slightly higher than 8.5 percent. They expect inflation to almost double by the year 2000 from the current rate of just over 3 percent. It should be noted that the survey was taken in July of 1992, and the outlook for interest and inflation may have changed since that time.

#### 9. Costs to Rise Faster Than Product Prices

Seventy percent of the respondents indicated that they do not expect product prices to keep up with that rate of inflation during the eight-year period from 1992 to the year 2000. Approximately 40 percent of the producers expect that the cost of production per bushel will increase faster than the rate of inflation, with the remaining 60 percent indicating

that costs will increase at the same or a lower rate than the rate of inflation.

#### 10. Less Government Financial Support of Farm Programs

Finally, 90 percent of the Top Farmer Workshop respondents expect that the government will have a greater influence on their farm in the year 2000 compared to today (apparently in the form of regulations), but 90 percent also felt that government payments would account for a smaller percentage of their gross revenue in the year 2000.

#### 11. These Farmers Remain Optimistic

In spite of projections of higher interest rates, higher inflation, and higher costs, almost 90 percent of the Top Farmer Workshop respondents indicated that they expect the financial prospects for crop farming to be the same or better in the year 2000 compared to 1992.

## Potential Impacts On Indiana Agriculture of Proposed Federal Tax and Spending Changes

*Department of Agricultural Economics\**

**T**he Clinton administration has proposed and Congress is considering a wide-ranging set of tax and spending changes that will affect Indiana agriculture along with every other sector of the economy. The proposals generally do not provide all the details necessary for a comprehensive assessment. In this paper, we attempt to provide a general assessment of the impacts on Indiana agriculture and rural economy of parts of the overall proposal. Clearly, we have not included all the tax and spending measures, not even all those directly affecting agriculture. Rather, we have included those we felt would be the most important

for Indiana's agriculture and rural economy.

Also, we are not making any judgements on whether any of the proposals are "good" or "bad" for agriculture or for the economy as a whole. Our sole objective is to provide information that may be useful to citizens and policy makers in making decisions about these proposals. One must recognize, also, that the proposals are evolving as discussion and debate continues, so the specific impact estimates given here certainly will not hold as the various measures are modified.

The proposed fiscal package must be judged not only on how it will affect Indiana farmers directly but also on the indirect, longer-term impacts of the tax and spending proposals on producers. The package is designed to accelerate and sustain the economic recovery assumed to be

underway. This economic growth could contribute to increased demand for food, improved off-farm employment opportunities for farm families, and improved economic conditions in the rural sector, all of which will benefit Indiana farmers in the longer run. It is also important to remember that people will respond to taxes and that markets will adjust in such a way as to make their longer run impacts less severe than their immediate impacts.

### Specific Measures

#### BTU Energy Tax

The proposed energy tax is on the energy content of different fuels. There are two rates: 59.9¢ (per million BTUs) for crude oil products and 25.7¢ for other energy sources. Exactly how the tax will be applied

\* Contributors: Otto Doering, Bob Jones, Marshall Martin, Kevin McNamara, George Patrick, Wallace Tyner, and Joe Uhl

is still being debated. Our best estimate is that the total direct and indirect impact on the cost of producing corn will be about \$3/acre or about 2.5¢ per bushel. In the short-run farmers will not be able to pass this on in their prices. The impact on soybeans will be about half the impact on corn, largely because of the difference in fertilizer and drying costs.

The BTU energy tax would result in price increases for all energy sources. Gasoline and diesel would be taxed at about 7.4 and 8.4 cents per gallon respectively. Natural gas would be taxed at about 2.6 cents per therm. The electricity tax could range between .09 and .27 cents per kilowatt hour consumed, depending on whether electrical energy is taxed based on the energy delivered to the consumer or energy consumed in the generation of electric power. At current gas and electricity prices and assuming the higher rate for electricity, both natural gas and electricity costs would go up a little less than 5 percent.

#### **Barge Fuel Tax Increase**

The existing barge fuel tax does not cover the cost of construction and rehabilitation of the inland waterways. The proposal increases the barge tax from 19¢ to \$1.19 per gallon over four years in order to eliminate the barge transport subsidy. The increased revenue would be sufficient to eliminate the current subsidy required for maintaining the inland waterways. This tax increase would increase the cost of transporting corn and fertilizer on the inland waterways. Estimates of the impact range from 4¢ to 10¢ per bushel of corn. These estimates assume there would be no change in the world (FOB U.S. Gulf) corn price, so the domestic U.S. price would fall by that amount. The impact would not be uniform, however, with a much greater impact on those regions that make greater use of barge transport. Also, to the extent that domestic corn price falls, deficiency payments will increase. The rise in deficiency payments should make up about two-thirds of the fall in corn price.

#### **Increase of Flex Acres from 15 to 25 Percent**

An increase of flex acres from 15 to 25 percent would eliminate government deficiency payments to farmers on that additional 10 percent of base acreage. Using 1992 figures, that change would eliminate payments on 436,610 acres or 48 million bushels of corn. With the 1992 deficiency payment of 73¢ per bushel, that amounts to \$35 million in lost revenue for Indiana farmers. In 1992 Indiana corn production was 877.6 million bushels. Spreading the lost revenue from the deficiency payment over the entire corn crop yields an income loss of 4¢ per bushel of corn produced by Indiana farmers.

#### **Elimination of Pay-92 Programs**

These programs allow farmers to not plant their crop base and receive payments on 92 percent of the eligible acres. In 1992 there were 48,529 "pay" acres in Indiana, resulting in payments of \$3.3 million. If one spreads that income loss over total corn production in the state, it amounts to 0.4¢ per bushel of corn produced. To the extent that pay-92 acres would come back into production, this increased production could depress corn price. Farmers in the commodity program would receive higher deficiency payments covering part of the loss, and those not in the program would incur larger losses.

#### **Eligibility Limitation on Off-farm Income**

This proposal eliminates eligibility for deficiency payments for anyone with off-farm income greater than \$100,000. It would have a small impact on producers in Indiana. The limitation would affect mainly high income landlords. Because they would not be eligible to receive deficiency payments under share leasing, they would have an incentive to switch to cash renting their land. The farm operator then would be eligible to receive the deficiency payment. Hence, the main impact would be in the form of an incentive to change from share leasing to cash rent. The change in lease terms could, however, move more farmers to the \$50,000 payment limit.

#### **Investment Tax Credit**

An investment tax credit reduces tax liability by a certain percentage of the value of capital investments made during the year. The original proposal is for a 7 percent credit in 1993 and 1994 and 5 percent thereafter. This could be important for farmers, depending upon which investments qualify. Total tax liability is reduced dollar for dollar by the amount of the credit. Consequently, net farm income increases by the amount of the credit. For example, if machinery were eligible and a farmer purchased a \$100,000 piece of equipment, income taxes would be reduced by \$7000 in 1993 or 1994. For the state as a whole, we estimate that, if all capital items were included, the annual benefit for Indiana farmers could be \$45 million in 1993 and 1994 and \$32 million per year thereafter.

#### **Rural Development**

The economic package includes considerable increases in funding for rural development. The package includes increases of \$470 million in loans and \$281 in grants to help poor rural communities comply with clean water standards. There are also funding increases for low income housing in rural areas.

#### **REA Subsidy Elimination**

Loans for rural electrification have been subsidized in the past. The package includes a proposal to eliminate this subsidy on rural electric power. This change would lead to increased costs for rural electric cooperatives, but the amount of any rate increase is impossible to estimate at this time.

## **Summary**

#### **Farm Impacts**

Several of the measures would lead to increased costs or reduced prices for farmers. The energy tax would increase costs. The increase in flex acres would reduce government deficiency payments. The barge tax would likely result in lower farm gate prices. However, the loss from the lower prices would be offset in

part by higher deficiency payments. If the corn price were to fall 6¢ due to the barge tax, farmers would recoup about 4¢ of that through higher deficiency payments. The impact of all the changes taken together, without adjusting for crop price changes, would be about 9¢ per bushel of corn produced (flex acre increase - 4¢, BTU tax - 2.5¢, barge tax - 2¢, and 0-92 elimination - 0.4¢). The investment tax credit would partially compensate for this loss for those farmers making capital investments. Also, to the extent production costs increase, we would expect to see some increase in market price, although not enough to completely offset the higher costs.

#### Consumer Impacts

The President's economic proposals will increase funding for the Women, Infants and Children's and Emergency Food Assistance programs. The proposals will not have much impact on consumer food costs in the next year, but there may be longer term impacts. The higher taxes and costs will increase the costs of food marketing and be passed through in part to consumers. The proposed increases in charges for federal meat and poultry inspection, higher livestock grazing fees for federal lands, and increased charges for irrigation water could also contribute to somewhat higher food prices in the future. Proposed reductions in federal subsidies for honey, peanut, and sugar producers won't significantly affect food prices.

In most cases, the analysis presented here must be viewed as preliminary and incomplete. It represents a rough estimate of direction and magnitude of impacts based upon the information available to us at this time.

## Purdue Top Farmer Crop Workshop

**T**he 26th Annual Purdue Top Farmer Crop Workshop is scheduled for July 25-28, 1993. Reserve those dates on your calendar along with several evenings the previous week to complete the workshop homework. Again this year, expect top speakers describing current and emerging tillage, seed, chemical, and machinery technology. Ray Rawson, Michigan farmer-manufacturer, coulters; Harry Stine, Iowa farmer-seedsman, soybean seed; Larry Gaultney, New Jersey, Dupont, chemicals; Don McGrath, Minnesota manufacturer, Tyler fertilizer spreaders; Roger Parker, Claas, will describe their newest products. Indiana crop consultant Lance Morrell, Illinois design engineer Ted Macy and others will demonstrate satellite based site specific farming software and hardware.

The record 150 farmers from 10 states participating in the 1992 session indicated, on average, they expected to increase farm size 50% in the next eight years. This workshop experience is the ideal way to test ways to make changes. You'll learn to interpret the computer signals indicating potential bottlenecks and opportunities.

Using Purdue's linear program crop budget during the workshop you can test before you invest in a change in your crop rotation, machinery size, tillage system or farm size. How does a switch to no-till drilling beans or other tillage system change affect your farming system? How many more acres can you farm if you increase your harvesting capacity? Perhaps you can jointly use one large combine or planter or drill or sprayer on multiple farms. Several farmers who have participated in previous sessions will share how they are doing these things now.

John Marten, former Farm Journal staff economist, will keynote the session. Bill Richards, Ohio farmer, and former Chief, U.S. Soil Conservation Service, will evaluate how we may meet our environmental responsibilities with natural resource planning. Purdue's Mike Boehlje will

summarize and share his own strategic management counsel. In between, several Purdue professors will share their lab and field research and South Dakotan Dwayne Beck will describe his tillage related research. You'll also get a progress report from Illinois farmer Roger Denhart's farming enterprise in Ukraine, and St. Louis grain merchant Greg Roy will share just how corn moves from your farm to a foreign consumer.

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***"The 26th Annual Purdue Top Farmer Crop Workshop is scheduled for July 25-28, 1993."***

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Nebraskan Deb Rood will offer the Myers-Briggs Type Indicator exam and will show participants how to interpret this personality assessment and use the results when communicating with others. Finally, participants will again be able to complete a Health Risk Appraisal survey which will be analyzed by the Purdue School of Nursing. At the workshop, several health and well-being tests will be offered, including blood cholesterol and sugar, lung capacity and body mass, and a cardiovascular step test. If you attended last year, you can compare your test scores.

The workshop begins at 3:00 p.m. Sunday and ends at noon Wednesday.

For more information and to receive a brochure describing the workshop, contact:

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Participate in this great networking opportunity — see you at the workshop!

# Land As An Investment

*J. H. Atkinson, Professor\**

## Why Buy land?

**I**n early summer after a shower, the aroma and beauty of a field of corn or beans evoke in many farm people both a sense of nostalgia and expectations of a bountiful harvest. There's something special about owning this land.

But, aside from personal satisfaction, why do people buy land? Farmers, of course, need land to farm. A high priority is placed by many farm families on land owned as a base of operation — home, storage facilities, and at least some acreage to farm or use for livestock. Even a small base of operation provides permanence and a sense of belonging to the community — factors which may be important in leasing additional land. Farmers may also purchase additional acreage in order to more fully employ their main assets of labor, management and equity capital; however, with a given amount of equity and credit, several acres can be leased for every one that is purchased. This can provide considerably more acres to farm and money to spend for family living compared to buying, but the security of tenure is not as strong on leased land.

Land purchase is also a means of investing equity capital for both farmers and non-farmers. Expected returns to investment in land include the annual operating return to land and increases (or decreases) in land values over time.

The non-operator landowner receives an annual return in the form of cash rent or a share of the crops. State-wide rent as a percent of average cropland value was 7.1 percent in 1992 according to the Purdue Land Values and Cash Rent Survey. After paying taxes, insurance and miscellaneous land ownership costs, the net return in 1992 would have been under 6 percent.

\* Purdue Professor Mike Boehlje made helpful comments which are appreciated.

The Purdue study last year found that cash rent for average quality cropland averaged from 6.6 percent to 7.6 percent across 6 regions of the state.

Many land buyers, both farmers and non-farm investors, accept low annual rates of return because they expect land values to increase over time, at least keeping up with the rate of inflation. And there is some probability that land values will go up faster than inflation, thus resulting in real increases in values. When the expectation of increasing land values (present to some extent in most purchases) becomes the *primary* concern, the buyer might be termed a speculator, especially if one uses substantial credit for the purchase.

## Will Land Values Beat Inflation?

According to USDA estimates, Indiana land values increased by about 13 times from 1912 to 1992, while the 1992 inflation index was nearly 15 times the 1912 figure. Indiana land values didn't quite hold their own in purchasing power or real value over this 80-year period. But wide differences occurred within this 80-year period in the relationship between land values and inflation

(Table 1). Consumer prices rose the first decade of the period, and so did land values but at a slower rate. Then prices fell into the late 20s and 30s, land prices much more than consumer prices, compounding the financial woes of Indiana agriculture during the great depression.

But from that point until 1982 the decade-by-decade increase in land values exceeded increases in the consumer price index. Indiana land prices declined about 38 percent from 1982 to 1992, the first decade-to-decade decline in 60 years. Consumer prices rose by 46 percent during that decade so the purchasing power of land dropped by about 57 percent (Table 1). The widely held view that land moves up with inflation was not true during this period! The current purchasing power of Indiana farm land as measured by the Consumer Price index is about the same as in the mid-fifties.

## Can Land Pay For Itself?

No, not if reasonable rates are paid for labor, non-land capital, and other inputs. Land is like a bond on which an annual payment is received and the initial investment is recovered at maturity or upon sale of the bond. In

**Table 1. Index Numbers of U.S. Consumer Prices and Indiana Average Farm Real Estate Value Per Acre, by Decades, 1912-92 (1967 = 100).**

Decade	Consumer Prices	Farm Real Estate	
		Value	Purchasing Power <sup>1</sup>
1912	29	21	72
1922	50	26	52
1932	41	13	32
1942	49	19	39
1952	80	50	63
1962	91	68	75
1972	125	113	90
1982	289	449	155
1992	421	279	66

<sup>1</sup> Farm real estate value index divided by Consumer Price Index. (This gives a purchasing power index in 1967 dollars. The purchasing power of Indiana farm real estate in 1992 was 66 percent of what it was in 1967.)

central Indiana, \$1500 per acre land might yield a net cash rent of \$90, each dollar of which would service a loan of \$10.67 if amortized for 25 years at 8 percent interest. The \$90 would service a total loan of \$960, thus requiring a down payment of \$540 per acre or 36 percent for the land to carry itself.

Farmers who buy land to operate may have an annual flow of funds which could be used to supplement earnings solely attributable to land. When estimating the return to land, expenses usually include a charge for operator labor. If family living expenses are being covered by other farming operations or off-farm income, the charge for operator labor could be used for debt service. In the above example this could increase by a third the debt that could be serviced.

In calculating the return to land under owner operation, interest expense on non-land capital is included. If no credit is being used, then this interest charge would be available for debt service, and total debt that could be serviced by all available funds might equal the purchase price. But this doesn't mean the land is paying for itself; it is being subsidized by labor and equity capital. Furthermore, private institutional lenders usually would not make a 100 percent loan without additional security.

#### Who Should Own Farm Land?

Land purchase is a risky business for farm operators, especially if substantial credit is used. But it is almost axiomatic that where there is risk of substantial loss, there also is the chance of substantial gain. For example, Indiana land purchased in 1962 would have gained 20 percent in purchasing power or real value by 1972, based on changes in the Consumer Price Index and USDA land value estimates. But with a purchase in 1982, a decline of 57 percent occurred by 1992. A 1972 purchase held for a decade would have gained 72 percent, but holding another decade would have resulted in a loss greater than the previous decade's gain in purchasing power!

One might argue that the farmer who buys land to farm should not be overly concerned with ups and downs in land values. There is truth in this statement if several assumptions are made: 1) Land is financed so that there is little chance of having to liquidate when farm incomes fall and land prices are low, 2) No consideration is given to results which could have been achieved in an alternative investment, and 3) The effect on credit availability due to decreased net worth from lower land values is unimportant. These assumptions tend to fit the older farmer who has accumulated sufficient cash to buy land with little or no credit, has no plans for expansion which would require credit use, and who values the security and other satisfactions which come from owning land.

#### What are the Alternatives?

What alternatives are available to the younger farmer struggling to pull together the resources necessary for a full-time farming operation? Here are some possibilities.

1. Get into livestock production. Each dollar invested in hog, poultry, or dairy production creates more productive employment opportunity than if invested in land. Also consider existing buildings on small acreage which can sometimes be bought for a fraction of new construction costs.
2. Use the same or less capital needed to buy one acre, but invest in additional equipment and operating expense to farm several acres of cash or share rented land. The cost per acre of using larger equipment on large acreage may be similar to the cost of smaller machinery on a small acreage, but the operator can cover more acres and would thus expect to earn more for his labor.
3. Invest in bigger equipment, and do custom farming in addition to farming rented or owned land. Before buying equipment, line up

land owners who want their land custom farmed, and reach agreement on what operations are to be performed and for what price. An incentive payment of a percentage of the yield or gross sales over a base amount can increase returns to both operator and landowner.

4. If you have special skills, consider investing in the equipment and facilities necessary to offer services to neighboring farmers and others. Examples are a well equipped shop, trucks for custom hauling, equipment for land clearing, terracing, etc., and equipment for spraying or spreading of herbicides, fertilizer, and lime.

For the younger farmers, renting may be the means to future ownership. In parts of the corn belt, nearly half of the farm land is not owned by people who farm it; however, much of this land is in the hands of farm-based folks — retired farmers and their offspring (even grandchildren) — folks who still appreciate the aroma following a summer rain that arises from a field of corn which is as "clean as a whistle," and who know that there's something special about owning land.

The settlement of much of our agricultural land was based on the philosophy that those who till the soil should own it and that we should be a nation of family farmers — farmers who are their own bosses and who receive the fruits of their labor. Out of this philosophy has come such institutions as the land grant colleges with their functions of teaching, research and extension; the Farmers Home Administration; and the Soil Conservation Service and other USDA agencies designed to help farmers produce food, fiber, and forest products more efficiently. As a result of this philosophy our agricultural production plant has become the envy of much of the world.



# Converting Swine Grower-Finishing to All-In-All-Out: Will It Pay?

*Chris Hurt, Professor; George Patrick, Professor; and Chris Overend, Graduate Assistant*

**A**ll-In-All-Out (AIAO) management of swine grower-finishing units is being considered by many producers. The mix of different ages and weights of pigs inherent in continuous flow management fosters disease transmission, which is reduced with AIAO. In AIAO management, pigs remain in the same group from birth to market. Facilities are thoroughly cleaned and disinfected between groups to achieve a high health status.

AIAO requires modifications to most existing buildings, as well as changes in management practices. The question for most producers considering AIAO is whether the shift will increase or decrease returns over time. A typical existing mid-western farrow-to-finish operation is used to examine the economics of conversion to AIAO in the grower-finishing unit of the facilities. Gains in production efficiencies for AIAO are based upon a Purdue study by Cline, et al.<sup>1</sup> They found that AIAO grower-finishing hogs had higher daily gains, better feed conversion, and took fewer days to reach market weights (see Table 1). The differences were all statistically significant.

Capital costs for conversion and annual operating costs were

estimated by the team of Purdue agricultural economists, agricultural engineers, animal scientists, and veterinarians who worked on the AIAO project.<sup>2</sup>

The existing facility in this case study was a 24-crate farrowing building with nursery and enclosed finishing. Farrowing was on a weekly plan with five sows farrowed each week for four weeks, and then four sows farrowed in the fifth week. An average of 38.5 pigs were weaned per week. Pigs remained in the nursery for five weeks, then were moved to a small pen in the finishing building. Pigs were later moved across the aisle, into a larger finishing pen, where they stayed until marketing. Total yearly production was 2,000 head of pigs weaned per year in the 120-sow operation.

## How AIAO Affects Economics

The conversion from continuous to AIAO production not only involves changing from a weekly breeding and farrowing schedule to a group breeding and farrowing schedule, but many related factors that affect profitability. A list of the factors which should be considered before the shift to AIAO follows. The factors are divided into those that increase costs and those that increase returns or reduce costs.

## Increased Costs

- Capital costs
  - Walls and pit dividers to make finishing rooms
  - Changes to the ventilation of rooms
  - Potential change in space requirements
  - Solid pen partitions in alley ways to avoid nose-to-nose contact
  - Lost profit opportunity in transition to a group system
- Variable Costs
  - Cleaning detergents and disinfectants
  - More labor for cleaning
  - More labor for the potential of moving pigs more often
  - Added electricity and repairs for cleaning
  - Added maintenance to walls and pit dividers

## Increased Returns Or Reduced Costs

- Less feed per pound of gain
- Fewer days to market, including
  - Reduced interest costs and
  - The potential to produce more pounds of pork per year by utilizing the “saved days” in the grower-finishing unit
- Lower death loss
- Reduced medication costs

In addition, the conversion to AIAO may affect the farrowing, cleaning, and marketing schedules as well as other management practices of a producer.

## How Buildings Should Be Modified

There are several ways to remodel finishing facilities for AIAO production. We elected to evaluate four alternatives. The objective of the first alternative was to minimize added capital, the objective of the second was to minimize added labor, and that of the third was a compromise of these two objectives. Finally,

**Table 1. Mean and Standard Deviation for Selected Performance Measures for Finishing Hogs in Continuous and AIAO Management Systems.**

Performance Measures	AIAO		Continuous	
	Mean	St. Dev.	Mean	St. Dev.
Avg. Daily Gain (lbs.)	1.71	.01	1.54	.01
Days to 230 Pounds	172	0.8	183	1.1
Avg. Daily				
Feed Intake (lbs.)	5.26	.05	4.89	.05
Feed Conversion (lbs. feed/lb. gain)	3.03	.02	3.18	.03

the fourth alternative examines returns if the full advantage of spreading fixed costs could be achieved. Although the farrowing and nursery phases were also converted to AIAO in all cases, this analysis considered only the grower-finishing phases of production.

needed by minimizing the number of times the pigs are moved and thus the number of times rooms are cleaned. The finishing building is remodeled into 4 grower-finisher rooms. Because 40 pound pigs are given the amount of space that would be required at market weight,

pigs are placed into pens with unfamiliar pigs twice, once out of farrowing and once out of the nursery. Total production is 2,000 pigs weaned per year. Capital costs for this alternative are \$18,804, and annualized variable costs are \$3,471 per year.

For the first three alternatives it was assumed that the producer *cannot* gain the full advantage of the 6.6 percent fewer days to market. To gain the full advantage of conversion to AIAO, they would have to produce 6.6 percent more pounds of pork in a year with the same facilities. This may be difficult. Although the AIAO pigs get to market sooner, the producer cannot simply buy feeder pigs to use the "saved space." Few producers can produce 6.6 percent more pigs with the same farrowing and nursery facilities. The easiest way to achieve this additional output might be to increase market weights of hogs by 6.6 percent. However, heavier weight market hogs might be subject to price discounts.

In the evaluation of the **fourth alternative**, we assumed the farm is able to fully utilize the 6.6 percent fewer days by increasing yearly output by a similar amount. In this final alternative, the economics include two additional impacts. The first is the cost-lowering impact of spreading the fixed costs over a larger output. The second is increased returns from the larger scale of operation, if production is profitable.

#### Economics Depend on How You Remodel

A farrow-to-finish budget was used to determine the costs and returns for each remodeling alternative. The year 1991 was used as the base year, with \$2.28 per bushel for corn and \$310 per ton for 40 percent hog supplement. A long-term average price of \$48 per hundredweight for market hogs was assumed. Costs of production were based upon the average cost data for farms on the 1991 Iowa State University Hog Records. Labor and fringes were charged at \$8 per hour and depreciation was seven years for equipment and 10 years for buildings. Interest rates were set at

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### ***"A number of factors are critical in the decision of converting to AIAO in grower-finishing."***

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The **first alternative** minimizes the capital investment required by using the existing space to its maximum. To do this, the first 32 feet of the finishing unit are modified to be a grower unit. The remaining portion of the building is modified to be three finishing rooms. The first finishing room has 10 pens where small pigs were allocated about 6 square feet each. Each pig has 7.5 square feet of space in the second room and about 9 square feet in the third finishing room. Pigs are moved a total of five times. This includes from farrowing to the nursery and then to the grower. After leaving the grower, the pigs are in each of the finishing rooms for five weeks. Some pigs are placed in pens with unfamiliar pigs at each move.

This strategy minimizes the amount of capital investment by maximizing the use of existing space, but it requires large amounts of additional labor. Each time a room is emptied, it is cleaned and sanitized. The grower unit and each of the three finishing rooms need to be cleaned 10.5 times per year. Total yearly production is 2,000 pigs weaned. Depreciable capital costs are \$13,092 and include insulation for the new grower room, replacement feeders in the grower, heaters in the grower, and the added walls to form the three finishing rooms. Variable costs for items such as detergents, electricity, added labor, and pit curtains are \$5,687 per year.

The **second alternative** minimizes the amount of additional labor

there is a need to extend the finishing facility an additional 32 feet. Furthermore, because there is no separate grower unit, all of the finishing facilities require insulation, heaters, some added ventilation equipment, as well as room and pit dividers.

A total of 192 pigs are weaned every 5 weeks and moved into the nursery for a 4 week stay. Then they are moved to a finishing pen where they stay until marketed at 28 weeks of age. No additional moves are required once the pigs are moved to finishing at about 40 pounds. Pigs need to be moved only twice. Total production is 2,000 head weaned per year, the same as in the continuous system. Capital costs are \$62,140 and the variable costs are \$3,149 per year.

The **third alternative**, the compromise alternative involves converting the first four pens on each side of the alley in the finishing room to a grower unit. The pigs stay in this grower unit for five weeks and move into finishing rooms at about 80 pounds. Pigs are moved out of the grower unit into one of three finishing rooms. The finishing rooms are modified by building walls to separate rooms and dropping a pit curtain. Insulation, heat, and mechanical ventilation are added in the grower unit only.

There is a need to build an additional 8 feet onto the finishing unit. Pigs are moved three times in this system: once out of farrowing, the second time out of the nursery, and the third time out of the grower. The

9 percent on fixed capital and 8 percent on operating capital.

Results of the economic analysis are shown in Table 2. The five columns represent the continuous system and the four remodeling alternatives in the conversion to AIAO. The results show that an objective of minimizing either the use of labor or capital may be unwise. The minimum capital remodeling alternative did lower total costs modestly from \$41.21 to \$41.04 per hundredweight and increased the returns above all costs per hog marketed by \$.70. However, the minimum labor alternative was not profitable and reduced the returns per hog marketed by \$2.94. The compromise, which did not attempt to minimize the use of labor or capital, was the most profitable conversion alternative. Returns above all costs increased by \$1.31 per hog marketed.

The importance of finding some way to utilize the extra finishing capacity created by fewer days to market can be seen in the last column. If an operation could increase output to use fully the days saved, costs were lowered by \$1.17 per hundredweight, and the returns were increased \$4.58 per hog marketed relative to the continuous system.

### Conclusions

We believe this study demonstrates that many hog producers may gain from conversion to AIAO in grower-finishing. It was our intention to budget conservatively, so actual returns are likely to be greater than those shown here.

A number of factors are critical in the decision of converting to AIAO in grower-finishing. First, results depend on how remodeling is done. This is clearly demonstrated by the differences among the four remodeling alternatives considered.

Second, it is clear from this study that the ability to utilize effectively the saved days due to fewer days to market is critical to gaining the full advantage of AIAO in grower-finishing. These advantages can be gained more easily in building a new set of buildings where the farrowing house can be sized with the fewer days to market in mind. The \$4 to \$5 per head range may be a reasonable estimate for the advantage of AIAO in a new set of buildings.

Third, it must be recognized that AIAO is a different hog production system. It is dependent upon scheduled movement and cleanings. If the skills to manage a tight production schedule and the time to stay with the schedule are not available, conversion to AIAO in grower-finishing should not be considered. AIAO increases the use of two important

resources on the farm—capital and labor, and much of the increased labor is for the less-than-glamorous function of washing rooms. In the compromise system, the labor requirement increased about 0.1 hours per hog marketed, and the added investment in the first year was about \$10 per hog. Using these as rough guidelines, a farm marketing 3,000 head might expect to increase labor requirements about 300 hours per year and invest \$30,000 to make the modifications.

Finally, it is important to note that each hog farm has a unique set of buildings. Conversion to AIAO in grower-finishing will be much easier for some than for others. We have demonstrated that conversion to AIAO in finishing can increase income on a typical midwestern farm. However, the question of whether AIAO in grower-finishing will pay on an individual farm will depend on the unique characteristics and costs of inputs for that farm.

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**Table 2. Results of AIAO Conversions on Selected Costs and Return Factors.**

	Continuous	Minimum Capital	Minimum Labor	Compromise	Gain All Days Saved
Variable Cost/Cwt.	\$36.97	\$36.37	\$35.85	\$35.91	\$35.45
Fixed Cost/Cwt.	\$4.23	\$4.66	\$6.59	\$4.89	\$4.60
Total Cost/Cwt.	\$41.21	\$41.04	\$42.44	\$40.80	\$40.04
Total Returns/Yr	\$32,069	\$33,411	\$26,410	\$34,589	\$40,880
Added Return(AIAO)	0	\$1,342	-\$5,659	\$2,520	\$8,811
Added Returns/Hog	0	\$.70	-\$2.94	\$1.31	\$4.58

## Marketing Services Desired from Grain Elevators

Ravindra G. Das, Student and J. William Uhrig, Professor\*

**F**ollowing a period of rapid expansion in the late 1970s, the grain industry was confronted with excess capacity and low margins for much of the 1980s and early 1990s. During the mid-80s, government-subsidized storage programs enabled many elevators to maintain their financial stability. However, as grain carryover levels were reduced in the late 1980s and early 1990s, elevators returned to merchandizing of grain as their primary revenue source.

One of the responses to excess capacity and tight margins may be an attempt to define and offer new services. Therefore, elevator managers are interested in knowing what types of services would interest farmers. With this in mind, we set out to define a list of services and to survey farmers regarding interest in these services.

The list of elevator services to be assessed was developed from interviews with three groups. The first was a group of elevator managers employed by a regional grain company with offices in Indiana and other midwestern states. Ideas for services were also solicited from professors at Purdue who work with the grain industry. Finally, a preliminary survey was shared with a group of farmers who attended the 1992 Purdue Agronomy Day. Responses from these farmers helped to refine the survey form and define new services.

The completed survey was then given to a group of 83 farmers who attended the 1992 Purdue Top Farmer Workshop. These commercial farmers came from eight states in the Midwest. The average farm size was about 1800 acres, and the farms ranged from 200 to over 4,000 acres.

The survey included 10 suggested elevator services. In addition, it

requested other comments or services the farmer felt would be important and also asked if the farmer currently was using a farm marketing consultant. Respondents were asked to rank their interest in each service on a scale from 1 to 5, with 1 indicating very interested and 5 indicating not interested.

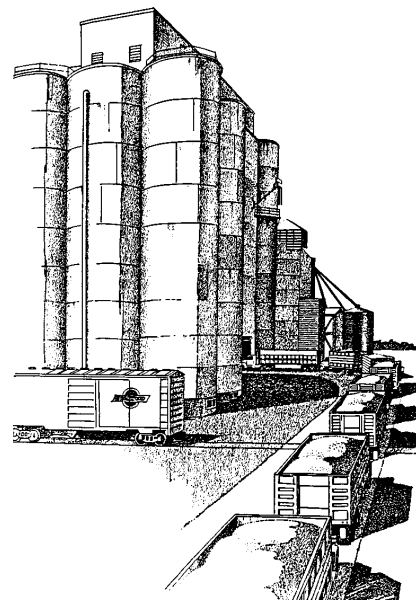
### Farmers Respond

The following is a list of the services in order of importance as ranked by the respondents. The number in parentheses is the average weighted value given by the farmers.

1. Farmers should receive a premium for grain and soybeans which exceed the minimum grade standard (1.48).
2. Elevators should provide market information that is not easily accessible to the farmer. This may include basis trends, pricing patterns, seasonality of futures, market summaries, etc (2.13).
3. The grain elevator should help farmers pursue specialty market opportunities throughout the world (2.22).
4. Elevators should offer programs which allow options to be attached to cash grain contracts, to roll futures contracts, or to use futures to unprice grain (2.55).
5. Elevators should take a daily grade for all truckloads from the same farm, rather than taking grades on each truckload (2.68).
6. Elevators should offer an indemnity fund, financed through a grain checkoff, to provide protection for grain delivered under deferred pricing (2.87).
7. Elevators should take a greater role in providing market education to farmers, including seminars, workshops, field days, and marketing clubs (2.95).
8. Grain elevators should provide additional grain account record keeping such as a quarterly statement detailing the volume sold, its price, total revenue generated from sales, storage summary, etc (3.04).
9. An elevator representative should make farm visits to explain various marketing alternatives, and develop marketing plans (3.12).
10. Elevators should provide "condominium storage" where farmers own storage capacities on elevator property for their own use and rent unused storage to other farmers (3.93).

### Evaluation of Farmer Responses

Farmers clearly have an interest in increasing returns from their grain, and any premiums which can be generated are highly ranked. In addition, farmers feel it is unfair to have a grain grading system which is based on minimum standards and would like an elevator to offer premi-



\* This project was completed as a Special Problem by Ravindra Das during his Senior year under direction of Dr. Uhrig.

ums for grain which exceeds minimum standards. This concern is also revealed when farmers indicate that they would like to have elevators take one daily grade rather than a grade on each truckload. They see the elevator as getting the advantage of "blending," while the farmer is held to the higher standard of meeting minimum requirements on each truck load.

Education is an important service that farmers would like more elevators to provide. This is indicated by their interest in having more of the inside information used by elevator personnel to make their merchandizing decisions, in the elevator

providing more direct education, and, to some extent, in on-farm visits. Of the surveyed farmers, 40.5 percent were currently using a marketing consultant.

Respondents in this survey clearly were interested in being able to use a full range of option and futures services at the elevator, rather than being forced to use an outside broker for these services. They were also interested in their elevator helping them to find new markets for specialty crops and acting as intermediaries between themselves as growers and users of their products who may be in foreign

lands. Increasing the security of payment was also important to these farmers, as indicated by their interest in an indemnity fund.

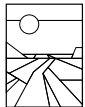
Several additional comments from farmers included interest in a longer term contract mechanism. This concept was to develop a contracting program which would allow a farmer to lock in a price and volume for three to five years.

Finally, if farmers in this survey are typical, elevator managers should not rush out to sell the elevator as condominium space, since these farmers did not indicate a desire to own a piece of the elevator.

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