

# PURDUE AGRICULTURAL ECONOMICS REPORT

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## Changing Times: A Farmer's Perspective

Will Erwin\*

**A**s biotechnology pushes out the frontiers of science and the information explosion proliferates, how are farmers impacted?

This article is a reflection of the thoughts of an individual Midwest commercial family farmer who has had a number of responsibilities in state and federal government. No claim is made to speak for other farmers who range from small, part-time operators to large corporate entities which have professional staffs and many employees.

Consideration will be given to what farmers are like, the comprehensive environment in which they operate, the macro changes in farmer decision making, how farmers look at change in general, how farmers look at changes in biotech in particular, how farmers assess a new product and some of the issues we will be facing in the future.

### What Are Farmers Really Like?

They are well-educated people, averaging slightly more years of education than non-farmers, often with university degrees and frequently with masters and Ph.Ds. As a group they work for less per hour than non-farmers, consume less, and accumulate more than others. In short, they live poorer but die richer, and they do it because they want to for non-economic reasons.

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***“There is increasing fear of unreasonable regulation and even of entrapment where farmers may follow all the rules and be found negligent”***

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Among those non-economic reasons are personal independence, love of and attachment to the soil, love of animals and nature, and a deep sense of stewardship. Most farmers put a high premium on religion. Daily working with the life and death realities of nature and isolation to think without interruption increases religious commitment, and the community discipline of rural people reinforces it.

Farmers are increasingly anxious economically as they have felt the agricultural depression. They are increasingly uncomfortable about seemingly endless environmental hazards, be they perceived or real. Radon, the ozone layer, and the unknowns of pesticides and biotech cause concern. News stories of women with breast cancer having higher levels of DDT in their systems intensify concerns, both in the specific and what they may indicate about all the pesticides in the future.

There is increasing fear of unreasonable regulation and even of entrapment where farmers may follow all the rules and be found negligent or where they may make the extra effort to be environmentally responsible and be found liable.

Farmers tend to trust their neighbors, their clergy, their farm organization, their university and extension people, as well as the business people they deal with; however, they are less comfortable with their

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He was Assistant Secretary of Agriculture in Washington with responsibilities for the Farmers Home Administration, the Rural Electrification Administration, and the Rural Development Service. He served on various boards and task forces for Presidents: Eisenhower, Johnson, Nixon, Ford, and Reagan, and was the agricultural consultant to the administration during the formation of the Environmental Protection Agency. Will also received an Honorary Doctorate Degree from Purdue University.

This article originated from a speech given to a biotechnology conference.

government and the extremists who may influence government.

Increasingly, farmers are uncomfortable with agricultural leaders who take extreme anti-environmental positions, but they are also concerned with unrealistic positions taken by some animal rightists and environmental spokespeople. Perhaps farmers' most rapidly escalating hunger is for fact and truth, and they are less sure where to get it.

#### The Environment In Which Farmers Operate

- The knowledge explosion has left farmers increasingly awed by the realization that what they know is a constantly reducing percent of the knowledge available. They feel a need for more knowledge and yearn for sources they believe are sound.
- Farmers are increasingly vulnerable. A county judge once told me he could put anyone in the county jail. There are so many laws, everyone is technically violating something, no matter how conscientious he or she is. This is compounded for the individual entrepreneurs who do not have professional staffs.

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- Farmers are misunderstood. My first real shock at EPA was the reality that many fine, conscientious government employees were writing regulations for farmers while they didn't understand agriculture. For example, early on, I was told by a fine, conscientious public servant who was writing regulations for farmers that most of the farmland in the U.S. was owned by large corporations. (Farmers know that over 90% is owned by families or individuals.)

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### ***"Historically farmers have looked at change as exciting."***

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While it may appear unrealistic to expect 98% of the population to be preoccupied with understanding the roughly 2% who farm, the 2% who farm are the custodians of much of the surface of the earth, and unless reality is understood, everyone will lose.

- The increasing sophistication of agricultural production technology in which biotech looms large raises increased questions of how, and if, individual farms can function effectively without vertical integration or new systems of getting technology to small and medium-sized farms.

#### **Macro Changes in Decision Making**

Before discussing the changes in American farmers' decision making, the fact should be emphasized that one of our great resources is that *American farmers can make decisions*. In my work in Bulgaria, I find that one of the major impediments to progress is that the state has made business decisions for them for fifty years, thus people have great difficulty in making the decisions required in business.

Based on almost a half century of farming, I would suggest the

following as major changes in decision making:

- The decision making process is more complex due to more information (some of which likely is inaccurate), increased and sometimes inconsistent regulations, and a decision-making climate of potential and sometimes real media-hyped anxiety.
- More dependence is being placed on others to sort out the information avalanche — crop consultants, marketing consultants, management consultants, environmental consultants, feed consultants, accountants, lawyers, etc.
- Farmers are less confident in decisions they make. Increased insurance — liability, pollution, health, and workmen's compensation — reflects this. There is also some increase in the "I'll do my best and let the chips fall" attitude.
- There is more anxiety in the process. Recently a county agricultural extension agent told me of a recent meeting on biotech in his area, and he said, "people are really afraid of it". It appears to me that this fear typifies most current decision making because:
  - Scientific data are too complex for non-trained people to understand.
  - There is deep and vocal disagreement about the risk.
  - Our culture hypes anxiety about the unknown.
  - Farmers have been alarmed by past traumas such as DES, EDB and Alar.
  - The rate in which science is disproving previous positions causes insecurity.
  - There is a substantial sense of regulatory harassment among farmers, and anything new

and complex bodes of more harassment.

### How Farmers Look At Change

Historically farmers have looked at change as exciting. This nation was settled by risk takers who viewed the frontier as an opportunity to change their lives for the better while they made the wilderness more productive.

Currently, there is still the same excitement for change. Farm shows, demonstrations, field days and farm tours excite farmers as they see new things and concepts. But change is viewed with increased anxiety, feelings of vulnerability and sometimes even futility. Perhaps the shift is reflective of a general perception that rural discipline is shifting from one based fundamentally on individual and community conscience to a discipline of government enforcement.

The changes promised by biotech also produce mixed feelings among farmers. The initial response is a combination of excitement and fear — excitement about the production potential and the hope of such things as genetic immunity reducing the losses from diseases and pests without the use of vaccines and pesticides — fear that undesirable or even dangerous dimensions may be introduced. Farmers remember that the introduction of rabbits to Australia was supposed to be highly beneficial, and many of us here in Indiana had a hassle with multi-flora rose which was to be a beneficial fence. But biotech carries a much higher fear level. Terms like “insecticidal protein” in corn create some anxiety as we are just now hearing more about the dangers of the pesticides used many years ago.

There is further fear that genetic alterations may introduce risk to those with rare but intense allergies. (Someone with the peanut allergy might now react to corn flakes.)

There is also the fear that something created by biotech might not be contained once released. DDT, EDB and Alar could be removed from the system, but a science fiction type biological plague could escape and be uncontrollable. I don't think this

doomsday fear is very strong with farmers, but the 100% safe Delaney Amendment-type thinking has some appeal to everyone, and there is some feeling that the traditional “nothing risked, nothing gained” philosophy should be rendered obsolete by science.

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### ***"How will we get leaders to take the risk of leading?"***

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Following the initial response we find economic opportunity and fear. The hope of farmers to produce a larger and better product at a lower cost is universal, but the unknowns create anxieties such as:

- Will biotech create huge surpluses and break markets?
- If the U.S. regulates biotech, will the rest of the world run with it and take our foreign and even domestic markets?
- Will the big corporations monopolize the new products?
- Will it force vertical integration of farms?
- Will it frighten consumers and destroy demand?

There is also the “political social fear”. This is simply the discomfort of being caught in a whipsaw between differing societal and political action groups where no one is quite sure whom to believe, and the producer is in the middle faced with the reality that *he has to decide while others debate*.

### **How Do Farmers Assess New Products?**

While farmers differ in systems and priorities in decision making, most

include the following questions when evaluating new product:

- Is the new product safe? What about immediate toxicity, long term health risk, immediate and long term environmental risk, and how reliable are the safety measures for its use.
- Will it increase profitability if I use it, and will I be left behind if I don't?
- Will this product affect demand for what I produce positively or negatively?
- Does it fit in the systems of my farm?
- Is it moral? It is quite common to hear farmers say, “I don't want to use that stuff because it is too 'hot',” or they don't want to use any chemicals they don't have to because of residues and unknowns. I think these same concerns are even greater regarding biotech in general.

### **What Are Some Of The Future Issues Farmers Face?**

- How will we get leaders to take the risk of leading? When I was still at EPA, I had a call from the president of a state farm group who said he was in big trouble because he had urged his farmers to be environmentally responsible and turn in their used oil for recycling rather than use it on the farm in a way that it might damage the environment. He said that about half followed his lead and they were now being held liable because the recycling plant had gone under and was a super fund site, while the other half who had ignored him were home free. Policy officials at EPA were sympathetic, but the enforcement people were adamant, taking the attitude that “the law is the law.” What gives particular concern is the number of knowledgeable people who, upon hearing of this problem, indicated that they were

not surprised, and that it never pays to get out in front.

- How do we develop a realistic attitude toward risk? Risk, risk assessment, risk management and risk to benefit relationships have all consumed much of our thoughts. But logic does not grab human attention as much as fear. The body politic wants simple, brief explanations. Unfortunately, risk assessment at the citizen level too often is typified by the young mother who came to my wife during the Alar scare smoking a cigarette with her child in her arms and said, "Will apples hurt my baby?"

Progress and quality of life will be enhanced by our ability to focus on reality in relationship to the risk, and then communicate it to people in simple terms. Risk is a price of progress. It must be assessed and managed. Unperceived risks can do great damage, but non-risks perceived as risks retard progress. Whom the public will trust and how to communicate complex science to laypersons in simple terms are ongoing issues of increased urgency.

How to communicate realism about risk is particularly difficult in our democracy. The free enterprise system encourages competition; therefore, our people are bombarded with the "fear-fix syndrome". TV commercials create insecurity about everything from bad breath to being cheated so that they can sell security. News commentators and headline writers compete for viewers and readers in trying to make their story the most exciting. Exaggerating risk is more exciting than cool analysis, and the limits of ethics are pressed. Politicians get elected by identifying risks they can fix, and they get little media coverage if they understate the risk. Some environmental extremists get prominence and contributions from extreme positions. And some farm leaders enhance their support with extreme positions on the environment. Hard science

and truth are often too complex, and, perhaps to the layperson, too dull to attract much public interest until the issues are too polarized for easily reasoned solutions. All of this increases fear, and most have a fix to sell that isn't as convincing as the fear.

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***"Individuals are increasingly overwhelmed by information explosion"***

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- Finally, it is clear that farmers are uncomfortable about how much they need to know, but can never know, and they, like all the others, are evaluating whom to trust. We have lived through what I hope is the extreme of the anti-hero era, but not without damage to our most revered institutions. Unfortunately, some scar tissue remains, and credibility levels will recover slowly.

I am a product of the land grant system and have profound and



continuing respect for it. There is, however, a real need for our educational and research institutions not only to continue to look at their daily tactical need to survive during difficult times, but also to examine in depth their strategic positions and set their sights on the horizon.

Many farmers have, over the years, received much of their thought stimulation from their churches and the state university system. Some historically appreciated the theology of the church, but were somewhat turned off by the fundamentalist preoccupation with the evils of smoking, drinking and sexual promiscuity, while they were more inspired by the open-minded scientific approach of the university people. Recently on the plane to Bulgaria, I read in the airline magazine a pragmatic article on communicative diseases which stated that the best cure for AIDS is to control sexual promiscuity. I then saw on CNN that the Senate was considering requiring warning labels on all alcoholic beverages. When this is added to the overwhelming evidence on smoking, I realized that those fundamentalists had been the most accurate in their positions, even though they were arrived at through a theological rather than scientific analysis. When this is compounded by the concern farmers have when they read the current labels and realize that the guidance given them in the past (which was the best science had to offer at the time) put them at risk by today's standards, there is reason for real soul searching.

In a cultural situation where individuals are increasingly overwhelmed by information explosion, made anxious by fear in a culture that hypes fear, their increased anxiety and frustration may lead to looking to other than hard science sources for guidance.

This may seem unlikely, but when I was in India, I was amazed to see educated Indians defending the tradition of sending cows to old cows' homes, their carcasses to remain uneaten in a society abounding with protein-deficient children.

Frustrated and insecure people often reach out in unexpected ways.

## You Need to Re-evaluate Crop Insurance!

George Patrick, Professor and Donald Pershing, Extension Economist

**M**ore farmers will be interested in multiple peril crop insurance (MPCI) in 1994. A new insurance plan, based on county yields, has been introduced. Major improvements have been made to the previous plan which continues to be based on an individual's yields. This article provides a brief overview of the changes, a discussion of the plans, and an analysis of some actual farm situations.

The new alternative, the *Group Risk Plan (GRP)*, is available to corn and soybean producers in most Indiana counties.\* Indemnities are based on the *county's* average yield per planted acre, rather than an *individual producer's* yields. GRP can provide a high level of protection, based on up to 90 percent of the expected county yield. The program is designed to minimize administrative costs and facilitate farmer participation.

The *Actual Production History Plan (APHP)* has also undergone significant changes. Policies for 1994 and later years will include the delayed/prevented planting coverage automatically. Prior to 1994, crops actually had to be planted before insurance coverage became effective unless a special delayed/prevented planting option had been purchased. Producers with certified production records for four or more years will not use "T-yields" (transitional yields) in determining their yield for insurance purposes. Those producers with less than three years of certified records will be able to use only a percentage of the T-yield to determine their insurance yield. Indemnities under APHP are based on the *individual producer's* yield on the insured unit.

\* GRP is not available for corn in Brown, Crawford, Dearborn, Floyd, Monroe, Ohio, Perry, and Switzerland counties. The soybean GRP program is not available in the counties above or in Lawrence, Martin, and Orange counties.

GRP is targeted at the above average, low risk farmers whose yields tend to move with those of the county and who are primarily concerned about widespread losses such as drought. APHP provides greater protection for a producer who may suffer a significant loss, such as hail damage, when county average yields may be only slightly affected. Producers cannot carry both GRP and APHP on the same crop in the same county. Because of these new developments in MPCI, Indiana producers should reevaluate crop insurance's role in their overall risk management strategy. The sales closing date for both GRP and APHP is April 15 for spring planted crops.

### Group Risk Plan (GRP)

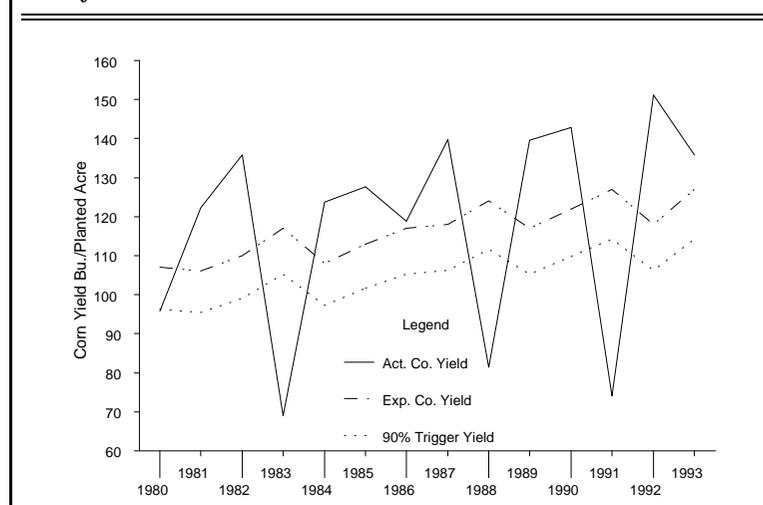
GRP is based on the idea that farmers in a county are often affected by the same event, such as a widespread drought, early fall frost, or other catastrophic event. Producers will differ in how closely their yields track with county yields over time. The GRP premium is based on the historical risk for the county and all farmers in the county pay the same premium per acre for the same insurance coverage. If the county average yield per planted acre drops below

the "trigger level," all producers in the county with the same contract receive the same per acre indemnity payment. Insured producers receive this payment whether or not their individual yields were reduced.

Farmers may elect a coverage level with a "trigger yield" between 65 and 90 percent of the expected county yield. This expected county yield incorporates the yield trend and is likely to be higher than the long-term county average yield per planted acre. For example, the 1994 expected county corn yield for Tippecanoe County is 127 bushels per acre and the 1983-92 average is 116.6 bushels per planted acre. Thus, at the 90 percent coverage level, the trigger yield would be 114.3 bushels. Producers insuring at that level would receive indemnity payments if the county average corn yield is less than 114.3 bushels per planted acre in 1994. Figure 1 illustrates the average county yield per planted acre, expected yield, and the 90 percent trigger yield for corn in Tippecanoe County for 1980 to 1993. With the 90 percent trigger yield, GRP for corn would have paid indemnities in 1980, 1983, 1988, and 1991.

Farmers may also elect a protection level, the dollars of insurance

**Figure 1. Average, Expected, and 90% Trigger Corn Yields, Tippecanoe County.**



per acre, which is independent of their own historical yields. The mid-protection level in a county is determined by multiplying the trigger yield times the *established price*. The national established prices for corn and soybeans in 1994 are \$2.20 and \$5.75 per bushel, respectively. Thus, for Tippecanoe County the mid-protection level for corn would be 127 bushels times \$2.20, or \$280 per acre. Producers may purchase a higher level of protection, up to 150 percent of the mid-protection level, or \$420 per acre in this case. Thus, producers with yields which are higher than the expected county yield may obtain coverage for their higher yields if they wish. On the other hand, producers seeking to protect only their out-of-pocket expenditures could elect a lower level of coverage. The minimum coverage level is 30 percent of the maximum coverage, or \$126 per acre in Tippecanoe County.

The government subsidizes the premiums by the lesser of 30 percent or a maximum amount per acre which varies by county and crop. For example, the maximum per acre subsidies in Tippecanoe County are \$4.19 for corn and \$2.12 for soybeans. Table 1 summarizes the unsubsidized premium rates for corn and soybeans in Tippecanoe County. The lower premium rates for soybeans reflect the lower probability of loss.

The insurance premium is calculated by multiplying the protection level selected by the premium rate and subtracting the lesser of 30 percent or the maximum subsidy amount. For example, for the mid-protection level of \$280 at the 90 percent coverage level, the unsubsidized premium would be \$280 times 5.0%

**Table 1. Unsubsidized GRP Premium Rates, in Percent, for Corn and Soybeans in Tippecanoe County for Alternative Coverage Levels.**

Crops	% Coverage Level					
	90	85	80	75	70	65
Corn	5.0	4.0	3.4	2.6	1.8	0.9
Soybeans	2.9	1.9	1.2	0.8	0.7	0.6

or \$14.00 per acre. The subsidy is the lesser of 30 percent of \$14.00, or \$4.20, or the maximum per acre subsidy of \$4.19. Thus, the net premium would be \$9.81 per acre. Reducing the coverage level to 85 percent, a 108.0 bushel trigger yield, would reduce the premium to \$7.84 per acre. Alternatively, reducing the protection level to \$190 per acre, equivalent to a price of \$1.50 per bushel at the 90 percent coverage level would make the premium \$6.65 per acre.

Insurance indemnities are paid if the county average yield falls below the trigger yield. If there are severe losses, defined as when the preliminary county yield is less than 85 percent of the trigger yield, a preliminary payment is made after November 30th. The final payment is made after April when the final county yield is determined. For example, if the final county corn yield was 100 bushels per planted acre there would be a shortfall of 12.5 percent relative to the 114.3 bushel trigger yield. At the \$280 protection level, this would result in an indemnity of 12.5 percent of \$280 or \$35.03 per acre. If the 85 percent trigger yield had been selected, there would have been a 7.4 percent shortfall and an indemnity of \$20.74 per acre.

GRP provides protection for widespread losses but does not protect well against hail and other isolated losses. If a producer's yields do not track with county average yields, GRP may not provide the protection desired. A farmer's actual yields have no effect on insurance indemnities. Thus, a producer may suffer a loss and receive no indemnity. On the other hand, an insured farmer may receive an indemnity when the average county yield is below the trigger yield and the farmer has no loss.

#### Actual Production History Plan (APHP)

APHP is the new name for an improved model of multiple peril crop insurance. APHP guarantees a minimum average yield per acre for the insured crop for the insured unit, with the minimum determined by the deductible chosen by the

farmer. If the producer's average yield for the insurance unit falls below the level specified in the policy, an indemnity is paid. Yields are adjusted for quality losses such as low test weight or an aflatoxin infestation. APHP covers unavoidable production losses caused by forces outside a producer's control such as drought, excessive moisture, hail, wind, frost/freeze, excessive temperature, insects, diseases, and natural disasters. Many policies also cover the costs of replanting if necessary. Losses caused by poor farming practices or theft are not covered.

Producers may elect to insure at one of four coverage levels. These are 75, 65, 50, or 35 percent of the insurance yield. These coverage levels correspond to 25, 35, 50, and 65 percent deductibles, respectively. For example, if a producer had an insurance yield of 120 bushels of corn per acre, the producer's actual average would need to fall below 90 bushels, the guarantee level, for an indemnity to be paid if 75 percent coverage level had been chosen. If the 65 percent coverage level had been elected, yields would need to drop below the guarantee level of 78 bushels per acre to receive insurance indemnities.

Farmers with four or more years of certified production records can base their insurance yield entirely on their actual yields. However, farmers without certified production records have an insurance yield which is only 65 percent of the county T-yield. For example, the T-yield for corn in Tippecanoe County is 129 bushels per acre. Thus, a farmer without any production records would have an insurance yield of only 84 bushels per acre. If a farmer has production records for one year, then 80 percent of the T-yield can be used for the other three years. For example, if a farmer had a 1993 yield of 140 bushels per acre, the insurance yield would be the average of 80 percent of 129 bushels for three years plus 140 or 112.4 bushels per acre. With records for two years, the percentage of T-yields used increases to 90 percent for the missing years. When the producer has records for three years, the

entire T-yield can be used for the missing year. This change was instituted to prevent abuses of the program by farmers with below average yields. In the past, farmers without production records have been able to use the T-yield for insurance purposes.

Farmers with more than four years of production records can use the additional years to reduce the effect of a bad year on their insurance yield. There is a 15 percent "cap" on insurance yield increases in one year and a 10 percent "cup" on insurance yield decreases in one year.

Participants in APHP continue to be required to provide their Social Security number or Employer Identification number. This allows the Federal Crop Insurance Corporation to track producers who have participated in the crop insurance program and their previous yields. The intent was to avoid abuses of the program by producers with poor performances who have been changing insurance companies in an attempt to get a fresh start with respect to yields. Recent changes in the use of T-yields reinforces this attempt to limit the "adverse selection" of insureds.

Producers in 1994 will automatically receive coverage for delayed/prevented planting, no special option will be required. If a producer is unable to plant because of weather conditions, the yield guarantee level will be reduced 1 percent per day delay in planting for up to 10 days after the final planting date (June 5, corn; June 20, soybeans). The reduction in yield guarantee level increases to 2 percent per day planting is delayed for the next 15 days. The maximum delayed planting yield reduction is 40 percent. A corn producer with a 90 bushel guarantee level who was entirely prevented from planting corn in 1994 would receive payment based on 50 percent of the 90 bushels, or 45 bushels.

Producers may elect a price used for premium and indemnity calculations which can be from 30 to 100 percent of the established price. The high, or market-based, price election

**Table 2. Price Elections for APHP Crop Insurance in 1994.**

Crop	Low	Price Election Level/Bushel	
		Established	High
Corn	0.66	2.20	2.40
Soybeans	1.73	5.75	5.90
Wheat	0.84	2.80	3.25
Grain Sorghum	0.60	2.00	2.20
Oats	0.42	1.40	1.45
Popcorn (per pound)	0.03	0.09	0.09

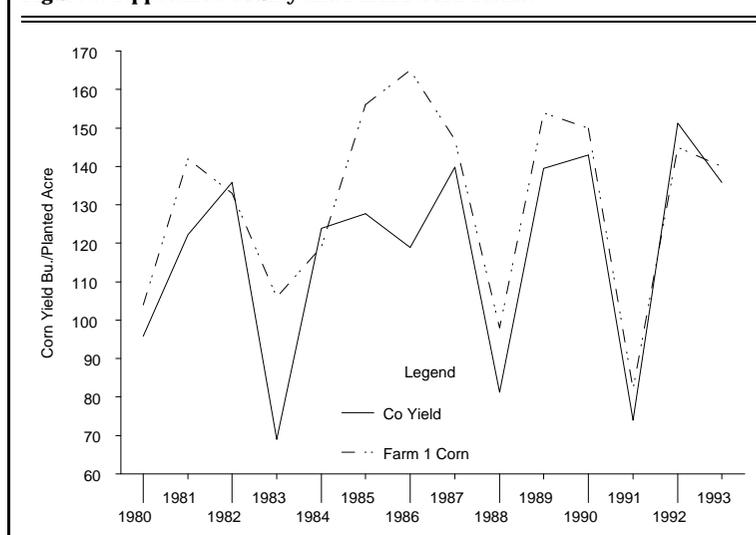
for some commodities is based on 80 percent of the average futures price during the last five trading days of specified periods. Under no circumstances may the high price election be less than the established price. The 1994 price elections for the primary Indiana crops are summarized in Table 2.

Premium rates are based on yield spans and coverage levels. Higher yields pay a lower rate, while higher coverage levels (lower deductibles) pay higher rates. For example, a Tippecanoe County producer with an insurance yield of 120 bushels per acre would have a subsidized premium rate of 2.9 percent for the 65 percent coverage level and 5.4 percent for the 75 percent coverage level. If the farmer's insurance yield was 140 bushels per acre, the rates would drop to 2.5 and 4.3 percent for the 65 and 75 percent coverage levels, respectively.

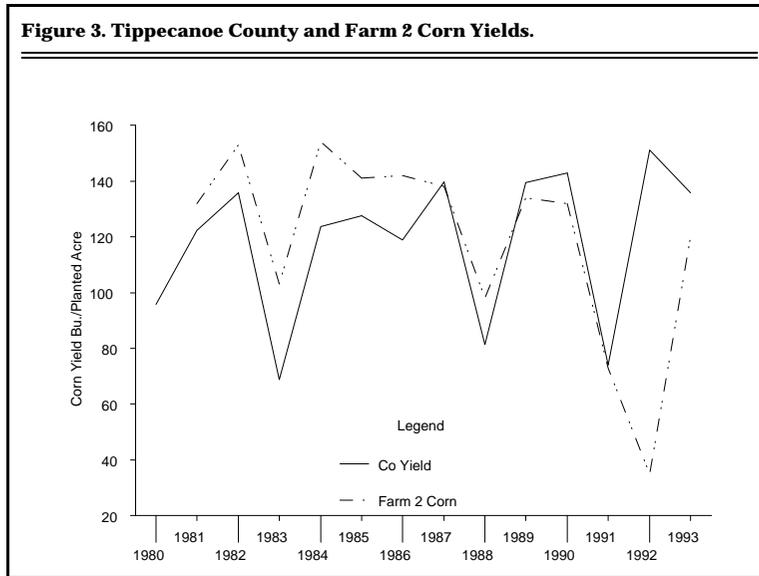
If a Tippecanoe County farmer had an APHP insurance yield of 127 bushels per acre, the county expected yield, the premium would be computed using a 4.8 percent rate for the 75 percent level of coverage level. The APHP yield of 127 bushels is multiplied by the 75 percent coverage level to obtain the guarantee level of 95 bushels. The 95 bushel guarantee level is multiplied by the price election, \$2.20 per bushel, to determine the per acre protection of \$209. The \$209 protection level times the 4.8 percent premium rate gives a \$10.03 per acre premium. If the 65 percent coverage level had been chosen, the premium would be \$4.90 per acre.

An indemnity would be paid if the individual producer's actual average yield on the insurance unit fell below the yield guarantee level. With the 95 bushel yield guarantee level, the farmer would receive \$2.20

**Figure 2. Tippecanoe County and Farm 1 Corn Yields.**



**Figure 3. Tippecanoe County and Farm 2 Corn Yields.**



per bushel of yield shortfall. For example, if the producer's actual 1994 yield was 80 bushels per acre, the producer would receive an indemnity of \$33 per acre.

#### Comparing GRP and APHP

How would producers have fared under GRP and APHP? The answer will vary depending on individual circumstances but the experience of two southern Tippecanoe County farms may be helpful. The crop which is being considered is also important. This section will first consider corn, and then soybeans.

#### Corn

Figure 2 shows the actual 1980 to 1993 corn yields for Farm 1 and the county average yield per planted acre. Farm 1's yields were generally above the county yields, they averaged 131.5 bushels per planted acre as compared to 116.8 for the county from 1980 to 1992. Although the ups and downs in yields do not track perfectly, Farm 1's bad years were the same as those of the county.

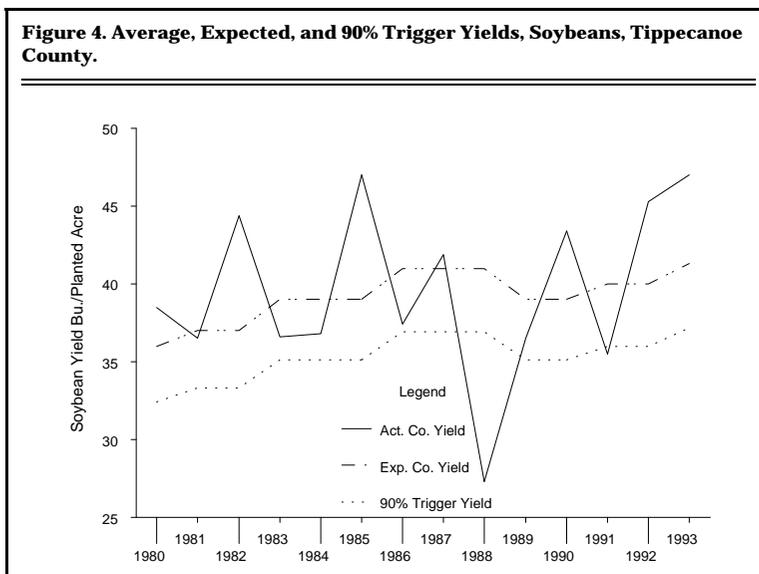
To compare GRP and APHP, it was assumed that the producer would purchase the same dollars of insurance coverage per acre under both programs. The 1994 APHP corn

yield would be 136 bushels per acre which, at the 75 percent coverage level and \$2.20 price election, equals a \$224 per acre protection level. The cost of APHP would be \$9.20 per acre. The premium cost for \$224 per acre of GRP insurance coverage with a 90 percent trigger yield would be \$7.84 per acre. Over the 1980 to 1993 period, Farm 1 would have received APHP indemnities in 1988 and 1991, and would have received GRP indemnities in 1980, 1983, 1988, and 1991. Total APHP indemnities for 100 acres during the 1980 to 1993 period would have been \$5,115 with a total premium cost of \$12,880. Total GRP indemnities for 100 acres during the 1980 to 1993 period would have been \$21,832 and the premiums paid would have totaled \$10,976.

Farm 2 had the 1981 to 1993 corn yields indicated in Figure 3, as no corn was grown in 1980. Farm 2's yields generally tracked county yields. However, when the county had its highest yield in 1992, Farm 2 was hit by a late spring frost and had its lowest yield for the entire period. With an APHP yield of 117 bushels per acre, Farm 2 would have received APHP indemnities on 100 acres of \$3,493 in 1991 and \$10,879 in 1992. Under an equivalent \$193 per acre protection level of GRP, indemnities would have been received in 1983, 1988, and 1991. Total indemnities under APHP would have been \$14,372 and premiums would have totaled \$11,544. With GRP, indemnities would have totaled \$18,750 and total premiums would have been \$8,788. It is important to note that no GRP indemnity would have been paid to Farm 2 in 1992, the year of its worst loss. A primary purpose of insurance for many people is to provide liquidity when it is needed and GRP would not have provided liquidity in 1992.

The experience of these two farms suggests that corn producers are likely to collect more frequently with GRP than with APHP. This is due primarily to the higher trigger level associated with GRP. The indemnities collected would have been greater and premium costs lower with GRP. However, as

**Figure 4. Average, Expected, and 90% Trigger Yields, Soybeans, Tippecanoe County.**



illustrated by Farm 2, very significant losses can occur for individual farms which would not be covered with GRP.

### Soybeans

Figure 4 shows the actual, expected, and 90 percent trigger yields for soybeans in Tippecanoe County for the 1980 to 1993 period. There are only two years in the 14 year period when GRP for soybeans would have paid an indemnity. The 1988 indemnity would have been sizeable but the 1991 payment would have been small. As noted above, the GRP premium rates for soybeans are lower than for corn because the historical frequency of loss has been less.

Figure 5 shows actual soybean yields for Farm 1 and Tippecanoe County over the 1980 to 1993 period. Although yields tended to go up and down together, Farm 1 had a bad year in 1989, the year following the low county yields of 1988. The 1994 APHP yield for Farm 1 is 45 bushels per acre. At the \$5.75 price election and the 90 percent trigger level, this is the equivalent of \$194 of insurance protection under GRP. The premiums per acre would be \$6.99 for APHP and \$3.94 for GRP. Over the 13 years when soybeans were grown from 1980 to 1993, a total of \$9,087 in premium would have been paid under APHP for 100 acres and \$575 indemnities would have been received. With GRP, \$5,122 would have been paid in premiums and \$5,680 received in indemnities.

Although only one farm was presented, additional analyses suggest Tippecanoe County soybean producers are less likely to receive indemnities with APHP than corn producers. Even with GRP, indemnities have been less frequent for soybean production. However, premium costs with GRP were lower than APHP.

### Conclusions and Management Implications

Producers will need to evaluate GRP and APHP for their specific situations. If a producer's yields track the ups and downs, especially the downs, of county yields, then GRP may provide good protection. Individuals with several soil types or

farming in different parts of the county are likely to be in this category. However, if a producer's yields do not track county yields, the individualized coverage of APHP may be needed. If a county has two distinct soil types, the county average yield may not reflect either area or the actual yields on individual farms very well.

Neither APHP nor GRP provide very good protection against hail or other isolated losses. If hail is a concern, farmers may wish to purchase only hail/fire protection. However, hail insurance may be combined with either APHP or GRP.

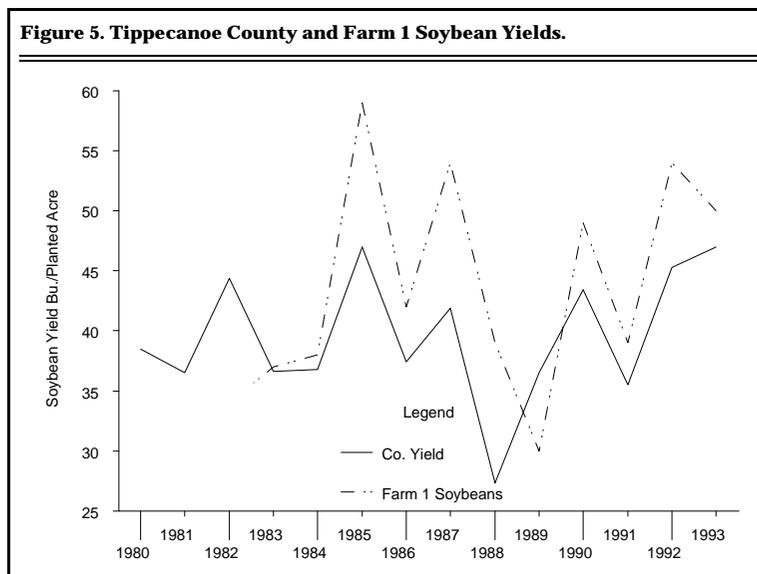
Producers differ in their ability to bear risk. Some farmers may decide not to carry crop insurance, while others cannot take that chance. Some lenders may require borrowers to carry crop insurance. Lenders may be more comfortable with APHP than GRP because of the link to the individual producer's yields. Farmers should remember that APHP generally pays within 30 days of a loss. With GRP, in some cases, no payment will be made until May of the following year.

Only a limited number of producers, those most likely to have losses, have tended to buy crop insurance in the past. This process, called adverse selection, has resulted in APHP premium rates which, in spite

of the government subsidy, may be high for the risks faced by the "good" producers. GRP does not have this problem. Furthermore, indemnities are based on county average yields and individual producers can do little to influence the outcome. The GRP rates are based on the 1962 to 1992 yields and appear "fair." With the 30 percent subsidy on premiums, the long-term cash flow return from GRP should be positive for producers but may not be as favorable as the example farms.

The limited analysis of actual farms suggests that corn may be a better insurance bet than soybeans. Losses with corn tend to be more frequent and larger than with soybeans. Corn and soybean yields do tend to move together. Although the premium rates for corn are higher than for soybeans, some producers may carry higher coverage on corn and not insure soybeans. If corn yields are down, the extra indemnity may cover possible soybean losses. If hay for livestock is a major crop, a higher coverage on corn may also help offset the additional expense of buying hay.

Crop insurance is different in 1994! The new plans may have a role in your revised risk management program. As crop insurance continues to change, reevaluate its role for you and your farm operation.



## Optimum Hog Marketing Weights With Higher Feed Prices

Michael A. Boland, Research Assistant and  
Paul V. Preckel, Associate Professor\*

**F**eed prices, in particular corn, are predicted to be higher in 1994 due to lower stocks caused by the flood that occurred in much of the western Corn Belt in 1993.

As a result, pork producers can expect higher feed costs. Maintaining low feed costs per pound of gain is important for profitability because feed is the largest cost in producing pork. However, the weight at which a producer markets hogs is also critical to profitability.

Hence, a key question for pork producers is: "how will higher feed costs impact the optimal marketing weight and profit per hog?"

Economically optimal marketing weights differ across producers depending upon management, nutrition, type and size of pens and facility, genetics, markets, and other factors. Average marketing weights have been increasing in recent years due, in part, to increased packer discounts for light weight hogs (generally under 235 pounds), processor demands for heavier primal cut weights, and substantial labor savings associated with trimming heavier primal cuts.

Over the past ten years, the average marketing weight for U.S. hogs has increased from 241 pounds to 252 pounds (Figure 1).

### Bioeconomic Model

Genetics based upon a typical Indiana hog genotype (Duroc x White Landrace) from the Purdue Cooperative Swine Lean Growth Trial was used in the economic model to determine an optimal marketing weight

for a feeder pig produced under different feed prices.

Feed costs were evaluated with four different corn prices (\$2.25, \$2.50, \$2.75, and \$3.00/bu) and a corresponding soybean meal price/ton (\$185, \$192.50, \$200, and \$207.50/ton, respectively).

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***"As feed costs get higher, it becomes more important for producers to determine the optimal marketing weight."***

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Other direct and indirect costs were obtained from the Purdue University Livestock Production Budgets (Foster et al.). All daily direct and indirect costs remained the same over time.

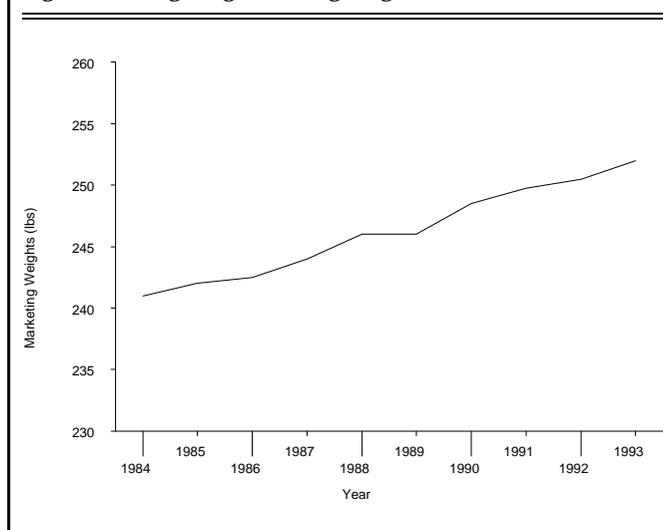
Three diets were fed to these animals. From 50 to 93 pounds, the barrows and gilts were fed a 19 percent

protein ration with 1.2 percent lysine. A 16.8 percent protein ration with 1.0 percent lysine was fed from 93 to 177 pounds.

Finally, the pigs were fed a 14.9 percent ration with .9 percent lysine above 177 pounds. The feed included corn, soybean meal, grain, premix, lysine, protein, and fat. The growth relationships between feed and live weight gain, and feed and lean weight gain were used to approximate the daily growth of the animal. An Indiana pork packer discount schedule was used to discount animals under 235 pounds or over 275 pounds.

The biological model maintained information on daily feed efficiency (pounds of feed/pound of live weight gain) and lean efficiency (pounds of feed/pound of lean gain). In addition, daily live weight gain was determined using daily feed intake. Total costs and revenues were calculated each day. A more detailed description of the economic and biological

Figure 1. Average Hog Marketing Weights



\* The comments and suggestions of Craig Dobbins, Chris Hurt, and John Kadlec are appreciated. The model used in this paper was funded, in part, by a grant from the Indiana Pork Producers Association.

model is presented in Boland, Preckel, and Schinckel.

The model was used to determine an optimal marketing weight and the associated profit per hog assuming a \$48.00/cwt live weight price. Profit is defined as a return to management and operator labor. With a corn price of \$2.25/bu and a soybean meal price of \$185/ton, the marketing weight was 253 pounds with a profit per hog of \$16.12.

When the corn price was increased to \$2.50/bu (\$192.50/ton soybean meal price), the marketing weight dropped to 250 pounds and profit dropped to \$10.16 per hog. A twenty percent increase in the price of corn per bushel (\$2.75/bu with a corresponding \$200/ton soybean meal price) yielded a marketing weight of 248 pounds and a profit of \$7.47 per hog.

Finally, \$3.00/bu corn and \$207.50/ton soybean meal yielded a marketing weight of 244 pounds and a profit per hog of \$4.77. Figure 2 contains the profits per hog associated with the different combinations of feed prices between 240 and 255 pounds. As the price of feed goes up, the cost of not marketing near the optimal weight increases as profits decline faster with the higher feed prices.

#### Summary and Conclusions

Higher feed costs mean lighter market weights. However, a producer's marketing weight depends upon several factors and your marketing weights are probably different than these. For example, crowding is a

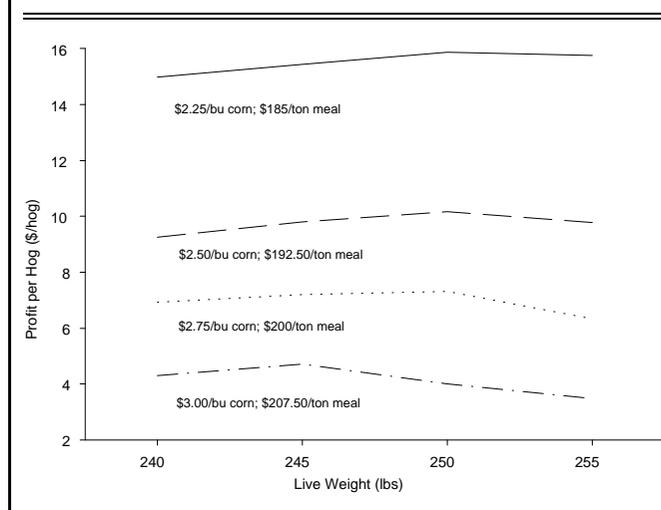
critical factor that a producer considers when deciding when to market.

Timing is another factor. You may have a group of pigs that you want to get out of the nursery, and hence you need to market the hogs in the finishing barn.

In addition, those producers growing their own corn may have a price/bushel different than ours. Finally, producers with improved genetics that are more feed efficient will use less feed per pound of gain. Hence, feed costs will be lower.

All of these factors help determine a marketing weight. As feed costs get higher, it becomes more important for producers to determine the optimal marketing weight.

**Figure 2. Profits Per Hog for Different Combinations of Feed Prices**



#### References

- Boland, M.A., P.V. Preckel, and A.P. Schinckel. "Optimal Hog Slaughter Weights Under Alternative Pricing Systems." *Journal of Agricultural and Applied Economics*, 25(1993): 148-163.
- Foster, K.A., W. Dillon, K. Hendrix, V. Mayrose, and M. Neary. "Purdue University Livestock Production Budgets for 1993." ID-200, Purdue University Cooperative Extension Service, West Lafayette, Indiana, 1993.



## 1994 State Farm Management Tour

**T**he 1994 State Farm Management Tour sponsored by the Indiana Farm Management Association and Purdue Cooperative Extension Service will be held July 12 and 13th. The location this year will be in Orange and

Washington Counties in Southern Indiana. There will be five outstanding farms to tour, and an opportunity to discuss management strategies with the owners. Check with your County Extension Office for further details.

## Off-Farm Employment and Earnings Among Indiana Farm Households

David H. Hearn, Research Assistant; Kevin T. McNamara, Associate Professor; and Freddie L. Barnard, Associate Professor

**O**ff-farm employment income is important to farm families for several reasons. First, such income is often needed to help the family achieve a reasonable standard of living. The 1991 *Costs and Returns Survey* conducted by USDA's Economic Research Service showed that the total household income of families who were primarily farmers was only slightly more than 75 percent of the average U.S. household income, and they relied on off-farm sources for almost 65 percent of their total income (USDA, 1993). Also, small and/or part-time farmers must often depend on off-farm employment income to compensate for net losses in the farming operation. Second, some farm households cannot meet the large capital requirements of

some forms of modern U.S. agriculture. These households may be young, new to farming, small-scale, or some combination of these characteristics. They must work off-farm to amass the capital which they will need to remain in farming. Third, farm households whose farming operation is experiencing financial distress due to low returns or heavy debt burdens may be forced to work off of the farm to meet their financial obligations to creditors.

Income from non-farm employment is a very large component of farm household income in the U.S. In 1991, about 43 percent of average U.S. farm household income came from off-farm employment, versus about 11 percent from farming. Only 55 percent of U.S. farm households reported farming as their principal

occupation. Of those, nearly 47 percent reported earning income from non-farm employment. The average amount earned per household from non-farm employment was slightly larger than the amount earned from farming. Almost 86 percent of farm households for whom farming was not the principal occupation reported income from non-farm employment, and on average these households needed such income to offset losses in the farming operation. Although Midwestern farm households were more dependent on farm income than households from other regions, they still received only slightly more than 22 percent of their total income from farming.

The importance to Indiana farmers of income from off-farm employment can be seen in the results of the 1993 *Indiana Farm Finance Survey*. The study shows what proportion of farm households in Indiana reported off-farm employment and income, and presents average off-farm income levels and averages of selected farm characteristics. The data are presented in several tables and organized by farm income levels, debt-to-asset ratios, reporting district, and the primary enterprise of the farm operation.

### Overall Participation in Off-Farm Labor

Table 1 compares net cash farm income between households who did and did not work off-farm. Of the 1,663 usable responses to the survey, 1,619 were from active farms, slightly more than 97 percent of the total. As shown, nearly 72 percent of the active farms in the sample had some household member who worked off-farm. About 56 percent of the households who did not work off-farm reported net cash farm income less than \$20,000, while almost 31 percent of those not working off-farm had net cash farm income of

**Table 1. Farm Income for Households With and Without Off-Farm Labor.**

Worked Off-Farm?	Farms	Net Cash Farm Income				
		No Report	Net Loss	\$0 - \$19,999	\$20,000- \$49,999	\$50,000 or More
	No.	----- Percentage of Farms -----				
No	460	13	12	44	20	11
Yes	<u>1159</u>	<u>8</u>	<u>24</u>	<u>49</u>	<u>15</u>	<u>4</u>
Total	1619	10	21	48	16	6

Source: 1993 Indiana Farm Finance Survey; Purdue

**Table 2. Farm Characteristics, No Off-Farm Labor versus Off-Farm Labor.**

Worked Off-Farm?	Active Farms	Acres	Oper. Age	D/A Ratio	Primary Enterprise Type						
					Crops	Beef	Hogs	Dairy	Poult.	Other	
	No.	----- Average -----				----- Percent of Farms in Row -----					
No	460	429	62	0.13	78	7	5	6	1	3	
Yes	<u>1159</u>	<u>296</u>	<u>49</u>	<u>0.25</u>	<u>73</u>	<u>11</u>	<u>7</u>	<u>4</u>	<u>0</u>	<u>4</u>	
Total	1619	332	53	0.22	74	10	7	4	1	4	

Source: 1993 Indiana Farm Finance Survey; Purdue

\$20,000 or more. In comparison, over 73 percent of households who worked off-farm had net cash farm income less than \$20,000, and only 18.5 percent of them reported income of \$20,000 or more.

Farm characteristics differ for farm households who worked off-farm when compared to households who did not (Table 2). The households who worked off-farm had smaller farms, younger operators, and a higher debt/asset ratio than the households who did not work off-farm. Proportionately fewer of the households who worked off-farm lived on field crop, dairy, and poultry farms, while proportionately more of them lived on beef, hog, and other crop farms. Further comparisons of these characteristics will be made in other tables.

#### Non-Farm Employment and Income by Farm Income Levels

Overall, about 57 percent of the operators and 48 percent of their spouses worked off-farm, and 18 percent of households had other members who also worked off of the farm (Table 3). The proportion of all family members who worked off-farm was higher for farms with low farm income, and much higher for the households which lost money in farming. Households which reported net losses or low income from farming were proportionately more likely to have worked more off-farm in the past year and to be planning to work more off-farm in the coming year. For all farms, about 15 percent reported working more off-farm in 1992, and 13 percent planned to work more off-farm in 1993.

Average farm size was larger and operator's off-farm employment income was smaller as net cash farm income increased (Table 4). On average, those farm households which reported negative or low farm income had farms less than one-half the size of those reporting moderate farm income and less than one-fifth the size of those reporting high farm income. Of the households which reported net cash farm income, those with positive but low farm income had the lowest average off-farm employment for spouses, while

those reporting either net farm losses or moderate farm income had the lowest average levels of non-wage, non-farm income. Both spouse's non-farm income and unearned income were highest for the farms with the highest net cash farm income.

#### Non-Farm Employment and Income by Debt-to-Asset Ratios

Almost 33 percent of the active farms surveyed declined to report some component of either their assets, their debts, or both, so no ratio is available for those farms (Table 5). About 24 percent of total active farms had debt-to-asset ratios of zero, while less than one percent reported being insolvent.

Many researchers prefer to assign financial risk levels to farms using debt-to-asset ratios. These levels are also shown in Table 5. The

usual grouping refers to those farms with debt-to-asset ratios less than 0.40 as financially safe, those with debt/assets from 0.40 to 0.70 as financially vulnerable, and those with debt/assets between 0.70 and 1.00 as in a financial crisis (Walker and Bellinghausen). Farms with debt-to-asset ratios greater than 1.00 are of course insolvent. According to this system, slightly more than half of Indiana farms surveyed were financially safe, about 12.5 percent were vulnerable, nearly 3 percent were in crisis, and less than one percent were insolvent.

The general trend in off-farm labor participation can be seen by the percentages across debt/asset ratios, but it is starkly outlined when viewed across risk categories. In general, the tendency to work off-farm increased as financial risk (as measured by debt-to-asset ratios)

**Table 3. Non-Farm Labor Participation, by Farm Income Levels.**

Net Cash Farm Income	Farms	Someone Worked Off-Farm	Worked Off-Farm?			Non- Wage Income	Work More Off-Farm?		
			Oper.	Spouse	Other		1992	1993	
	No.		----- Percent of Farms -----						
No Report	156	62	51	38	12	32	10	8	
Net Loss	336	83	71	54	23	46	20	19	
\$0 - \$19,999	772	74	61	49	19	51	15	13	
\$20,000-\$49,999	259	65	40	43	14	58	13	12	
\$50,000 or more	<u>96</u>	<u>48</u>	<u>19</u>	<u>37</u>	<u>12</u>	<u>50</u>	<u>4</u>	<u>3</u>	
Overall	1663	72	56	47	18	50	14	13	

Source: 1993 Indiana Farm Finance Survey; Purdue

**Table 4. Farm Characteristics and Non-Farm Income Levels, by Farm Income.**

Net Cash Farm Income	Farms	Acres	Oper. Age	D/A Ratio	Off-Farm Income		Unearned Income	
					Oper.	Spouse		
	No.		----- Averages -----					
No Report	156	299	55	0.27	\$27,177	\$15,602	\$14,615	
Net Loss	336	178	52	0.26	33,436	17,486	10,983	
\$0 - \$19,999	772	220	53	0.20	28,214	15,714	13,151	
\$20,000-\$49,999	259	546	51	0.24	19,782	16,874	10,959	
\$50,000 or more	<u>96</u>	<u>1108</u>	<u>54</u>	<u>0.16</u>	<u>14,959</u>	<u>18,187</u>	<u>16,993</u>	
Overall	1619	332	53	0.22	\$28,117	\$16,407	\$12,648	

Source: 1993 Indiana Farm Finance Survey; Purdue

**Table 5. Non-Farm Labor Participation, by Debt-to-Asset Ratios.**

Risk Level	D/A Ratio	Farms		Someone Worked	Worked Off-Farm?			Non-Wage	Work More Off-Farm?	
		No.	Pct.	Off-Farm	Oper.	Spouse	Other	Income	1992	1993
	No Report	531	32	354	51	41	15	27	10	8
Safe	Zero	387		235	49	35	15	68	7	5
	0.01-0.09	123		91	56	48	18	62	16	14
	0.10-0.19	106		82	65	58	28	55	15	14
	0.20-0.29	119		98	60	66	20	51	21	22
	0.30-0.39	<u>92</u>		<u>79</u>	<u>70</u>	<u>55</u>	<u>22</u>	<u>72</u>	<u>18</u>	<u>17</u>
	Subtotal	827	51	585	56	46	18	64	12	11
Vulnerable	0.40-0.49	79		64	67	62	15	49	25	19
	0.50-0.59	75		64	66	65	21	54	26	30
	0.60-0.69	<u>49</u>		<u>38</u>	<u>53</u>	<u>57</u>	<u>22</u>	<u>57</u>	<u>26</u>	<u>24</u>
	Subtotal	203	13	166	63	62	19	53	26	24
Crisis	0.70-0.79	27		24	70	77	18	51	29	37
	0.80-0.89	11		10	81	81	27	63	45	36
	0.90-0.99	<u>6</u>		<u>6</u>	<u>100</u>	<u>33</u>	<u>50</u>	<u>16</u>	<u>50</u>	<u>16</u>
	Subtotal	44	3	40	77	72	25	50	36	34
Insolvent	1.00 or more	14	1	14	92	57	28	42	42	42

Source: 1991 Indiana Farm Finance Survey: Purdue

increased. For instance, about 57 percent of the operators whose farms were safe worked off of the farm, but this proportion rose until roughly 93 percent of the operators of insolvent farms worked off-farm. This pattern also holds for other household members' off-farm work and for households working more off-farm in both the past year and the coming year. The proportion of spouses working off-farm increased as financial condition worsened to the crisis level: roughly 47 percent of spouses on safe farms worked off-farm while about 72 percent of spouses on farms in crisis worked off-farm. However, only about 57 percent of spouses on insolvent farms worked off-farm.

The smallest farms, on average, were those at each extreme of the scale, with either debt-to-asset ratios of zero or ratios at or near insolvency (Table 6). Table 6 indicates that average farm size may be smaller for farms in crisis than for the safe or vulnerable farms; if so, the pattern is not strong. In general, average operator's age, operator's non-farm income, and household unearned income all tend to fall as the ratio of debts to assets rises. Spouse's average income seems to rise as debt/assets increases.

#### Non-Farm Employment and Income by Reporting District

Participation by farm families in non-farm employment seems to vary across reporting districts. The tendency for operators to work off-farm, relative to their proportion of total active farms surveyed, increased from north to south and from west to east. In general, spouses were most likely to work off-farm across the middle of Indiana. Spouses in the Central and East Central reporting regions were most likely to work off farm, while spouses in the Southeast region were least likely to work off-farm. Contrary to the spouses, other household members in the Southeast region were most likely to work off-farm, relative to the number of farms in the region. The likelihood that households received non-wage income increased from the south to the north; households in the North-west region were most likely to have

**Table 6. Farm Characteristics and Non-farm Income Levels, by Debt-to-Asset Ratios.**

D/A Ratio	Farms	Acres	Oper. Age	D/A Ratio	Off-Farm Income		Unearned Income
	No.				Oper.	Spouse	
No Report	531	293	55	---	\$27,486	\$15,097	\$11,563
Zero	387	225	59	0.00	31,276	15,950	18,300
0.01 - 0.09	123	357	54	0.05	29,463	19,081	13,969
0.10 - 0.19	106	398	52	0.15	29,763	15,570	10,018
0.20 - 0.29	119	439	49	0.25	28,361	17,565	9,662
0.30 - 0.39	92	430	48	0.34	27,378	16,331	11,999
0.40 - 0.49	79	374	43	0.44	29,667	17,045	7,153
0.50 - 0.59	75	452	45	0.54	22,126	17,951	6,069
0.60 - 0.69	49	542	42	0.64	23,470	14,657	5,604
0.70 - 0.79	27	406	43	0.74	21,083	15,556	8,650
0.80 - 0.89	11	300	43	0.85	37,200	18,833	34,749
0.90 - 0.99	6	239	39	0.94	13,833	16,500	20
1.00 or more	14	291	42	1.16	23,102	14,697	5,362

Source: 1993 Indiana Farm Finance Survey: Purdue

unearned income, while those in the South Central region were the least likely. Households in the East Central region had the highest relative likelihood of having worked more off-farm in 1992 and of planning to work more off of the farm in 1993.

Farms in the Northwest region (Table 7) on average were the largest, had the youngest operators, and they had the highest debt-to-asset ratios, the lowest operator's off-farm employment income, and the highest spouse's off-farm employment income. In general, farms in southern Indiana were smaller and had the lowest debt-to-asset ratios. The oldest operators were in the South Central region. Farm households in the North Central region had the lowest average levels of both spouse's and unearned income. Operator's and unearned average income levels were highest in the Central reporting region.

#### Non-Farm Employment and Income by Primary Enterprise Type

Survey responses are broken down by primary farm enterprise in Table 8. As should be expected in Indiana, the vast majority (about 75 percent) of farms surveyed were mainly engaged in field cropping. Poultry operations were least represented at only about 1 percent of the total. Dairy farm operators and their spouses were the least likely to both work off-farm and to plan to work more off of the farm. On the other hand, households on farms specializing in beef, hogs, and "other" crops were far more likely to work off-farm than their counterparts on other types of farms. Households on beef farms were more likely, and households on dairy and poultry farms less likely, to work off-farm than households on field crop farms.

Beef farms had the lowest average debt-to-asset ratios and spouse non-farm incomes, but average operator off-farm income was relatively high. Field crop farms were the largest while "other" crop farms were the smallest. Dairy operators' average non-farm income was the lowest. The largest average spouses' non-farm income was on "other" farms. Hog farm households had, on

**Table 7. Farm Characteristics and Non-Farm Income Levels, by Reporting District.**

Reporting District	Farms	Acres	Oper. Age	D/A Ratio	Off-Farm Income		Unearned Income
					Oper.	Spouse	
	No.	----- Averages -----					
Northwest	143	693	51	0.27	\$20,860	\$18,866	\$11,974
North Central	218	317	52	0.23	25,540	14,425	10,317
Northeast	253	263	53	0.21	26,480	16,294	12,232
West Central	106	438	53	0.23	24,591	16,618	11,049
Central	223	330	54	0.22	34,072	15,750	15,209
East Central	167	303	53	0.26	28,827	15,473	13,488
Southwest	186	319	52	0.18	30,545	16,571	14,603
South Central	175	203	56	0.18	27,721	18,274	11,523
Southeast	148	203	52	0.22	30,758	16,734	12,248

Source: 1993 Indiana Farm Finance Survey: Purdue

average, the youngest operators, the highest debt-to-asset ratios, and the lowest non-wage incomes. Poultry farms, by contrast, had the oldest operators, the highest average operators' non-farm incomes, and the highest average unearned income levels.

#### Summary

This report has summarized selected results from the 1993 Indiana Farm Finance Survey regarding non-farm employment for Indiana farm households. Farm households with negative or low farm income were more likely to work off-farm and to depend on off-farm income than those households receiving moderate or high levels of farm income. In addition, households living on Indiana farms were more likely to work off of the farm as the debt-to-asset

ratio of the farm business, a measure of financial risk, increased.

The tendency for households to rely on off-farm employment and income varied, sometimes widely, across reporting regions. While the proportion of operators reporting off-farm employment increased as one moved from north to south and from west to east across Indiana, farm spouses in the central regions were the most likely to work off of the farm. Households in the East Central region were the most likely to have worked more, and to plan to work more, off of the farm.

Households living on farms specializing in "other" crops generally worked significantly more off-farm and had higher off-farm income levels than households on beef, hog, or field crop farms, while households on poultry farms generally worked off farm less, but had higher average

**Table 8. Non-Farm Labor Participation, by Primary Farm Enterprise.**

Primary Enterprise	Farms	Someone Worked Off-Farm	Worked Off-Farm?			Non-Wage Income	Work More Off-Farm?	
			Oper.	Spouse	Other		1992	1993
	No.	----- Percent of Farms -----						
Crops	1210	70	56	48	17	50	15	13
Beef	154	81	69	49	19	51	14	12
Hogs	105	77	57	43	17	47	12	13
Dairy	69	62	29	30	23	50	8	8
Poultry	16	63	43	43	6	50	6	12
Other	65	79	72	53	24	47	16	20

Source: 1993 Indiana Farm Finance Survey: Purdue

off-farm incomes, than beef, hog, or dairy households. Households on dairy farms had both the least participation in and lowest incomes from off-farm employment.

These results show that income from non-farm employment is very important to Indiana farmers. For all active farms in the sample, 57 percent of operators and 48 percent of spouses worked off of the farm. Over 71 percent of the households on active farms reported that some household member worked off-farm. While some of those households are probably not full-time farmers, that proportion is much higher than the 47 percent of U.S. (full-time) farmers that reported off-farm work.

It is difficult to determine the share of total income derived from non-farm sources because the survey did not derive exact farm income levels. However, some ranges can be derived, though these ranges are not

totally accurate. The 48 percent of the sample which received positive but low (\$0 - \$19,999) net cash farm income received much more income from off-farm sources than they did from the farm operation. At most, farm income made up only 26 percent of total household income for these farmers, less than the 35 percent share for U.S. farmers as a whole but more than the 22 percent for Midwestern farmers as a group. The households which had moderate levels of net cash farm income received roughly 30 to 51 percent of total income from the farm, while those with high net cash farm income received at most half of total income from the farm. In general, therefore, Indiana farmers needed income from non-farm sources to supplement low (or negative) household income from farming. Without this income, Indiana farm households would not achieve a standard

of living on a par with their non-farming neighbors.

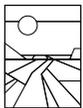
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