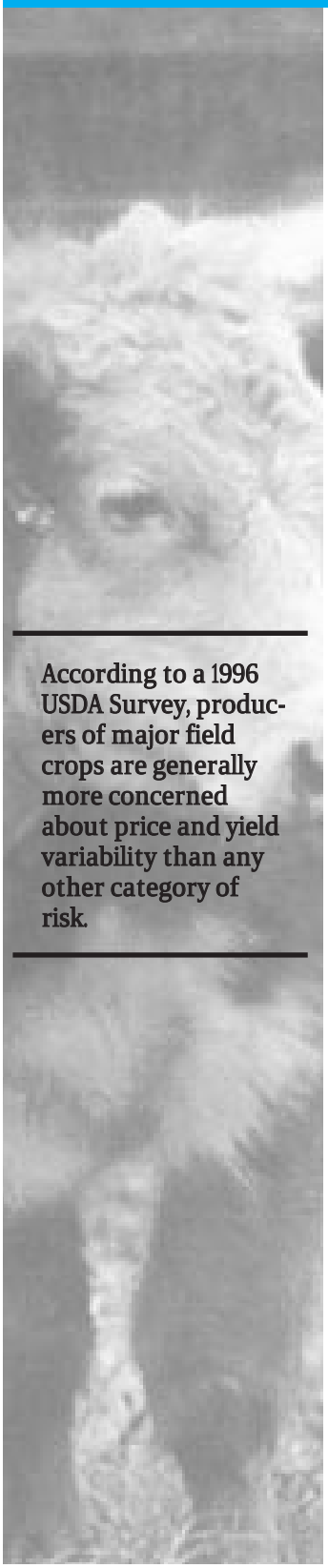
Types of Risk Most Important to Producers



According to a 1996 USDA Survey, producers of major field crops are generally more concerned about price and yield variability than any other category of risk.

A 1996 USDA survey indicates that producers are most concerned about changes in government laws and regulations (institutional risk), decreases in crop yields or livestock output (production risk), and uncertainty in commodity prices (price risk). In general, producers of major field crops tend to be more concerned about price and yield risk, while livestock and specialty crop growers are relatively more concerned about changes in laws and regulations.

Several surveys have asked farmers about the most important types of risk that they confront in their farming operations. These types of questions are typically part of a larger survey that inquires about producers' risk management strategies, and offers respondents a list of concerns that they can score in terms of importance. Scores generally are not ranked relative to one another, meaning that producers independently analyze each concern on the list.

In 1996, USDA's Agricultural Resource Management Study[1] (ARMS), a nationwide survey of farm operators, questioned farmers as to their degree of concern about factors affecting the operation of their farms. The ARMS is probability-based, and results can be expanded to reflect the U.S. farm sector. The concerns cited in the survey varied from "uncertainty in commodity prices" to "ability to adopt new technology." Mean scores for each concern were estimated by assigning a value to each measure of importance, with "not concerned" receiving a value of 1.00 and "very concerned" receiving a value of 4.00.

Wheat, corn, soybean, tobacco, cotton, and certain other producers answering the survey were more concerned about yield and price variability than any of the other categories (table 1). This may be partly due to the 1996 Farm Act, which greatly reduced government intervention in markets for program crops (wheat, corn, cotton, and other selected field crops), and may have heightened producers' wariness concerning price risk. Producers of other field crops, nursery and greenhouse crops, beef cattle, and poultry were relatively more concerned about changes in laws and regulations, perhaps reflecting trepidation about changes in environmental and other policies. Across all farms, the ARMS results indicate that producers' degree of concern was greatest regarding changes in government laws and regulations (with a score of 3.02), decreases in crop yields or livestock production (with a score of 2.95), and uncertainty regarding commodity prices (with a score of 2.91).

Other surveys have also examined producers' risk perceptions, most often focusing on crop production in specific geographic areas. These other surveys, despite the limited location and time period of the analysis, generally support the ARMS findings that price and yield risk are the most important concerns facing producers of major field crops. One of the most comprehen-

[1]The ARMS survey was formerly known as the Farm Costs and Returns Survey (FCRS).

Table 1—Farmers' degree of concern about factors affecting the continued operation of their farms

How concerned are you about each factor's effect on the continued operation of your farm?	Other cash grains	Wheat	Corn	Soybeans	Tobacco	Cotton	Other field crops	Fruit/nuts	Vegetables	Nursery/greenhouse	Beef	Hogs	Poultry	Dairy	Other livestock	All farms
	Mean scores[1]															
Decrease in crop yields or livestock production	3.35	3.51	3.2	2.98	3.16	3.68	2.53	3.05	2.85	2.78	3.09	3.53	3.20	3.4	2.41	2.95
Uncertainty in commodity prices	3.41	3.83	3.4	2.93	3.15	3.75	2.48	2.88	2.82	2.63	2.96	3.31	3.09	3.54	2.47	2.91
Ability to adopt new technology	2.52	2.38	2.39	2.33	2.21	2.77	1.92	2.34	2.09	2.24	2.25	2.63	2.60	2.45	2.12	2.23
Lawsuits	2.43	2.47	2.03	2.46	1.89	2.78	2.07	2.39	2.66	2.06	2.36	2.70	2.32	2.36	2.00	2.26
Changes in consumer preferences for agricultural products	2.65	2.55	2.39	2.40	2.40	2.86	2.13	2.44	2.59	2.69	2.58	3.01	2.79	2.76	2.30	2.47
Changes in Government laws and regulations	3.31	3.36	3.15	2.79	2.77	3.54	2.88	2.97	2.75	3.09	3.03	3.23	3.34	3.31	2.88	3.02

[1]1 = Not concerned, 2 = Slightly concerned, 3 = Somewhat concerned, 4 = Very concerned.

Source: Perry, Janet, editor, "Adaptive Management Decisions--Responding to the Risks of Farming," unpublished working paper, U.S. Dept. Agr., Econ. Res. Serv., December 1997.

sive studies of producers' attitudes toward risk was conducted in 1983 at a land-grant university (Patrick and others, 1985). This survey, covering 12 States, was designed to elicit the most important types of variability faced by farmers and to determine the importance of different types of variability across different regions. Weather and output prices were cited as the most important sources of crop risk, regardless of location. Producers also marked inflation, input costs, diseases and pests, world events, and safety and health as other important sources of risk.

Interesting differences, however, appeared by farm-type grouping. For example, farmers in the Southeast, where mixed (crop and livestock) farming is important, and corn, soybean, and hog producers in the Midwest, gave less importance to variability from commodity programs than did cotton or small grain growers. Midwestern corn, soybean, and hog producers gave much greater importance to family plans as a source of variability than did the other farm-type groups.

Producers' circumstances also affected perceptions of risk in the 1983 Patrick survey. Using a slightly different sample than above, Patrick found that the greater the debt-to-asset ratio, the greater the importance given to risks associated with the cost of credit on crop farms. Risks associated with hired labor increased in importance as farm size increased. The producer's level of education appeared to be relatively unimportant in influencing the importance given to different sources of variability (Patrick).

More recently, participants in Purdue's 1991 and 1993 Top Farmer Crop Workshops were questioned about their attitudes toward farm risks. They rated crop price and crop yield variability as the top sources of risk in 1991, but ranked them second and third in 1993 (Patrick and Ullerich; Patrick and Musser). Concern about injury, illness, or death of the operator was the highest rated source of risk in 1993, significantly higher than in 1991 (table 2). The importance of changes in government environmental regulations, land rents, and technology also increased significantly between 1991 and 1993. Respondents did not give much importance to livestock price or pro-

Farmers participating in a 1993 Purdue Workshop rated injury, illness, or death of the operator as the highest rated source of risk, followed by crop price and yield variability.

duction variability, likely reflecting the limited importance of this enterprise on their operations.

Other surveys of producers in the Midwest and Great Plains have found similar results. Farmers and ranchers in Nebraska indicated in the mid-1990's that output price risk and yield risk were the most important sources of risk (Jose and Valluru). On a 1-10 scale, the respondents rated output price fluctuations (6.07), input price fluctuations (5.98), and drought (5.73) as the most important sources of risk. Although hail damage was rated high in importance (6.58), the number of farmers who selected hail as the most important risk factor was low. Survey research focusing on Kansas lender-to-farming risks has provided similar findings (Mintert).

In California, where the use of irrigation is common, output risks are secondary to price risks among growers.

When California growers were questioned, important regional variations appeared. A 1992/93 survey of 569 California growers, which used a ranking scheme similar to the ones in the Patrick studies, reveals that output risks are secondary to price risks among growers in that State (Blank, Carter, and McDonald). These growers ranked output price and input costs as first and second, respectively, among their risk concerns. These results largely reflect the low yield risk faced in California in most situations, due largely to the widespread use of irrigation.

Because of the apparent importance of yield and output price risk to many producers, particularly in the Midwest and Great Plains, these two risks are the focus of the following section, which examines the measurement of risk. Disaggregate (farm- and county-level) data are available to measure the price and yield risk confronted by producers across the country. Thus, the following section quantifies the price and yield risks for producers in different locations, using corn as an example crop.

Table 2—Mean and standard deviation of importance ratings of sources of risk by Top Farmer Crop Workshop participants, 1991 and 1993[1]

	1991 (n = 80)		1993 (n = 61)	
Sources of risk	Mean	Standard deviation	Mean	Standard deviation
Changes in government commodity programs	3.83	1.08	3.66	1.03
Changes in environmental regulations	3.81	1.03	4.13**	.78
Crop yield variability	4.21	.91	4.13	.78
Crop price variability	4.31	.87	4.16	.86
Livestock production variability[2]	2.86	1.40	2.68	1.34
Livestock price variability[2]	3.17	1.54	2.75	1.37
Changes in costs of current inputs	3.70	.89	3.89	.84
Changes in land rents	3.18	1.16	3.56**	.96
Changes in costs of capital items	3.66	.94	3.77	.82
Changes in technology	3.54	1.03	3.84*	.97
Changes in interest rates	3.48	1.09	3.52	1.09
Changes in credit availability	3.05	1.29	3.21	1.23
Injury, illness, or death of operator	3.86	1.30	4.39**	.94
Family health concerns	--	--	4.05	.91
Changes in family relationships	3.36	1.42	3.73	1.29
Changes in family labor force	2.96	1.28	3.11	1.25

-- = Not applicable. n = Number. * The difference between years is statistically significant at the 10-percent confidence level. ** The difference between years is statistically significant at the 5-percent level.

[1]1 = Not important; 5 = Very important. [2]In 1991, only 65 and 66 of 80 farmers responded to the livestock production and price variability questions. Had the nonrespondents been coded as a 1 (not important), the means would have been 2.50 and 2.79 for livestock production and price variability, respectively.

Source: Excerpted by ERS from Patrick, George F., and Wesley N. Musser, *Sources of and Responses to Risk: Factor Analyses of Large-Scale Cornbelt Farmers*. Staff Paper No. 95-17, West Lafayette, IN: Purdue University, Department of Agricultural Economics, December 1995.

Sources of Risk in Farming

Some risks are unique to agriculture, such as the risk of bad weather significantly reducing yields within a given year. Other risks, such as the price or institutional risks discussed below, while common to all businesses, reflect an added economic cost to the producer. If the farmer's benefit-cost tradeoff favors mitigation, then he or she will attempt to lower the possibility of adverse effects. These risks include the following (Hardaker, Huirne, and Anderson; Boehlje and Trede; Baquet, Hambleton, and Jose; Fleisher):

Production or yield risk occurs because agriculture is affected by many uncontrollable events that are often related to weather, including excessive or insufficient rainfall, extreme temperatures, hail, insects, and diseases. Technology plays a key role in production risk in farming. The rapid introduction of new crop varieties and production techniques often offers the potential for improved efficiency, but may at times yield poor results, particularly in the short term. In contrast, the threat of obsolescence exists with certain practices (for example, using machinery for which parts are no longer available), which creates another, and different, kind of risk.

Price or market risk reflects risks associated with changes in the price of output or of inputs that may occur after the commitment to production has begun. In agriculture, production generally is a lengthy process. Livestock production, for example, typically requires ongoing investments in feed and equipment that may not produce returns for several months or years. Because markets are generally complex and involve both domestic and international considerations, producer returns may be dramatically affected by events in far-removed regions of the world.

Institutional risk results from changes in policies and regulations that affect agriculture. This type of risk is generally manifested as unanticipated production constraints or price changes for inputs or for output. For example, changes in government rules regarding the use of pesticides (for crops) or drugs (for livestock) may alter the cost of production or a foreign country's decision to limit imports of a certain crop may reduce that crop's price. Other institutional risks may arise from changes in policies affecting the disposal of animal manure, restrictions in conservation practices or land use, or changes in income tax policy or credit policy.

Farmers are also subject to the ***human or personal risks*** that are common to all business operators. Disruptive changes may result from such events as death, divorce, injury, or the poor health of a principal in the firm. In addition, the changing objectives of individuals involved in the farming enterprise may have significant effects on the longrun performance of the operation. *Asset risk* is also common to all businesses and involves theft, fire, or other loss or damage to equipment, buildings, and livestock. A type of risk that appears to be of growing importance is *contracting risk*, which involves opportunistic behavior and the reliability of contracting partners.

Financial risk differs from the business risks previously described in that it results from the way the firm's capital is obtained and financed. A farmer may be subject to fluctuations in interest rates on borrowed capital, or face cash flow difficulties if there are insufficient funds to repay creditors. The use of borrowed funds means that a share of the returns from the business must be allocated to meeting debt payments. Even when a farm is 100-percent owner financed, the operator's capital is still exposed to the probability of losing equity or net worth.

The sources of risk in agriculture range from price and yield risk to financial and contracting risk.