8-1-1988

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Economics Staff Paper Series No. 88-5**

August 1988

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MULTIPLE PERIL CROP INSURANCE:

WHAT IS IT?

SHOULD YOU BUY IT?

Burton Pflueger and Gerald Toland[1]

Introduction

Do you remember the year you experienced severe drought or the hail storms that have hit your farm? Adverse events like this reduce your crop yields and/or quality, and can have a significant impact on your cash flow and net worth. Unfortunately, there are many adverse events including drought, excessive temperatures at pollination, excess moisture, flood, wind, frost, hail, disease, pest outbreaks, and fire which are largely outside your control.

Figure 1 depicts why wheat crops fail in South Dakota, as measured by the multiple peril crop insurance claims experience from 1981 to 1986.[2]

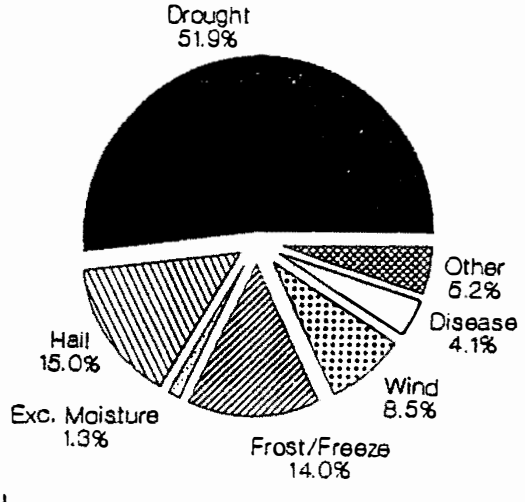

Fig. 1 Why Wheat Crops Fail in South Dakota

Fortunately, there are strategies that you as a manager can use to reduce the impact of these adverse events. Examples of risk-reducing strategies might include diversification or growing more than one crop (don't put all your eggs in one basket); use of land tenure arrangements in which you share your risk with others, such as share rental arrangements; use of drought and disease resistant varieties and scheduling varieties to reduce risk; use of aggressive weed and pest control measures; and purchase of multiple peril and/or hail and fire crop insurance.

The purposes of this fact sheet are: (1) to describe the basic features of multiple peril crop insurance (MPCI), with emphasis on its role as a tool for reducing your financial risk; and (2) to describe a budgeting procedure that you may find useful in assessing whether you should buy crop insurance protection. Our focus will be on the impact of the purchase of MPCI on your farm's net cash flow and balance sheet should an adverse event arise. Specific details of MPCI contract provisions should be discussed with a qualified crop insurance agent.

What is Crop Insurance? Should You Buy It?

Crop insurance is available in two forms: (1) limited peril insurance, including commercial hail and fire insurance; and (2) multiple peril crop insurance (MPCI).

Hail and fire crop insurance (H/FCI) is offered under two types of plans--spot and area. Spot (acre-by-acre) plans pay you for losses based on the percentage loss occurring due to hail/fire on your damaged acres. Normal yields on non-damaged fields do not reduce payments. In contrast, under area hail and fire plans, indemnities are paid based upon the percentage of yield loss due to hail/fire averaged across your insured unit.

MPCI guarantees a minimum average yield per acre for the insured crop for the insured unit, with the minimum determined by the deductible you choose. If your average yield (adjusted for quality) for the insured unit falls below the level specified in your insurance policy, the insurance company agrees to pay you the difference. The guarantees are based on commonly accepted standards for good quality grain. To calculate an actual yield for insurance purposes harvested yields are adjusted for quality factors such as grade, kernel quality and moisture level.

Crop insurance may be attractive to you because:

1. It represents an opportunity to substitute a known cost (annual premiums) for unpredictable and irregular yield losses, particularly catastrophic losses. You can **transfer** a portion of your yield risk.

2. It **stabilizes** your farm's cash flow, thereby making you a lower risk borrower. This may improve access to and terms for borrowed money.

3. It may provide the **financial liquidity** needed to remain in farming for another year in the event of a significant crop yield loss.

4. It may increase the attractiveness of **cash forward contracts and hedging using futures** since your risk of not being able to perform in accordance with the contract is reduced.

Major factors which influence your MPCI purchase decision include:

1. Your **financial capacity** to withstand a significant crop yield loss; that is, your family's capacity to self-insure.

2. Your **willingness** to take risk; that is, your attitude toward the trade off between greater profit vs. lower risk.

3. The **probability** that the yield will fall below your insured coverage.

4. The **expected benefits** of the insurance due to risk reduction versus the annual premium cost.

The purchase of multiple peril crop insurance may simultaneously increase your long-run average net profit per year as well as reducing your downside risk. If the purchase of multiple peril crop insurance significantly reduces your probability of bankruptcy over the next decade, your long-run average net profit per year (and, net worth accumulation) can increase with the purchase of MPCI.

Development of the Multiple Peril Crop Insurance Program

The federal government (USDA) and to a limited extent, the private industry have sponsored some form of multiple peril crop insurance since 1938. However, until recently MPCI was available for only a few crops in a limited number of counties. The goal of the Crop Insurance Act of 1980 was to make crop insurance available to growers of major crops as a replacement for the USDA's low-yield disaster program. The Farm Bill of 1985 takes that goal a step further. Beginning with crops harvested in 1987, if MPCI is available in your county, you will not be eligible for emergency low-interest loans unless you purchase crop insurance. Multiple peril crop insurance is offered on all ASCS program crops and is now available on most other commercial crops. Table 1 depicts the crops that are insurable by county in South Dakota.

Basic Features of Multiple Peril Crop Insurance

How Is It Marketed?

Crop insurance is marketed by local crop insurance agents who, in most cases, sell crop insurance along with other lines of insurance.

CROP INSURANCE PROGRAMS IN SOUTH DAKOTA COUNTIES BEGINNING IN 1987

CODE	COUNTY	WINTER CROPS	SPRING CROPS
003	Aurora		Bly,Crn,GrS,Oat,Soy,Sun,Wht
005	Beadle	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
007	Bennett	Wht	Bly,Crn,GrS,Oat,Sun
009	Bon Homme		Bly,Crn,GrS,Oat,Soy,Wht
011	Brookings		Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
013	Brown	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
015	Brule	Wht	Bly,Crn,DyB,GrS,Oat,Soy,Sun
017	Buffalo	Wht	Bly,Crn,DyB,GrS,Oat
019	Butte	Wht	Bly,Crn,DyB,GrS,Oat,Sun
021	Campbell		Bly,Crn,Flx,GrS,Oat,Sun,Wht
023	Charles Mix	Wht	Bly,Crn,GrS,Oat,Soy,Sun
025	Clark	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
027	Clay		Bly,Crn,DyB,GrS,Oat,Soy,Wht
029	Codington	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
031	Corson		Bly,Crn,Flx,GrS,Oat,Sun,Wht
033	Custer	Wht	Bly,Crn,GrS,Oat
035	Davison		Bly,Crn,GrS,Oat,Soy,Sun,Wht
037	Day	Rye	Bly,Crn,Flx,Grs,Oat,Soy,Sun, Wht
039	Deuel	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
041	Dewey	Wht	Bly,Crn,Flx,GrS,Oat,Sun
043	Douglas		Bly,Crn,GrS,Oat,Soy,Sun,Wht
045	Edmonds	Rye	Bly,Crn,Flx,Grs,Oat,Sun,Wht
047	Fall River	Wht	Bly,Crn,GrS,Oat
049	Faulk	Rye	Bly,Crn,Flx,GrS,Oat,Sun,Wht
051	Grant	Rye	Bly,Crn,DyB,Flx,GrS,Oat,Soy, Sun,Wht
053	Gregory	Wht	Bly,Crn,GrS,Oat,Sun
055	Haakon	Wht	Bly,Crn,Flx,GrS,Oat,Sun
057	Hamlin	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
059	Hand	Wht	Bly,Crn,Flx,GrS,Oat,Sun
061	Hanson		Bly,Crn,GrS,Oat,Soy,Sun,Wht
063	Harding	Wht	Bly,Crn,Flx,GrS,Oat,Sun
065	Hughes	Wht	Bly,Crn,DyB,Flx,GrS,Oat,Soy, Sun
067	Hutchinson		Bly,Crn,GrS,Oat,Soy,Sun,Wht
069	Hyde	Wht	Bly,Crn,Flx,GrS,Oat,Soy,Sun
071	Jackson	Wht	Bly,Crn,GrS,Oat
073	Jerauld		Bly,Crn,GrS,Oat,Wht
075	Jones	Wht	Bly,Crn,GrS,Oat
077	Kingsbury	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
079	Lake		Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht,
081	Lawrence	Wht	Bly,Crn,GrS,Oat
083	Lincoln		Bly,Crn,DyB,GrS,Oat,Soy,Wht
085	Lyman	Wht	Bly,Crn,GrS,Oat,Sun
087	McCook		Bly,Crn,GrS,Oat,Soy,Sun,Wht
089	McPherson	Rye	Bly,Crn,Flx,GrS,Oat,Sun,Wht
091	Marshall	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
093	Meade	Wht	Bly,Crn,GrS,Oat,Sun
095	Mellette	Wht	Bly,Crn,GrS,Oat,Sun
097	Miner		Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
099	Minnehaha		Bly,Crn,DyB,GrS,Oat,Soy,Wht
101	Moody		Bly,Crn,Flx,GrS,Oat,Soy,Wht
103	Pennington	Wht	Bly,Crn,GrS,Oat
105	Perkins	Wht	Bly,Crn,Flx,GrS,Oat,Sun
107	Potter	Wht	Bly,Crn,Flx,GrS,Oat,Sun
109	Roberts	Rye	Bly,Crn,DyB,Flx,GrS,Oat,Soy, Sun,Wht
111	Sanborn		Bly,Crn,GrS,Oat,Sun,Wht
113	Shannon	Wht	Bly,Crn,GrS,Oat,Sun
115	Spink	Rye	Bly,Crn,Flx,GrS,Oat,Soy,Sun, Wht
117	Stanley	Wht	Bly,Crn,Flx,GrS,Oat,Sun
119	Sully	Wht	Bly,Crn,DyB,Flx,GrS,Oat,Soy, Sun
121	Todd	Wht	Crn,GrS,Oat,Sun
123	Tripp	Wht	Crn,GrS,Oat,Sun
125	Turner		Crn,GrS,Oat,Soy,Wht
127	Union		Crn,DyB,GrS,Oat,Soy,Wht
129	Walworth		Crn,Flx,GrS,Oat,Sun,Wht
135	Yankton		Crn,GrS,Oat,Soy,Wht
137	Ziebach	Wt	,Crn,Flx,GrS,Oat,Sun

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KEY TO ABBREVIATIONS:

Bly/Barley, Crn/Corn, DyB/Dry Beans, Flx/Flax, GrS/Grain Sorghum, Oat/Oats, Rye/Rye, Soy/Soybeans, Sun/Sunflowers, Wht/Wheat

*No rate published, consult your crop insurance agent.

The objective of these agents is to provide a full range of insurance protection from crop insurance to farm/home owners' policies to meet farmers' risk management needs.

If the farmer's yield risks are general, the agent would likely recommend the multiple peril coverage which provides protection on most crops against practically all unavoidable causes of loss. If the primary risk is hail/fire damage, then the agent would likely recommend commercial hail/fire crop insurance (H/FCI). It is also becoming common to develop a blend of multiple peril and commercial hail and fire protection into a comprehensive package to both reduce the deductible that is required in MPCI and expand the range of peril of H/FCI.

H/FCI can provide acre by acre coverage for a given crop with protection up to the "Actual Cash Value" of the crop (e.g., 35 bu. x $2.50 = $87.50 Actual Cash Value). This protection can usually be purchased anytime during the growing season with a 24-48 hour delay of insurance going into effect.

What Causes of Yield Losses are Covered?

MPCI on most crops covers unavoidable production losses caused by:

1. Drought
2. Excessive moisture
3. Hail
4. Wind
5. Frost/freeze
6. Tornado
7. Lightning
8. Flood
9. Insect infestation
10. Plant disease
11. Excessive temperature during pollination
12. Wildlife damage
13. Fire
14. Earthquake

MPCI does not cover losses resulting from:

1. Poor farming practices
2. Low commodity prices (e.g., crop was not harvested because it was not worth harvesting)
3. Theft
4. Specified perils which are excluded in a limited number of policies.

There are specific restrictions on some crops based upon acceptable farming practices. For example, in most instances potatoes cannot be insured if potatoes were grown in the previous two years. There are restrictions on planting dates for many crops. However, in many instances, reduced coverage can be obtained for the base premium if late planting occurs. A qualified crop insurance agent can provide the details.

How Much Coverage Can be Purchased?

There are two decisions that determine the amount of coverage: (1) the level of coverage (i.e., the amount of deductible); and, (2) the price at which yield losses are converted to cash.

Your insurance yield is based on **your actual production history** (APH) which is an estimate of your 10-year average yield on the insurance unit. APH provides coverage based upon your proven performance record, not county averages.

Level of Coverage. You have the option of insuring at one of three coverage levels:

1. 75% of your insurance yield (i.e., 25% deductible)
2. 65% of your insurance yield (i.e., 35% deductible)
3. 50% of your insurance yield (i.e., 50% deductible)

MPCI payments are made if yields fall below your insurance guarantee.

Your yield guarantee per acre is equal to:

Insurance yield x coverage purchased (i.e., 50%, 65%, or 75%)

For example, if your insurance yield is 35 bushels of wheat per planted acre and you purchase 65% coverage (35% deductible), your yield guarantee would be:

35 bu./acre x 0.65 = 22.8 bu./planted acre.

Commodity Indemnity Price Elections.

You must select a commodity indemnity price from the three elections available. This sets the price at which losses will be paid. For example, the 1988 low, medium, and high price elections for wheat are $2.00, $2.25 and $2.60, respectively.

How are Indemnity Payments Calculated?

If your average yield (adjusted for quality) is greater than your yield guarantee, no indemnity is paid. If your average yield per acre is less than your yield guarantee, the indemnity paid is equal to:

(Yield guarantee - average yield for insured unit) x indemnity price.

For example, using our previous case example, if your yield was 10 bu./planted acre your indemnity payment would be:

(22.8 bu./acre yield guarantee - 10.0 bu./acre realized yield) x $2.60/bu. indemnity price = $33.28/planted acre.

Indemnity payments are taxable income.

What Does Multiple Peril Crop Insurance Cost?

Premium rates are based on your historical yields and the loss history for the county in which you farm. The premium rate, as a percent of the dollar value of protection, varies with your 10 year average yield level. Table 2, for example depicts the premium rate structure for wheat for Lyman County in the South Dakota.

You have the option of buying MPCI with or without hail and fire coverage. However if you choose to opt out of the hail and fire insurance component of MPCI, an equivalent dollar amount of hail and fire coverage must be purchased as a separate hail and fire policy.

Premiums are generally due around the normal harvest period and if not paid within 30 days of billing, interest may be charged for late payment. Premium payments are a tax deductible expense.

To encourage broader participation, Congress authorized a 30 percent subsidy for premiums at the 50 percent and 65 percent coverage levels which is included in the quoted rates. However, if you choose 75 percent coverage, you must pay the full additional premium cost over the 65 percent level which decreases the effective subsidy rate. You also benefit from the federal government paying all of the administrative costs to operate the program. These two subsidies reduce your premium cost by about 50%.

Your premium/acre is calculated as follows:

Yield guarantee x indemnity price selected x premium rate.

For example, if we use our case example yield guarantee of 22.8 bu./acre, an indemnity price of $2.60/bu., and a premium rate of 7.1% the premium is:

22.8 bu./acre x $2.60/bu. x 0.071 = $4.21/acre

The 7.1% premium rate is based upon 65% coverage. The rate is circled in Table 2.

Do I Have To Insure All of My Crop?

If you purchase MPCI for a particular crop, all of that crop you are raising in the same county must be insured. It is not possible to just insure the portion of a crop that is most susceptible to loss. However, each crop is insured separately, so you may insure one crop without having to insure a second crop produced in the same county. A qualified crop

Table 2 MULTIPLE PERIL CROP INSURANCE COUNTY COVERAGE AND RATE TABLE

State: South Dakota — County: Lyman
Crop: Wheat — Practice: Summerfallow

Approved Insurance Yield (Bu.)	Subsidized Premium Rates With Hail and Fire Protection (%)	Subsidized Premium Rates Without Hail and Fire Protection (%)
	COVERAGE LEVEL 1 (50%)	
12 & Below	17.9	15.1
13 - 16	14.8	12.0
17 - 19	10.9	8.1
20 - 23	8.5	6.0
24 - 28	7.0	4.9
29 - 32	5.9	4.1
33 - 35	5.1	3.6
36 - 39	4.5	3.2
40 & Above	4.3	3.0
	COVERAGE LEVEL 2 (65%)	
12 & Below	24.8	21.1
13 - 16	20.6	17.5
17 - 19	15.1	12.3
20 - 23	11.8	9.0
24 - 28	9.7	6.9
29 - 32	8.1	5.7
33 - 35	7.1	5.0
36 - 39	6.2	4.3
40 & Above	5.9	4.1
	COVERAGE LEVEL 3 (75%)	
12 & Below	45.3	38.5
13 - 16	37.6	31.9
17 - 19	27.6	23.4
20 - 23	21.6	18.3
24 - 28	17.6	14.3
29 - 32	14.9	11.6
33 - 35	12.9	9.6
36 - 39	11.4	8.1
40 & Above	10.7	7.5

Note: The premium per acre is calculated as follows:
Insurance yield x coverage level x indemnity price selected x premium rate.

insurance agent can define the insurable units for the land you farm.

Claims are paid by farm unit. A single farm (located in one county) represents one unit. If you crop-share rent a second farm, the rented acreage constitutes a second unit. Providing proper records are maintained, you may qualify for more than one unit if your land is located in separate sections.

When Must MPCI Be Purchased?

MPCI must be purchased by the date specified as the end of the sales period. In South Dakota the closing date for winter crops is September 30 and for spring crops it is April 15.

Analysis of the MPCI Purchase Decision

To help you analyze whether to purchase MPCI, two worksheets have been developed. The first worksheet helps you identify and quantify your downside yield risks. The second worksheet helps you project your net cash flow with and without MPCI coverage for alternative yields, including a typical year scenario and a low yield year scenario. It also permits examination of alternative coverage (deductible) levels.

Analyzing Historical Yields

Consideration of historical yields and the assessment of the downside risks help you determine the risks you face and the alternative yields you might consider in the cash flow analysis. All factors or risks which have the

potential of reducing yields need to be considered. Even though the prospect of a flood may not be very significant, for example, it may wash out the total crop on a portion of your farm when it happens.

We will use a case farm example to further illustrate our discussion. The crop under consideration is wheat, and the farmer's ASCS program acreage is 1,000 acres.

The farmer's wheat yields per planted acre for the last seven years are as follows:

Year	Yield, bu/acre
1986	37
1985	34
1984	44
1983	31
1982	40
1981	28
1980	15

A good indicator of your long-run average yield can be obtained by calculating an "olympic" average. If you have 7 to 12 years of yield data, throw out the lowest and highest yields, and calculate the average for the rest. For this farm, the lowest yield was 15 bu./ acre in 1980, a year of serious drought, and the highest yield was 44 bushels per acre in 1984. When the high and low values are thrown out, the yields remaining average 34 bushels per acre.

The farmer has given considerable thought to the probability of alternative yield levels, based on his own experience and that of his neighbors. Figure 2 depicts his 1988 estimates for wheat using a bar graph of probabilities. The heights of the bars for each yield range indicate **the relative likelihood of that yield occurring.** For example, the most likely yield range is 35 to 40 bushels per acre.

An additional way to look at this information is to consider the chances of a yield below some specified level. This is the concept of cumulative probabilities. For example, the probability of a yield below 20 bu./acre is 8% as indicated by the line labeled CP (for cumulative probability). This approach helps identify the chances of a yield less than some critical level such as the yield required to meet cash flow obligations.

You can also use this approach to determine the chances of a yield less than the guarantee such as the 22.8 bu. in the above example. The farmer's estimate, based upon Figure 2, is 14%.

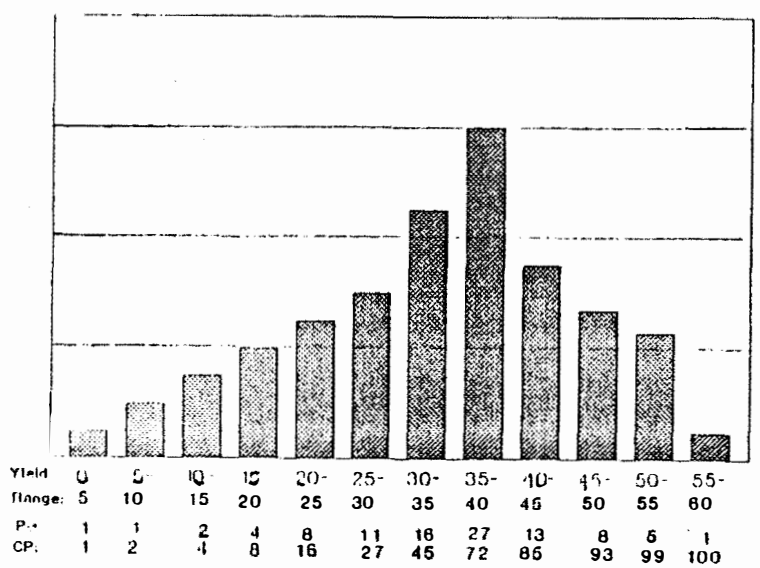

Fig. 2 Yield Probabilities for Wheat to be Harvested in 1988 (bu./acre)
* P = probability of each yield range

WORKSHEET 1

EVALUATION OF SOURCES OF RISKS

Crop: Wheat

Source	Chance of Loss No. of Ye. Out of 25		Comments (e.g., Type of Loss; Experiences You or Your Neighbor Have Had)
1. Drought	5		North ¼ more susceptibl
2. Excess Moisture	3		Heavier soils on south-east ¼ prone to ponding
3. High temp. at pollination.			
4. Flood			
5. Wind	4	10-15	Hot dry winds period-ically damage the crops
6. Hail	10	10-50	Some almost every year ~~on home~~ place
7. Frost	8	10-25	Late frost in '81 ~~damaged~~ wheat
8. Insects	3	5-20	Grasshoppers in '83
9. Diseases	2	5-10	Not serious since I started to farm
10. Fire	2	10-15	Hit neighbor this year

An important managerial goal is to achieve the financial liquidity needed to stay in business. Knowing the chances of the yield being less than that needed to generate this level of liquidity, provides the basis for assessing the family's capacity to bear yield risks.

Downside Yield Risk

Historical yields help identify the range in possible yields and the average yield you might expect. Worksheet 1 can be used to help further evaluate the potential downside risks. It is designed to help identify and evaluate factors which result in yield losses.

We begin by assessing the chance in terms of the number of years out of 25 that a loss will occur due to each source of risk. For example, you might think drought will reduce expected yield 5 years out of 25. Next, we assess the potential severity of the loss. Specifically, what is the extent of loss in the event it occurs? We suggest you use an index of 0 to 100 or a percentage to rate the potential loss where 100 would indicate a complete loss. It would also be helpful to use a range of expectations rather than a single number to estimate your perception of the risks you face. This assessment can be used to compare your risks to the deductible levels in MPCI.

In following through the drought example we indicated a drought was expected to significantly reduce yield 5 years out of 25. We need to now estimate the extent of loss in those 5 years. Let us say we estimate that to be 30 to 70 percent. This will result in a yield loss of 10 to 25 bushels per acre from the expected yield of 35 bushels per acre. A sample is shown in Worksheet 1. A blank worksheet is included at the end of the publication. It is also important to consider the combined impact of these risks. Individually each unexpected loss may not substantially reduce the yield but more than one unexpected loss may occur in a particular year.

Use Worksheet 1 to think of all the loss experiences that have occurred on your farm in recent history.

The consideration of historical yields and the assessment of the downside risks helps you determine the risks you face and the alternative yields you might consider in the cash flow analysis.

Cash Flow Projection

The case farm includes 2,000 acres, 1,355 of which is owned and 645 is rented. It is cropped on a wheat - fallow rotation. It is also has a cow-calf enterprise.

The farmer plans to participate in the USDA's wheat program. Assume, for discussion purposes, that participation is at the 27.5% level. Thus, he anticipates planting 725 of the 1,000 acres to wheat with 275 acres being set-aside in the Acreage Conservation Reserve (ACR). There will be 185 acres of set aside and 450 acres of fallow.

He projects his pre-harvest cash expenses at $49.14/acre and harvest cash expenses at $.27/bu. for normal yields and $.39 bu. for low yields[3]. The expenses for fallow and set aside acres are projected at $5/acre.

The farmer is considering the purchase of MPCI on his owned acreage. That's 485 acres. In addition to the cash variable expenses, money is required for the overhead expenses including taxes, capital replacement and family living. Property taxes on owned land are $2,425; the share of the machinery loan payments allocated to owned wheat acreage is $6,305 and the share of the $20,000 family living allocated to the wheat grown on owned land is $10,000.

From a cash flow view, the requirements, exclusive of debt service on land, are:

Cash Variable Expense on 485 planted acres	
Wheat production expense on owned cropland @ 49.14/acre	$23,833
Wheat harvesting & hauling expense 16,975 bu. @ $.27/bu.	4,583
Set aside and fallow @ 5/acre	3,175
Total	$31,591
Overhead and Fixed Expenses	
Property taxes	$2,425
Machinery debt payment	6,305
Family living (labor)	10,000
Other fixed cash requirements	5,000
Total	$23,730
TOTAL CASH REQUIRED	$55,321

Revenues are provided by sales and government payments. For budgeting purposes, a harvest equivalent sale price of loan of $1.92 is used. That is $2.19/bu. loan price less $.27/bu. for storage. Total sales on 485 acres of wheat are projected at $32,592. Deficiency payments are estimated at $2.10/bu., and are based on a program base yield of 31 bu./acre. That is a revenue of $65.10/acre, or $31,574. This analysis is for the owned land portion of the operation only. Any cash surplus from the rented land portion could be used to help debt on owned land.

Estimated revenue totals $64,166. Given cash variable expenses and overhead cash flow commitment of $55,321, the dollars remaining for debt service on land and other machinery replacement net out at $8,845--for typical yields. That's $18.24/acre planted. This analysis is for the owned portion of the operation only.

Worksheet 2 provides an organizational framework and step-by-step calculations for cash flow projections under alternative yield scenarios The objective of the cash flow projection is to evaluate the economic consequences of the downside risk protection provided by MPCI, and to help you evaluate whether you have adequate cash and credit reserves to meet a cash flow shortfall--should it occur.

The example depicted in Worksheet 2 assumes 65% coverage and a $2.60/bu. indemnity price. The 65% coverage was chosen because it provides significant downside protection, with a yield guarantee of 22.8 bu./acre. The $2.60 indemnity price was chosen because it's in the range of the projected net sale price received including deficiency payment. Line 11 includes the cash expenses for the cropped acres and the cash expenses for the fallow and set aside acres allocated on a per acre basis to the production acres.

The worksheet shows the net cash flow for the typical year without insurance of $24.78/acre, the same figure calculated above. In the disaster year the net cash flow is -$17.67/acre. A blank worksheet is provided at the end of this publication.

Comparison of Coverage Levels

Usually, the next step in the budgeting process is to evaluate the performance of alternative coverage levels, particularly in the shortfalls--should they occur. Which coverage level should you purchase? We begin by calculating the premiums per acre, as depicted in Figure 3. As noted earlier, the premium per acre goes up much more rapidly between 65% and 75% versus 50% and 65% coverage.

Next, the downside risk "protection" provided by MPCI is evaluated. Figures 4, 5, and 6 depict the impacts of the 50%, 65%, and 75% coverage levels respectively, on the downside risk protection provided, and the trade-off between annual premiums per acre and downside protection. The $2.60 price election is used for these comparisons.

Figure 5 depicts the impact of MPCI on net cash flow for alternative wheat yields for the 65% coverage level. The 65% coverage level puts a floor under net cash flow at a level that covers non-land cash flow requirements. Note,

WORKSHEET 2

ANALYSIS OF PER ACRE NET CASH FLOW

Crop: Winter wheat

Situation: Lyman County, South Dakota

	Typical Year		Disaster Year	
	With Insurance	Without Insurance	With Insurance	Without Insurance
Projected Crop Sales and Other Cash Inflows:				
1. Enter yield/planted acre	35	35	10	10
2. Enter expected market price of crop at harvest time	$ 1.92	1.92	1.92	.92
3. Expected sales: Line 1 x Line 2	$ 67.20	67.20	19.	20
4. Enter other receipts (deficiency pmt., straw, etc)	$ 65.10	65.10	6[illegible]	
5. Total receipts: Line 3 + Line 4	$132.30	132.30		
MPCI Premium				
6. Enter insurance yield	35	xxx		
7. Enter level of coverage (.5, .65, or .75)	0.65	xxx		
8. Enter premium rate for the desired level of coverage	7.1%	xxx	7.	
9. Enter crop price election	$ 2.60	xxx	2.6	
10. Insurance premium: Line 6 x Line 7 x Line 8 x Line 9	$ 4.20	xxx	4.20	
Projected Crop Cash Requirements				
11. Enter preharvest cash operating expense	$ 49.14	49.14	49.14	4[illegible].14
12. Enter harvest cash expense for yield on line 1	$ 9.45	9.45	3.90	3.90
13. Enter debt service, family living, and other fixed cash requirments.	$ 48.93	48.93	48.93	48.93
14. Total cash requirements: Line 11 + Line 12 + Line 13	$107.52	107.52	101.97	101.97
Projected MPCI Payment Received				
15. Enter Line 6 x Line 7	22.75	xxx	22.75	xxx
16. Enter Line 15 - Line 1 (enter a zero if answer is a negative number)	0	xxx	12.75	xxx
17. Insurance payment received: Line 16 x Line 9	0	xxx	33.15	xxx
NET CASH FLOW: Line 5 - Line 10 - Line 14 + Line 17	$ 20.58	24.78	11.28	-17.67

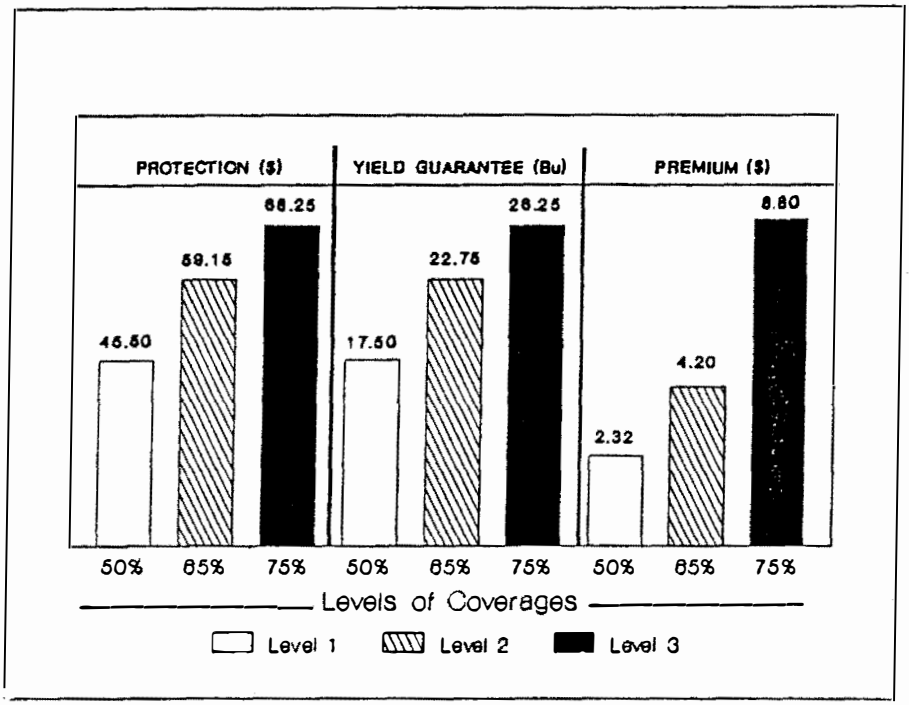

Fig. 3 Protection, Guarantee, Premium/acre vs. Coverage

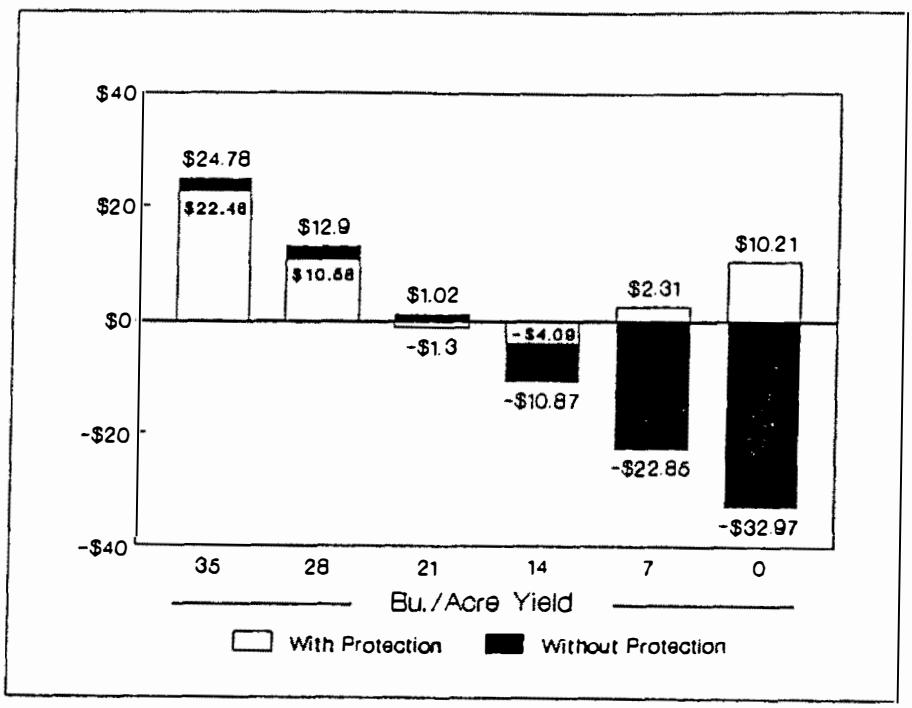

Fig. 4 Net cash flow with and without MPCI protection for 50% coverage level

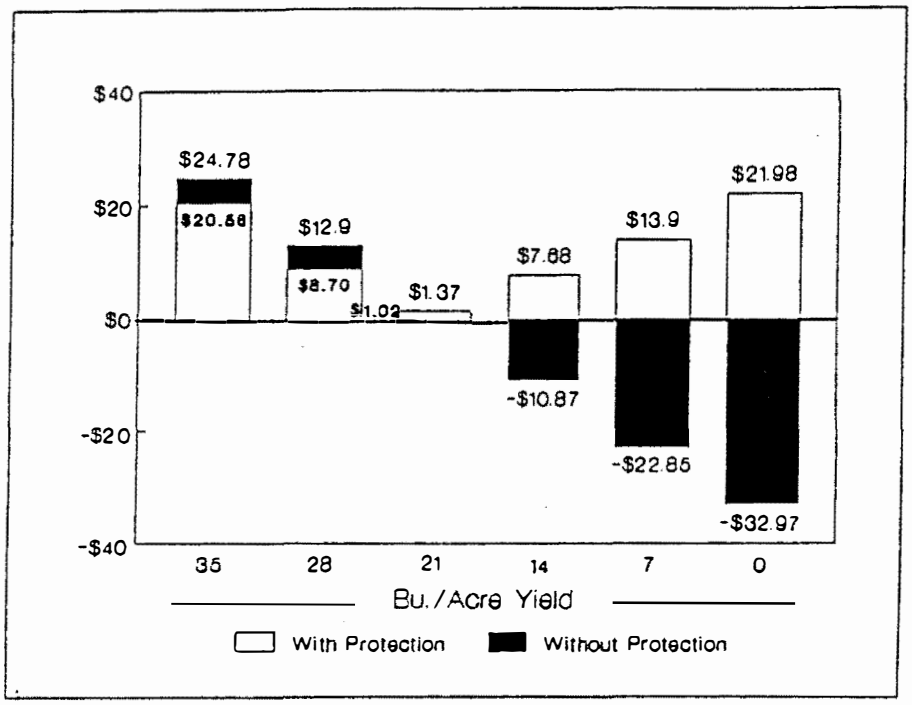

Fig. 5 Net cash flow with and without MPCI protection for 65% coverage level

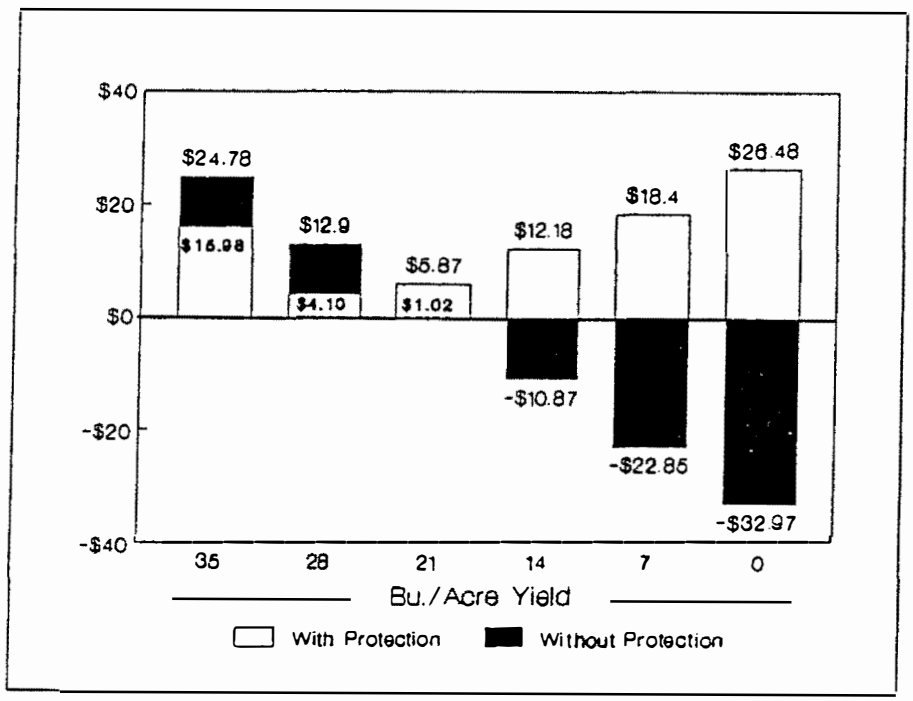

Fig. 6 Net cash flow with and without MPCI protection for 75% coverage level

the difference between the two columns for the typical year is the MPCI premium payment per acre.

In comparing Figures 4 and 5, net incomes for yields above 21 bushels (the first two bars on the left of the chart) are similar for the 50 and 65% coverage levels. At low yields the net income is higher for the 65% coverage level as indicated by the open bars above the $0 line. For example, the net cash flow with 65% insurance for a 7 bushel yield is $13.90/acre. Note that the $2.60 price election is used in these calculations. At the 75% coverage level as shown in Figure 6 net incomes are reduced for yields above 21 bushels due to the higher premium rates.

In previous sections we discussed yield risks and cash flow projections. You also made an assessment of your risk situation. In this section we looked at the protection offered by the three levels of MPCI coverage. Combining all of these allows you to select a strategy that fits you and your situation.

Analyzing Your Financial Reserves

The final step in the analysis is to **develop a risk management plan.** The plan should be based on the implications of alternative strategies for the long term financial structure of the business.

Potential risks first become apparent in a cash flow analysis as was demonstrated in Worksheet 2. The calculations showed the impact on cash flow of a low yield. In this case there was a cash flow shortfall of $17.67/acre without crop insurance before any allocation to land payments.

In reviewing risk management strategies, it is helpful to trace the impact of cash flow variations through the balance sheet. The balance sheet shows the value of assets and liabilities with the difference between the two being the net worth or owner's equity in the business[4]. A cash flow shortfall, as demonstrated in Worksheet 2, will reduce the equity in the operation. Equity represents the wealth of the owners. It can also be viewed as **financial reserves.** The question that you need to answer is how much you can allow these reserves to be drawn down and still maintain solvency or how much you are willing to let them be reduced.

With the case farm we used in the analysis, the base situation had a debt-asset ratio of 37%. That is, the debts were 37% of the total value of the assets. The case farm had total assets valued at $500,000 and total liabilities of $185,000. The debt/asset ratio would be $185,000/$500,000 or .37.

With both owned and rented land included in the analysis, the percent debt was held at about 37% with crop insurance as the yield decreased below the expected 35 bu./acre. Without crop insurance the debt-asset ratio increased to nearly 50 percent for the disaster level yield. Another point to keep in mind is that this is a one-year analysis. That is, it demonstrates the impact of low yields on the financial reserves for only one year.

The implications of reduced yields are influenced by the specific debt level. For instance, for a relatively low debt situation, crop insurance may not be as important as it is for the manager in a relatively high debt situation. However, the low debt manager needs to consider long run implications and the risk strategies that will contribute to achieving the long run goals of the business. The high debt manager definitely needs to consider crop insurance as a tool that can transfer risk and help to keep the farm in business.

Selecting Your Plan

The graphic presentations demonstrate the ability of crop insurance to help stabilize cash flow and provide liquidity in the short run to preserve the long run financial reserves.

In the final analysis the benefits of crop insurance to you depend upon **your capacity and**

willingness to take risks and the probability of a loss occurring. Worksheet 1 was designed to help you assess the chances of a loss and Worksheet 2 was designed to help you with the first step in evaluating your capacity to withstand yield losses. You can then apply the results of the cash flow analysis to your specific financial situation by thinking about the implications for your balance sheet.

CREDITS

[1] Burton Pflueger is an Extension Farm Mangement Specialist and Gerald Toland is an Assistant Professor of Economics at South Dakota State University. This publication is adapted from publications prepared by Gayle S. Willett, Washington State University, J. Roy Black and Gerald Schwab, Michigan State University, and from information provided by the Federal Crop Insurance Corporation and the American Association of Crop Insurers, Washington, DC.

[2] Source: The American Association of Crop Insurers, Washington, DC.

[3] Expenditures include seed, fertilizer and lime, herbicides and insecticides, drying, fuel, machinery repairs, custom hire, trucking and interest. The following publication is a useful source of additional information on production costs: Pflueger, Burton, Expected Production Costs for Major Crops in South Dakota, EMC 864. South Dakota Cooperative Extension Service.

[4] For further information on financial planning see: Rieckman, Arnold, et al, Management Guide for Planning a Farm or Ranch Business, EC 744, South Dakota Cooperative Extension Service.

WORKSHEET 1

EVALUATION OF SOURCES OF RISKS

Crop:_____

Source	Chance of Loss No. of Years Out of 25	Extent of Loss Use Index of 0-100 To Specify Range	Comments (e.g., Type of Loss; Experiences You or Your Neighbor Have Had)
1. Drought			
2. Excess Moisture			
3. High temp. at pollination.			
4. Flood			
5. Wind			
6. Hail			
7. Frost			
8. Insects			
9. Diseases			
10. Fire			

WORKSHEET 2

ANALYSIS OF PER ACRE NET CASH FLOW

Crop: _____

Situation: _____

	Typical Year		Disaster Year	
	With Insurance	Without Insurance	With Insurance	Without Insurance
Projected Crop Sales and Other Cash Inflows:				
1. Enter yield/planted acre	_____	_____	_____	_____
2. Enter expected market price of crop at harvest time	$_____	_____	_____	_____
3. Expected sales: Line 1 x Line 2	$_____	_____	_____	_____
4. Enter other receipts (deficiency pmt., straw, etc)	$_____	_____	_____	_____
5. Total receipts: Line 3 + Line 4	$_____	_____	_____	_____
MPCI Premium				
6. Enter Insurance yield	_____	_____	_____	_____
7. Enter level of coverage (.5, .65, or .75)	_____	_____	_____	_____
8. Enter premium rate for the desired level of coverage	_____	_____	_____	_____
9. Enter crop price election	$_____	_____	_____	_____
10. Insurance premium: Line 6 x Line 7 x Line 8 x Line 9	$_____	_____	_____	_____
Projected Crop Cash Requirements				
11. Enter preharvest cash operating expense	$_____	_____	_____	_____
12. Enter harvest cash expense for yield on line 1	$_____	_____	_____	_____
13. Enter debt service, family living, and other fixed cash requirments.	$_____	_____	_____	_____
14. Total cash requirements: Line 11 + Line 12 + Line 13	$_____	_____	_____	_____
Projected MPCI Payment Received				
15. Enter Line 6 x Line 7	_____	_____	_____	_____
16. Enter Line 15 - Line 1 (enter a zero if answer is a negative number)	_____	_____	_____	_____
17. Insurance payment received: Line 16 x Line 9	_____	_____	_____	_____
NET CASH FLOW: Line 5 - Line 10 - Line 14 + Line 17	$_____	_____	_____	_____