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CC339 Multiple Peril Crop Insurance

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MULTIPLE PERIL CROP INSURANCE

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MULTIPLE PERIL CROP INSURANCE:

WHAT IS IT?

SHOULD YOU BUY IT?

Doug Jose

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 crops fail in Nebraska, as measured by the multiple peril crop insurance claims experience from 1981 to 1986.

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

2. Your family's willingness to take risk; that is, your family's 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.

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 Nebraska Counties Beginning in 1987

#### Code | County | Winter Crops | Spring Crops | Code | County | Winter Crops | Spring Crops
--- | --- | --- | --- | --- | --- | --- | ---
001 | Adams | Wht | Crn, Grs, Hys, Oat, Pop, Soy | 099 | Kearney | Wht | Crn, Grs, Hys, Oat, Pop, Soy
002 | Antelope | Rye, Wht | Bly, Crn, Grs, Oat, Pop, Soy | 101 | Keith | Wht | Bly, Crn, DyB, Grs, Oat, Soy, SuB
005 | Arthur | Wht | Crn, DyB, Grs, Soy | 103 | Keya Paha | Wht | Bly, Crn, Grs, Oat
009 | Blaine | Wht | Crn, Grs, *Oat | 107 | Knox | Wht | Bly, Crn, DyB, Grs, Oat, Pot
111 | Boone | Wht | Bly, Crn, Grs, Oat, Pop, Soy | 111 | Lancaster | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
113 | Box Butte | Wht | Bly, Crn, DyB, Grs, Oat, Pot, SuB | 113 | Logan | Wht | Bly, Crn, DyB, Grs, *Oat
117 | Brown | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 115 | Loup | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
118 | Buffalo | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy | 117 | McPherson | Wht | Bly, Crn, DyB, Grs, *Oat
123 | Butler | Wht | Bly, Crn, Grs, Hys, Oat, Soy | 119 | Madison | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
125 | Cass | Wht | Bly, Crn, Grs, Oat, Soy | 121 | Merrick | Wht | Bly, Crn, DyB, Grs, Oat, Pot, SuB
127 | Cedar | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 123 | Morrill | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy
129 | Chase | Wht | Bly, Crn, DyB, Grs, *Oat, Pot, Pop | 125 | Nance | Wht | Bly, Crn, Grs, Hys, Oat, Soy
011 | Cherry | Wht | Bly, Crn, Grs, Oat | 127 | Nemaha | Wht | Bly, Crn, Grs, Oat, Soy
039 | Cheyenne | Wht | Bly, Crn, DyB, Grs, Oat, SuB | 135 | Perkins | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
035 | Clay | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 137 | Phelps | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
037 | Colfax | Wht | Bly, Crn, DyB, Grs, Soy | 139 | Pierce | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
043 | Cuming | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 141 | Plate | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
047 | Dakota | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 143 | Polk | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
049 | Dawes | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 145 | Red Willow | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
051 | Dixon | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 147 | Richardson | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
053 | Dodge | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 149 | Rock | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
055 | Douglas | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 151 | Saline | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
057 | Dundy | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 153 | Sarpy | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
059 | Fillmore | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 155 | Saunders | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
061 | Franklin | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 157 | Scott Bluff | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
063 | Furnas | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 159 | Seward | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
067 | Gage | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 161 | Sheridan | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
069 | Garden | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 163 | Sherman | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
071 | Garfield | Wht | Bly, Crn, DyB, Grs, Oat, Soy | 165 | Sioux | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
073 | Gosper | Wht | *Bly, Crn, DyB, Grs, Oat, Soy | 167 | Stanton | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
075 | Grant | Wht | Crn, Grs, Hys, Oat, Soy | 169 | Thayer | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
077 | Gageley | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 171 | Thomas | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
079 | Hall | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 173 | Thurston | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
081 | Hamilton | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 175 | Valley | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
083 | Harlan | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy | 177 | Washington | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
087 | Hayes | Wht | Bly, Crn, Grs, Hys, Oat, Soy | 179 | Wayne | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
089 | Hitchcock | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy | 181 | Webster | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
091 | Holt | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy | 183 | Wheeler | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
093 | Hooker | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy | 185 | York | Wht | Bly, Crn, DyB, Grs, Oat, Pop, Soy
095 | Howard | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy | 097 | Johnson | Wht | Bly, Crn, Grs, Hys, Oat, Pop, Soy

### Key to Crop Abbreviations:
- *No rate published, consult your crop insurance agent.

12/04/86
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. See a qualified crop insurance agent for 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:

\[ \text{Insurance yield} \times \text{coverage purchased} \text{ (i.e., 50\%, 65\%, or 75\%)} \]
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:

\[ 35 \text{ bu./acre} \times 0.65 = 22.8 \text{ bu./planted acre}. \]

**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:

\[ (\text{Yield guarantee} - \text{average yield for insured unit}) \times \text{indemnity price}. \]

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

\[ (22.8 \text{ bu./acre yield guarantee} - 10.0 \text{ bu./acre realized yield}) \times 2.60/\text{bu. indemnity price} = 33.28/\text{planted acre}. \]

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 Banner County in the Nebraska Panhandle.

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:

\[ \text{Yield guarantee} \times \text{indemnity price selected} \times \text{premium rate}. \]

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 5.2% the premium is:

\[ 22.8 \text{ bu./acre} \times 2.60/\text{bu.} \times 0.052 = 3.08/\text{acre} \]

The 5.2% 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
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 Nebraska 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 con-
sidered. 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.

To make our discussion more concrete, we
will use a case farm example. The crop under
consideration is wheat, and the farmer’s ASCS
program acreage is 900 acres.

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Yield bu./acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>37</td>
</tr>
<tr>
<td>1985</td>
<td>34</td>
</tr>
<tr>
<td>1984</td>
<td>44</td>
</tr>
<tr>
<td>1983</td>
<td>31</td>
</tr>
<tr>
<td>1982</td>
<td>40</td>
</tr>
<tr>
<td>1981</td>
<td>28</td>
</tr>
<tr>
<td>1980</td>
<td>15</td>
</tr>
</tbody>
</table>

A good indicator of your long-run average
yield can be obtained by calculating an "olym-
pic" 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 bushels per 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 neigh-
bors. 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 cumula-
tive probabilities. For example, the probability
of a yield below 20 bushels per acre is 10% as in-
dicated 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%.

![Diagram](attachment:image.png)

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

## Crop: Wheat

<table>
<thead>
<tr>
<th>Source</th>
<th>Chance of Loss</th>
<th>Extent of Loss</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Drought</td>
<td>5</td>
<td>30 to 70</td>
<td>North 1/4 more susceptible</td>
</tr>
<tr>
<td>2. Excess moisture</td>
<td>3</td>
<td>10 to 20</td>
<td></td>
</tr>
<tr>
<td>3. High temp. at poll.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Flood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Wind</td>
<td>4</td>
<td>10 to 15</td>
<td>Some almost every year on home place</td>
</tr>
<tr>
<td>6. Hail</td>
<td>10</td>
<td>10 to 70</td>
<td></td>
</tr>
<tr>
<td>7. Frost</td>
<td>8</td>
<td>10 to 25</td>
<td></td>
</tr>
<tr>
<td>8. Insect</td>
<td>3</td>
<td>5 to 10</td>
<td>Grasshoppers in '85 Not serious since I started farming</td>
</tr>
<tr>
<td>9. Diseases</td>
<td>2</td>
<td>5 to 10</td>
<td>Hit neighbor last year</td>
</tr>
<tr>
<td>10. Fire</td>
<td>2</td>
<td>10 to 15</td>
<td></td>
</tr>
</tbody>
</table>
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 1800 acres, 1160 of which is owned and 640 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 652.5 of the 900 acres to wheat with 247.5 acres being set-aside in the Acreage Conservation Reserve (ACR). There will be 159.5 acres of set aside and 580 acres of fallow.

He projects his pre-harvest cash expenses at $32.62/acre and harvest cash expenses at $.24 per bu. for normal yields and $.35 bu. for low yields. The expenses for fallow and set aside acres are projected at $5 per acre.

The farmer is considering the purchase of MPCI on his owned acreage. That's 420.5 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 wheat acreage land are $1,500; the share of the machinery loan payments allocated to owned wheat acreage is $8,500 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 Expenses on 420.5 owned wheat acrs.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost (Excl. Debt Service on Land)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat production expense on owned</td>
<td>$13,717</td>
</tr>
<tr>
<td>Cropland @ 32.62/acre</td>
<td></td>
</tr>
<tr>
<td>Wheat drying &amp; hauling expense</td>
<td>$14,717</td>
</tr>
<tr>
<td>14,717 bu @ $.24/bu</td>
<td></td>
</tr>
<tr>
<td>Set aside and fallow @ 5/acre</td>
<td>$3,628</td>
</tr>
<tr>
<td>Total</td>
<td>$20,947</td>
</tr>
</tbody>
</table>

**Overhead and Fixed Expenses**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property taxes</td>
<td>$1,500</td>
</tr>
<tr>
<td>Machinery debt payment</td>
<td>$8,500</td>
</tr>
<tr>
<td>Family living (labor)</td>
<td>$10,000</td>
</tr>
<tr>
<td>Other fixed cash requirements</td>
<td>$5,000</td>
</tr>
<tr>
<td>Total</td>
<td>$25,000</td>
</tr>
</tbody>
</table>

**TOTAL CASH REQUIRED**

(excluding debt service on land) $45,947

Revenues are provided by sales and government payments. For budgeting purposes, a harvest equivalent sale price of loan of $1.93 is used. That is $2.20/bu. loan price less $.27/bu. for storage. Total sales on 420.5 acres of wheat are projected at $28,405. Deficiency payments are estimated at $2.10/bu., and are based on a program base yield of 32 bu./acre. That is a revenue of $67.20/acre, or $28,258. 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 revenues total $56,663. Given cash variable expenses and overhead cash flow commitment of $45,947, the dollars remaining for debt service on land and other machinery replacement net out at $10,716--for typical yields. That's $25.48/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 $25.48/acre, the same figure calculated above. In the disaster year the net cash flow is -$17.81/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.
**WORKSHEET 2**

**ANALYSIS OF PER ACRE NET CASH FLOW**

**Crop:** Wheat  
**Situation:** Nebraska Panhandle Case Farm

<table>
<thead>
<tr>
<th>Typical Year</th>
<th>Disaster Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>With Insurance</strong></td>
<td><strong>Without Insurance</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Projected Crop Sales and Other Cash Inflows:</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enter yield/planted acre</td>
<td>35</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>2. Enter expected market price of crop at harvest time</td>
<td>$1.93</td>
<td>$1.93</td>
<td>$1.93</td>
</tr>
<tr>
<td>3. Expected sales: Line 1 x Line 2</td>
<td>$67.20</td>
<td>$77.20</td>
<td>$19.30</td>
</tr>
<tr>
<td>4. Enter other receipts (deficiency pmt., straw, etc.)</td>
<td>$67.50</td>
<td>$77.50</td>
<td>$77.50</td>
</tr>
<tr>
<td>5. Total receipts: Line 3 + Line 4</td>
<td>$134.75</td>
<td>$154.75</td>
<td>$86.50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MPCI Premium</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Enter insurance yield</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>7. Enter level of coverage (0.50, 0.65 or 0.75)</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
</tr>
<tr>
<td>8. Enter premium rate for the desired level of coverage</td>
<td>4.2%</td>
<td>XXX</td>
<td>5.2%</td>
</tr>
<tr>
<td>9. Enter crop price election</td>
<td>2.60</td>
<td>2.60</td>
<td>2.60</td>
</tr>
<tr>
<td>10. Insurance premium: Line 6 x Line 7 x Line 8 x Line 9</td>
<td>$7.08</td>
<td>$7.08</td>
<td>$7.08</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Projected Crop Cash Requirements</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Enter preharvest cash operating expense <strong>(32.42 + 8.74)</strong></td>
<td>$41.36</td>
<td>$41.36</td>
<td>$41.36</td>
</tr>
<tr>
<td>12. Enter harvest cash expense for yield on line 1</td>
<td>$8.46</td>
<td>$8.46</td>
<td>$8.46</td>
</tr>
<tr>
<td>13. Enter debt service, family living, and other fixed cash requirements <strong>(except land)</strong></td>
<td>$59.45</td>
<td>$59.45</td>
<td>$59.45</td>
</tr>
<tr>
<td>14. Total cash requirements: Line 11 + Line 12 + Line 13</td>
<td>$102.77</td>
<td>$102.77</td>
<td>$104.31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Projected MPCI Payment Received</strong></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Enter Line 6 x Line 7</td>
<td>22.75</td>
<td>22.75</td>
<td>22.75</td>
</tr>
<tr>
<td>16. Enter Line 15 - Line 1 (enter a zero if answer is a negative number)</td>
<td>0</td>
<td>12.75</td>
<td>0</td>
</tr>
<tr>
<td>17. Insurance payment received: Line 16 x Line 9</td>
<td>0</td>
<td>38.15</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NET CASH FLOW:</strong></th>
<th>Line 5 - Line 10 - Line 14 + Line 17</th>
<th>Line 5 - Line 10 - Line 14 + Line 17</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>With Insurance</strong></td>
<td>$22.40</td>
<td>$25.48</td>
</tr>
<tr>
<td><strong>Without Insurance</strong></td>
<td>$12.26</td>
<td>$-17.81</td>
</tr>
</tbody>
</table>
Fig 3. Protection, Guarantee, Premium/acre vs. Coverage

![Graph showing protection, guarantee, and premium/acre levels for different coverage levels.]

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

![Graph showing net cash flow with and without protection at different yield levels.]

**Levels of Coverages**
- Level 1
- Level 2
- Level 3

**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
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, 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 insurance for a 7 bushel yield is $15.02/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 $17.81/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 varia-

...tions 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. 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 $450,000 and total liabilities of $166,000. The debt/asset ratio would be $166,000/$450,000 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 family's 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 H. Doug Jose, is an Extension Farm Management Specialist at the University of Nebraska. 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: Jose, H. D. et al, Estimated Crop & Livestock Production Costs, Nebraska, 1987, Publication EC87-72. Nebraska Cooperative Extension Service.

4 For further information on Balance Sheets see: Your Balance Sheet, Publication EC71-874, Nebraska Cooperative Extension Service.
# EVALUATION OF SOURCES OF RISKS

<table>
<thead>
<tr>
<th>Source</th>
<th>Chance of Loss</th>
<th>Extent of Loss</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Years</td>
<td>Use Index of 0-100</td>
<td>(e.g., Type of Loss; Experiences You or Your Neighbor Have Had)</td>
</tr>
<tr>
<td>1. Drought</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Excess moisture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. High temp. at poll.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Flood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Wind</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Hail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Frost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Insect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Fire</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Crop:** ________________

In comparing Figures 4 and 5, set index for how much you can allow these reserves to be drawn down and still maintain stability or how

65% average level. All one yields the plot above the 65%

level. The average level of

price structure in use is shown in Figure 5.

With both owned and rented land included in

the calculations, the average level is shown.

In the calculations, the average level is shown in

Figure 6 as in the higher premium rates.

With both owned and rented land included in

the calculations, the average level is shown.

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# WORKSHEET 2

## ANALYSIS OF PER ACRE NET CASH FLOW

**Crop:**

**Situation:**

<table>
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<th>Typical Year</th>
<th></th>
<th>Disaster Year</th>
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<td>With Insurance</td>
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</table>

### 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 (0.50, 0.65 or 0.75)
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 requirements

### 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

---

Typical Year

Disaster Year