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Malt Barley Risk Management Strategies

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Introduction

Malt barley is an important crop to Northern Plains farmers. In regions like Bottineau County North Dakota, barley comprises over 28% of planted acreage (NASS). Prior to the mid-1990s almost all the crop was produced without contracts, marketed on a spot basis, and minimal use was made of crop insurance, excluding hail insurance. At present, a majority of the crop is both contracted before planting and insured with federally subsidized crop insurance.

Farmers who raise a crop under contract receive a price premium if quality specifications are met. Even though the crop is both contracted and insured, malt barley is still a risky crop. While other crops are of comparable risk (Federal Crop Insurance Corp. 2006), the source of risk differs in barley. Price risk is nil due to contracting, but there is substantial uncertainty as to whether crop quality specifications will be met (i.e., acceptance risk). In addition to the vagaries of weather and disease that impact production yields, climatic risks also affect quality parameters such as protein, plump, sprout, and deoxynivaleno (DON). In 2005, less than 20% of malt barley raised under contract in eastern North Dakota met quality specifications. When their malt barley crop is rejected, farmers rely heavily on federal crop insurance indemnity payments to meet cash flow needs.

Unfortunately, several provisions of malt barley crop insurance result in “coverage gaps” and limit its attractiveness as a risk management tool. First, the program is among the most complex as it contains two specialized malt quality endorsements, in addition to base multi-peril (APH) program coverage and price election options. Few producers (and even crop insurance agents) are aware of these endorsements, the requirements imposed, and enhanced coverage levels provided, in part due to the complexity involved. Second, quality provisions in the policy often do not align with malt buyer contract specifications, resulting in coverage gaps. Moreover, contract specifications vary by malt buyer. Thus, farmers may have their crop rejected, but are ineligible for a crop insurance indemnity payment.

This paper summarizes a grower education program that was recently delivered to 2,000 Northern Plain’s growers in ID, MT, ND, and WY to assist them in formulating their risk management strategy for raising malt barley in 2006. Data and discussion from dryland North Dakota sessions are used as examples for the remainder of this article. The program began with an overview of existing U.S. Department of Agriculture (USDA) Risk Management Agency (RMA) malt barley crop insurance provisions to educate growers of coverage options. Shortcomings in the program were then reviewed along with RMA proposals being proposed to correct current deficiencies. Grower reaction to these proposals was obtained. Finally, results of a Monte-Carlo simulation model were presented to delineate the additional risk management coverage afforded through increased participation in available crop insurance and contracting programs. Multi-peril crop insurance was found to lessen downside risk of negative net returns

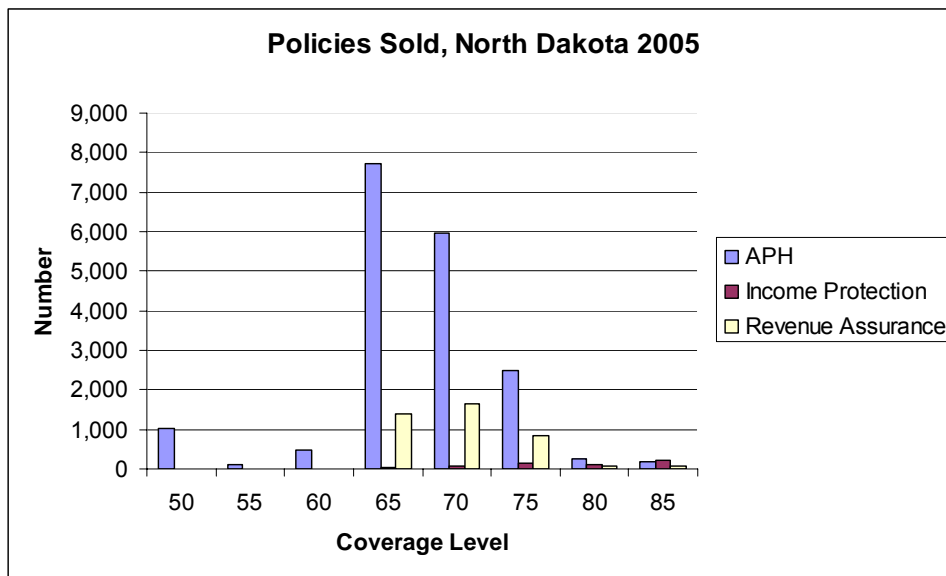
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at the expense of lower expected revenue while the addition of contract and malt option endorsement B are both preferred strategies as returns over variable cost increase and downside risk is reduced.

North Dakota Malt Barley Crop Insurance

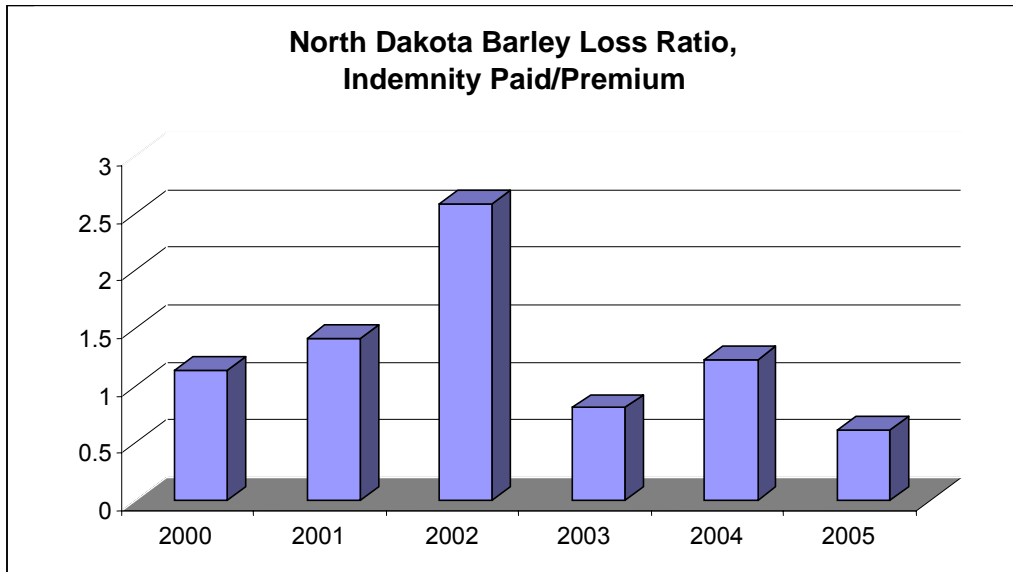
North Dakota barley farmers actively participate in USDA RMA federal crop insurance programs. In 2005, 7,800 APH multi-peril policies with coverage at the 65% level were sold (Figure 1). Nearly all of these selected the highest price election level of \$2.35/bushel. Almost as many producers (6,000) selected the higher level APH multi-peril policy with 70% coverage. Participation in the highest levels of APH multi-peril (75%, 80% and 85% coverage), as well as the Income Protection and Revenue Assurance programs, was far less. The rising cost of insurance combined with declining federal subsidy levels make higher coverage levels prohibitively expensive for most North Dakota farmers. About 1,000 growers participated in the basic catastrophic (CAT) level program, primarily because they received a disaster payment in the past and were required to participate in order to be eligible for 2005 federal government payments. Recent adverse weather in North Dakota has resulted in barley growers collecting more indemnity payments than the premium paid, in the past four of six years (Figure 2).

Figure 1. North Dakota malt barley crop insurance participation, 2005.



Two unique endorsements are available to malt barley growers, malt option A and B. Malt option A is for growers who do not have a contract when purchasing their crop insurance. They are either producing for the open market or intend to contract later. In order to purchase malt option A, a grower must have production records documenting that they have successfully raised malt barley in four previous years. These years do not have to be consecutive due to rotational requirements. If purchased, malt option A provides an additional \$0.70/bushel payment if a grower’s barley crop is rejected for malt. Growers electing malt option A pay an additional 40% premium surcharge.

Figure 2. North Dakota barley loss experience.



Barley growers with a malt contract can participate in malt option B. This option is particularly attractive to new growers as they are not required to have a history of malt production or acceptance. The value of this option is the difference between their contract price and RMA's price election for feed barley. In 2006, RMA is going to lower the price election for barley from \$2.35 to \$1.85, which increases the value of the malt option since malt barley contract premiums being offered for 2006 are similar to the 2005 price of \$2.80/bushel. The surcharge for malt option B is also 40%.

Example of Malt Option B

	Production Guarantee ¹ (a)	Actual Production (b)	Loss (a) - (b)	Value	Payment
Feed Barley	3,000	2,000	1,000	\$1.85	\$1,850
Malt Barley	3,000	0	3,000	\$0.95	<u>\$2,850</u>
Total					\$4,700

¹Production (4,615) x .65 yield guarantee = 3,000 bu.

To illustrate malt option B, assume a farmer has some combination of yield and acreage that produces 4,615 bushels/year. If he selected a 65% yield guarantee, he has 3,000 bushels guaranteed at \$2.80, the contract price. Assume he has a bad year in 2005 and only harvests 2,000 bushels. Further, assume that due to quality problems, none of his barley makes malting quality (e.g., all of it is rejected). His insured yield loss is then 1,000 bushels for which he would get a payment of \$1,850 in 2006. In addition, because he has malt option B, he gets another payment of \$2,850 because his crop didn't make malting (3000 x .95):

In 2005, few barley farmers purchased either malt option A (7) or option B (914). Farmers remarked that their crop insurance agent was not aware of these specialized endorsements. Also, both options are on an enterprise basis which implies that all barley acreage within a county is considered as one parcel. This limits the options' attractiveness to producers as they are not able to claim losses on individual parcels of land (units) when average production exceeds guarantee levels on other units, within a county.

Limitations of Current Barley Crop Insurance

Growers participating in the program expressed several concerns about RMA's existing malt barley crop insurance program. Many regions of the Northern Plains have experienced adverse weather in recent years. As a consequence, their yield histories have declined which results in reduced coverage in future years. Growers also expressed concern about rising energy and fertilizer prices. Without an increase in either malt barley contract prices or RMA's price election, a lower proportion of their cash costs will be protected.

Growers attending were most critical of "coverage gaps" in the malt options, especially protein and DON. Quality provisions of option A and B often do not align with malt buyer contract specifications, which results in coverage gaps. Thus, farmers may have their crop rejected, but be ineligible for an indemnity payment. For example, malt buyers reject a grower's crop if protein exceeds 13.5%, but growers are unable to collect a crop insurance indemnity payment unless protein exceeds 14%. Likewise, the malt standard for DON is 0.5 parts per million (ppm) while the standard for crop insurance is 2.0 ppm.² Finally, malt buyers utilize a proprietary method of measuring sprout damage while RMA relies on Grain Inspection, Packers, and Stockyards Agency procedures.

Growers in western regions wondered why the malt options were not available on a unit basis in their area. Historically, acceptance levels have been high in their area. They feel that RMA's policy with respect to malt options should vary by county like other crop insurance provisions instead of being uniform statewide.

RMA Proposals for Program Improvement

RMA is proposing to change several key provisions of the malt barley crop insurance program (Federal Register, 7 CFR Part 457). These include:

- 1) Change the definition and procedure for measuring sprout losses from USDA's "damaged by sprout" to industry's "injured by sprout".
- 2) Lower the protein standard for two row barley from 14.0% to 13.5%.

² Technically, the contract specification is nil, but DON = 0.5 is interpreted as non-detectable.

- 3) Implement a “good producer discount” whereby growers with a favorable record of raising acceptable barley would be eligible for premium discount.
- 4) Increase incentives for conditioning barley to meet contract specifications

Growers attending the program complimented RMA for proposing these changes. However, they had several concerns and had hoped that RMA would have corrected more deficiencies. First, six row barley growers desired the same reduction of the protein standard proposed for two row barley. Growers had also hoped the DON gap would have been closed by lowering the existing standard of 2 ppm to the contract specification of 0.5 ppm.

Analysis

In addition to production and price risks faced by other farmers, malt barley farmers also face uncertainty about the value of the crop insurance program. The program provisions are complex and growers have difficulty accessing the tradeoffs between increased premium cost and risk protection being afforded. Moreover, levels of risk protection are somewhat uncertain as various coverage gaps exist.

To illustrate to growers the risk and return implications of their alternatives for 2006 malt barley production, a Monte-Carlo simulation model, developed in @Risk was used to delineate the additional risk management coverage afforded through increased participation in various crop insurance and contracting program options.

The simulation model was calibrated with enterprise variable cost and return data from local farm management recordkeeping systems, 10-year individual farm yield distributions estimated with RMA data, 30-year Winnipeg Grain Exchange price data, and American Malt Barley Association (AMBA) crop quality survey data. Distributions for the yield, price, and quality variables were determined using the distribution fitting algorithms in @Risk (Palisade Corporation 2004). The distributions selected were logistic for yields, discrete for acceptance and quality, and normal for price. Wilson, Gustafson and Dahl (In review) provide a detailed description of model development, methods, and data sources.

Crop insurance premium costs for each policy option were added to cash expenses. Indemnity payments were calculated and added to gross returns in iterations where either yields fell below guaranteed levels or the crop was rejected due to quality problems. As described earlier, coverage gaps did result in outcomes where farmers had a loss but were unable to collect an indemnity payment. One-thousand iterations were run for each policy option.

Results are summarized in Figure 3. Malt barley farmers face substantial financial risk when their crop is raised without crop insurance or contract. Expected returns over variable cost for a North Dakota dryland farmer that purchases the minimum level of catastrophic (CAT) crop insurance and does not have a malt barley contract averages \$32.82 per acre as shown in the first panel of Figure 3. More importantly, there is a 10.6% chance of a loss (e.g., variable costs exceed total revenue) and a maximum loss potential of -\$19.15 per acre.

Increasing crop insurance coverage to 65% multi-peril (APH) coverage lowers expected returns to \$31.82 due to the higher net premium cost (premium less indemnity received), as shown in the second panel of Figure 3. However, downside risk is reduced as the probability of returns over variable cost being negative declines to 8.7% and the maximum loss potential is now only \$11.58. Thus, crop insurance lessens downside risk at the expense of lower expected

revenues. This tradeoff may appeal to risk averse farmers with either high debt or household cash flow needs.

The addition of a contract and malt option endorsement B are both stochastic dominant as returns over variable cost increase and downside risk is reduced as shown in the third and fourth panels of Figure 3. Having a malt contract and the Option B endorsement, in addition to 65% multi-peril coverage, increases average expected returns to \$69.54 as shown in the fourth panel. Downside risk is mitigated and there is no longer any probability of a loss (defined above). Net returns over variable costs are always positive for the simulations. While price risk is mitigated due to having a contract, the impact of the crop not being accepted due to quality concerns increases due to crop quality specifications not being met.

Conclusion

RMA's malt barley crop insurance program is both complex and unique as it contains two specialized endorsements that provide farmers indemnity payments when their contracted crop is rejected due to low quality. The endorsements are not perfect though as provisions of the crop insurance policy do not align with contract specifications. Therefore, farmers face uncertainty in their risk management decision.

To help farmers more fully understand the nuances and merits of the malt barley crop insurance policy, an education program was developed and delivered to 2,000 growers in the Northern Plains region. A Monte-Carlo simulation model was developed to illustrate the risk management benefits of additional crop insurance coverage and contracting. Multi-peril crop insurance lowered expected returns, but reduced downside risk. Malt option B and contracting were stochastic dominant as returns increased and downside risk was reduced.

There are several important implications from this study. First, several gaps in the malt barley crop insurance program limit its attractiveness to growers. These gaps arise because policy provisions do not align with contract specifications. These fundamental problems in the malt barley crop insurance program limit the program's value as a safety net to producers. If contracting and greater quality specificity become more pervasive among other commodities in agriculture, federal crop insurance may not adequately fulfill the risk management needs of farmers. Similar crop quality and insurance issues have already arisen in potatoes and sunflowers (Nicholson 2006).

Second, coverage gaps in malt barley crop insurance exist in part because indemnity payments are triggered by quality losses in addition to production levels. As processors continue to place more emphasis on the quality of other agricultural commodities, additional quality endorsements may need to be developed.

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Figure 3. 2006 North Dakota dryland malt barley risk management, alternative crop insurance and contracting choices.

