

South Dakota State University
**Open PRAIRIE: Open Public Research Access Institutional
Repository and Information Exchange**

Economics Commentator

Economics

2-27-2009

Insuring Corn, Soybeans, and Wheat; Yield Ratios and Income


Matthew Diersen

South Dakota State University, Matthew.Diersen@SDSTATE.EDU

Tia Dodson

South Dakota State University

Follow this and additional works at: http://openprairie.sdstate.edu/econ_comm

 Part of the [Agricultural and Resource Economics Commons](#), and the [Regional Economics Commons](#)

Recommended Citation

Diersen, Matthew and Dodson, Tia, "Insuring Corn, Soybeans, and Wheat; Yield Ratios and Income" (2009). *Economics Commentator*. Paper 497.

http://openprairie.sdstate.edu/econ_comm/497

This Newsletter is brought to you for free and open access by the Economics at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Economics Commentator by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.



ECONOMICS COMMENTATOR

South Dakota State University

No. 506

February 27, 2009



INSURING CORN, SOYBEANS, AND WHEAT

by

Matthew Diersen
Associate Professor

Every year brings another round of crop insurance choices. For the 2009 crop year the change in price limits on revenue products makes a revisit of the product type choice vital to making sound risk management decisions. Market conditions also affect what products may look attractive and what coverage level would best fit the needs of individual farms.

Crop insurance is widely used on the major crops in South Dakota. In 2008 producers purchased \$3.8 billion of coverage on corn, soybeans, and wheat. Insurance is a major input cost as producers paid \$264 million in premiums (after subsidies of 58%) for coverage, which is over \$22 per acre on major crops. Revenue coverage has dominated the product choice in recent years. Production problems that would have caused insured losses were limited last year, but price declines resulted in indemnity payments of \$334 million.

What follows are analyses of recent insurance trends for corn, soybeans, and wheat and of aspects to consider when choosing coverage now and when marketing crops later in the year.

Corn Choices

Producers have overwhelmingly insured corn using Revenue Assurance (RA) over the past decade (figure 1). Typically they include the Harvest Price Option, labeled RA-HPO, meaning the maximum indemnity (Continued on page 2)



YIELD RATIOS AND INCOME

by

Tia Dodson
Research Associate

As the time to purchase crop insurance approaches, I thought I would take this opportunity to introduce myself and share some results of my graduate research. I am a new research associate in the Economics department having recently moved to Brookings from California where I worked as a policy analyst for UC Berkeley's Institute for Transportation Studies. Prior to living in Berkeley, I was studying agricultural economics and political science at Colorado State University.

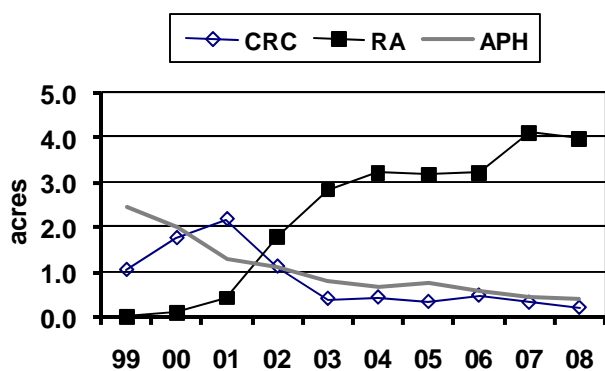
This research is timely because it involves making strategic insurance decisions. It was conducted in Colorado in response to some discontent among wheat growers who were experiencing increasing premiums. The study closely examined the premium calculation to uncover important characteristics that affect the cost of insurance. The results of the research demonstrate the premium calculation's affect on different groups of producers and suggests ways to optimize insurance choices.

Insurance is meant to be reflective of risk, meaning the riskier the operation the higher the premium. From the insurers' standpoint, predicting and estimating risk can be difficult. To assess the accuracy of insurance, a common measurement is employed by which the total collected premium is divided by total indemnities paid. In the short run, this ratio may be larger or smaller than one, but (Continued on page 3)

(Insuring Corn ... continued from page 1)

can increase with harvest price increases. RA was first offered in 1999 and quickly replaced Crop Revenue Coverage (CRC), a competing revenue insurance product. Use of yield only products, based on Actual Production History (APH) has also steadily given way to use of RA. Typically producers have found RA-HPO to cost less per acre at desired coverage levels compared to buying CRC. In addition, subsidized premiums help make revenue insurance less expensive than obtaining similar protection by combining APH products with put options.

Figure 1. Corn by Coverage Type



Source: USDA-RMA

Beginning with the 2009 crop year the price limits for RA-HPO and CRC are now the same at 200% of the projected harvest or base price. The features of the two products on corn are more similar than they were in the past. Having a price limit reduces the maximum level of coverage of RA-HPO and should lower the premiums. The price limit is changed from a fixed dollar amount for CRC with an ambiguous change to the premiums. The result is the relative cost of the two product types could change and disrupt the historic heavy use of RA for corn. The two types now provide the same coverage except for using a different month to compute the harvest price.

CRC will continue to settle to the October average of the December futures price. RA-HPO will continue to settle to the November average of the December futures price. Prior to 2006, this difference mattered very little (table 2). Small price changes between October and November tended to average out quickly. However, harvest prices have been relatively high and more volatile in recent years. In 2006 the corn

revenue insurance products had a beginning price election level of \$2.59 per bushel. CRC coverage finished with a price election of \$3.03 per bushel and RA-HPO finished at \$3.56 per bushel. Similar changes were observed in 2007 and 2008. Thus, producers with contracts or hedges to be lifted earlier (later) in the harvest period may favor CRC (RA-HPO). However, the cost difference should also be considered.

Table 1. Price Election Levels on Corn

Year	Base or Projected Price	CRC Harvest Price	RA-HPO Harvest Price
2004	2.83	2.05	1.99
2005	2.32	2.02	1.93
2006	2.59	3.03	3.56
2007	4.06	3.58	3.80
2008	5.40	4.13	3.74

Source: USDA-RMA

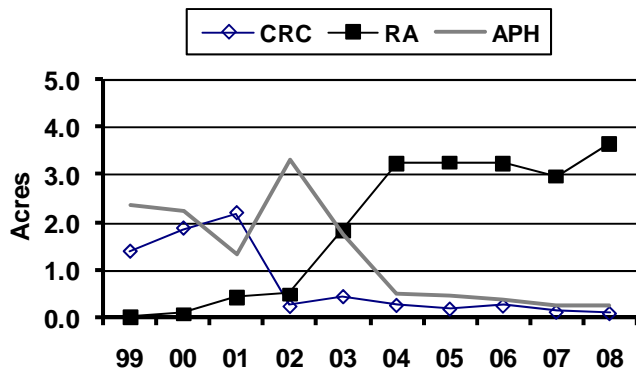
Volatility has not been confined to harvest time. The spring volatility level (used to set the premiums for revenue insurance) has increased in recent years. Corn price volatility historically fluctuated around 20%, but rose steadily since 2006 to 30% in 2008. Thus, more futures price movements were expected between the time insurance was established and finally settled at harvest. For 2009 the early volatility estimate is 37%. So even though the base or projected price election is similar to 2007, at \$4.04 per bushel, the higher volatility means higher premiums. For perspective, the increase in volatility would more than double the cost of an at-the-money option on corn futures compared to when volatility was lower.

Soybean and Wheat Choices

Producers may recall some substantial shifts across product types for soybeans (figure 2). In 2002 the price election level on yield insurance products was higher than for revenue insurance products, leading to a pronounced spike in APH coverage. In 2009 the price election levels are similar across product types. The revenue price election is \$8.80 per bushel for 2009. RA has dominated the type choice the past few years. Producers that used CRC on soybeans in 2008 saw coverage limited by the fixed limit move. Because RA-HPO and CRC have the same harvest period calculation dates and now the same price

limits, producers can readily select the coverage type with the lowest cost.

Figure. 2. Soybean by Coverage Type



Source: USDA-RMA

Insuring wheat is a little more complex when looking at aggregated activity in South Dakota. Both winter and spring wheat are covered with various ending dates, different price election levels and insurance periods. CRC is more commonly used further west. RA is more commonly used on spring wheat. Producers have also continued to use APH coverage because the cost of revenue coverage is relatively high as a percent of all wheat production costs. Producers of spring wheat that used CRC in 2008 had indemnity payments limited by the old price limit on that coverage. The price election level on 2009 spring with for APH at \$8.77 per bushel is much higher than the level for revenue products at \$6.20 per bushel. Thus, a shift to APH would be likely for some spring wheat producers, especially for those that do little pre-harvest marketing.

Summary

The major price changes in 2009 will likely cause producers to again consider their optional insurance coverage. The change in the limits on revenue products is an added incentive to actively study which product will be the most cost effective. The desired coverage level and type of unit structure will also be important considerations. After insurance is purchased, concentrating on marketing can resume. Without the unlimited protection that RA-HPO used to provide, prudent producers will be looking at making covered sales in 2009. That implies that any forward sales or hedges be covered by the purchase of inexpensive call options.

Yield Ratios ... (continued from page 1)

averaged over several years the loss ratio should be close to one. For years this indicator showed that insurance was paying out more than it was collecting (Goodwin, 1994). To provide premium estimations that are more accurate, RMA established a class rating system and then instituted a continuous base rating system in 2001 (Schnapp, 2006).

The cost structure was changed from a discrete model to a continuous rating system, whereby a producers' individual risk is estimated. The discrete, or class rating system grouped producers into set categories based on their actual production history (APH) and assigned a premium based on these groups. The continuous base rating system uses an individual producers' yield ratio to determine relative risk. The yield ratio is a producers' APH divided by the current year's county average. In general, if a producer's APH is above the county average that producer is viewed as less risky. The opposite is true for producers with an APH below the county average. Because this risk estimation directly affects the cost of the insurance, producers above the county average are paying less for insurance than producers that are below the county average. The magnitude of the difference in premium depends on the insurance. Three different types of insurance products were included in the study, Actual Production History (APH) insurance, Revenue Assurance (RA), and Crop Revenue Coverage (CRC).

The effects of crop insurance were demonstrated by using a simulation that calculated net revenue for a model farm in Eastern Colorado. The main variables in the revenue model were premium and indemnity levels, thereby examining cost and payoffs from insurance. Yields and prices were stochastic to capture appropriate levels of variability. Two scenarios demonstrated the difference in yield ratios. Scenario I was a farm with yields consistently above the county average and scenario II was a farm below the county average.

By only adjusting the county average the simulation was akin to taking a producer and putting him/her in two different counties, one where the producer has yields lower than the county average and one where the producer has yields higher than the county average. This approach ensures that the two scenarios

can be compared because the insured amount and yield variability are the same across scenarios.

The resulting calculation of net revenue took into account the costs and benefits of each insurance option. The insurance options were ranked using a stochastic dominance test, which is used to rank risky alternatives (Richardson 2006). Stochastic dominance, with respect to a function, assumes a risk averse personality so if a producer takes on additional risk they must be compensated more. The rankings of product types and yield election levels are presented in the following table. Note that for scenario I RA at the 65% level is the dominant insurance choice. For Scenario II CRC at the 65% level is preferred, while APH and the benchmark of no insurance are also highly ranked choices. These rankings are not prescriptive but are meant to illustrate the effect a producer's relative risk position can have on the cost and therefore the effectiveness of insurance.

Stochastic dominance rankings

Level of Preference	Scenario I (high)	Scenario II (low)
Most preferred	RA 65	CRC 65
2nd most preferred	CRC 80	APH 65
3rd most preferred	RA 80	CRC 80
4th most preferred	CRC 65	Benchmark

For counties like those in Eastern Colorado, there can be considerable variation in yields resulting from

rainfall variability and differences soil type and quality. In general, South Dakota counties are smaller and likely less variable than counties in Colorado, so the effects of the yield ratio are not likely to be as extreme. This effect, though, is still something to be aware of. A change in relative position, dropping below the county average or rising above the county average, may signal a need to reevaluate insurance decisions by pricing alternatives and weighing differences in price against changes in coverage.

References

Goodwin, B. K. "Premium Rate Determination in the Federal Crop Insurance Program: What do Averages Have to Say About Risk?" *Journal of Agricultural and Resource Economics* 19(1994):382-395.

Richardson, J. W., K. D. Schumann, P. A. Feldman. "Simulation and Econometrics to Analyze Risk." *2006 Simetar Users Manual*.

Schnapp, F. and L. Jansonius. "Continuous Rating". National Crop Insurance Services. 2 March 2006 <www.agrisk.org/NCISPUBS/LAIPPUB/Art1200.htm>.

ECONOMICS COMMENTATOR

Department of Economics
South Dakota State University
Box 504 Scobey Hall
Brookings, SD 57007-0895
Phone: 605-688-4141
Fax: 605-688-6386
E-Mail: Penny_Stover@sdstate.edu
120 copies of this newsletter were produced at a cost of less than \$100

SOUTH DAKOTA STATE UNIVERSITY
Department of Economics
Box 504
Brookings SD 57007-0895
Change Service Requested

