



# Crop Insurance Decisions in an Era of Increased Volatility

Bruce Sherrick

[sherrick@illinois.edu](mailto:sherrick@illinois.edu)

University of Illinois



- New price levels and volatility render traditional commodity support programs less effective for management of revenue risk.
- Crop insurance viewed as risk management “cornerstone” with increased importance of effective usage. Product subsidy and selection issues of increased importance.
- Indemnity Price determination, impact of interactions with marketing decisions, new limits, and divergence of base from expected prices increases importance.

## Major decision issues:

- **Farm-based vs. Area-based products**
- **Revenue or Yield insured**
- **If Revenue, option for guarantee value to increase with price increases or fixed at signup.**



## 1. Yield insurance

- Actual Production History (APH) pays based on the number of bushel shortfall times (cash intent) price

## 2. Revenue without guarantee increase

- Revenue Assurance – Base Price (RA-BP) and IP pay when a revenue index from yield times futures price is below guaranteed revenue.

## 3. Revenue with guarantee increase

- Crop Revenue Coverage (CRC) and Revenue Assurance – Harvest Price (RA-HP) pay when crop revenue index is below yield times the higher of base price or harvest price. Essentially includes the option on price increasing in the guaranteed revenue.

## 1. Yield insurance

- Group Risk Plan (GRP) pays when county average yields are below elected fraction of expected level.

## 2. Revenue without guarantee increase

- Group Risk Income Plan (GRIP) pays percentage shortfall in county-based revenue index (average yield times average futures price) times an available revenue level. The Maximum protection can be very high.

## 3. Revenue with guarantee increase

- GRIP-HR, like GRIP but with additional feature that guaranteed revenue increases if prices increase.

## **“Base” Price:**

**Corn – CBOT Dec. contract avg. in February**

**Soybeans – CBOT Nov. contract avg. in Feb.**

## **“Harvest” Price:**

**Corn – CBOT Dec. avg in October (CRC, GRIP) and  
November (RA)**

**Soybeans – CBOT Nov. contract avg. in October**

- Revenue insurance pays when “available” revenue index is below guaranteed level – not your actual revenue. Marketing gains/losses against springtime fall futures need to be considered.
- Increase in guaranteed revenue if Harvest Price is greater than Base Price (embedded call option\*) has value, but can be offset by difference between futures and average Feb futures.
- Increase in guarantee good for “aggressive” users of forward contracts or futures contracts

\* max price change for 2009 and beyond is to 2 times base price, no down side limit

- Indemnity based on county yields, not own farm yields
- Group Plans (GRP, GRIP, GRIP HR) – county insurance products may work well if yields are highly correlated with county's. Does NOT matter if your yields are higher or not.
- Easy to administer, often works well for farms spread over large regions.
- Not settled until county yields are final in following year.
- Payments can be very large due to 1.5 factor in maximum liability, high resulting “leverage” in protection.
- High prices, low yields, average revenue often results in high payments under GRP and GRIP-HR, but not GRIP; High yields, low prices, both GRIP and GRIP-HR can make high payments but not GRP.



# Premiums and Risk Subsidies

- Premiums (costs of insurance products) are federally subsidized. Subsidy rates are set in the Agricultural Risk Protection Act of 2000 and can be adjusted annually. Subsidy rates vary by coverage level and type of insurance.**

*2009 Subsidy Schedule (Group products had subsidy rates reduced most)*

Insurance	----- Coverage Level -----									
	CAT	50%	55%	60%	65%	70%	75%	80%	85%	90%
All Farm-level	1	0.67	0.64	0.64	0.59	0.59	0.55	0.48	0.38	
GRP	1					0.59	0.59	0.55	0.55	0.51
GRIP						0.59	0.55	0.55	0.49	0.44

- Example – a producer’s total premium for Corn Crop Revenue Coverage is \$84/acre at 70% coverage. The producer pays \$34.44 and the federal government pays \$49.56. If accurately rated, producers should make more in payments than they pay in premiums over time.**

**Crop insurance companies receive administrative and operating (A&O) subsidies from the Federal government for delivering crop insurance products. These subsidies are set by the SRA and averaged about 21.6% across all policies in 2007, a bit lower in 2008, and potentially much lower in 2009.**

## 2008 A&O Subsidies, % of Tot. Prem.

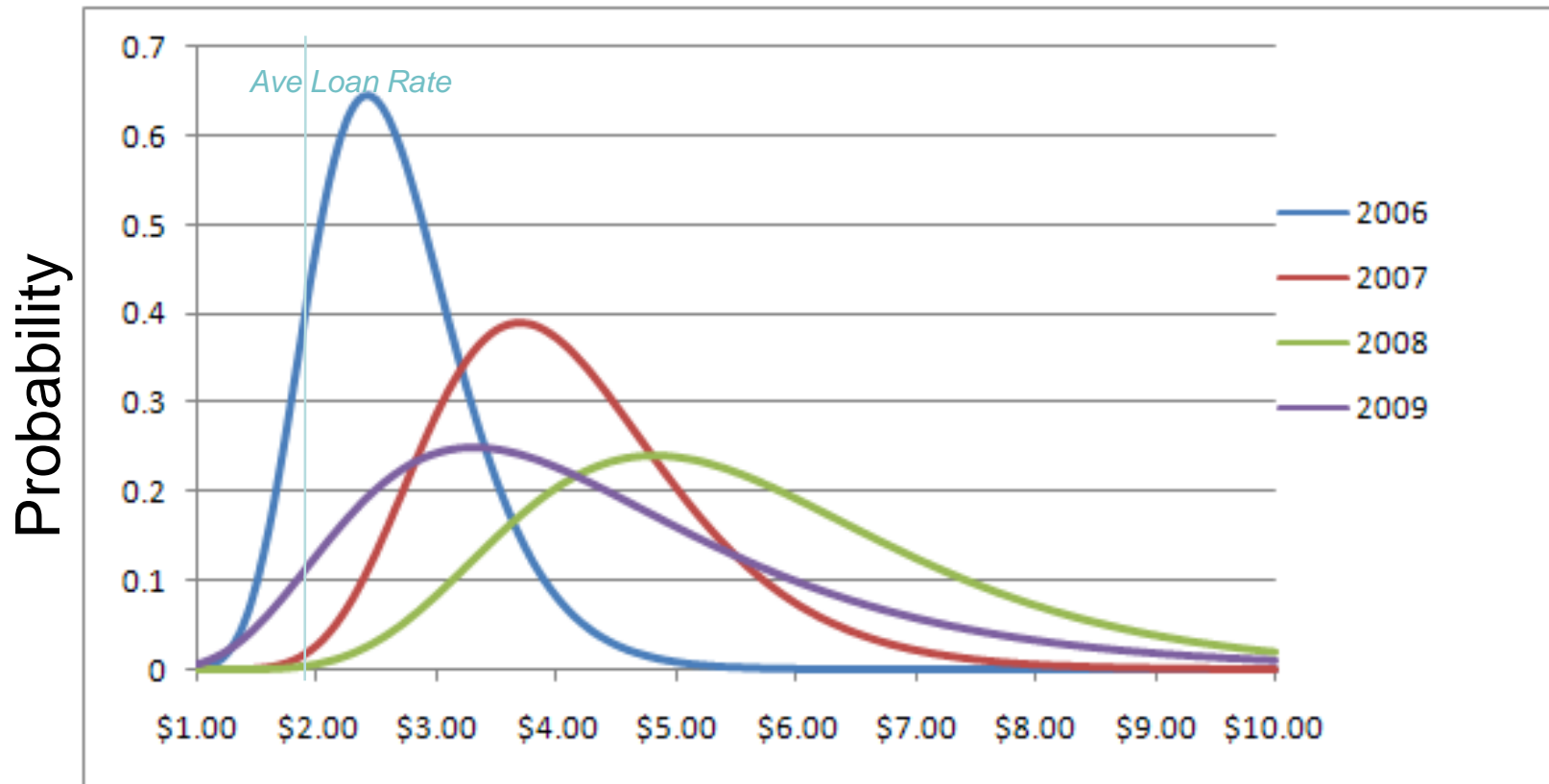
Coverage Level	----- APH	Product Revenue	----- Group
70% or less	24.2%	20.8%	22.4%
80%	21.7	18.7	20.1
85%	21.0	18.1	19.4
90%			19.4

Revenue products include CRC, RA and IP. Group products include GRP and GRIP. Proposed reductions in A&O subsidy of 2-5% go into effect beginning in 2009 unless rescinded. Vary by LR experience. Group likely reduced to **12%** across all.

see: <http://www.rma.usda.gov/pubs/ra/sraarchives/09sraamendment1.pdf> for final proposed rates.



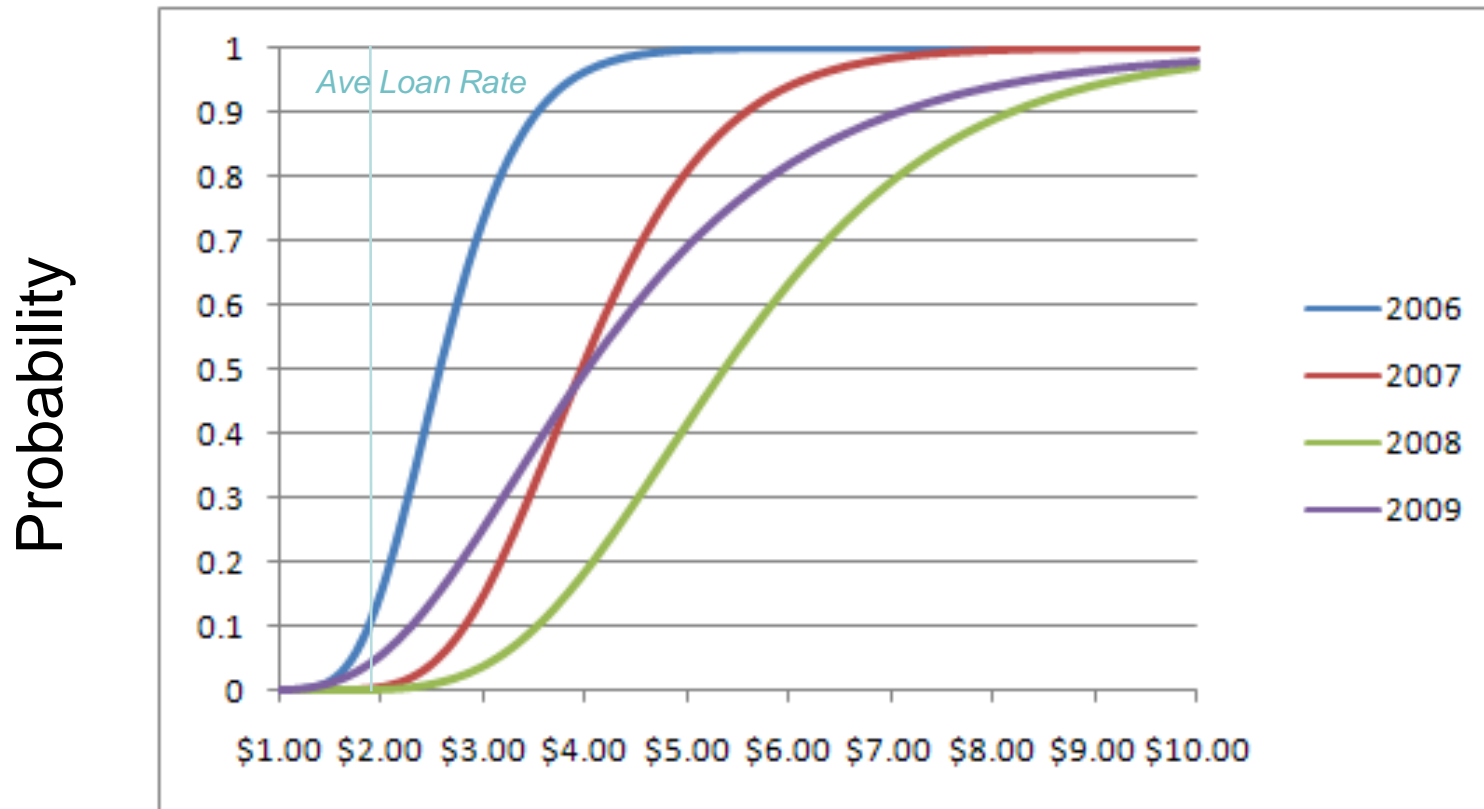
## *Implied by options market data ...*



CBOT Dec Futures, as of March sign-up date, except 2009 which is as of 12/16/08 settlement



## *Implied by options market data ...*



CBOT Dec Futures, as of March sign-up date, except 2009 which is as of 12/16/08 settlement

# Sign-up Date Information:



<i>(corn price information)</i>	2006	2007	2008	2009
APH Indemnity Price	\$2.00	\$3.50	\$4.75	\$4.00
GRP Price	\$2.00	\$2.95	\$3.75	\$4.00
CRC, RA, GRIP Base Price	\$2.59	\$4.06	\$5.40	<i>\$4.42 if today</i>
RA volatility	0.23	0.26	0.30	<i>.43 if today</i>
CRC price factor	0.385	0.651	1.002	<i>over 1 if today</i>
GRIP volatility	0.23	0.25	0.28	<i>.43 if today</i>
Expected Price ( <i>Dec F</i> )	\$2.652	\$4.108	\$5.655	<i>\$4.414</i>
Variance of price	0.443	1.243	3.605	<i>4.128</i>
Standard deviation	0.666	1.115	1.899	<i>2.032</i>
Prob < 1.96 (app. LR)	13.56%	0.41%	0.10%	<i>≈5%</i>
Prob < APH price	15.42%	31.99%	35.55%	<i>≈49%</i>
Prob < GRP price	15.42%	13.37%	13.70%	<i>≈49%</i>
Prob < CRC price	51.09%	53.54%	50.88%	<i>≈59%</i>
Expected less Ave	\$0.06	\$0.05	\$0.26	<i>0 today</i>

- Prices may increase during Feb and result in indemnity price (average) below final price.
  - *Increases value of HR products*
  - *Decreases chance of revenue products paying*
- Prices may decrease during Feb and result in indemnity price (average) above final price.
  - *Increases chance of revenue products paying*
- Average and final prices are the same.
  - *Cubs win World Series.*

# Evaluating Choices:

*DeKalb Co. Illinois Farmer-Paid premiums (2008, basic units, no BYE election)*

Estimated Premiums - \$/Per acre

Coverage Election	APH	RA-BP	RA-HP	CRC	GRP	GRIP	GRIP HR
50%	\$1.28			\$3.10			
55%	\$1.95			\$4.63			
60%	\$2.69			\$6.25			
65%	\$4.05	\$5.85	\$9.31	\$9.38			
70%	\$5.51	\$9.89	\$15.11	\$12.76	\$2.28	\$9.29	\$9.53
75%	\$8.01	\$16.65	\$24.78	\$18.76	\$2.64	\$15.73	\$17.05
80%	\$12.03	\$27.75	\$40.49	\$28.72	\$3.69	\$22.91	\$25.49
85%	\$18.30	\$45.79	\$65.68	\$45.09	\$5.90	\$37.06	\$41.64
90%					\$10.62	\$59.72	\$68.15

*(note: local examples uses in each workshop location)*

# Evaluating Choices:

*DeKalb Illinois*

## Frequency of payment

Coverage Election	APH	RA-BP	RA-HP	CRC	GRP	GRIP	GRIP HR
50%	0.04%			0.02%			
55%	0.12%			0.20%			
60%	0.28%			0.60%			
65%	0.54%	7.70%	9.02%	1.94%			
70%	1.30%	11.80%	13.90%	4.88%	0.46%	9.34%	9.78%
75%	2.68%	17.24%	20.08%	10.90%	1.12%	14.28%	15.34%
80%	5.50%	23.42%	27.86%	20.32%	2.58%	20.38%	22.66%
85%	10.52%	30.34%	37.64%	32.14%	5.56%	26.96%	31.52%
90%					11.30%	34.64%	43.22%

*(note: local examples uses in each workshop location)*



# Evaluating Choices:

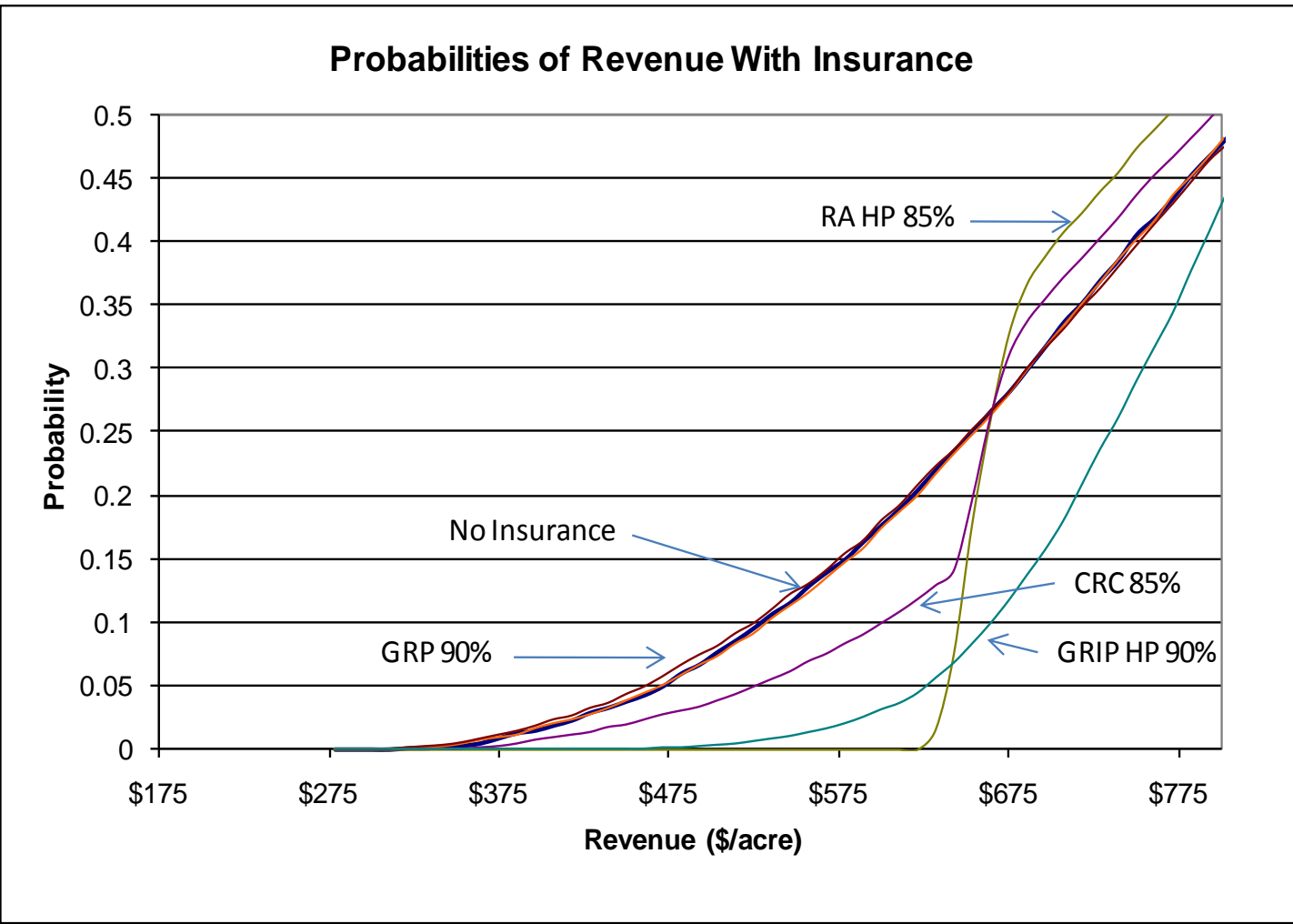
## *DeKalb Illinois*

### Estimated Net Average Cost of Insurance

Coverage Election	APH	RA-BP	RA-HP	CRC	GRP	GRIP	GRIP HR
50%	\$1.27			\$3.09			
55%	\$1.91			\$4.56			
60%	\$2.58			\$6.01			
65%	\$3.77	\$0.42	\$2.50	\$8.55			
70%	\$4.88	\$0.03	\$2.95	\$10.36	\$1.97	-\$5.97	-\$6.40
75%	\$6.59	\$0.22	\$4.53	\$12.79	\$1.89	-\$8.97	-\$9.31
80%	\$9.03	\$2.11	\$8.67	\$15.63	\$1.96	-\$14.63	-\$15.69
85%	\$12.16	\$8.03	\$17.93	\$19.80	\$2.14	-\$16.85	-\$19.65
90%					\$2.87	-\$14.13	-\$19.71

*(note: local examples uses in each workshop location)*

# Risk Reduction Impacts:



## Correlation of crop revenue and insurance payments

Product	Coverage Election								
	50%	55%	60%	65%	70%	75%	80%	85%	90%
APH	-0.19	-0.22	-0.26	-0.30	-0.37	-0.44	-0.49	-0.55	
RA-BP			-0.28	-0.34	-0.40	-0.45	-0.49	-0.54	
RA-HP			-0.31	-0.37	-0.43	-0.49	-0.54	<b>-0.59</b>	
CRC	-0.22	-0.26	-0.31	-0.37	-0.43	-0.49	-0.54	-0.58	
GRP					-0.18	-0.21	-0.25	-0.28	-0.31
GRIP					-0.19	-0.22	-0.25	-0.29	-0.32
GRIP-HR					-0.23	-0.26	-0.30	-0.33	-0.36

*IL Averages based on iFARM simulation models*

- Enterprise unit subsidy adjustment in 2009 – intended to more nearly equalize dollar subsidy to that under basic/optional units.
- Conversion of price limits (CRC, GRIP, RAHP) to 2\*base price and no downside limit. No treatment of ave-Feb vs. end-of-Feb prices....
- Revised A&O, reduced group policy subsidy rates.
- BE and related endorsements simplified/expanded.
- Potential New Products, “Combo” in 2011
- Base and indemnity price convergence – 2011.

# Enterprise Units

Coverage Level	Current Subsidy	RMA Alternative Subsidy New Rates	
		EU	WFU
50	0.67	0.80	N/A
55	0.64	0.80	N/A
60	0.64	0.80	N/A
65	0.59	0.80	0.80
70	0.59	0.80	0.80
75	0.55	0.77	0.80
80	0.48	0.68	0.71
85	0.38	0.53	0.56

Source: RMA

# Example

## CRC Corn, McLean County, Ill, 2008

Acres	300
APH Yield	158
CRC Price	\$5.40
Coverage Level	75%

	Optional Unit	Enterprise Unit	
		Before	After
Liability (per acre)	\$639.90	\$639.90	\$639.90
Premium Rate	7.1%	4.9%	4.9%
Total Premium	\$45.13	\$31.66	\$31.66
Subsidy Rate	55%	55%	77%
<b>Subsidy Amount</b>	<b>\$24.82</b>	<b>\$17.41</b>	<b>\$24.38</b>
Grower Premium	\$20.31	\$14.25	\$7.28

Source: RMA

Coverage Level	50%	55%	60%	65%	70%	75%	80%	85%	Avg.
Discount*	28%	24%	20%	17%	14%	13%	11%	11%	17%

- Simple average discount across all counties in the pilot area.
- The BE discount is applied only to the yield portion of a grower's premium rate.

Source: RMA

## APH Premium for McLean County, IL (Non-Irrigated Corn, 75% Coverage Level)

	W/O BE	W/ BE	Change
Price	\$4.00	\$4.00	0%
Liability	\$474.00	\$474.00	0%
Premium Rate	3.3%	2.5%	-26%
Premium Per Acre	\$15.78	\$11.66	-26%
Subsidy Per Acre	\$8.68	\$6.41	-26%
Grower Premium	\$7.10	\$5.25	-26%



*Thanks!*

***farmdoc* Crop Insurance main page:**

**<http://www.farmdoc.uiuc.edu/cropins/index.asp>**

**email questions or comments:**

***sherrick@illinois.edu***