

# Implications of Extending Crop Insurance to Crops

Bruce A. Babcock  
Center for Agricultural and Rural  
Development  
Iowa State University



# Overview of Talk

- Review of LGM and LRP
- Look at why LGM and LRP sales were suspended
- Presentation of results of financial soundness of the programs
- Recommendations for change
- Look at rationale for underlying rationale for LGM and LRP



# A Note of Financial Disclosure

- Two of my colleagues at Iowa State University and I are partially responsible for the design of LGM and fully responsible for LGM premium rates. Although we receive no direct financial benefits from sales of LGM, we do receive compensation for our time spent maintaining the product.



# What livestock insurance do we have?

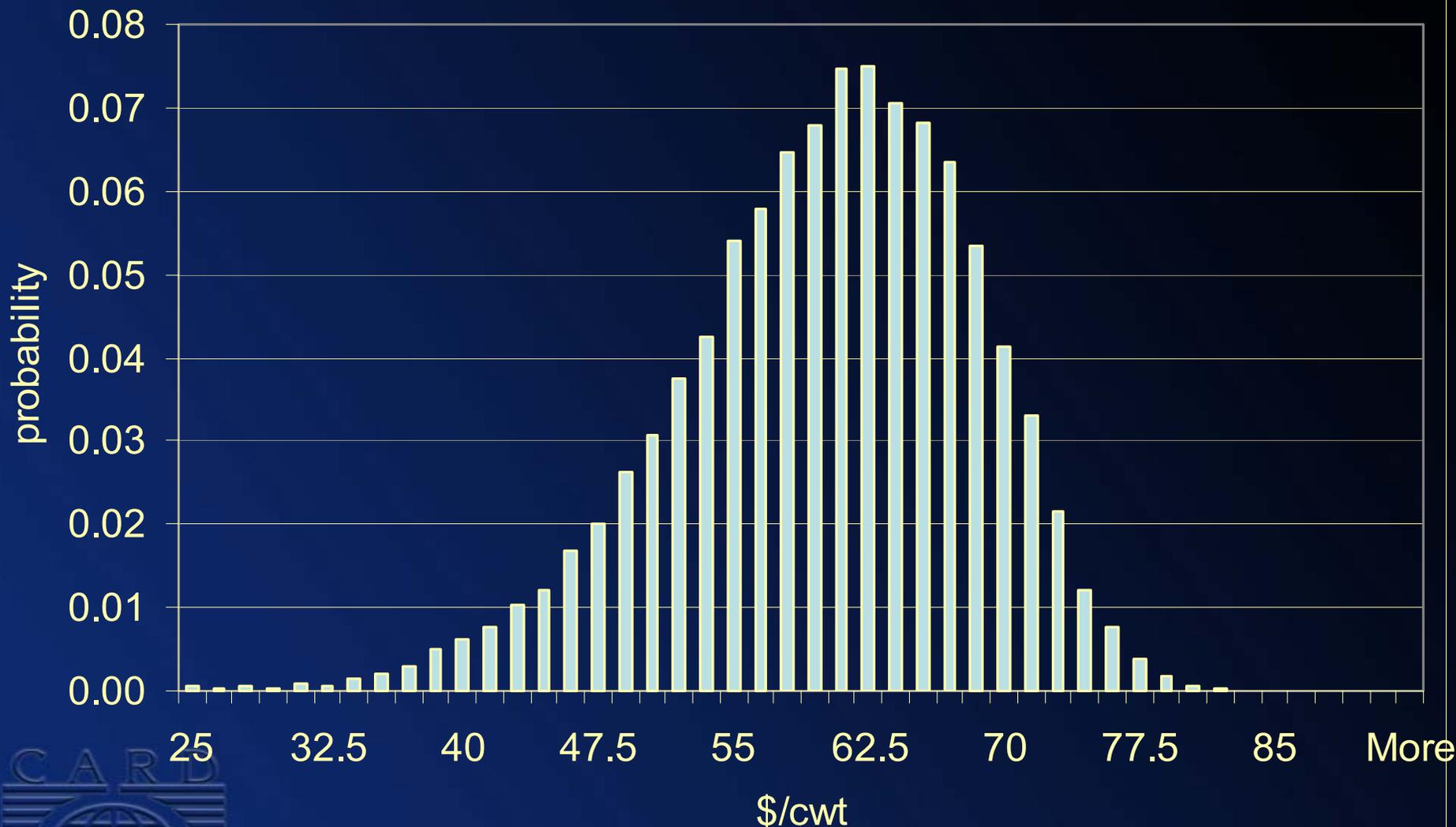
- ARPA extended the crop insurance program to allow livestock insurance
  - LGM and LRP are the two approved livestock programs
  - AGR also can cover livestock
- LGM covers the margin between market value and feed costs of Iowa hogs
- LRP covers market value of hogs and feeder cattle in various states



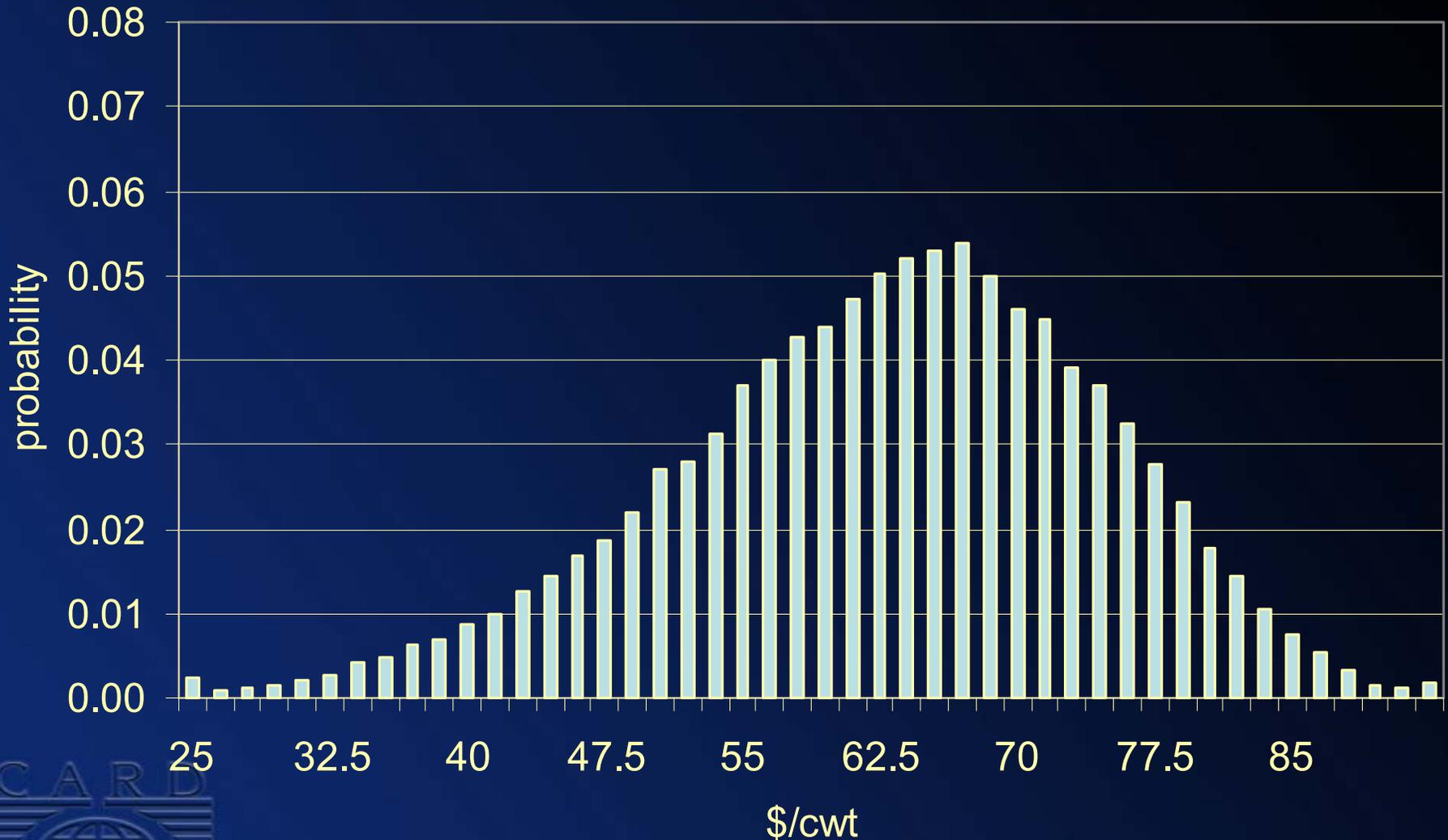
# Why only cover price risk?

- Insurance against catastrophic herd loss already available.
- Management plays a key role in weight gain and disease control.
- Price risk large

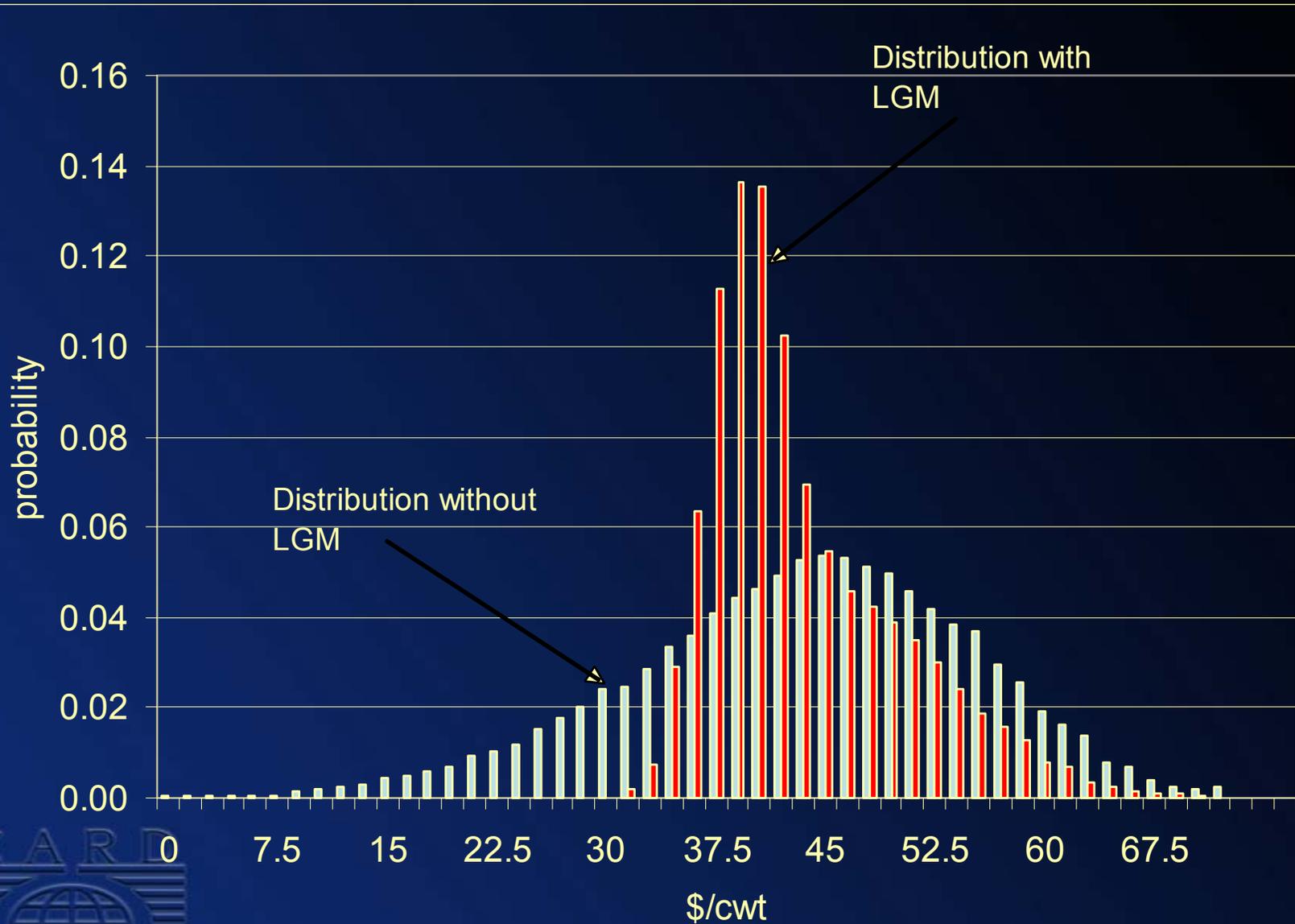
# Distribution of April Hog Prices on January 15, 2003 (Futures price = \$56.90)



# Distribution of July Hog Prices on January 15, 2003 (Futures price = \$63.40)



# Effect of LGM on Price Risk for July Hogs





# Problems with LGM and LRP

- An insurance contract provides a known amount of coverage at a known premium at the time the contract is signed.
- LGM used to set both and then allow the insurance to be sold for two weeks. Sales period will now be two days.
- LRP sets the price and coverage and allows sales for one day.



# The Problem with Waiting: Old LGM

	October	November	December	January
Projected Gross Margin - LGM	75.71	74.35	72.61	74.84
Projected Gross Margin - July 31 Market	63.60	63.91	62.99	66.85
Implied Coverage Level	119%	116%	115%	112%
Ratio of July 31 Value to Charged Premium	2.41	2.11	1.81	1.69
Actual Loss Ratio	1.42	2.48	2.79	2.69*



# The Problem with Waiting: Current LRP

- Suppose cattle futures settled at \$80/cwt on a Wednesday.
  - On Thursday LRP would offer 95% coverage at \$76/cwt at \$3.79/cwt (volatility = 18%)
- Suppose futures settled at \$78 on Thursday. The \$76 coverage is actually 97.4% coverage.
  - When futures is at \$78, a \$76 option has a value of \$4.55.
- Expected loss ratio = 1.20.



# Effect of Speculative Demand on Loss Ratio for LRP

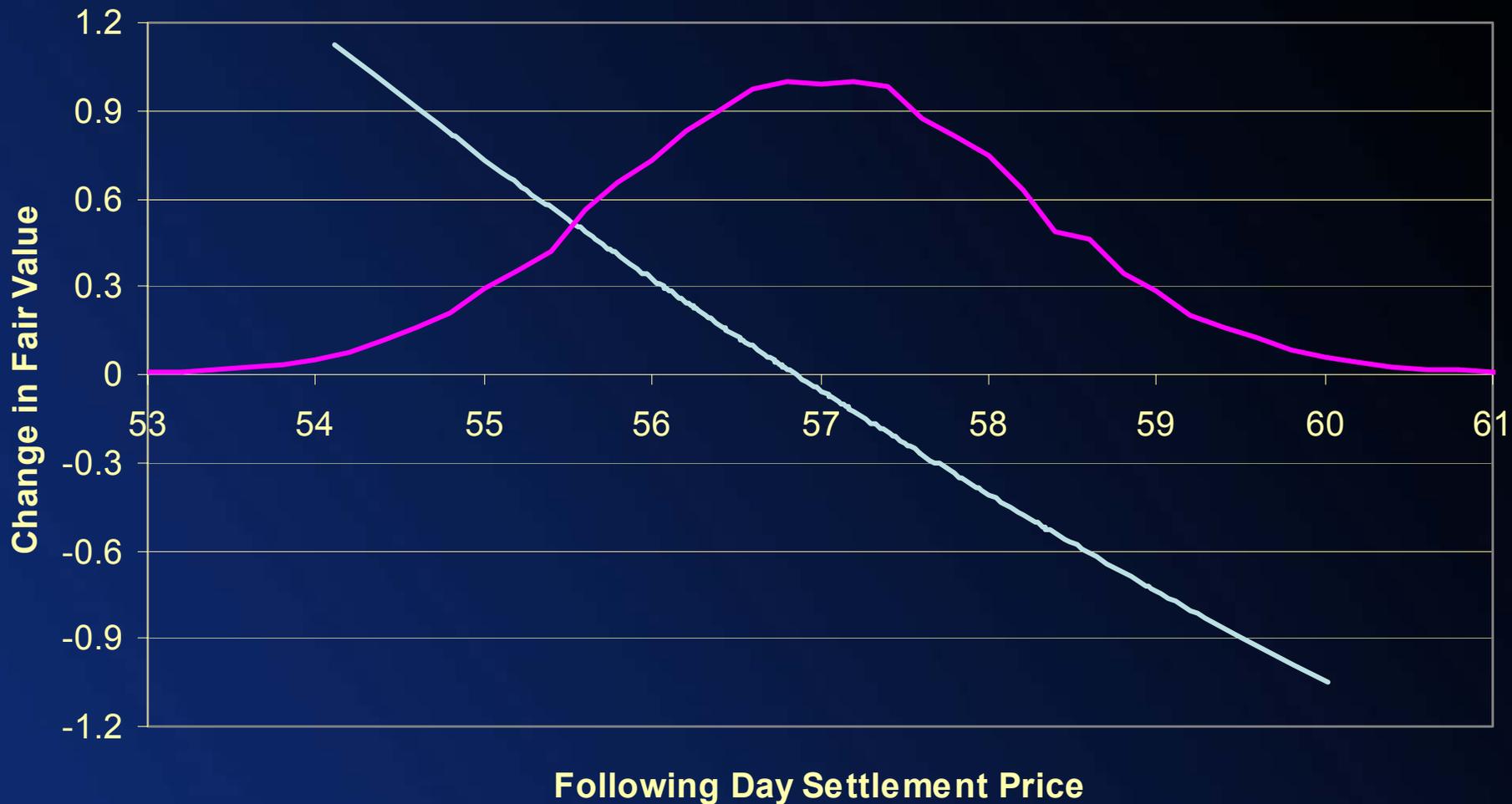
- Suppose nobody bought LRP unless the price dropped.
  - The price drop would increase “real” coverage level
- What is the volatility of a daily price movement? On January 2, 2004, the daily price volatility on April lean hogs was 2.2%.
- Price of LRP = \$2.93.



# How the Following Day's Settlement Price Affects the Fair Value of the Previous Day's LRP Guarantee



# The Change in Fair Value Plus the Probability Distribution of the Change



# Effect of Speculative Demand on Loss Ratio for LRP

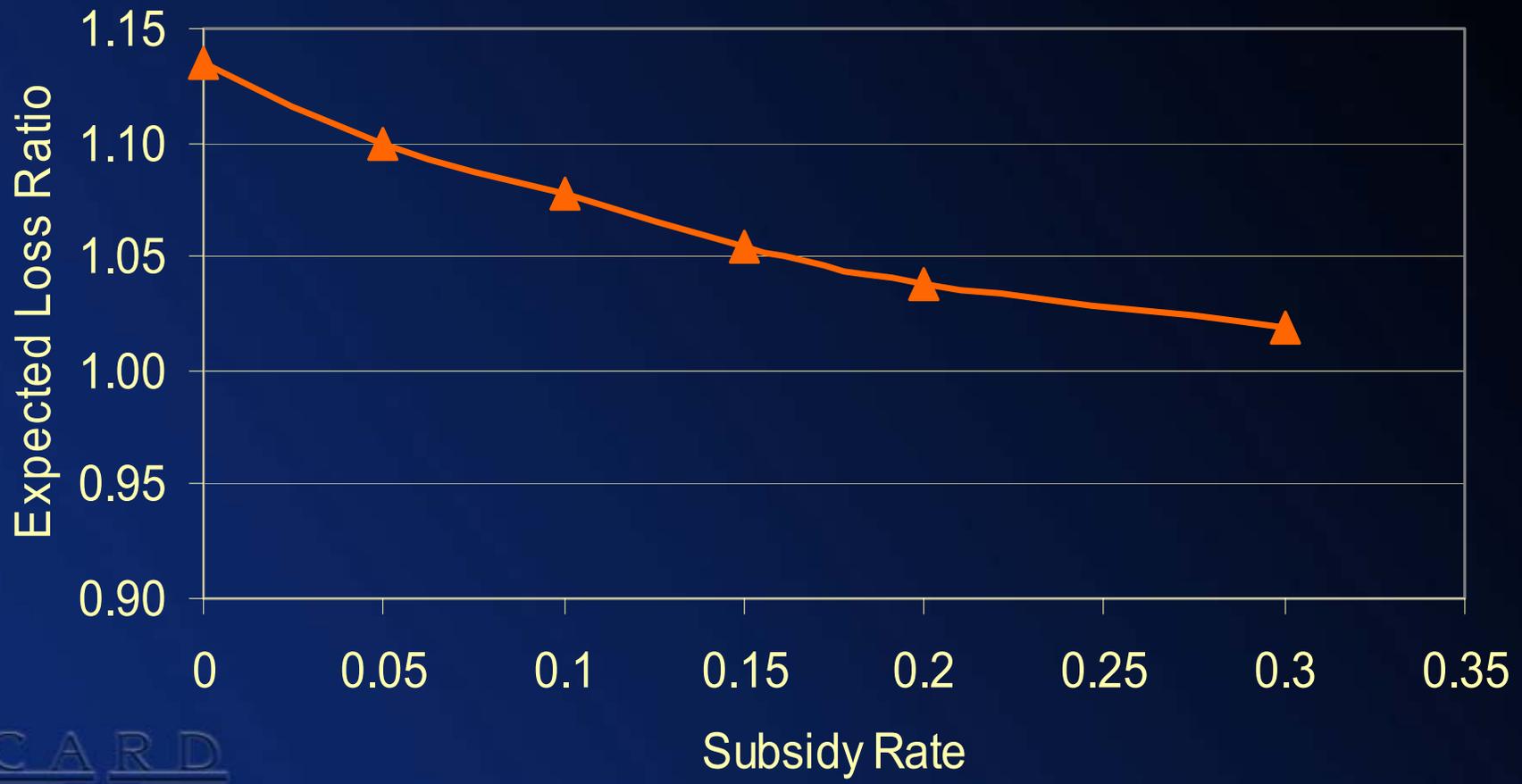
- If LRP is only sold when the market price drops, then the expected loss ratio is 1.12.

# Options for Taking Care of this Problem

1. Charge an option premium of 12.2% as a price of entry into LRP.
2. Load LRP by 12.2%
  - But then price movement would just have to be greater
3. Subsidize the product so that even if price goes down by some amount, LRP it is more than a fair bet.



# Expected Loss Ratio for LRP with 100% Speculative Demand



# LRP Net Subsidy = 4.3%

- Expected loss ratio reduced to 1.10, but 10% load reduces the loss ratio to 1.0
  - Of course, expected indemnities divided by subsidized premium = 1.15.
- But one more problem with LRP



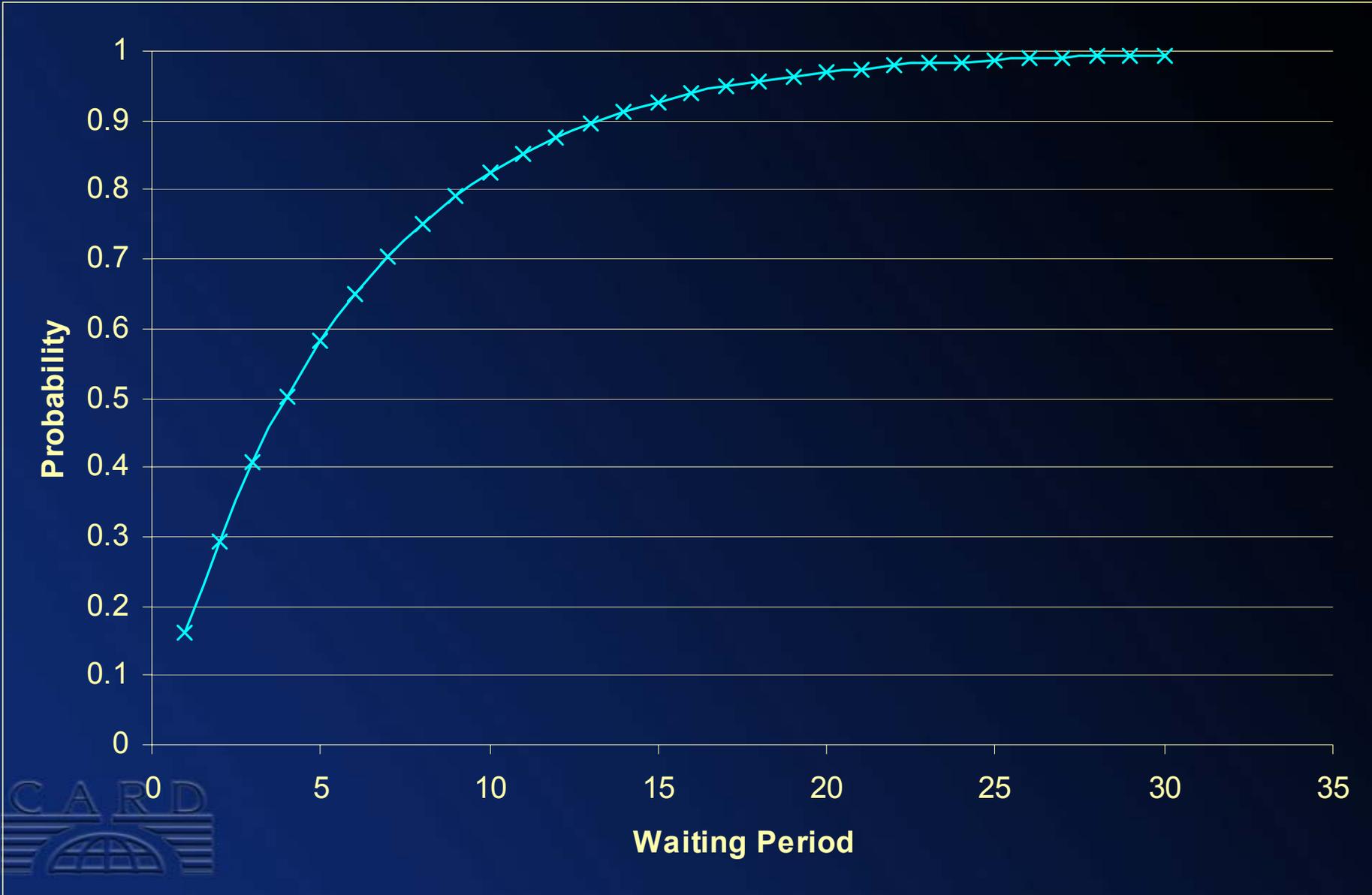
# LRP value can be increased by waiting

- Suppose futures price goes down \$1.00/cwt. Should I buy LRP?
- What are the chances that it goes down by \$2.00 tomorrow? Or on any day in the next 10 days?
- Because LRP is sold each day, buyers who can wait will wait for a sharp enough price drop to make the purchase even more advantageous.

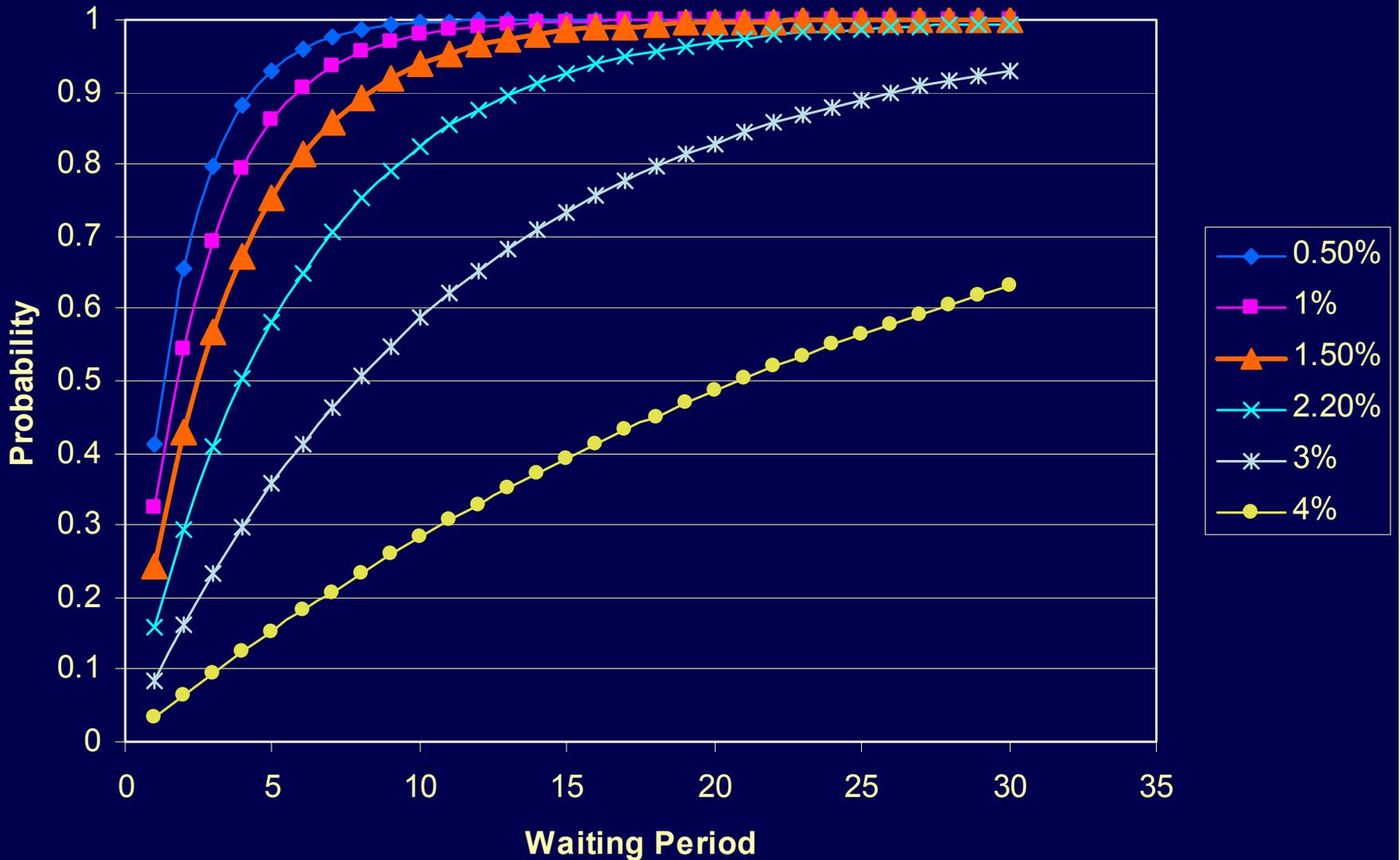
# How likely is it that prices will drop by 2.2%?

- With a daily price volatility of 2.2%, there is a 16% probability that price will drop tomorrow by 2.2%.
- There is a 70.56% chance that price will not drop by 2.2% either today or tomorrow:
  - There is a 29.44% chance that price will drop by at least 2.2% either today or tomorrow.

# How long to wait for a 2.2% price drop?



# How long to wait for different drops?



# Implications of being able to wait

- If demand is sensitive to price drops, then loss ratio will be large.
- If for every producer who buys LRP when price drops by 0.5%, 10 buy it when price drops by 4.0%, then expected loss ratio of LRP = 1.23.

# What about LGM?

- The two-day waiting period should cause loss ratio to be between 1.13 and 1.16.
  - A load offset by a premium subsidy like LRP does now, would drive the loss ratio close to 1.0
- But with LGM being sold only once a month, the value of waiting is much lower. Could be reduced even more if sales were quarterly.

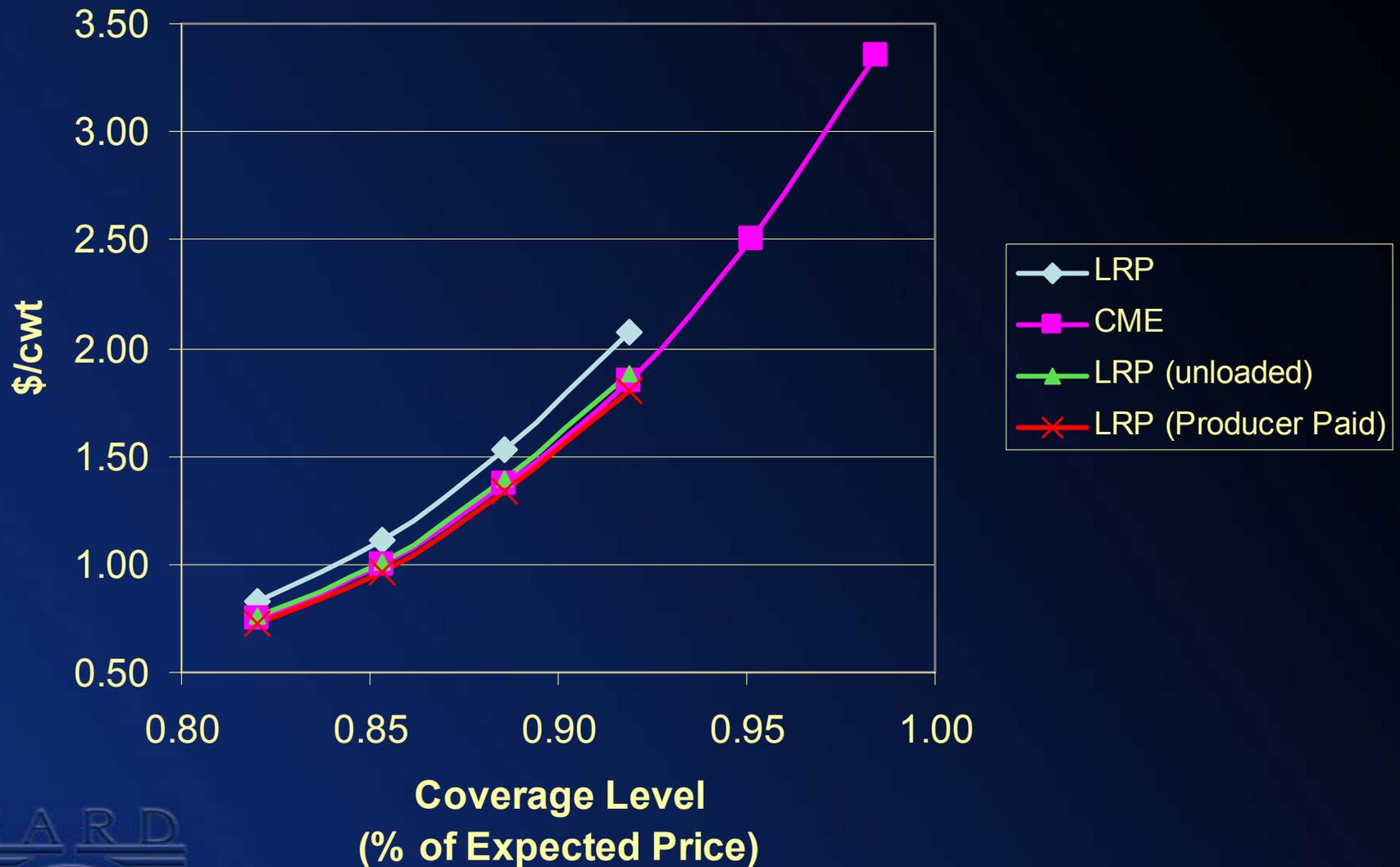


# Why Do We Even Need These Products?

- LRP gives about the same coverage as CME options



# LRP is priced the same as CME put options



# Why Do We Even Need These Products?

- LRP gives about the same coverage as CME put options on lean hog futures
  - But each option covers 210 market hogs
- LGM coverage could be duplicated by buying call options on feed and put options on hogs
  - Corn option covers 480 hogs
  - Soy meal option covers 1,400 hogs



# Why Do We Even Need These Products?

- Out of pocket expenses larger for option strategy than LGM
  - \$9.85 per hog for options vs \$8.88 for LGM for July hogs in January
  - Cost decrease even more if marketing plan contains hogs in multiple months



# Why Do We Even Need These Products?

- Are farmers more willing to use crop insurance agents than commodity brokers?
- Lower transaction costs seems a small benefit for the cost of the programs

# Do the Products Cause Any Harm?

- LRP should replace all producer demand for options on CME.
- LGM would reduce demand by a smaller amount
- Neither LRP nor LGM would increase supply of hogs.

