

# Hedging Kansas Live Cattle: Summary of Outcomes over the Past 10 Years

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KSU RISK AND PROFIT 2020 ONLINE CONFERENCE  
AUGUST 10, 2020



KANSAS STATE UNIVERSITY | Agricultural Economics

## Hedged vs. Unhedged

- Hedging sale of live cattle using futures markets is one option for price risk management
- Hedging gets a lot of attention in academic circles: research, extension, and classrooms
- Use among livestock producers is not as prevalent as academics would expect
- Broad summary of hedging outcomes might be helpful for producers deciding whether or not to hedge



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# Hedged vs. Unhedged

- Hedging: maintaining equal and opposite positions in a physical commodity and a corresponding futures contract for that commodity
- Your investment in the physical commodity will change value in the opposite way your futures investment changes



# Hedging Mechanics

- Live Cattle Hedging:

Cash Market	Futures Market
-buy feeder cattle	- sell" live cattle futures contracts equal to pounds of live cattle you expect to sell
-sell live cattle	- "buy" same number of live cattle futures contracts that you "sold" earlier



# Hedging Mechanics

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Cash Market

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-sell live cattle

Futures Market

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# Hedging Mechanics

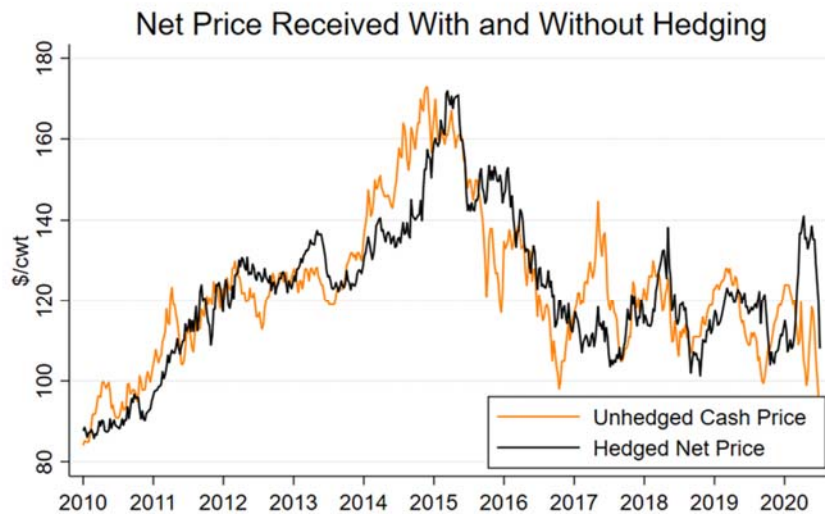
- Live Cattle Hedging
- Maintain equal and opposite positions in cash and futures
- Futures transactions offset each other and you are left with no futures position
- There are many strategies that adjust this approach but hedging to manage risk is always consistent and disciplined



## Definitions for this Study

- Unhedged Price
  - USDA AMS reported negotiated cash prices for Kansas
  - Weighted average of the steer and heifer prices
- Hedged Price
  - Sell futures, hold for 23 weeks then buy
  - Unhedged Price + gain/loss from futures
  - $\text{Gain/Loss From Futures} = \text{Futures Price 23 weeks before sale of live cattle} - \text{Futures Price the week of the sale of live cattle}$
- Gives a weekly hedged price series that would result from a uniform hedging strategy





Cash price is weighted average five-area negotiated live steers and heifers  
 Futures price is weekly average of the relevant CME Live Cattle contract  
 Hedges are 23 weeks with no selective criteria  
 Data Sources: USDA AMS and CMEGroup data compiled by LMIC

- Trends are basically the same
- Sometimes Unhedged prices are higher and sometimes lower
- At times hedging misses extreme losses and, at times, it misses extreme gains



## Hedging Outcomes

Price Series	Average	St. Dev.	Minimum	Maximum
Unhedged Cash Price	122.96	17.99	84.02	172.83
Hedged Net Price	122.48	17.87	85.79	171.86
Nearby Futures	121.45	17.80	84.63	170.76



# Does hedging work?

- Comparing net price received is a measure for determining how well hedging works
- Hedging cannot influence changes in price level over time
- Hedging cannot influence variability of net price level over time
- Benefits of hedging
  - Give hedger greater ability to predict net price and plan ahead for profit/loss
  - Avoid catastrophic losses



# Comparing Actual vs. Predicted Prices

- When placing feeder cattle, a feeder likely has some prediction of the eventual selling price of the finished cattle
- There are many ways to arrive at a prediction of price:
  - Public sources like university extension services
  - Private sources like marketing services
  - The current cash price
  - The current price of the futures contract closest to the month in which the cattle will be sold
- For the hedger, expected price will be **current price of the futures contract closest to the month in which the cattle will be sold plus expected basis for that time**



# Basis

- For the hedger, expected price will be **current price of the futures contract closest to the month in which the cattle will be sold plus expected basis for that time**
- A hedger must predict basis to arrive at an expected price
- $\text{Basis} = \text{Cash} - \text{Futures}$
- The effectiveness of a hedge relies on ability to predict basis
- Though not easy to predict, basis is much more predictable than price
- In this study, I use a three-year average of basis in a given calendar week
- There are other ways to arrive at a basis prediction



# Basis

- A hedger has exchanged flat price risk for basis risk
- This is the fundamental reason hedging decreases the risk around expected price
- Basis is less volatile (easier to predict) than price

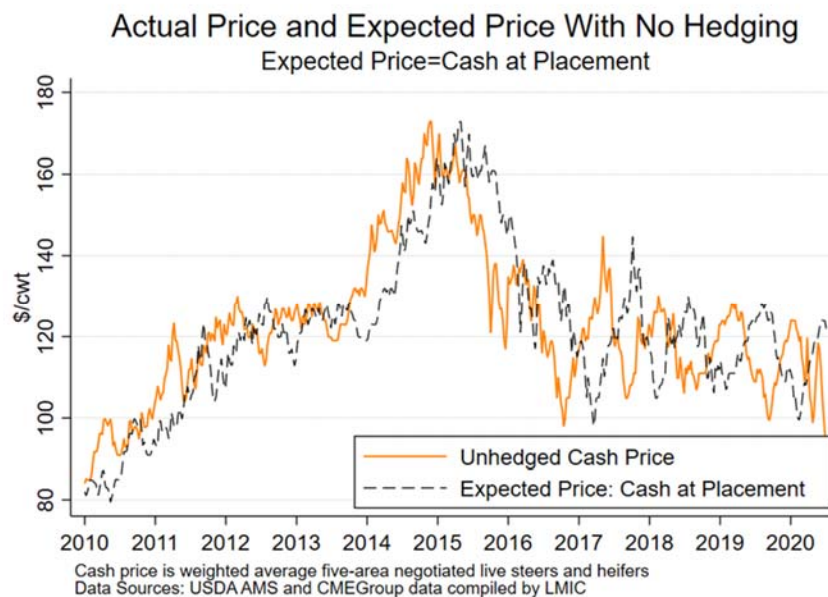


# Comparing Actual vs. Predicted Prices

Three methods of prediction:

- 1) Cash Price at the time of feeder cattle placement
- 2) Relevant Futures Price at the time of feeder cattle placement
- 3) Futures Price at the time of feeder cattle placement +  
Expected Basis

*1 and 2 are unhedged methods and 3 is with hedging*



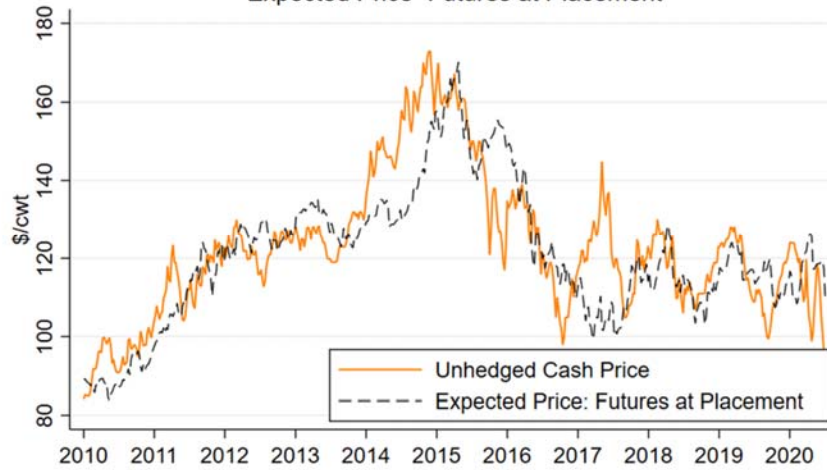
- Orange line is cash price at the time of sale
- Black line is the predicted or expected price
- In this case, the prediction was live cattle cash price at placement





## Actual Price and Expected Price With No Hedging

Expected Price=Futures at Placement



Cash price is weighted average five-area negotiated live steers and heifers  
Futures price is weekly average of the relevant CME Live Cattle contract  
Data Sources: USDA AMS and CMEGroup data compiled by LMIC

- Orange line is cash price at the time of sale
- Black line is the predicted or expected price
- In this case, the prediction was relevant live cattle futures price at placement



## Actual Price and Expected Price Hedging

Expected Price=Futures at Placement + Expected Basis



Cash price is weighted average five-area negotiated live steers and heifers  
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Hedges are 23 weeks with no selective criteria  
Data Sources: USDA AMS and CMEGroup data compiled by LMIC

- Orange line is net price received by a hedger at the time of sale. This is the cash price plus gains/losses from the futures position
- Black line is the predicted or expected price
- In this case, the prediction was relevant live cattle futures price at placement plus expected basis

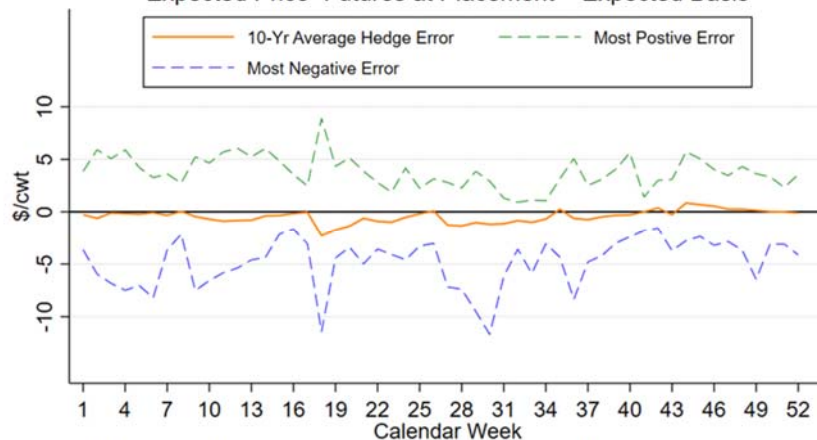


# Hedging Outcomes

Prediction Method	Average	St. Dev.	Minimum (good surprise)	Maximum (bad surprise)
Cash at Placement	-1.03	13.39	-29.95	38.61
Relevant Futures at Placement	-2.03	10.94	-42.77	34.73
Futures + Expected Basis (Hedged)	-0.61	3.11	-14.47	8.90



Difference Between Expected and Actual Prices  
 Expected Price = Futures at Placement + Expected Basis



- Orange line is the average prediction error in a calendar week from 2010 to June 2020
- Green and Blue lines are max and min errors for a week, respectively
- Negative Error = Hedger guessed low on expected price (good surprise)
- Positive Error = Hedger guessed high on expected price (bad surprise)

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## Positive Prediction Errors over 10 Years

Prediction Method	0-10	10-20	20-30	> 30
	\$/cwt	\$/cwt	\$/cwt	\$/cwt
Cash at Placement	113	70	44	7
Relevant Futures at Placement	169	43	13	2
Futures + Expected Basis (Hedged)	234	0	0	0

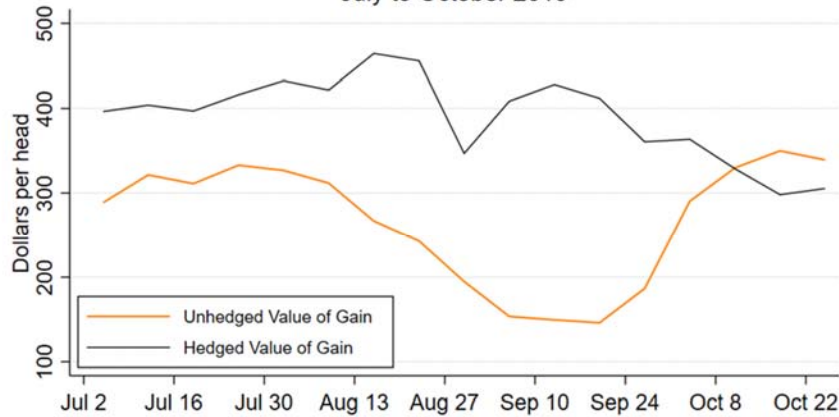


## Two Case Studies

- August 2019 fire at the Tyson plant near Holcomb, KS
- Spring 2020 COVID-19 disruptions



### Hedged and Unhedged Value of Gain July to October 2019



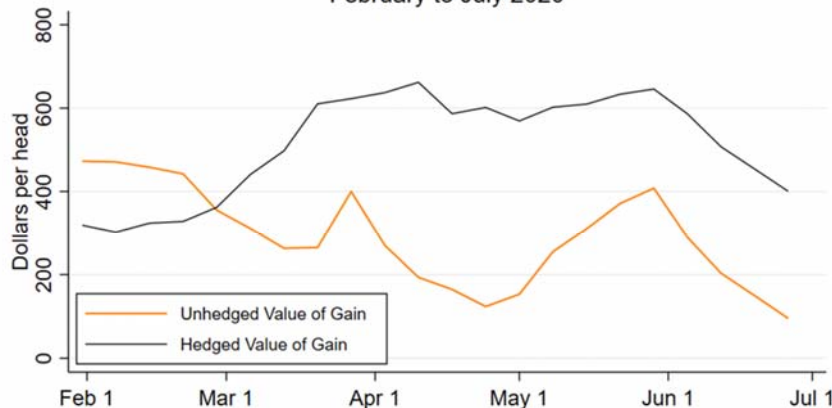
Cash price of live cattle is weighted average five-area negotiated live steers and heifers  
 Feeder calf price is the Friday value of CME Feeder Cattle Index  
 Futures price is weekly average of the relevant CME Live Cattle contract  
 Hedges are 23 weeks with no selective criteria  
 Assuming 800 lbs at placement and 3.25 lbs per day gain over 161 days  
 Data Sources: USDA AMS and CMEGroup data compiled by LMIC

### Weeks surrounding the fire at the Tyson Plant near Holcomb, KS

- Hedged VOG based on:  
 Feeder Cattle Price = CME Feeder Index value at placement  
 23-week feeding period with 3.25 pounds ADG  
 23-week hedge using live cattle futures
- VOG is not profit
- Average VOG from July to October 2019  
 Unhedged: \$267/head  
 Hedged: \$390/head
- A few weeks unhedged VOG was well below \$200/head
- Assumes a feeder could sell cattle



### Hedged and Unhedged Value of Gain February to July 2020



Cash price of live cattle is weighted average five-area negotiated live steers and heifers  
 Feeder calf price is the Friday value of CME Feeder Cattle Index  
 Futures price is weekly average of the relevant CME Live Cattle contract  
 Hedges are 23 weeks with no selective criteria  
 Assuming 800 lbs at placement and 3.25 lbs per day gain over 161 days  
 Data Sources: USDA AMS and CMEGroup data compiled by LMIC

### Spring 2020: COVID-19 Disruptions

- Hedged VOG based on:  
 Feeder Cattle Price = CME Feeder Index value at placement  
 23-week feeding period with 3.25 pounds ADG  
 23-week hedge using live cattle futures
- VOG is not profit
- Hedged VOG was, on average, \$221/head higher than unhedged for this period
- A few weeks hedged VOG was well below \$400/head higher than unhedged
- Assumes a feeder could sell cattle



# Limitations and Concerns

- Understanding your local basis is key to hedging
- Hedging involves broker fees, so consider carefully the fees what you get in return
- Capital requirements for a margin account are substantial
  - \$2,500 per contract
  - 1 live cattle contract =40,000 lbs live weight which covers ~30 head (1333 lbs average)
  - To hedge 100 head \$7,500 is needed initially and more if the market rallies
  - The margin is not gone but tied up for the duration of the hedge



# Limitations and Concerns

- This study (and many others) demonstrates that live cattle futures prices are related to cash prices in a predictable way *at the regional level, over time*
- A single hedge should never be used to evaluate a risk management strategy
- This study is meant to show the trade-offs of hedging
- Benefits of hedging
  - Give hedger greater ability to predict net price and plan ahead for profit/loss
  - Avoid catastrophic losses
- Hedging is a risk management tool that requires a consistent disciplined strategy



# Hedging Kansas Live Cattle: Summary of Outcomes over the Past 10 Years

Full paper on AgManager:

<https://agmanager.info/livestock-meat/marketing-extension-bulletins/marketing-strategies-and-livestock-pricing/hedging>

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