



A Guide to Better Basis Forecasts

Kevin Dhuyvetter
Extension Agricultural Economist
K-State Research and Extension

Presented at K-State Risk Management Workshops
Winter 2005

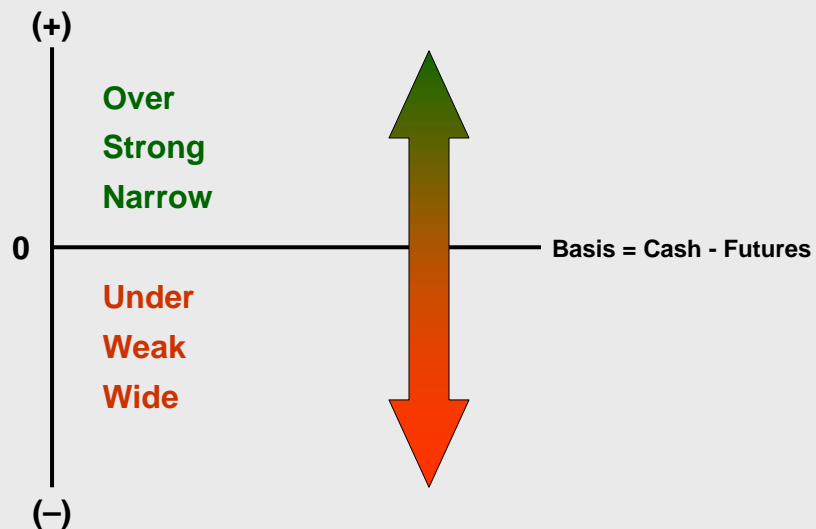


What is Basis?

- Basis is the difference between two prices.
- In commodity marketing, basis is generally referred to the difference between a specific cash price and a specific futures price.
- Mathematically: $\text{Basis} = \text{Cash} - \text{Futures}$
- Nearby and Deferred



Basis terminology



Basis

- Generally, basis is more predictable than cash or futures prices due to:
 - Convergence
 - Futures and cash prices move together (same fundamental conditions generally affect both markets)
 - Year-to-year stability



How should basis be calculated?

- Determine:
 - Location, date, quality, futures contract
- Daily vs. weekly (grain vs. livestock)



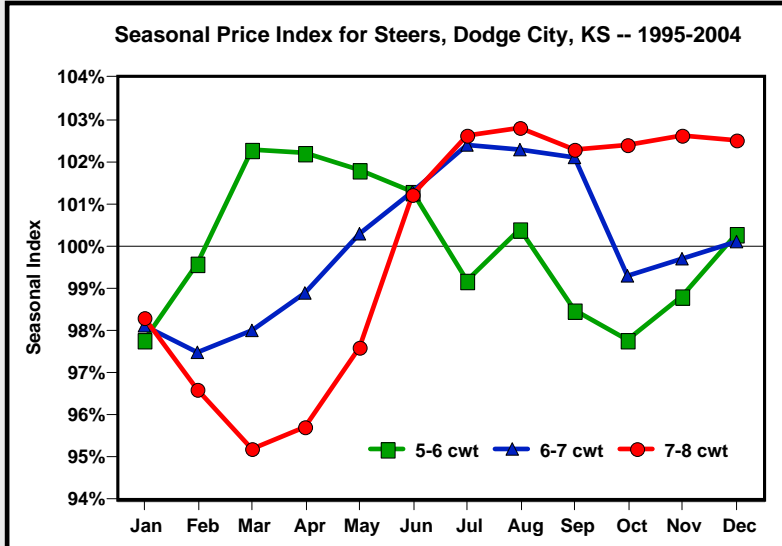
How should basis be calculated?

- Mathematically: $\text{Basis} = \text{Cash} - \text{Futures}$
- It is “easy” to calculate basis ...

... but it is important to use the “right” price if we want the information to be useful.



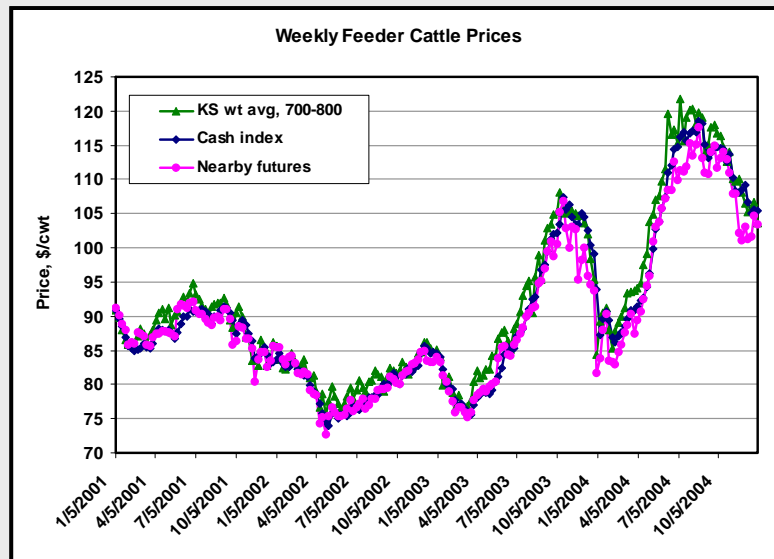
Feeder cattle price indices



Basis patterns will vary by calf weight



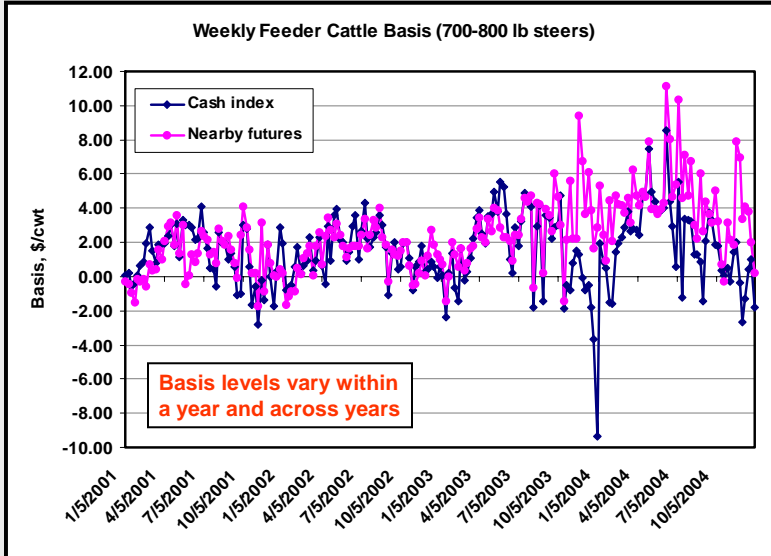
Weekly average feeder cattle prices



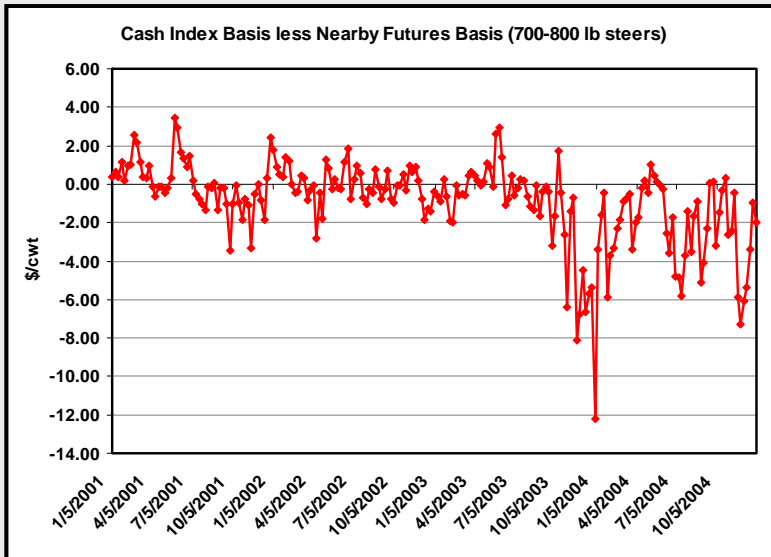
Prices appear to move together quite well



LRP versus hedging basis

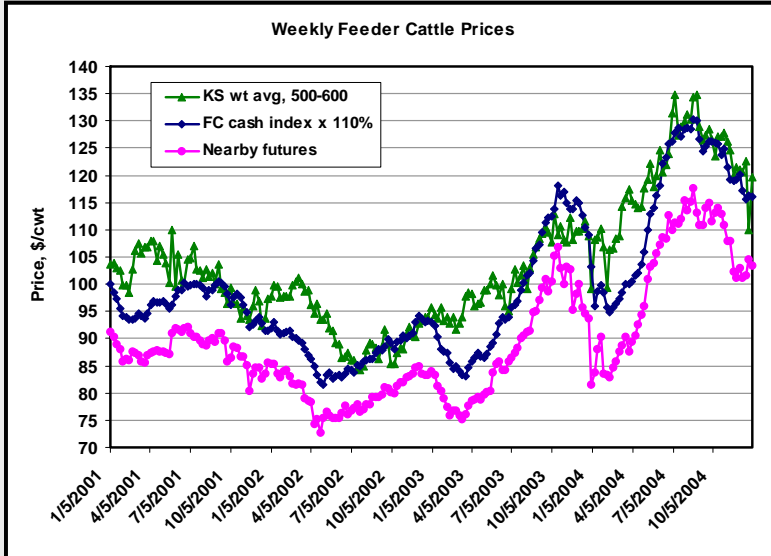


LRP versus hedging basis

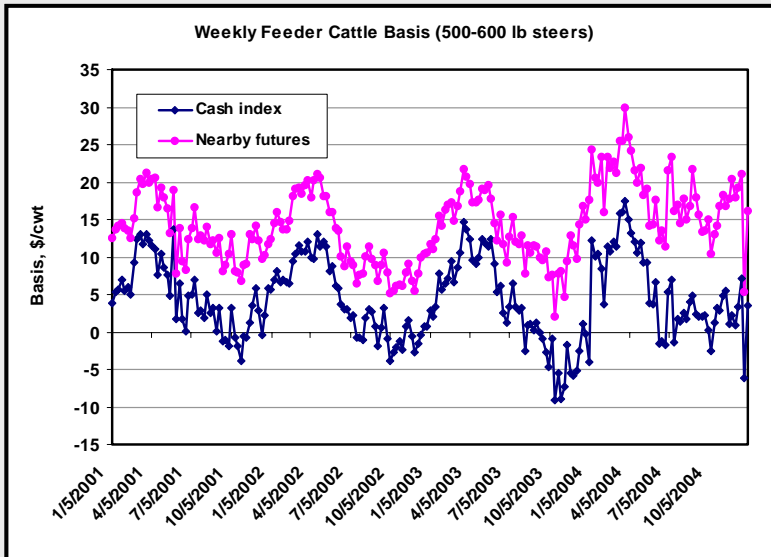




LRP versus hedging basis



LRP versus hedging basis





Uses of basis information

- Judge cash/contract bids
- Storage decisions
- Lifting hedges
- Projecting cash prices
- Picking marketing strategies



Futures prices are price expectations

$$\begin{array}{r} \text{Futures price} \\ + \text{expected basis} \\ \hline \text{Expected cash price}^* \end{array}$$

* Simple and reasonably accurate procedure for formulating cash price forecast.

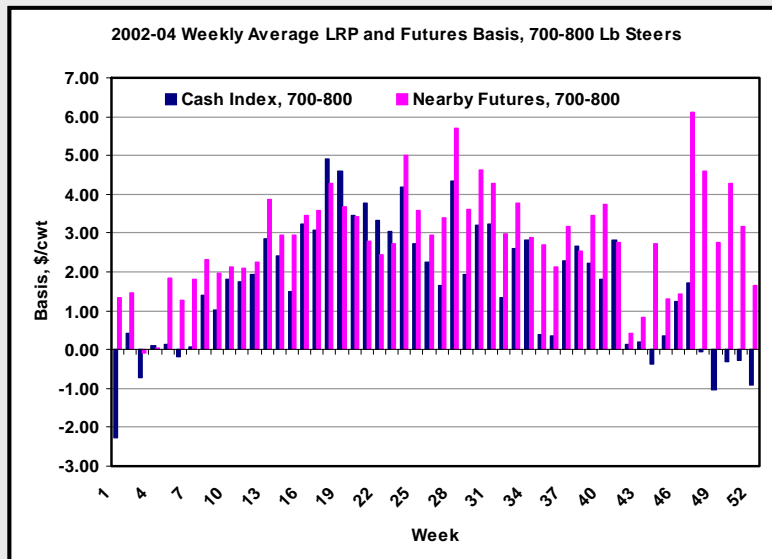


Forecasting basis

- Where does “expected” basis come from?
- Basis forecast = f (historical basis)
- Research has generally shown there is little benefit to complex fundamental models compared to historical averages.
- “Optimal” historical averages
 - ➔ Livestock, 3-yr or 4-yr average

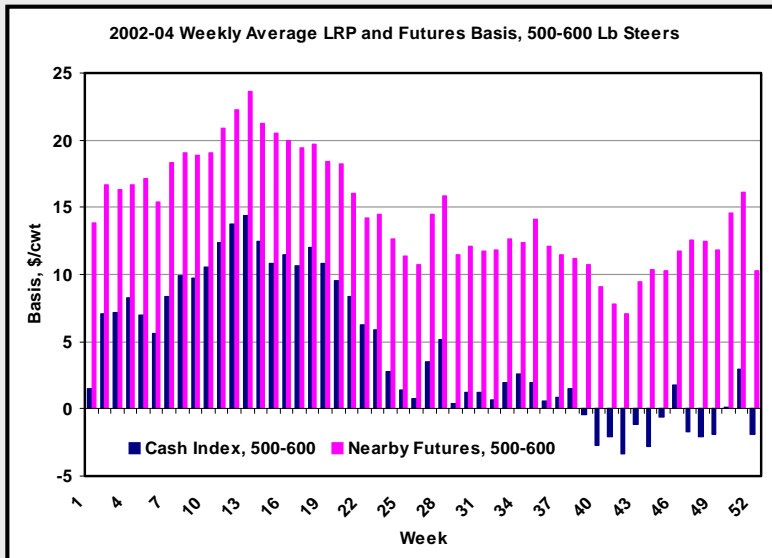


LRP versus hedging basis...





LRP versus hedging basis...



Basis as it relates to put options

Put option strike	\$96.00
+ Expected basis	3.50
- Premium	2.13
<hr/>	
= Expected minimum selling price	\$97.37

Based on May FC futures of \$98.02 on 2/11/05 and expected selling date of mid May



Basis as it relates to LRP

LRP coverage level	\$92.29
+ Expected basis	4.00
- Premium	1.21
<hr/>	
= Expected minimum selling price	\$95.08

Based on LRP quotes on 2/11/05 and ending date of 5/13/05
(expected ending value = \$98.31, 13 week endorsement)



How should basis be calculated?

- Average over several years (years may vary depending on commodity)
 - ➔ Average = expected value
- Measure variability (risk)
 - ➔ Historical range (highs and lows), standard deviation
 - ➔ Variability measure indication of risk

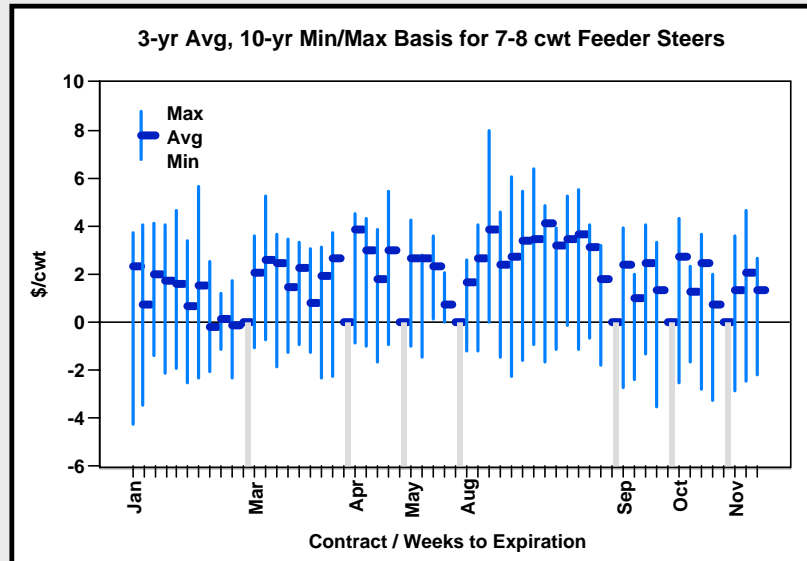


How do we deal with missing data?

Weekly Dodge City Steer Prices								
1995-2004								
Purecount			522		382	406	442	488
Count			522		522	522	522	522
Average			79.70		96.40	88.70	82.51	79.86
Min			50.8		52.57	50.12	51.08	49.89
Max			118.37		150	132.08	122.75	121.75
Date (Wed)	Year	Week	Futures	Contract	4-5 cwt	5-6 cwt	6-7 cwt	7-8 cwt
09/01/2004	2004	35	110.15	Sep	144.77	132.08	114.85	113.17
09/08/2004	2004	36	110.85	Sep	132.00	120.50	115.12	114.77
09/15/2004	2004	37	113.97	Sep	137.96	123.89	n/a	113.71
09/22/2004	2004	38	114.70	Sep	136.00	132.00	118.53	117.27
09/29/2004	2004	39	114.80	Sep	n/a	n/a	n/a	n/a
10/06/2004	2004	40	113.10	Oct	128.64	n/a	119.46	117.42
10/13/2004	2004	41	114.10	Oct	142.69	127.14	115.72	114.52
10/20/2004	2004	42	112.25	Oct	n/a	124.99	110.89	115.88
10/27/2004	2004	43	114.07	Oct	137.03	122.82	113.26	114.46
11/03/2004	2004	44	107.92	Nov	134.75	119.14	109.48	111.50
11/10/2004	2004	45	108.20	Nov	136.16	118.48	112.83	109.51
11/17/2004	2004	46	108.37	Nov	133.50	115.56	107.71	110.29
11/24/2004	2004	47	102.27	Jan	n/a	n/a	n/a	n/a
12/01/2004	2004	48	103.27	Jan	n/a	115.25	110.00	n/a
12/08/2004	2004	49	102.42	Jan	n/a	121.10	n/a	106.42
12/15/2004	2004	50	102.07	Jan	129.00	116.67	108.36	105.13
12/22/2004	2004	51	104.72	Jan	n/a	n/a	108.32	107.00
12/29/2004	2004	52	103.05	Jan	n/a	n/a	n/a	n/a



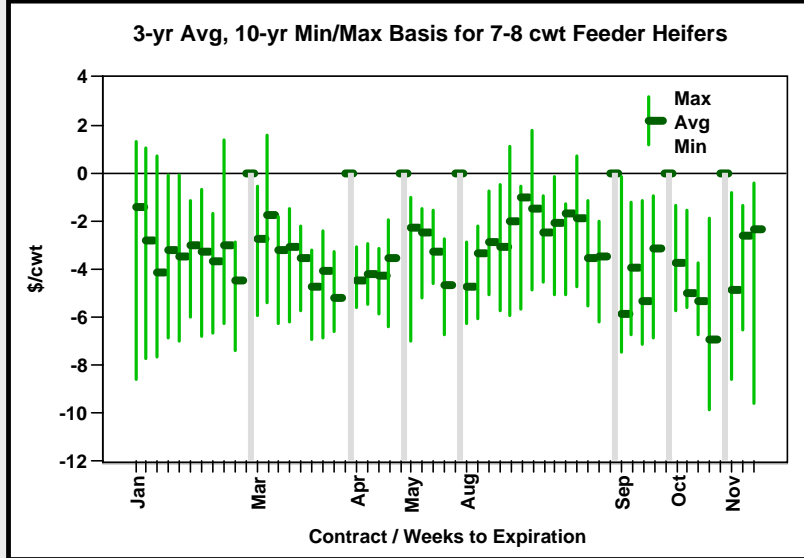
Dodge City 7-8 cwt feeder steer basis



1995-2004



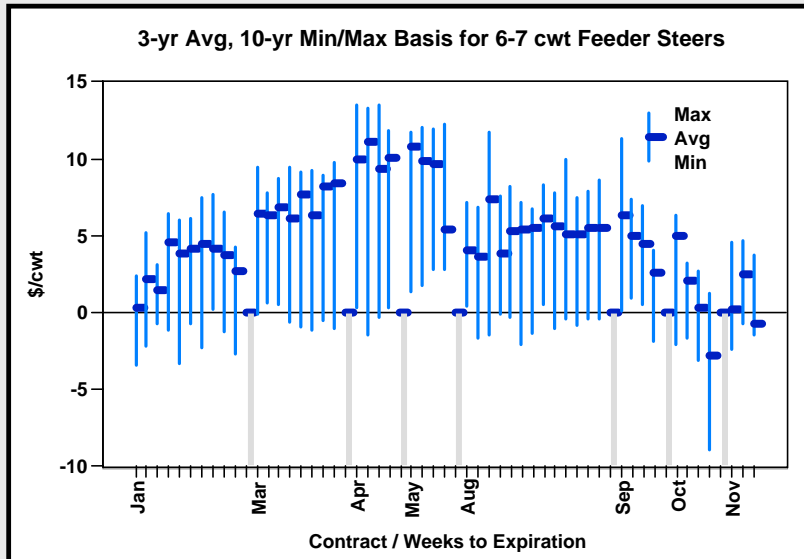
Dodge City 7-8 cwt feeder heifer basis



1995-2004



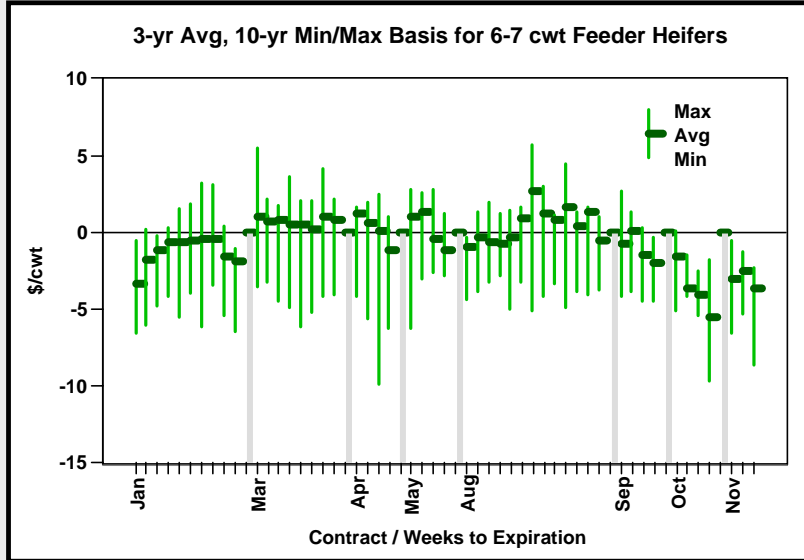
Dodge City 6-7 cwt feeder steer basis



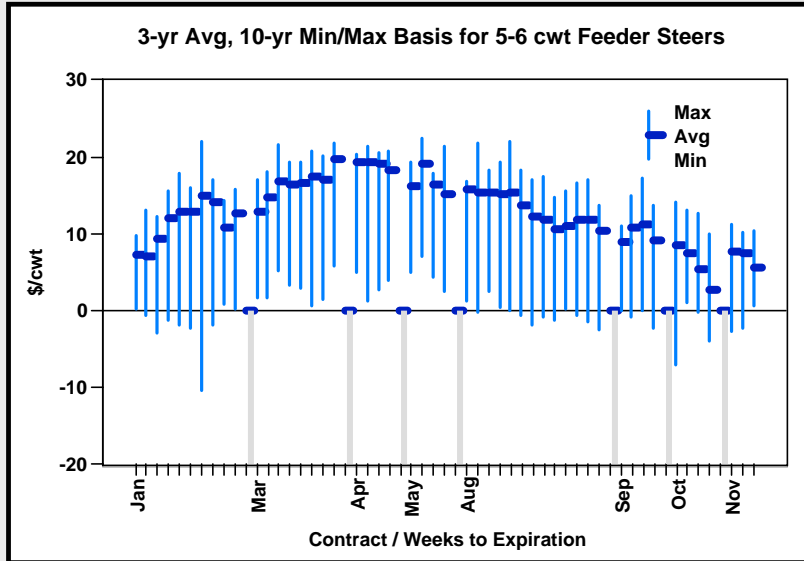
1995-2004



Dodge City 6-7 cwt feeder heifer basis

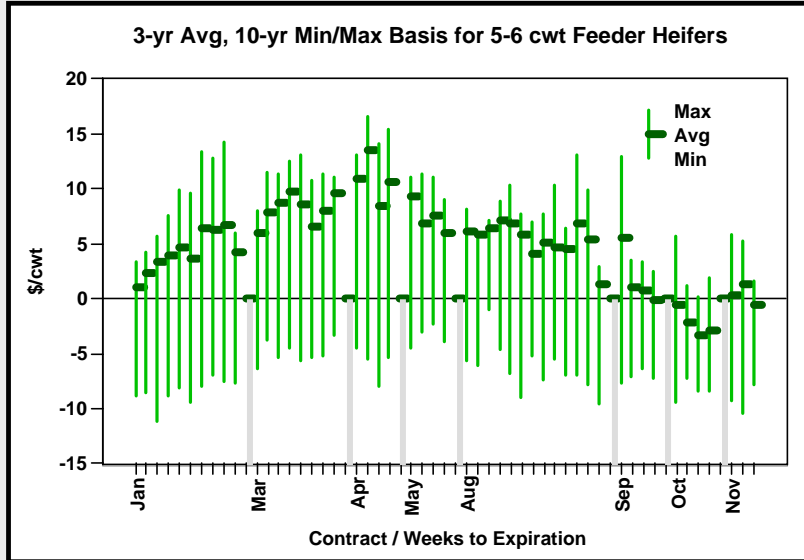


Dodge City 5-6 cwt feeder steer basis





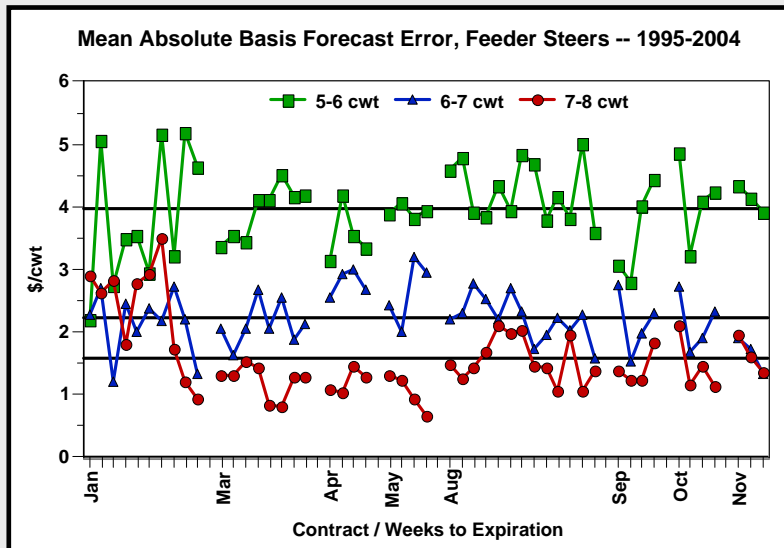
Dodge City 5-6 cwt feeder steer basis



1995-2004



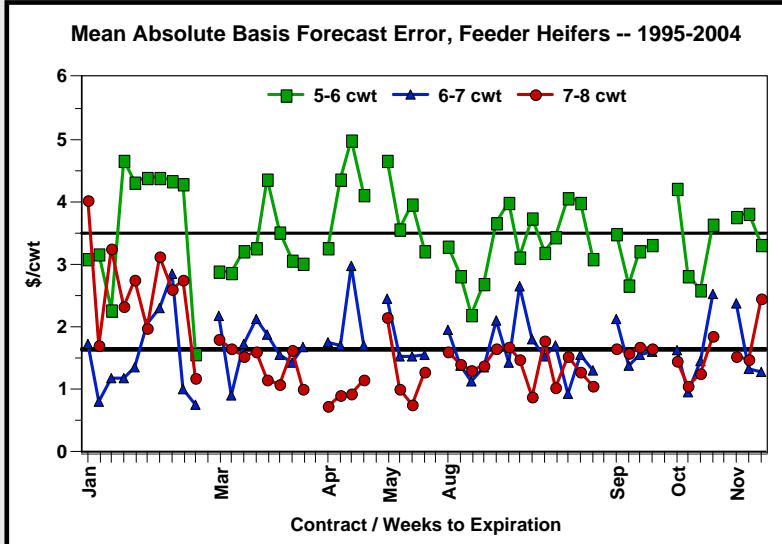
Absolute forecast error = 3-yr average - actual



Easier to predict heavier weight steers



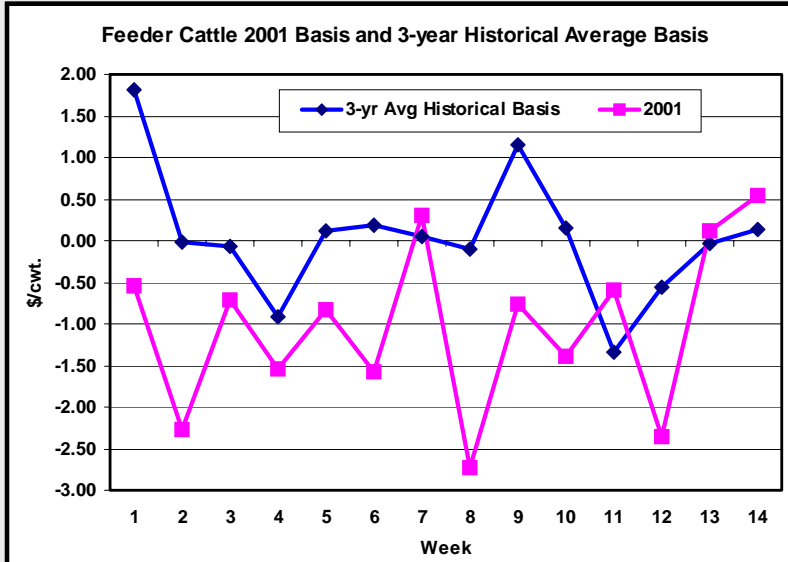
Absolute forecast error = 3-yr average - actual



Easier to predict heavier weight heifers (easier to predict heifers than steers)

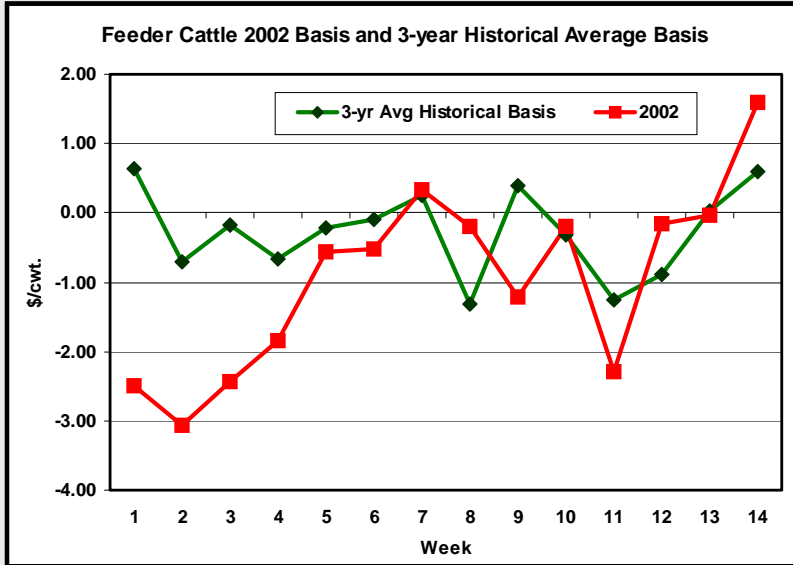


Should forecast consider current basis?





Should forecast consider current basis?



Livestock Basis Forecasts: How Beneficial Is Current Information?

Glynn T. Tonsor
Kevin C. Dhuyvetter
James R. Mintert



Objectives

- Compare livestock basis forecasting accuracy using forecasts:
 - from “simple” historical averages
 - incorporating current basis deviation from historical averages
- Evaluate optimal amount of current information to include
 - Over several time horizons (1993-2002 and 1998-2002)
 - Identify the \$/cwt. gained in basis forecasting



Data

- Futures settlement price data were obtained from Bridge Financial Data Center.
- Price series began on Jan. 1, 1989 for feeder cattle and live cattle.
- Cash prices were obtained from the USDA's **Agricultural Marketing Service** (provided by the Livestock Marketing Information Center)
 - Feeder cattle cash prices were organized to match futures contract specification changes provided by the Chicago Mercantile Exchange.



Methodology

Basis forecast (BF):

$$BF_{tk} = \text{HistAvg}_t + (X * (\text{Basis}_{t-k} - \text{HistAvg}_{t-k}))$$

where:

HistAvg is historical average basis (3-year and 4-year for feeder cattle and live cattle, respectively)

X represents the proportion of current basis deviation from historical average which is included in the forecasts (0 to 1.0)

t denotes the week (1-520 for 10 year period)

k denotes the forecast horizon (# of weeks between forecast date and the week being forecasted) (k=4, 8, 12, 16, 20, and 24)



Methodology

Out-of-sample squared basis prediction errors were generated using:

$$SE_{tk} = (\text{Basis}_t - (\text{HistAvg}_t + ((X) * (\text{Basis}_{t-k} - \text{HistAvg}_{t-k}))))^2$$

where:

SE is the squared basis prediction error

HistAvg is historical average basis (3-year and 4-year for feeder cattle and live cattle, respectively)

X represents the proportion of current basis deviation from historical average which is included in the forecasts (0, 1, and optimal)

t denotes the week (1-520 for 10 year period)

k denotes the forecast horizon (# of weeks between forecast date and the week being forecasted) (k=4, 8, 12, 16, 20, and 24)

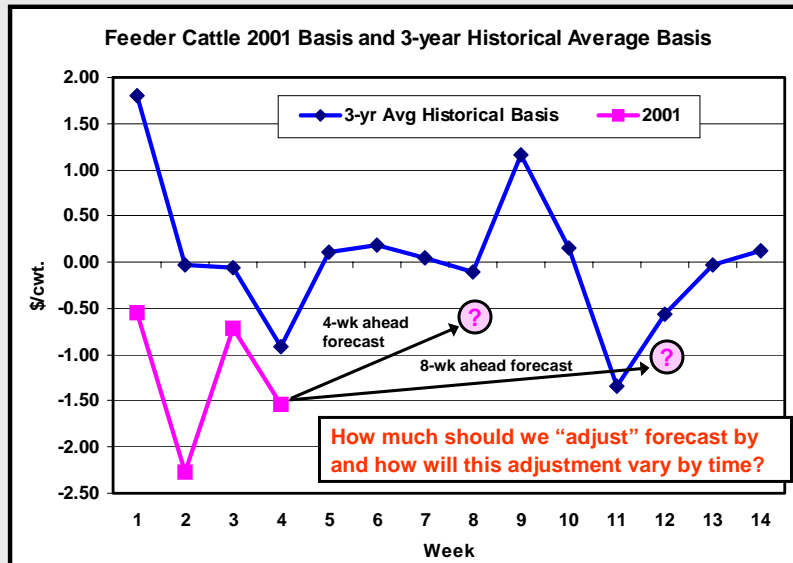


Methodology (continued)

- The “X” variable was solved for such that it minimized the sum of squared errors (i.e. optimized in-sample)
- Out-of-sample MAEs were then calculated for:
 - Forecasts over the last full 10 and 5 years of data
 - Forecasts made 4, 8, 12, 16, 20, 24 weeks prior to the week being forecasted.
 - Forecasts made using the “optimal” amount of the current basis deviation from the historical average

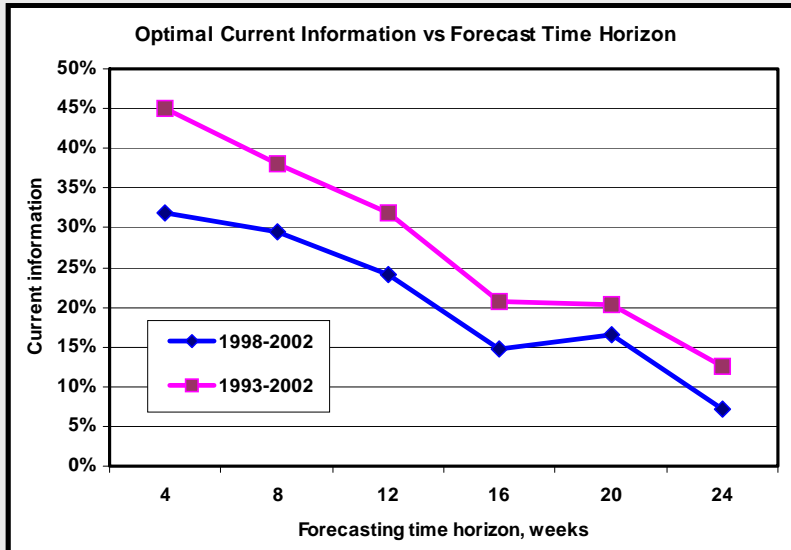


Should forecast consider current basis?





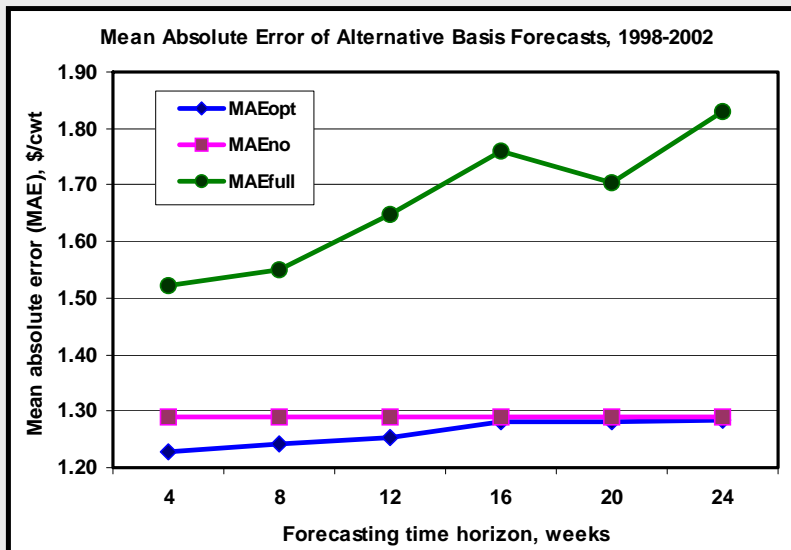
Current information to include...



Value of current information lessens for further out forecasts



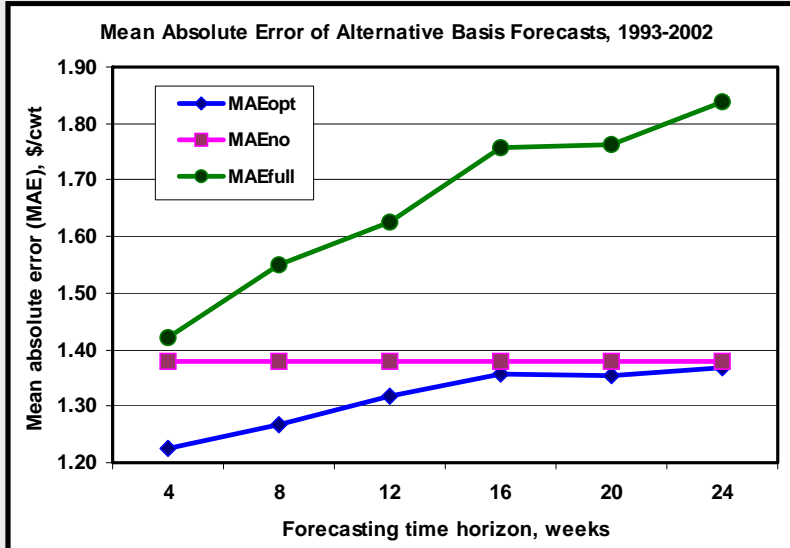
Impact of current information on MAE



Incorporating 100% of current information worsens forecasts



Impact of current information on MAE



Incorporating 100% of current information worsens forecasts



Conclusion

- Basis is generally more predictable than prices.
- Very important when thinking about basis to make sure relevant/correct prices are used.
- Ignoring missing data in a multiple year average may lead to inappropriate averages.
- Basis is often forecasted using historical basis information, but incorporating “current” information can improve forecast accuracy.

AgManager: Info on Crops, Livestock, Farm Management and Policy - Microsoft Internet Explorer

Address: http://www.agmanager.info/

about contributors useful links site map feedback Search

AG MANAGER.INFO
Kansas State Research & Extension

- Agribusiness
- Crops
- Farm Management
- Human Resources
- Income Tax & Law
- Livestock & Meat
- Policy

Ag Econ News
Contributors
Events
Programs
Sponsors

www.agmanager.info

A Website Providing Information and Tools For The Competitive Business

Contact Us:
Department of Agricultural Economics
342 Waters Hall
KS 66506
8702

Kevin C. Dhuyvetter
785-532-3527
kcd@ksu.edu

Questions ?

Interactive Crop Basis Tool
partially funded by the Kansas Corn Producers

Site Updates

104-105 KS Marketing Loan Rates
Feb 4, 2005 by Brad Lubben

In the Cattle Markets
Feb 3, 2005 by LMIC

Updated Crop Databases
Feb 3, 2005 by Dhuyvetter

Analyzing Your Business: How do you know where you stand?
Feb 1, 2005 by Dhuyvetter and Kastens

Diesel Fuel and NH3 Price Forecasts
Jan 29, 2005 by Dhuyvetter

NF Disaster Affairs & KS Counties

Done

start | Inboxes - Microsoft Out... | AgManager: Info on ... | 5:27 PM

Livestock Reports v1.03 - LRP Coverage Prices, Rates, and Actual Ending Values - Report for 02/ - Microsoft Internet Explorer

Address: http://www3.rma.usda.gov/apps/livestock_reports/criteria_flow.cfm

Select Criteria Main Menu Formatted Print 02/12/2005 10:51:50 AM

LRP Coverage Prices, Rates, and Actual Ending Values - Report for 02/11/2005

USDA subsidizes 13 percent of total LRP premium.

State	County	Endorsement Length	Commodity	Type	Practice	Crop Year	Expected End Value	Coverage Price	Coverage Level	Rate	Cost Per CWT	End Date	Actual End Value
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$92.290	0.938900	0.013122	1.211	05/13/2005	
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$90.290	0.918400	0.011264	1.017	05/13/2005	
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$88.290	0.898100	0.009174	0.810	05/13/2005	
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$86.290	0.877700	0.006490	0.560	05/13/2005	
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$84.290	0.857400	0.005920	0.499	05/13/2005	
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$82.290	0.837000	0.005043	0.415	05/13/2005	
20 KANSAS	998 ALL COUNTIES	13	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.311	\$80.290	0.816700	0.004484	0.360	05/13/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$92.430	0.936400	0.017678	1.634	06/10/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$90.430	0.916200	0.013613	1.231	06/10/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$88.430	0.895900	0.010517	0.930	06/10/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$86.430	0.875600	0.007289	0.630	06/10/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$84.430	0.855400	0.006100	0.515	06/10/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$82.430	0.835100	0.005396	0.444	06/10/2005	
20 KANSAS	998 ALL COUNTIES	17	0801 FEEDER CATTLE	810 STEERS WEIGHT 2	997 NO PRACTICE SPECIFIED	2005	98.704	\$80.430	0.814900	0.004911	0.395	06/10/2005	

Done

start | Inboxes - Microsoft ... | Windows Media ... | Internet Exp... | Microsoft Excel ... | 10:54 AM