



Grain Storage Economics

Kevin C. Dhuyvetter
Extension Ag Economist
Kansas State University
Manhattan, KS 66506
785-532-3527 -- kcd@ksu.edu

Presented at ...



Grain storage economics – simply the markets way of providing signals to ration the use of a commodity that is produced at one time of the year, but used throughout the year.

Pretty straight forward concept!

The problem – new information continuously comes to light and thus the market signals keep changing (i.e., we are dealing with expectations and thus risk and uncertainty are involved)...

“Selling the grain and buying a July call may cost you 10¢/bu., but that is less than the cost of storage.” ... “Don’t put it in a bin -- buy a call.”

Extension economist
Top Producer, January 1998

(today it’s more like 60¢/bu (corn) – how does that compare to the cost of storage?)

Returns to storage come from...

- Prices increasing
- Basis strengthening
- Marketing flexibility
- Premiums for identity preservation
- Reduced costs
- Etc.

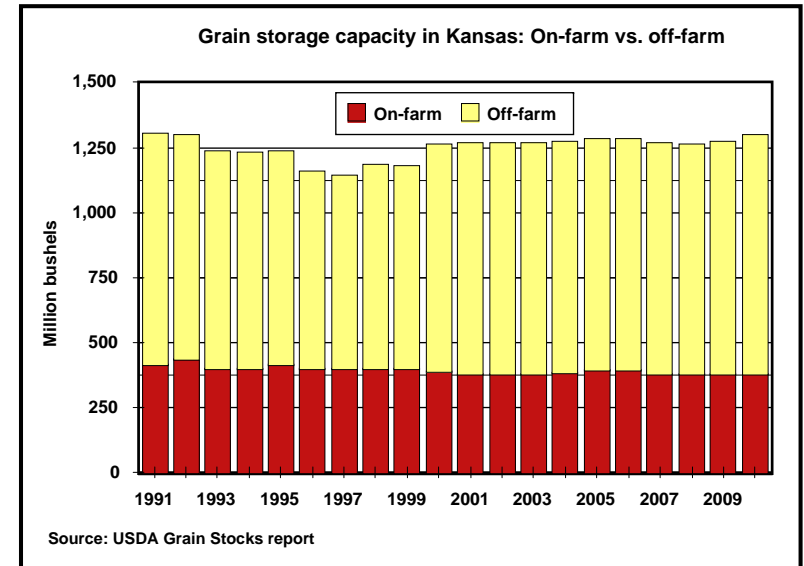
(some of these simply require retaining ownership, some require physical ownership, and some may require ownership on-farm)

Reasons for current interest in storage...

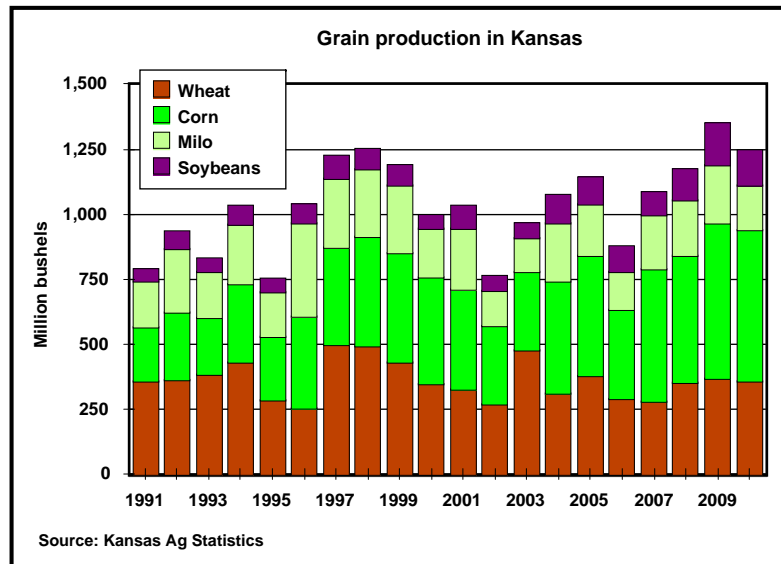
- Wide basis levels at harvest
- Storage availability
- Alternative markets
- Others???



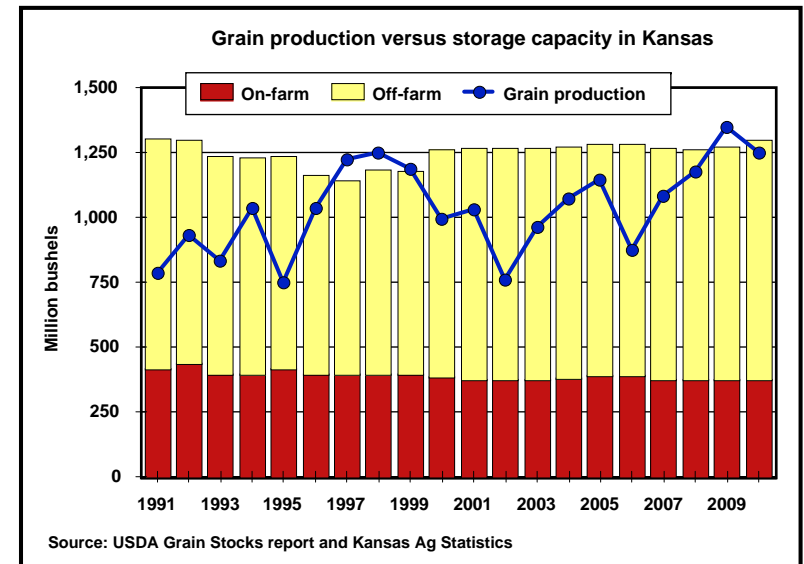
Total grain storage in KS has been fairly constant over time...



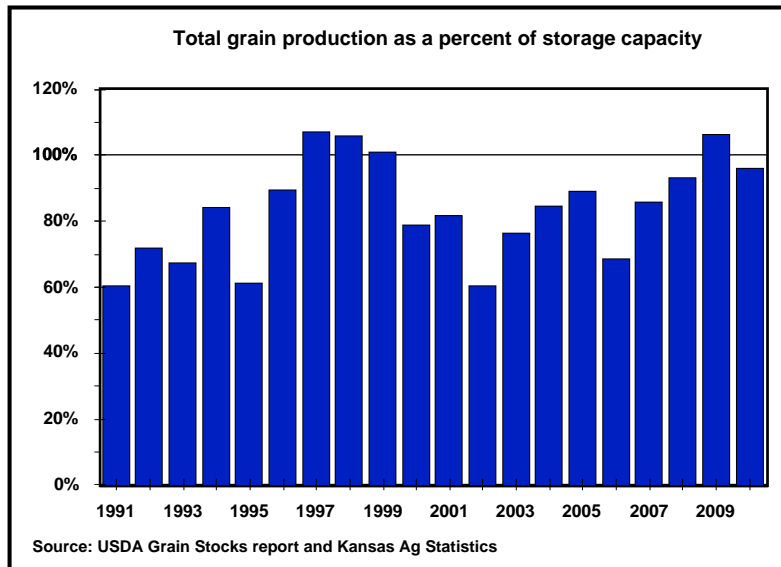
Grain production is much less constant...



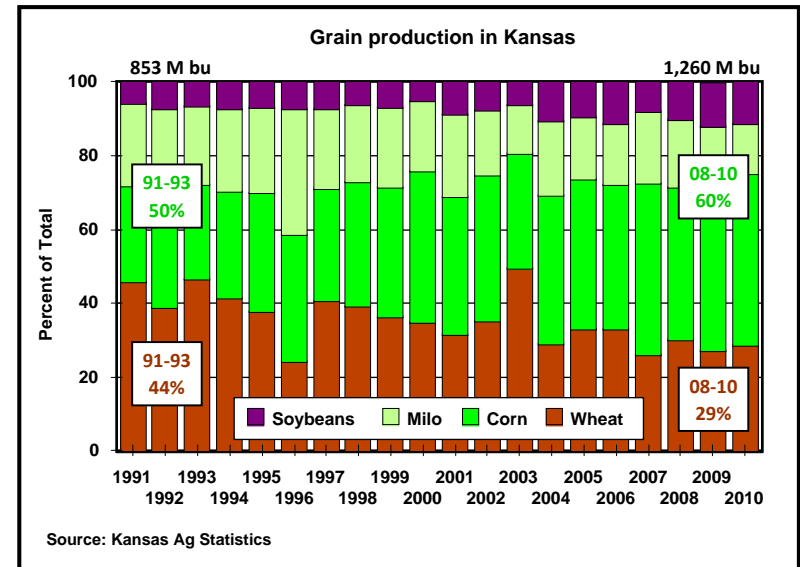
A need for more storage capacity?



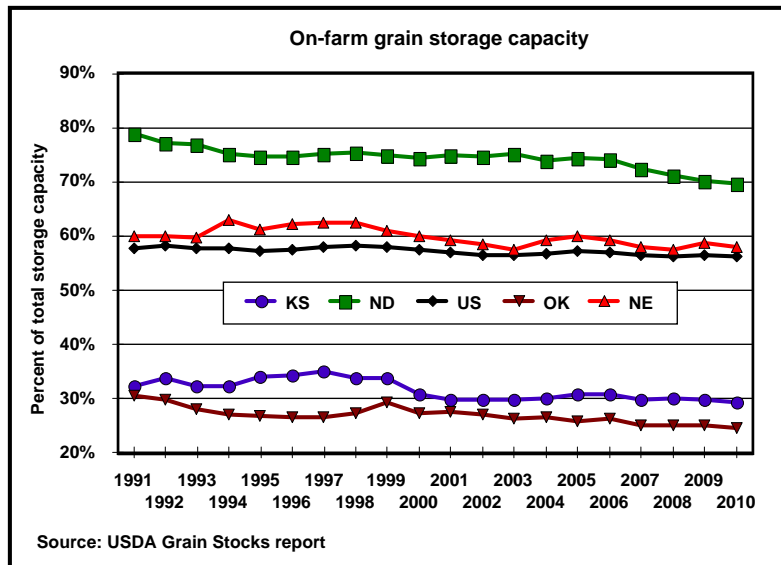
A need for more storage capacity?



Higher percent of grain production is feedgrains today...



KS and OK have relatively low levels of on-farm storage...



Increase in on-farm storage due to...

- Changing markets
- Use of semis lowers cost of hauling
- Bottlenecks at harvest
- Grain quality
- Crop mix changing
- Increasing acreage of specialty crops

Analysis of historical returns...

Competitive market: Price = cost

Returns...

- to storing in commercial elevator
(commercial storage rates + interest)
- to storing on-farm
(interest only)
- due to price increases only

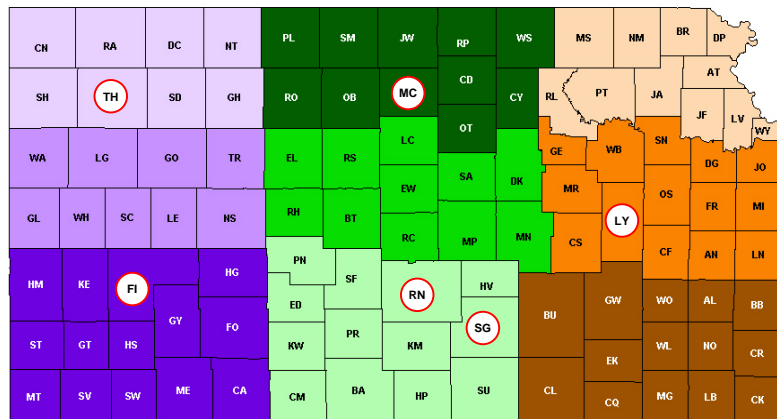
Crop price data...

- Weekly prices 1982-2010 (28 years)
 - Four weeks per month (48 weeks per year)
- Crops
 - Wheat (W), Corn (C), Milo (M), Soybeans (S)
- Locations
 - Beloit (W,M,S); Colby (W,C,M); Emporia (W,C,S); Garden City (W,C,M,S); Hutchinson (W,C,M,S); and Whitewater (W,C,M,S)
- Summary
 - 21 crop-locations
 - Missing prices for 2.7% of weeks were “filled in”



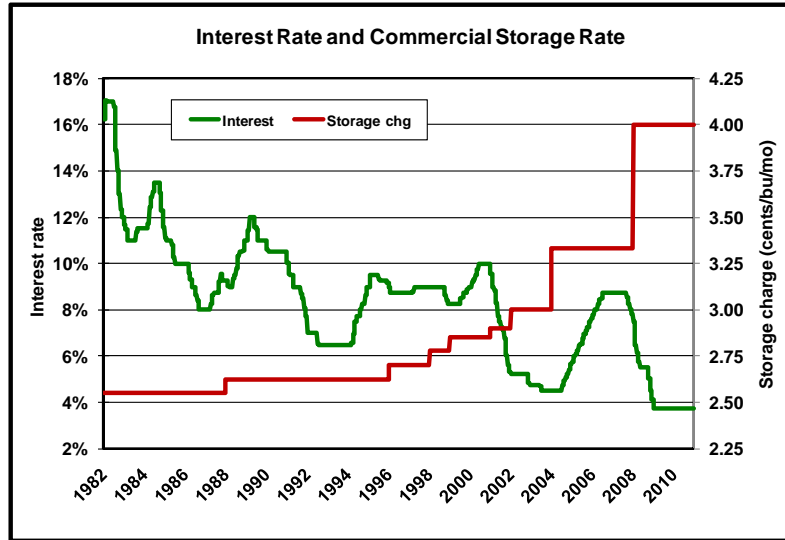
Department of Agricultural Economics

Locations analyzed



Storage costs used in analysis...

- Physical cost
 - Commercial average of 2.91¢/bu/mo (2.98 for soybeans)
 - Range of 2.55¢ to 4.00¢ (max of 4.50 for soybeans)
 - Source: Cooperating elevator quotes
- Interest cost
 - Bank prime + 0.5% x harvest price
 - Source: Federal Reserve



Formula for calculating returns...

$$\text{Return}_t = \text{Price}_t - \text{Storage cost} \times \text{weeks} - \text{Price}_{\text{harv}} \times (1 + \text{Int}_t \times \text{weeks} \div 48)$$

where,

Return_t = return to storage in week t, \$/bu.

Price_t = price in week t, \$/bu.

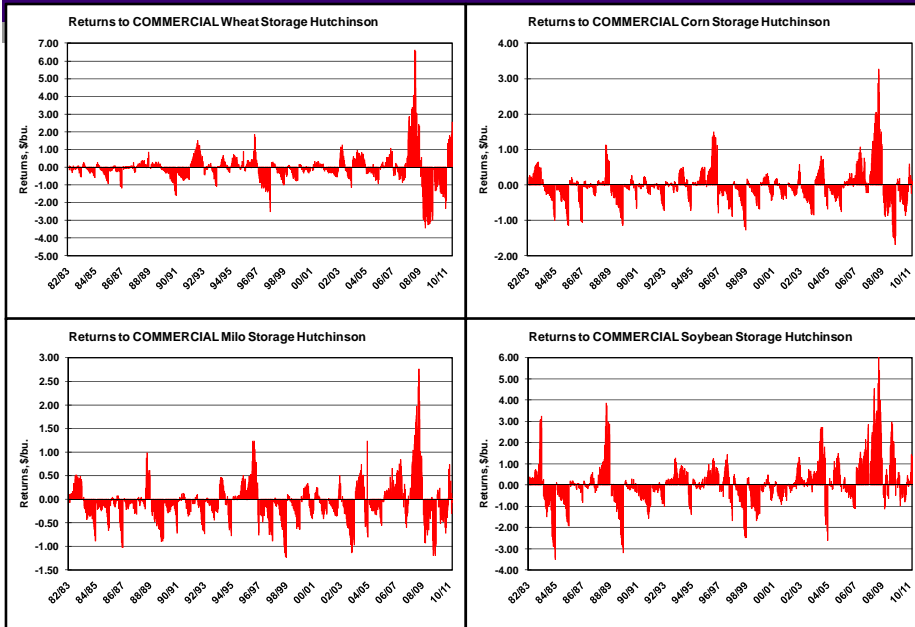
Storage cost = physical storage cost

Weeks = weeks grain is stored

$\text{Price}_{\text{harv}}$ = harvest price, \$/bu.

Int_t = interest rate in week t

Returns are highly variable from year to year (increasing over time?)...



Marketing

- Price Picking/Forecasting
- Picking a Price Picker/Forecaster
- Seasonal prices
- Basis; Elevator Storage Returns
- Farm Storage/Transportation Costs/Returns
- Selecting Market to be in: Futures or Cash
- Grain Quality
- Local Cash Prices
- Income Tax and Cash Flow Selling
- Marketing Channels (Identity Preserved)

Inefficient Efficient

Post-harvest Grain Storing and Hedging with Efficient Futures

Terry Kastens and Kevin Dhuyvetter

“Some successful marketing strategies do appear to exist, but generally they are based on using the market as a source of information.”

Zulauf and Irwin; RAE 20(1998)

Problem

- Can futures plus basis guide grain storage decisions? Or, are cash markets efficient like futures markets?
- Must signal-based storage be hedged?
- 1985-1998 simulation of grain storage decisions in Kansas at
 - 23 wheat locations
 - 11 corn locations
 - 17 milo locations
 - 13 soybean locations

Model

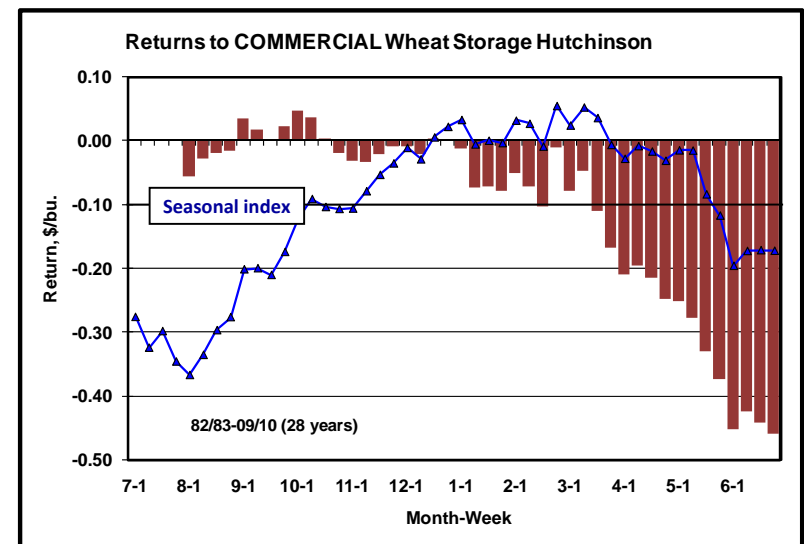
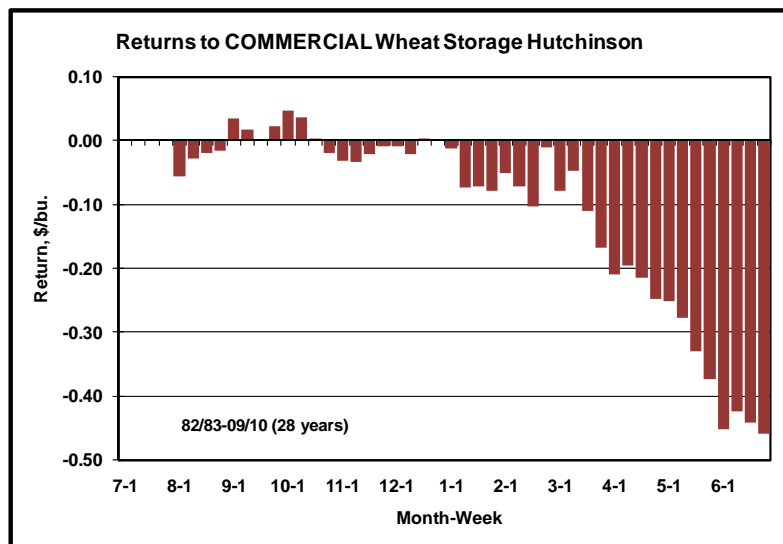
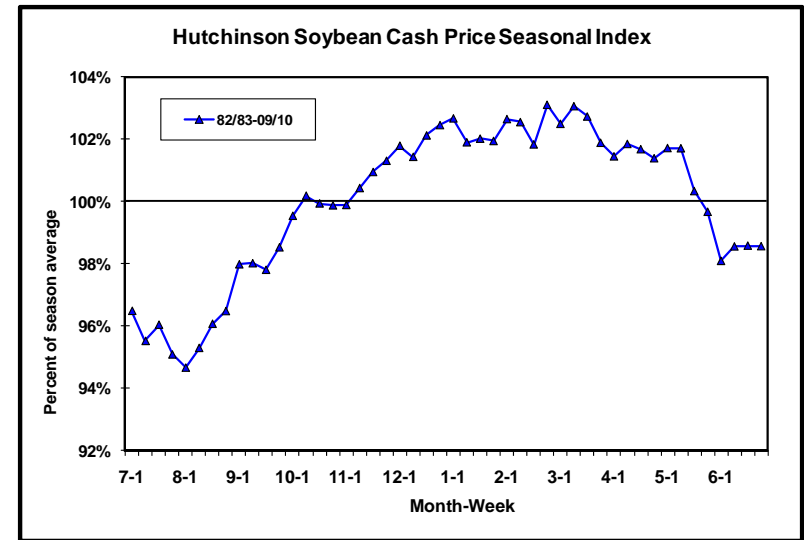
- If the deferred futures price this week (any contract) plus expected basis less the cost of storing is greater than the current price, then store grain . . .
- Otherwise, sell all grain
- For hedging . . .
- During the storage period, dynamically select the contract that maximizes expected returns to storage (accounting for transaction costs)

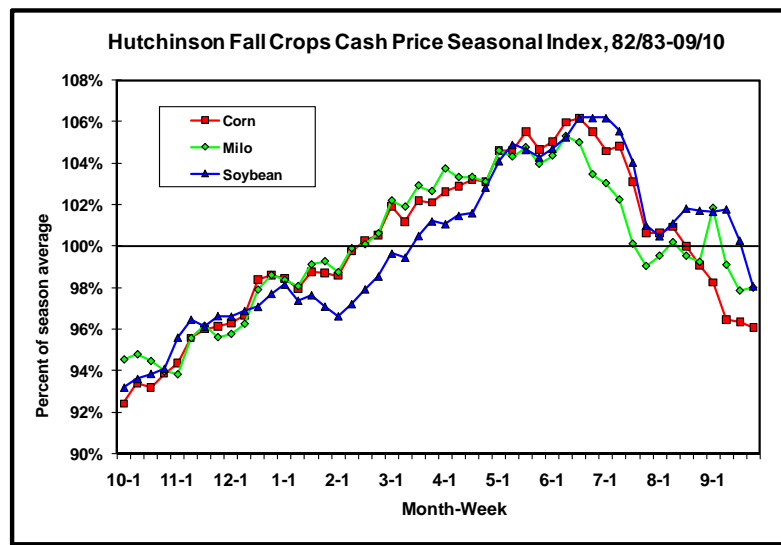
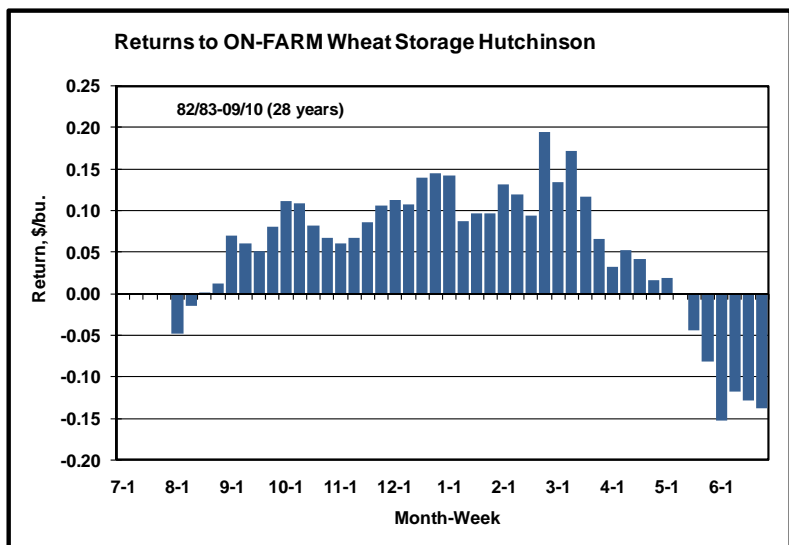
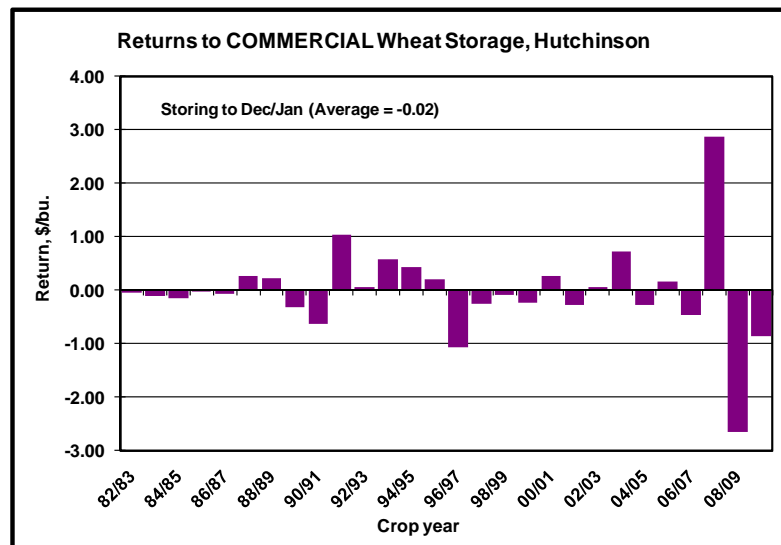
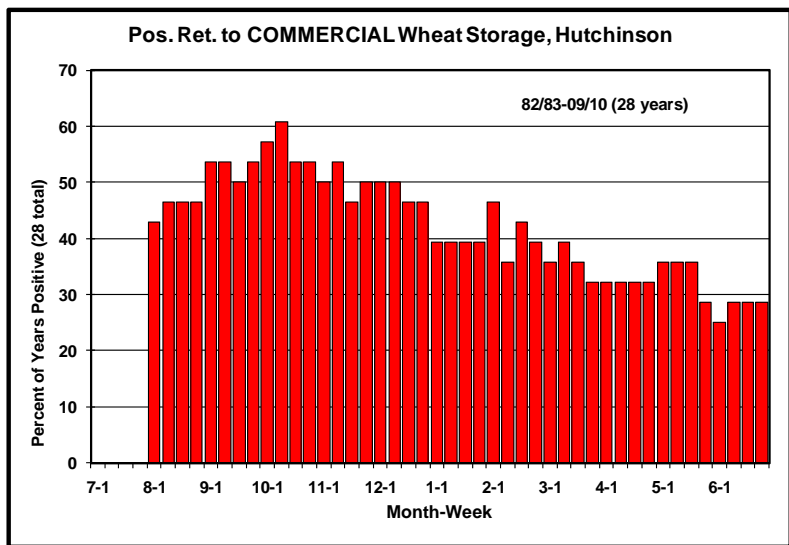
Base Model

- Price expectations: futures + 3-year basis
- Harvest date: week of 50% completion
- Start model: at harvest
- Interest rate: bank rate on new farm loans
- Storage cost: 2.6 cents/bu./month with 30 day grace period

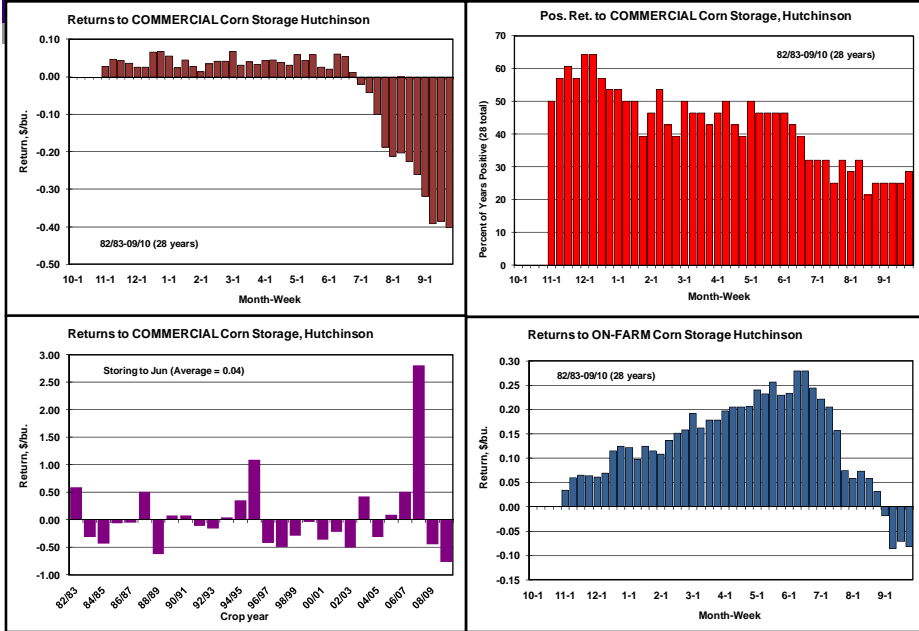
Conclusions

- Futures-based storage signals appeared to work for wheat and soybeans but not corn and milo
- Highly variable results: need more data?
- Hedging appeared to reduce risk for corn and milo but increase risk for soybeans
- Cannot reject cash market efficiency
- Identifying “real-time” marketing strategies that consistently increase returns is very difficult

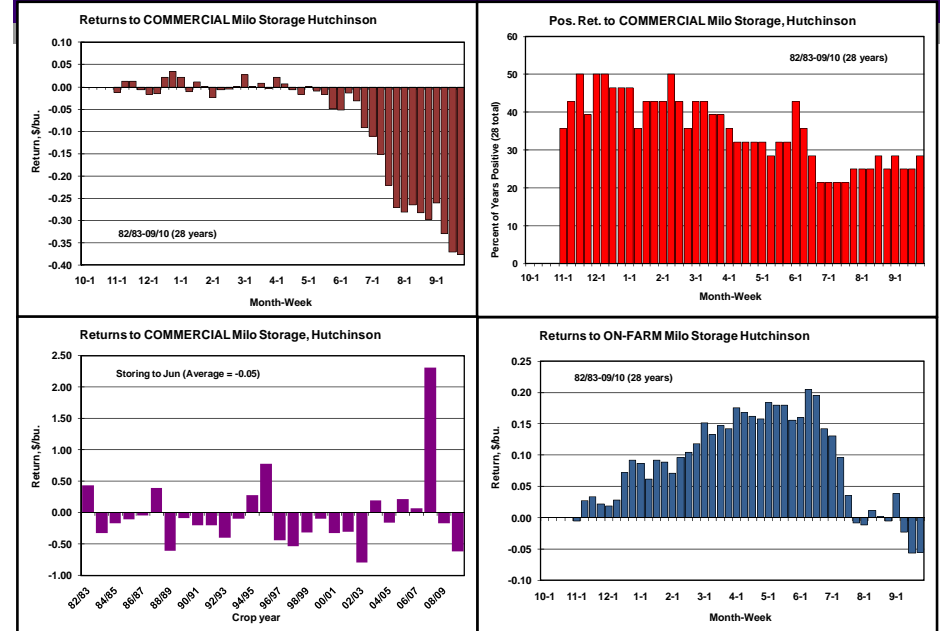




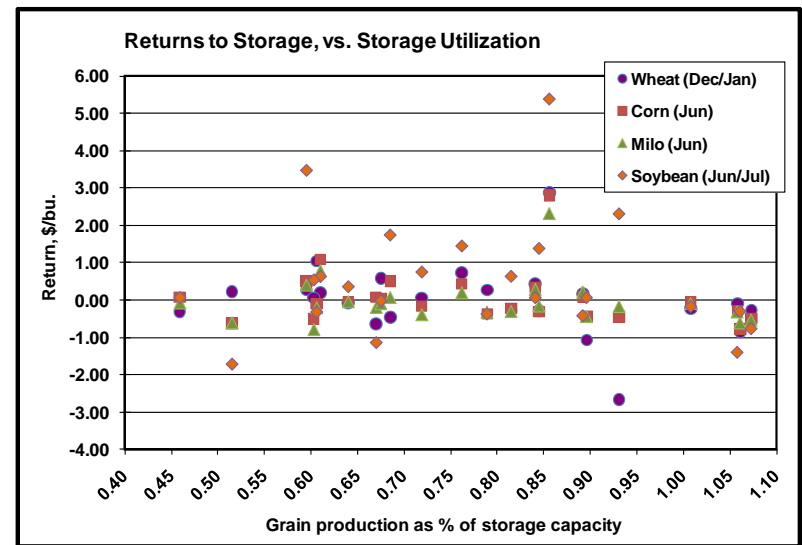
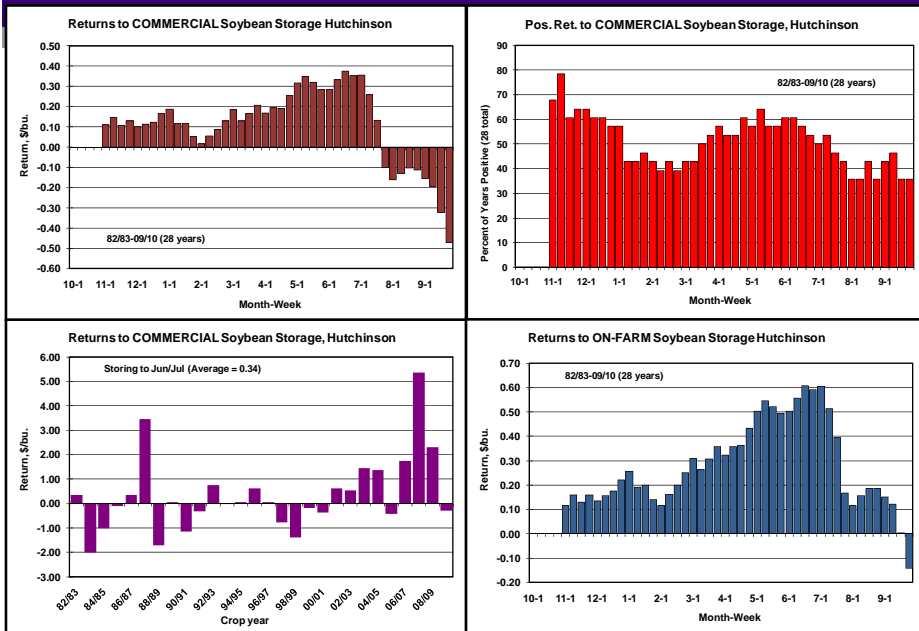
Corn storage returns...



Milo storage returns...



Soybean storage returns...



Comparison of Commercial Storage Returns by Location*

Location	Wheat (Dec/Jan)	Corn (Jun)	Milo (Jun)	Soybean (Jun/Jul)
Colby	-\$0.01	\$0.02	-\$0.02	n/a
Beloit	\$0.00	n/a	-\$0.02	\$0.38
Garden City	-\$0.01	\$0.03	-\$0.02	\$0.32
Hutchinson	-\$0.02	\$0.04	-\$0.05	\$0.34
Whitewater	-\$0.02	\$0.02	-\$0.02	\$0.37
Emporia	-\$0.07	\$0.02	n/a	\$0.39

* Average for 28-year period (1982/83 - 2009/10)

On-farm returns...

- Returns over interest cost ranged from 15¢ to 25¢ per bushel for wheat, milo, and corn and were 50¢ to 60¢ per bushel for soybeans
- Producers constructing on-farm storage facilities need to consider variable and fixed costs
 - Variable costs are labor, utilities, shrink, and repairs
 - Annual fixed costs will depend on investment, time horizon, and interest charge

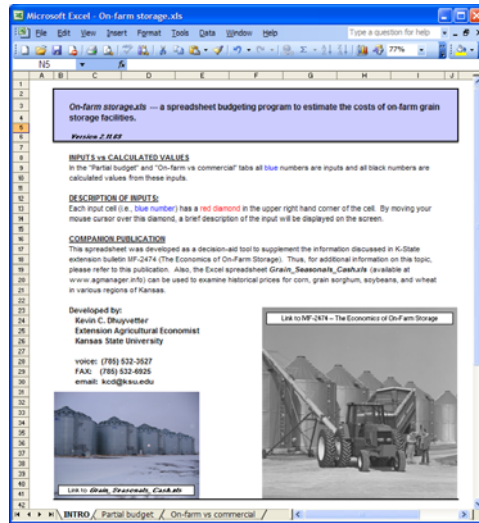
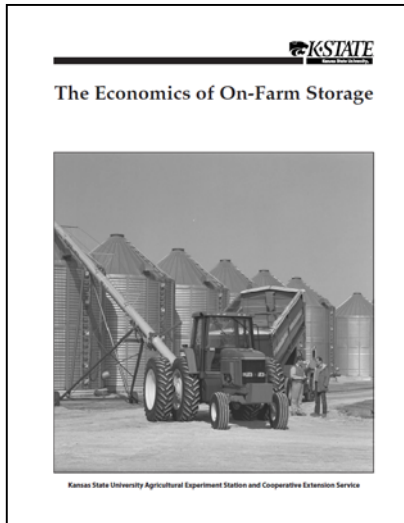
Benefits of on-farm storage ...

- Storage space available when needed
- Increased marketing flexibility
- Potential for identity preservation
- Reduced bottlenecks
- Utilize labor and trucks in off-season
- Quality considerations
- Grain available for livestock feed on farm
- VC may be less than commercial storage

Disadvantages of on-farm storage ...

- Responsible for condition of grain
- TC may be greater than commercial storage
- Higher risk with regards to grain quality and costs being uncertain
- Additional labor may be required

Extension publication and Excel spreadsheet for estimating costs of on-farm storage...



Summary of historical returns

- Returns are extremely variable from year to year
- Average returns over VC to routinely storing to capture seasonal price changes are small (to cover TC requires benefits beyond seasonal price changes)
- Optimal storage length varies by crop
- Slight differences geographically
- Results generally support efficient markets



For more information and decision tools related to farm management, marketing, and risk management go to www.AgManager.info

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

