The VSR Track Record

for 2018 Kansas HRW Wheat Futures

KSU Risk & Profit Conference

August 16-17, 2018

DANIEL O'BRIEN, ELIZABETH YEAGER & ART BARNABY - KANSAS STATE UNIVERSITY

DARREL HOLADAY – COUNTRY FUTURES, INC.

Non-Convergence & VSR Issues

A. If the market is working perfectly, no one will want to deliver!

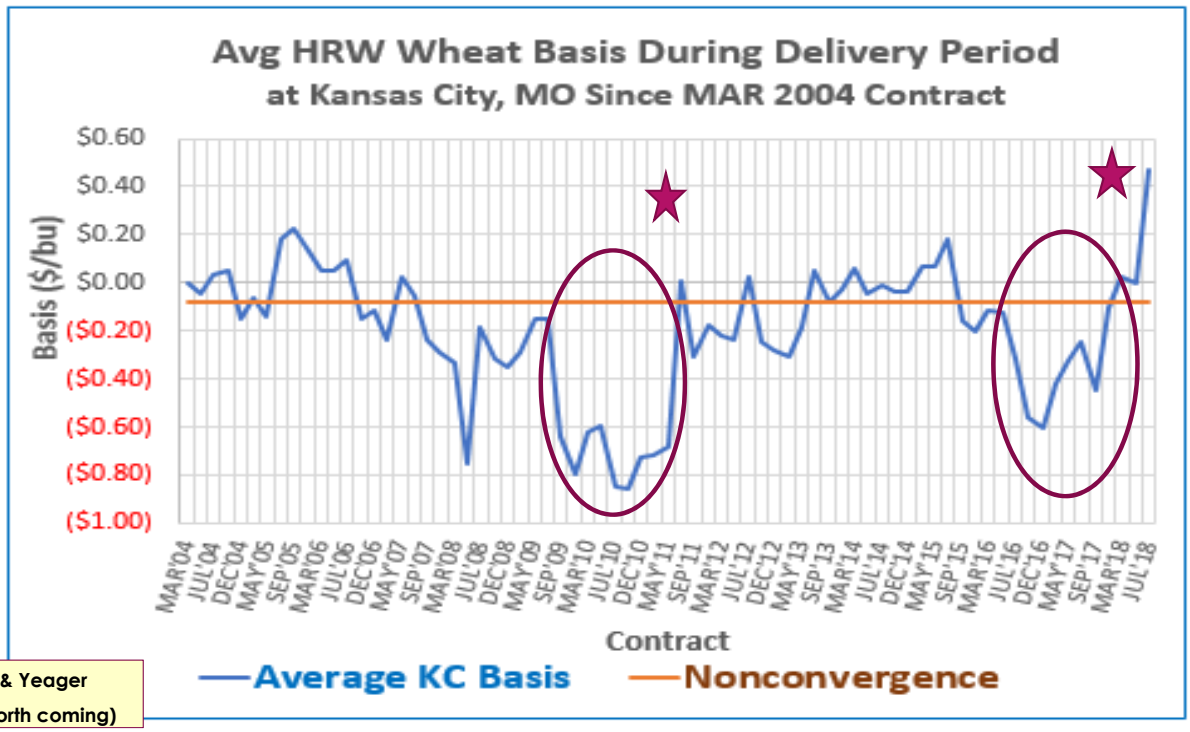
B. When futures are a dollar higher than cash, *then* farmers would like to deliver wheat – as occurred in 2016. This caused the non-convergence.

C. Actions by the CME on Kansas HRW Wheat Futures

From Fixed Seasonal Storage Rates ➲ **Variable Storage Rate (VSR)**

From Electronic Warehouse Receipt ➲ **Shipping Certificates**

➔ Changes effective **March 18, 2018** on the **MARCH 2018 Contract**



Minnix & Yeager 2018 (forth coming)

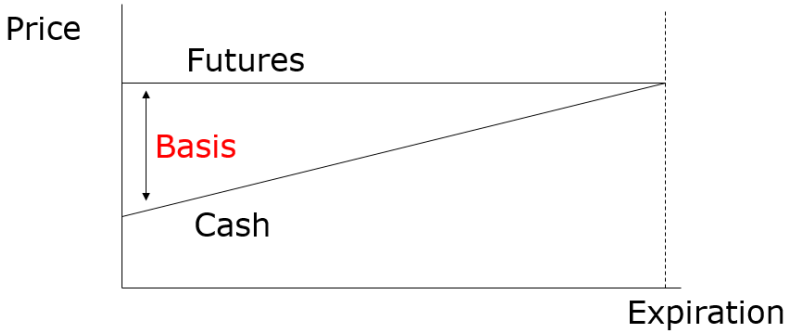
Non-Convergence & VSR Issues

D. VSR has now been applied to Kansas HRW Wheat Futures

- **Key factors in VSR**
  - o Daily grain storage rates
  - o Interest Rates
  - o Daily KS HRW Wheat futures prices & upfront "*spread*"

Convergence of Grain Futures & Cash $'s

- "***Convergence***" is the market pattern of cash & futures prices tending to "*come together*" at contract expiration
  - Grain basis approaches **zero ($0.00)** at the delivery market as the futures contract *expires*



Convergence of Grain Futures & Cash $'s

- **"Convergence" is necessary for….**
  - Effective futures hedging
  - Efficient discovery of storage returns (i.e., "the carry")
  - Performance of crop insurance revenue contracts

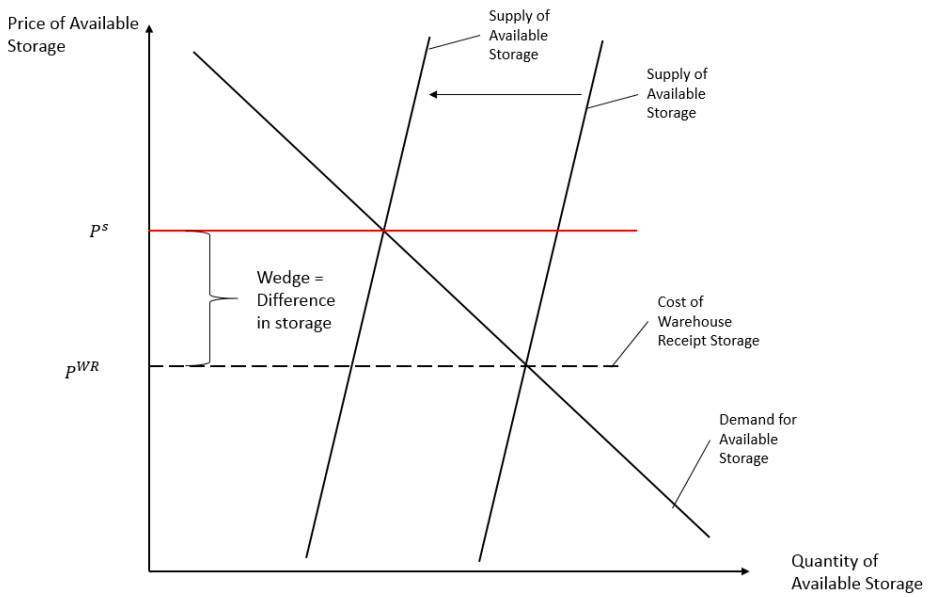
Actions by the Chicago Mercantile Exchange:

From Fixed Seasonal Storage Rates ➲ **Variable Storage Rate (VSR)**

From Electronic Warehouse Receipt ➲ **Shipping Certificates**

➔ *Changes effective **March 18, 2018** on the **MARCH 2018 Contract***

Wedge Creation



Minnix & Yeager 2018 (forth coming)

Non-Convergence in a HRW Wheat Hedge

- **Pre-harvest - on February 1st**

JULY HRW futures	=	$4.00	
Expected basis	=	$0.40 under	
Expected net price	=	$3.60	

- **THEN at harvest - on July 1st**

JULY HRW futures	=	$5.00	(**JULY futures up $1.00 / bu**)
Actual basis	=	$1.00 under	(**Basis $0.60 / bu *wider* than expected**)
Loss on futures	=	$1.00	
Actual net price	=	$3.00	(**Net price $0.60 *lower* than expected**)

Non-Convergence in a HRW Wheat Hedge

- **Pre-harvest - on February 1st**

JULY HRW futures	=	$4.00	
Expected basis	=	$0.40 under	
Expected net price	=	$3.60	

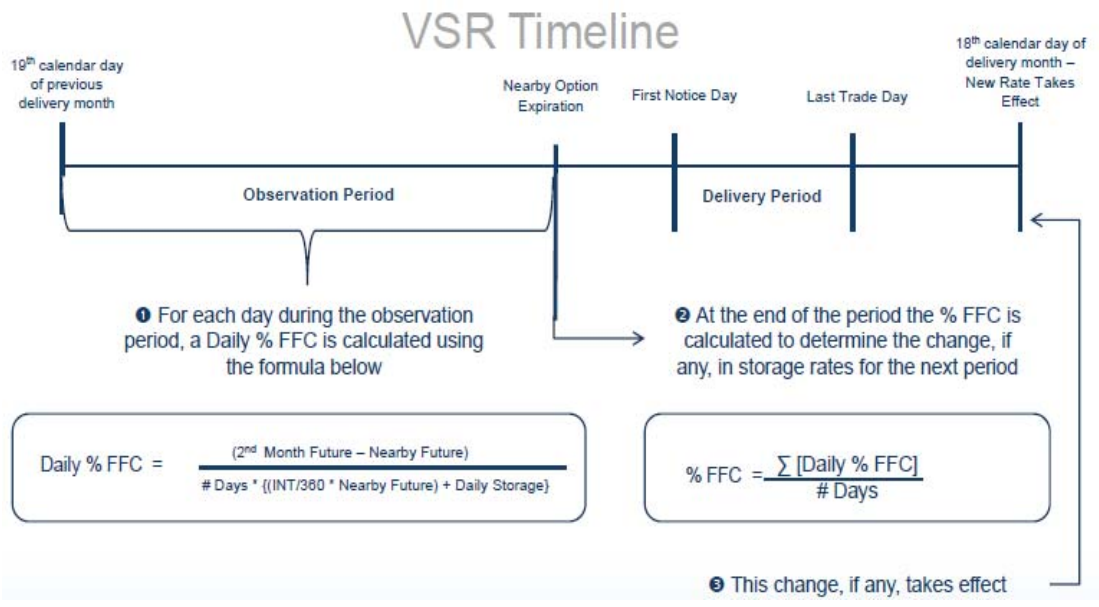
- **THEN at harvest - on July 1st**

JULY HRW futures	=	$3.50	(**JULY futures up $1.00 / bu**)
Actual basis	=	$1.00 under	(**Basis $0.60 / bu *wider* than expected**)
Gain on futures	=	$0.50	
Actual net price	=	$3.00	(**Net price $0.60 *lower* than expected**)

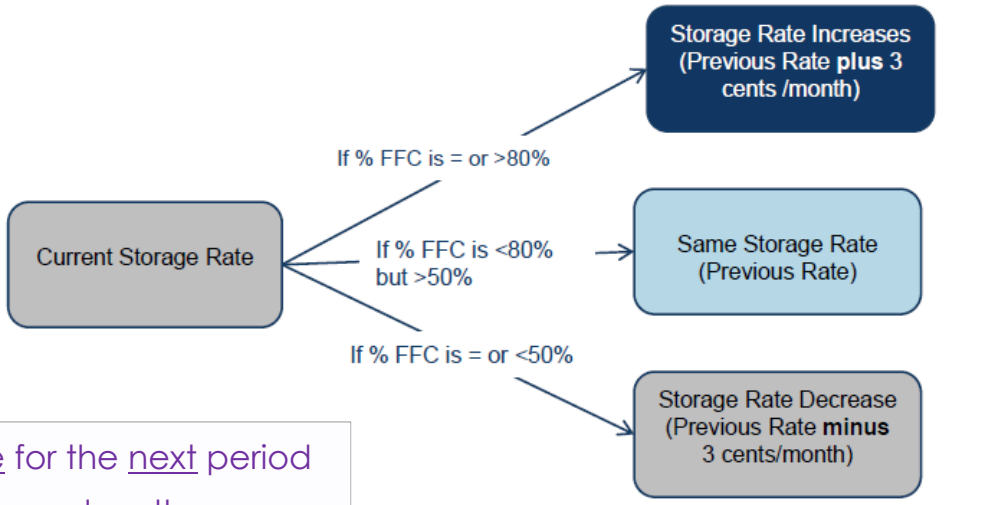
Non-Convergence in a HRW Wheat Hedge

- **Key to understanding non-convergence**
  - Realizing that physical grain is not deliverable by farmers on futures contracts
- **Delivery Instruments used to make/take futures delivery**
  - Only CME approved elevators can create warehouse receipts / shipping certificates
  - ⇨ *Takers of delivery must **pay storage** on these "paper" delivery instruments **IF** they "hold" rather than "sell" them (i.e., "load out")*
  - Takers of the delivery will receive a margin call for the full value of the contract ($5.00 wheat would create a margin call of $25,000/contract)
- **Non-Convergence** results when the "***value of the delivery instrument***" diverges from the "***value of cash grain***" at the delivery point

VSR Storage Rates – Timeline & Calculation



VSR Adjustments – Based on % Financial Full Carry



The Storage Rate for the next period will be adjusted based on the **percent of Financial Full Carry (% FFC)**

VSR: "Financial Full Carry" (FFC)

Calculating Financial Full Carry (FFC)

⇨ The cost to…

1) **Take delivery** of a wheat ***shipping certificate***
2) **Carry it** to the *next delivery period* - *and* -
3) **Re-deliver it** during the *next delivery period*

Figuring "Financial Full Carry" (FFC)

$$\#\,Days * \left[\left(Interest/_{360} * Futures\ \ Price\right) + Daily\ \ Storage\right]$$

Where:

Days = Number of calendar days from first delivery day in the nearby contract to first delivery day in the contract following the nearby contract

Interest = 3-Month LIBOR rate + 200 basis points

Futures Price = Settlement price for the nearby contract

Daily Storage = Current daily premium charge

Example: SEPT 2018 HRW Wheat on 6/22/2018

- **64 days** between 1st delivery day for JULY 2018 & SEPT 2018
- **Daily Storage Rate = $0.00365 /day** (≈ $0.11 /month) ***(minimum $)***
- **3-Month LIBOR rate = 2.3%** ⇨ 2.3% +2.0% base = 4.3% interest
- **JULY 2018 Futures = $4.88 ¾ /bu**

➢ **FFC**$^{5/21\text{-}6/22}$ **=** 64 days x [((.043/360) x $4.88 ¾) + $0.00365/day] = $0.27 /bu

KANSAS CITY HRW WHEAT VSR

Variable Storage Rate July 2018 - Sept 2018 Calculation Period

July 2018 First Delivery Day	7/2/2018
September 2018 First Delivery Day	9/4/2018
Number of Carry Days	64
Storage Rate Used in Calculation	$0.00365/bu/day
Running Average % of Full Carry	63.37%

VSR Calculator:

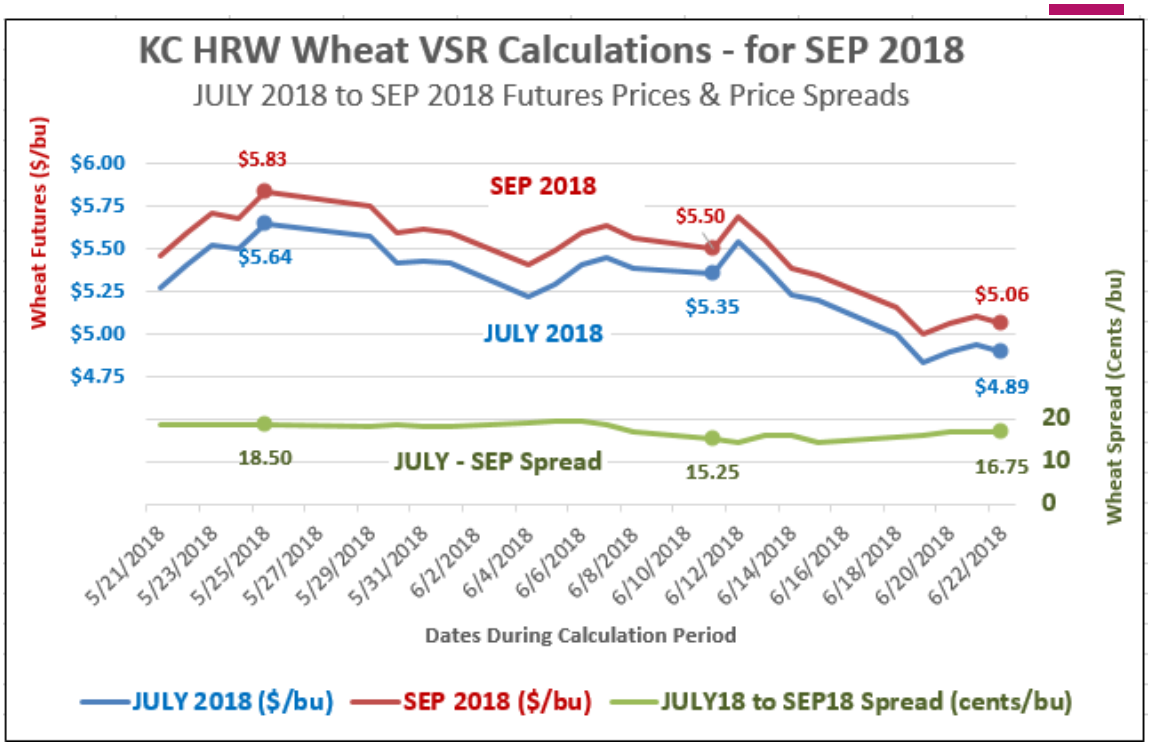
CME worksheet

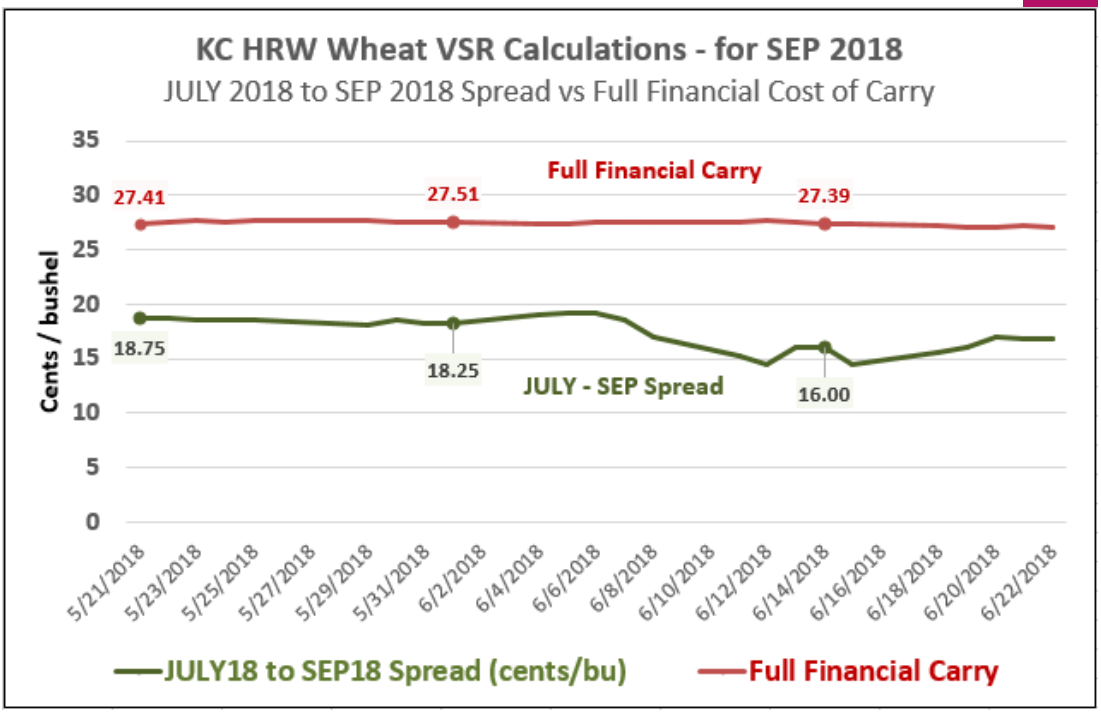
KS HRW Wheat

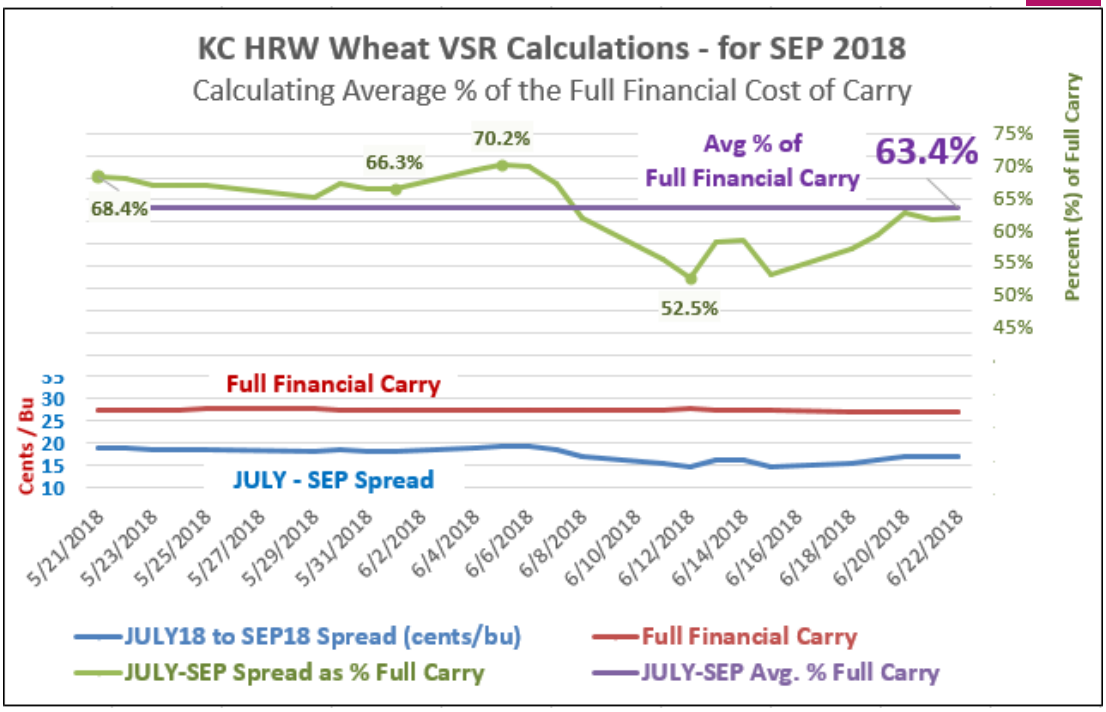
SEPT 2018

CME Results*

Date	July 2018 Contract Price	Sep 2018 Contract Price	3M LIBOR Plus 200 Basis Points	Financial Full Carry	Jul18-Sep18 Spread	Jul-Sep Spread as % of Full Carry
5/21/2018	$5.2650	$5.4525	4.32938	0.274123	0.1875	68.4%
5/22/2018	$5.4050	$5.5925	4.33000	0.275206	0.1875	68.1%
5/23/2018	$5.5175	$5.7025	4.33000	0.276072	0.1850	67.0%
5/24/2018	$5.4900	$5.6750	4.33000	0.275861	0.1850	67.1%
5/25/2018	$5.6400	$5.8250	4.31938	0.276909	0.1850	66.8%
5/29/2018	$5.5650	$5.7450	4.31813	0.276321	0.1800	65.1%
5/30/2018	$5.4075	$5.5925	4.30719	0.275006	0.1850	67.3%
5/31/2018	$5.4250	$5.6075	4.30031	0.275074	0.1825	66.3%
6/1/2018	$5.4075	$5.5900	4.32125	0.275142	0.1825	66.3%
6/4/2018	$5.2150	$5.4050	4.31781	0.273631	0.1900	69.4%
6/5/2018	$5.2900	$5.4825	4.31381	0.274169	0.1925	70.2%
6/6/2018	$5.3975	$5.5900	4.31919	0.275045	0.1925	70.0%
6/7/2018	$5.4450	$5.6300	4.32088	0.275426	0.1850	67.2%
6/8/2018	$5.3825	$5.5525	4.32713	0.275006	0.1700	61.8%
6/11/2018	$5.3475	$5.5000	4.32631	0.274729	0.1525	55.5%
6/12/2018	$5.5350	$5.6800	4.33263	0.276233	0.1450	52.5%
6/13/2018	$5.3900	$5.5500	4.33563	0.275145	0.1600	58.2%
6/14/2018	$5.2225	$5.3825	4.34063	0.273900	0.1600	58.4%
6/15/2018	$5.1975	$5.3425	4.33469	0.273653	0.1450	53.0%
6/18/2018	$4.9950	$5.1500	4.32594	0.272014	0.1550	57.0%
6/19/2018	$4.8300	$4.9900	4.32469	0.270735	0.1600	59.1%
6/20/2018	$4.8875	$5.0575	4.33025	0.271225	0.1700	62.7%
6/21/2018	$4.9325	$5.1000	4.33188	0.271586	0.1675	61.7%
6/22/2018	$4.8875	$5.0550	4.33506	0.271267	0.1675	61.7%




KC HRW Wheat VSR Calculations - for SEP 2018
JULY 2018 to SEP 2018 Spread vs Full Financial Cost of Carry
Cents / bushel
Full Financial Carry
27.41
27.51
27.39
18.75
18.25
16.00
JULY - SEP Spread
JULY18 to SEP18 Spread (cents/bu)
Full Financial Carry


KC HRW Wheat VSR Calculations - for SEP 2018
Calculating Average % of the Full Financial Cost of Carry
Avg % of
Full Financial Carry
63.4%
70.2%
66.3%
68.4%
52.5%
Percent (%) of Full Carry
Full Financial Carry
JULY - SEP Spread
Cents / Bu
JULY18 to SEP18 Spread (cents/bu)
Full Financial Carry
JULY-SEP Spread as % Full Carry
JULY-SEP Avg. % Full Carry

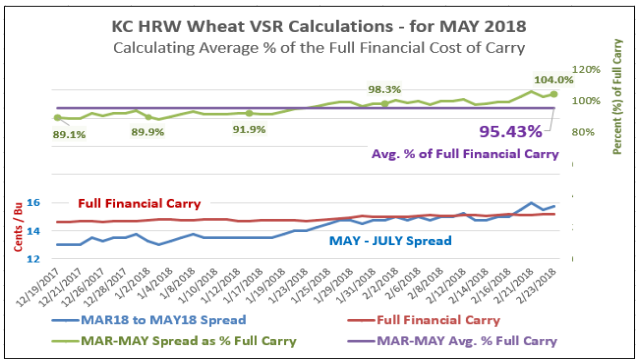
VSR #s: KS HRW Wheat SEP 2018 Contract

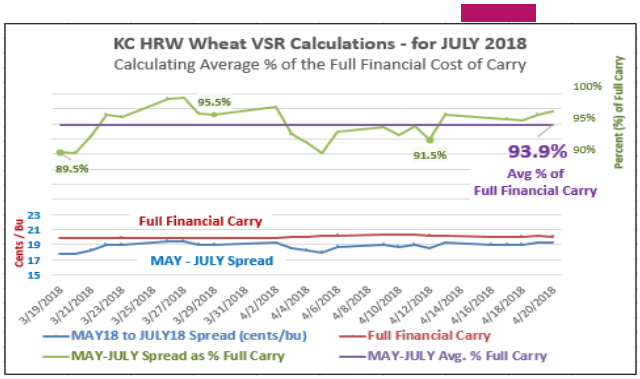
- **Current Maximum Premium (Storage) Charge**
  - $0.00365/bu/day (x 30 days = $0.10^{95} /mo.)

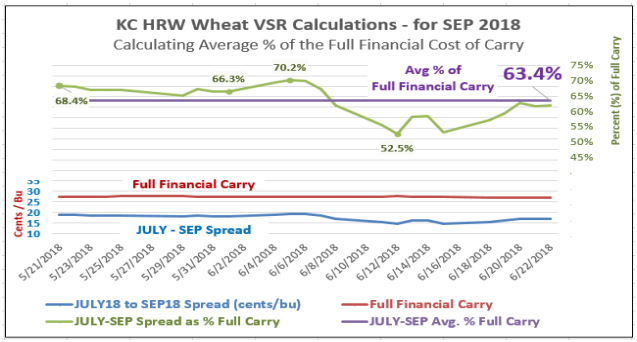
- ~~***IF*** Avg. % of Full Carry ~~**is ≥ 80%,**~~ the ~~**Max. Storage Charge *increases***~~ to ~~$0.00465 (≈ $0.14^{85} /mo.)~~

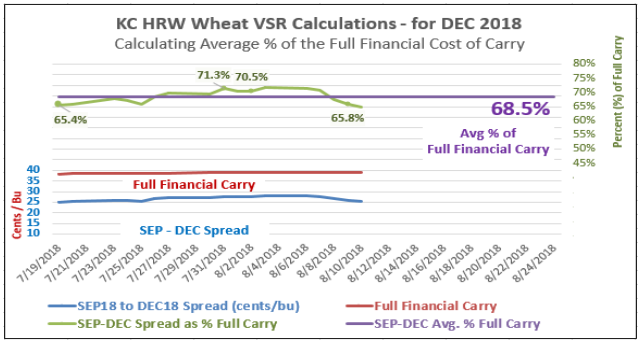
- ***IF*** Avg. % of Full Carry **is > 50% & < 80%, Max. Storage Charge *stays at*** $0.00365/bu/day (≈ $0.10^{95} /mo.) ****

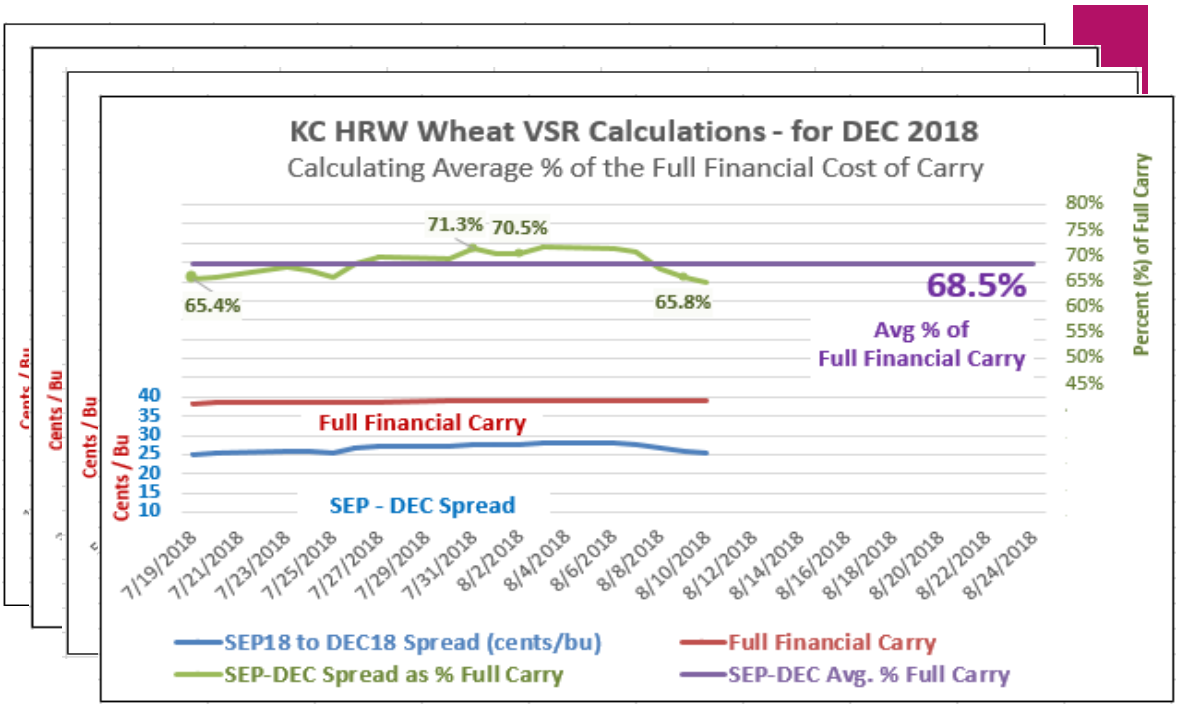
- ~~***IF*** Avg. % of Full Carry ~~**is ≤ 50%, Max. Storage Charge *decreases***~~ to ~~$0.00265 (≈ $0.08^{85} /mo.)~~











Question: Has VSR affected volume of trade in "*Lead*" vs "*Deferred*" HRW Wheat Futures?

Futures Detail

Refresh

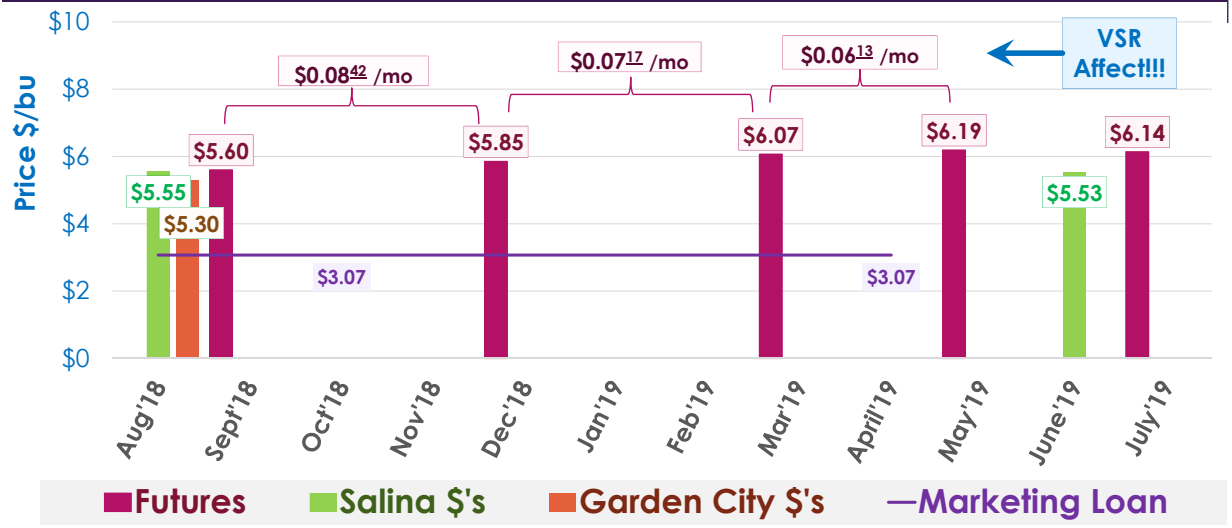
ELEC. HRW WHEAT (@KW) [10 Minute Delay] Spread Matrix | Symbol Search | Symbol Lookup

	More Info	Month	Last	Chg	% Chg	Open	High	Low	Previous	Volume	Open Int	Trade Time
chart	options	Sep-18	548'2	-11'4	-2.05	559'4	561'6	548'2	559'6	40296	77417	08/13/18 06:31
chart	serial options	Oct-18	---	---	0	---	---	---	---	---	---	---
chart	serial options	Nov-18	---	---	0	---	---	---	---	---	---	---
chart	options	Dec-18	573'6	-11'2	-1.92	585'0	587'0	573'4	585'0	46882	117726	08/13/18 06:31
chart	options	Mar-19	595'6	-10'6	-1.77	605'4	608'4	595'6	606'4	16736	48669	08/13/18 06:32
chart	options	May-19	609'0	-9'6	-1.58	618'6	620'4	609'0	618'6	5564	11931	08/13/18 06:24
chart	options	Jul-19	607'0	-6'6	-1.1	613'6	617'0	606'2	613'6	3848	18965	08/13/18 06:25
chart	options	Sep-19	621'0	-0'6	-0.12	622'0	625'0	621'0	621'6	665	1182	08/12/18 19:55
chart	options	Dec-19	635'6s	-10'6	-1.66	646'2	648'4	635'0	646'4	640	3428	08/10/18 13:19
chart	options	Mar-20	643'4s	-9'2	-1.42	650'2	652'0	645'0	652'6	19	155	08/10/18 13:15
chart	options	May-20	636'6s	-9'2	-1.43	---	---	---	646'0	0	3	08/10/18 13:15
chart	options	Jul-20	612'6s	-9'2	-1.49	622'0	622'0	612'4	622'0	9	146	08/10/18 13:15
chart	options	Sep-20	612'6s	-9'2	-1.49	---	---	---	622'0	0	2	08/10/18 13:15
chart	options	Dec-20	617'0s	-9'0	-1.44	---	---	---	626'0	0	2	08/10/18 13:15
chart	options	Mar-21	619'0s	-9'0	-1.43	---	---	---	628'0	0	0	08/10/18 13:15
chart	options	May-21	619'0s	-9'0	-1.43	---	---	---	628'0	0	0	08/10/18 13:15
chart	options	Jul-21	609'2s	-9'0	-1.46	---	---	---	618'2	0	6	08/10/18 13:15

Mon, Aug 13, 2018 6:42 AM CDT *Quotes are in market time

Wheat Cash & HRW Wheat Futures

Salina & Garden City, KS Local Elevators - August 10, 2018



Observations on the *Effectiveness & Impact* of VSR on HRW Wheat Futures

DARRELL HOLADAY – COUNTRY FUTURES INC.

Summary – Barnaby, et al.

1. **HRW wheat futures are not trading the value of wheat, they are trading the value of a warehouse receipt / shipping certificate, that currently has a fixed storage rate.**
   - Corn & soybean shipping certificates also have a fixed storage rate; this could change in the future.

2. **When there is a big crop, the VSR storage rate should increase & ration out the available supply of storage. Currently for HRW wheat the fixed storage rate prevents the market adjustment.**
   - The VSR will allow the market to find the real value of storage & the resulting value of wheat.

Summary – Barnaby, et al.

3. **As the contracts roll over & the VSR drives the storage rate higher, at some point it will no longer be profitable for the long to pay the storage cost.**
   - Then they will convert the "***paper***" into real wheat – causing futures & cash prices at delivery points to converge.

4. **Farmers can't ship 5 truck loads of real wheat to Salina & deliver to offset a futures position.**
   - Effectively famers can't make delivery on futures – BUT they can be delivered on.

Summary – Barnaby, et al.

5. **The only "people" who can make delivery on HRW wheat are the large multi-national elevators.**
   - In a normal market, only a few deliveries are required to cause convergence.

6. **These same designated delivery elevators must have a strong *balance sheet* combined with "*adequate storage*" to be approved for delivery by CME** (i.e., to be "*declared regular*").

Summary – Barnaby, et al.

7. **Famers should NOT carry a short futures position into the delivery period thinking they have the leverage of delivery – because they DON'T.**
   - The only way out of short futures is to buy back their contract.

8. **The academic argument is "*a farmer might find an elevator that would be willing to take delivery IF the farmer were to purchase a warehouse receipt in the secondary market.*"**
   - ***However*** – after paying par value for the receipt, it prevents the farmer from arbitraging the non-convergence.

Non-Convergence & Variable Storage Rates in CME Kansas HRW Wheat Futures

KSU Risk & Profit Conference, August 17-18, 2017

D. O'BRIEN, E. YEAGER & A. BARNABY - KANSAS STATE UNIVERSITY

K. SHULL – FORT HAYS STATE UNIVERSITY