

# 2022 Fertilizer Prices and Risk Management

Understanding & Managing Fertilizer Application and Cost

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# Take Home Message

- Fertilizer prices are likely to continue to be high in 2022.
  - Will prices moderate / come down or is there another leg up on the increase?
- Need to be thinking about profit maximizing decisions not yield or price maximizing.
- More aggressive with output price risk management.

# Not Just Fertilizer: Input Prices and Availability

- Land prices and rents are up.
- Prices for most crop protection products are up.
- Availability of inputs is currently a concern.
- Machinery costs are up.
- Labor shortages.
- Domestic trucking and logistical issues.
  - Port delays.
  - 11 hour driving time?
- Will prices be cheaper before they are needed in 2022?

Global Picture  
Factors Influencing Price

# FERTILIZER



# Factors Influencing Fertilizer Prices

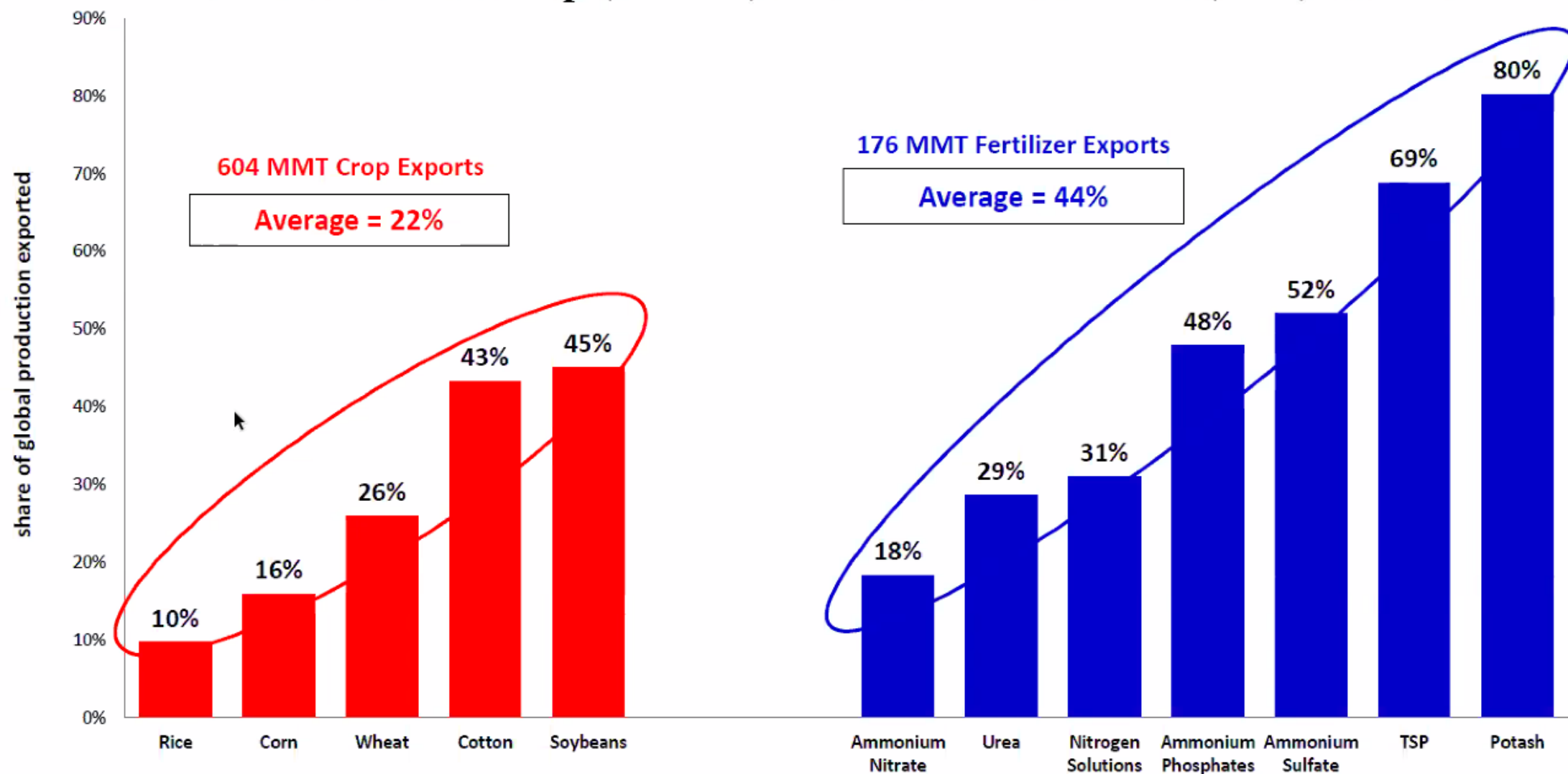
- Supply chain logistical issues.
- Tariffs (Morocco and Russia).
- Constrained foreign production (China).
- Domestic production (hurricanes).
- Natural gas prices.
- Increased global demand / high commodity prices.
- Geopolitical stability.

# Supply Chains

- Supply chains go unnoticed when they work well.
- Supply chain efficiency versus resiliency.
- Risk in owning inventory when prices run up.



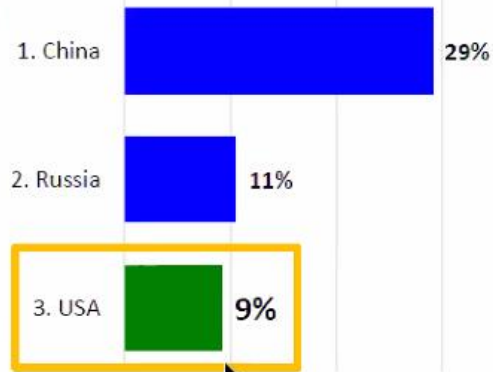
## Share of World Crop (2020/21) and Fertilizer Products (2020) Traded



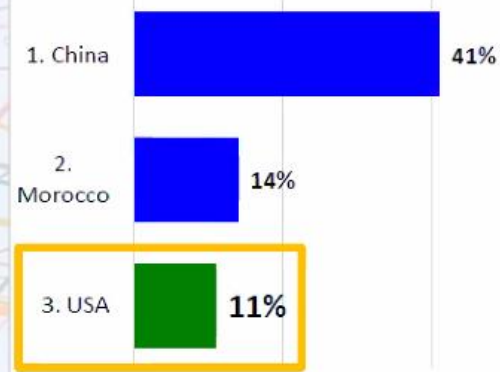
Source: U.S. Department of Agriculture and International Fertilizer Industry Association.  
Averages computed as total exports (crop or fertilizer material) divided by total production.

# Global Producers - 2020

## Ammonia

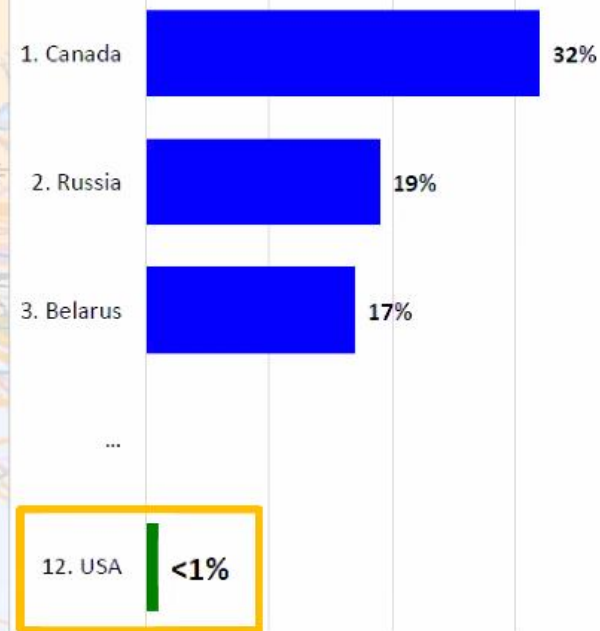


## Processed Phosphates<sup>1/</sup>

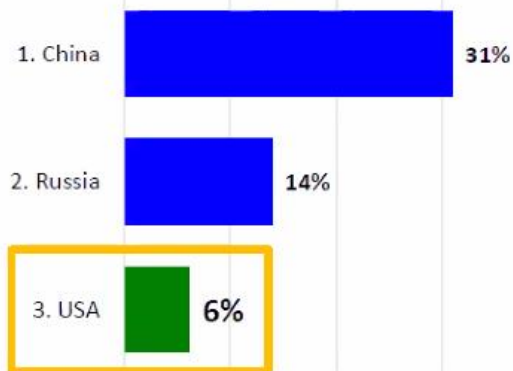


<sup>1/</sup> DAP, MAP, and TSP.

## Potash



## Urea



Source: International Fertilizer Association (IFA).

The U.S. is not a major share of global production.



# China Curbs Exports

## Producers Face Fertilizer Price Squeeze

China Phosphate Fertilizer Export Freeze Adds to Global Supply Challenges

9/30/2021 | 4:45 PM CDT

## China customs to inspect fertilizer exports from 15 Oct

Published date: 13 October 2021

China's General Administration of Customs will start inspections on fertilizer exports from 15 October, according to an official notice published today.

Share:

COMMODITIES

## Chinese urea futures slide from record highs on new export measures

CONTRIBUTOR  
Emily Chow — Reuters

PUBLISHED  
OCT 14, 2021 5:56AM EDT

## Global Phosphate Exports



## Global Urea Exports

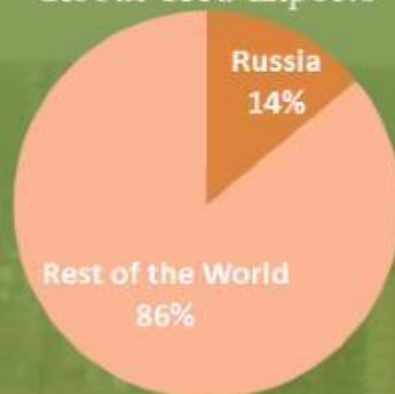


# Russia Restricts Exports

Global Ammonia Exports



Global Urea Exports



Global Phosphate Exports



Global Potash Exports



03 Nov 2021

## Russia to impose export quotas on nitrogen, complex fertilizers

November 3, 2021

### Russia to Impose Nitrogen, Complex Export Quotas

Russia halts nitrogen, phosphate fertilizer exports to support local farmers

Market

Russia sets 6 month quotas for fertilizer exports from Dec. 1

3 Nov 2021 | Masha Belikova

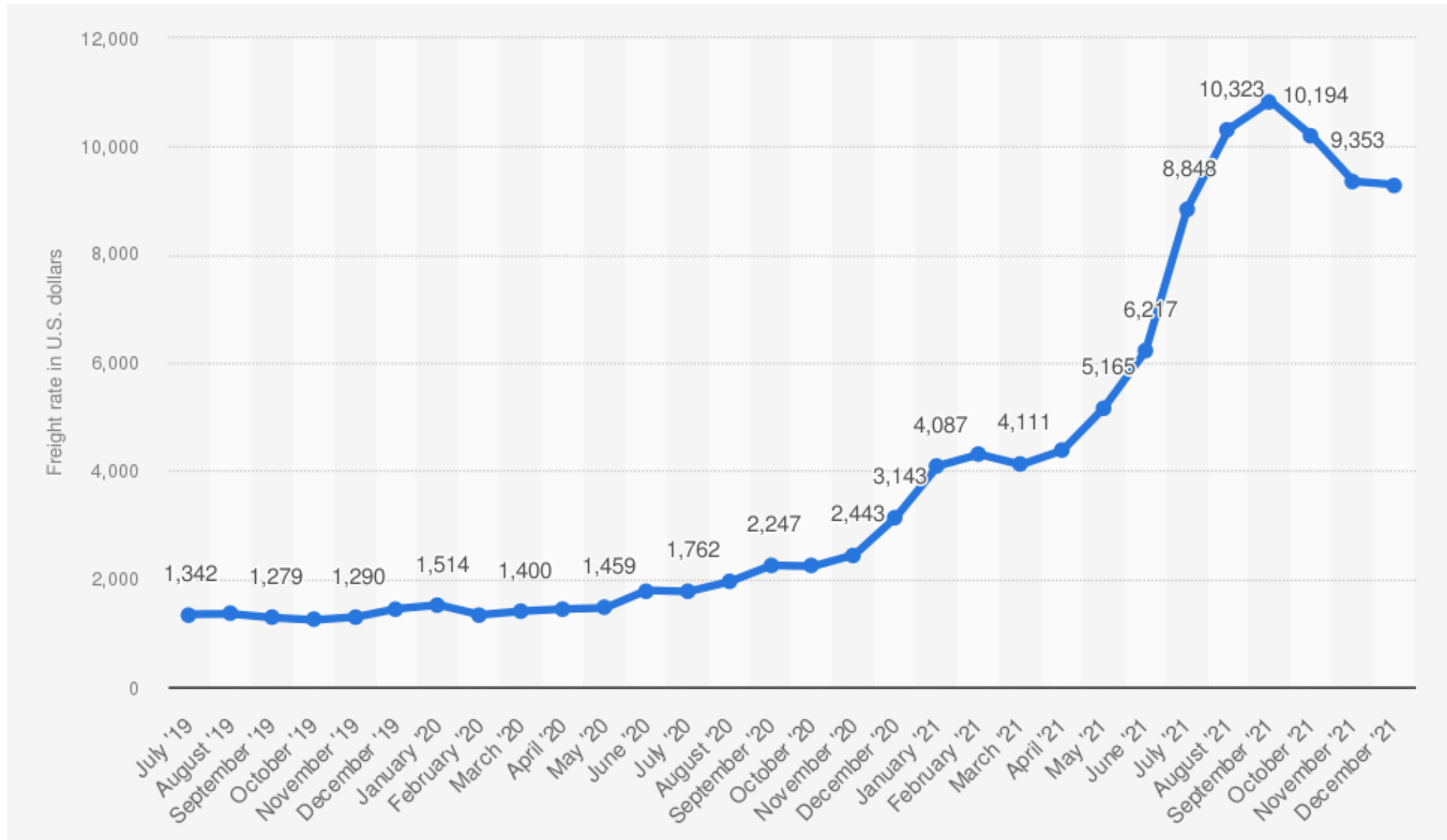
2020 Fertilizer Imports: Total and by Type	\$ billion
Total	\$6.25
Potassium Chloride	2.65
Urea	1.31
Monoammonium Phosphate	0.59
Urea-Ammonium	0.40
Diammonium Phosphate	0.40
Ammonium Sulphate	0.11
Nitrogen-Phosphorus	0.09
Fertilizers, Mixes	0.10
Other Fertilizers	0.59

Source: U.S. Department of Agriculture, Global Agricultural Trade System (GATS)



# Global container freight rate index from July 2019 to Dec. 2021 (in U.S. dollars)

Container freight rate index worldwide 2019-2021



Source(s): Freightos; [ID 1250636](#) (download from statista.com)

# Baltic Dry Index: Jan. 2016 – Jan. 2022



Source: <https://tradingeconomics.com/commodity/baltic>

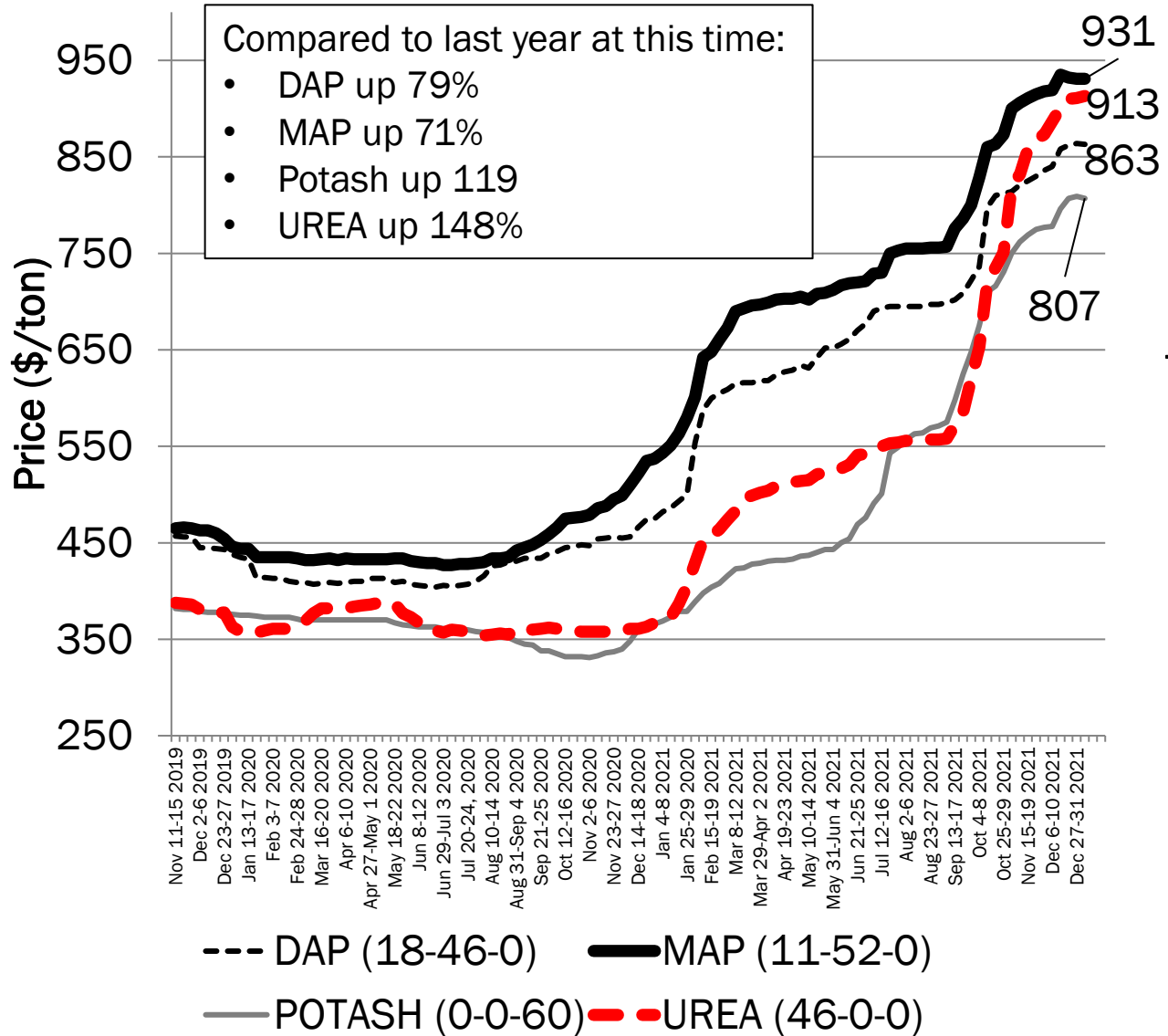


Up, down, or sideways?

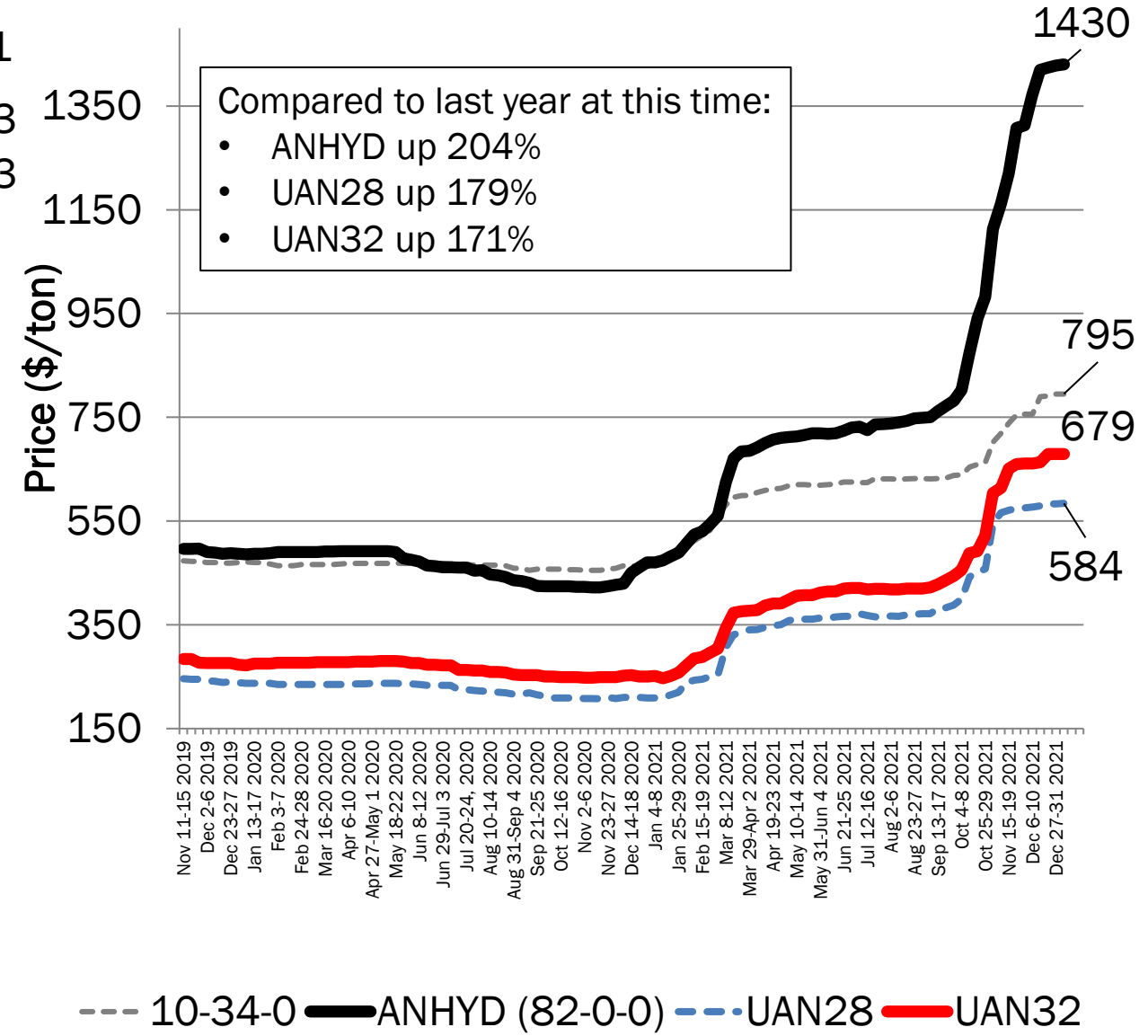
# FERTILIZER PRICES



## Dry Fertilizer Price, 2019-2022

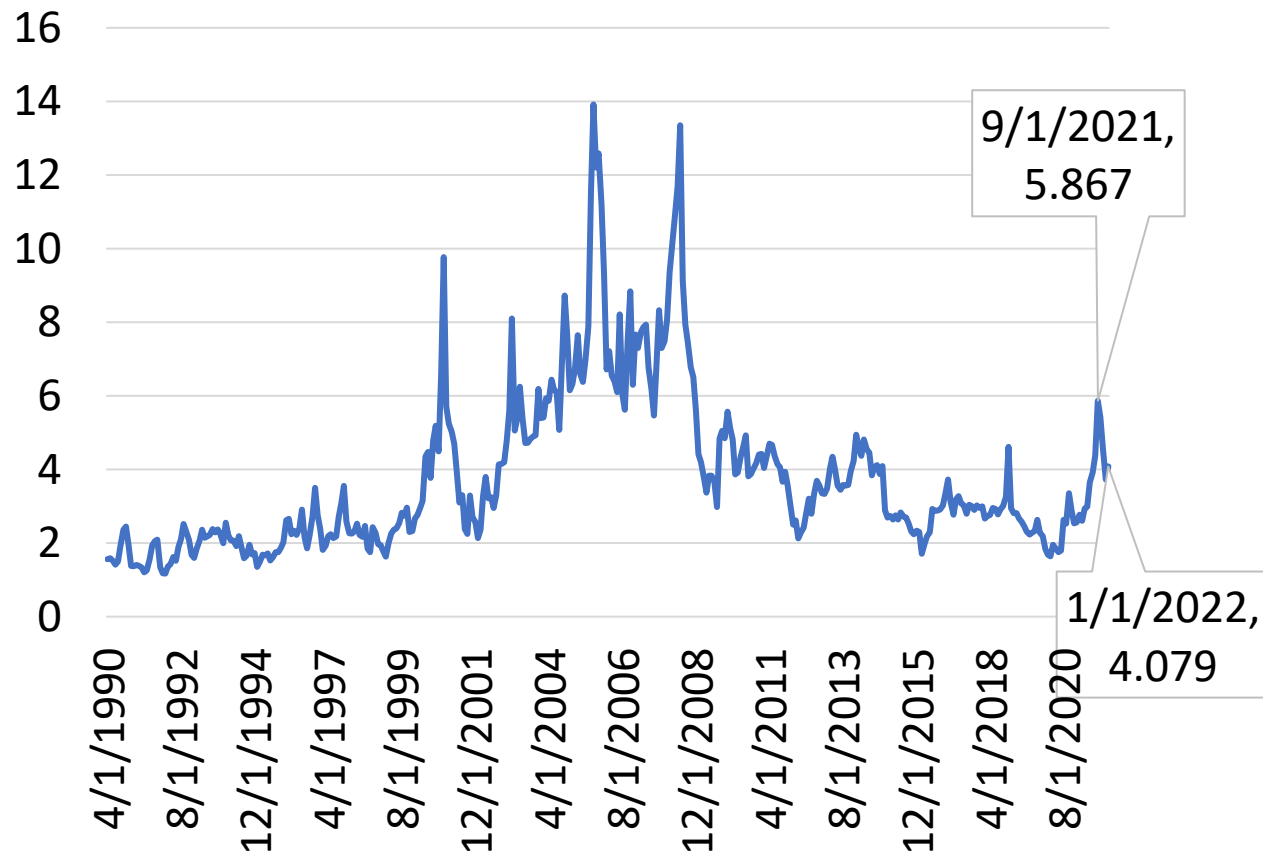


## Liquid Fertilizer Price, 2019-2021



# Is There Hope For Lower Fertilizer Prices?

Monthly Neraby Natural Gas Futures



- Natural gas accounts for 70-90% of variable production costs for nitrogen fertilizer.
- Natural gas prices are down 30% from the peak – Up 59% compared to last year.
- Lower natural gas prices should help with lowering nitrogen costs..... but there are a lot of other moving parts in fertilizer prices.

# Nitrogen Price

- Increased value in natural gas only accounted for about 15% of the increased in nitrogen fertilizer cost.
- Increased N demand due to higher corn prices/increased acres globally.
- Market power by nitrogen manufacturers and extraction of economic rents from producers. (CF Industries, Nutrien, Koch, and Yara-USA (75% concentration ratio).

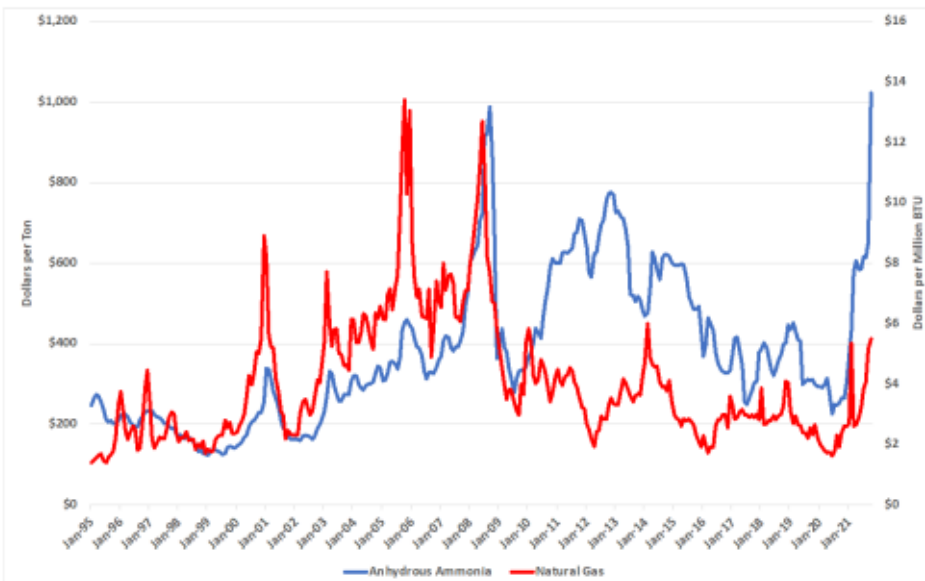


Figure 7. Anhydrous Ammonia and Natural Gas Prices, January 1995 to October 2021.

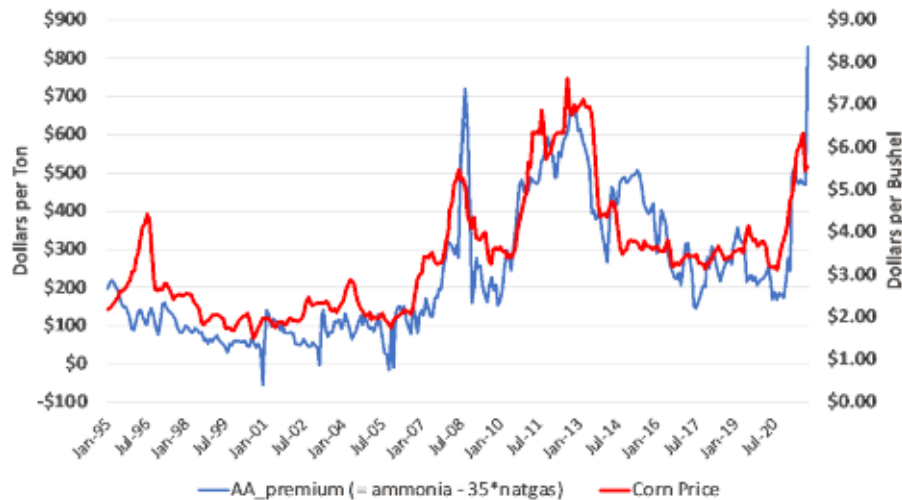
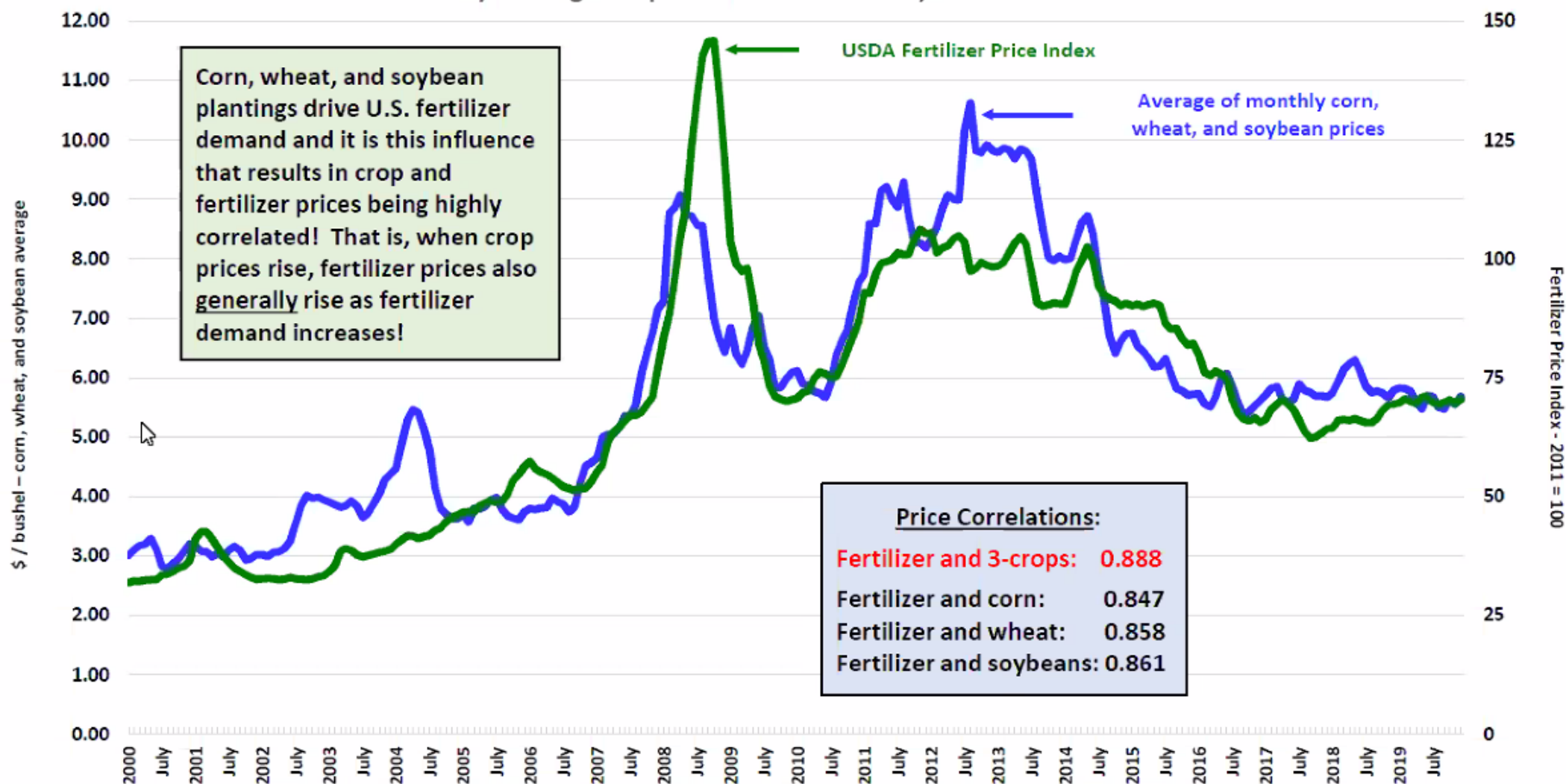


Figure 8. Anhydrous Ammonia price less the value of natural gas and U.S. corn prices, January 1995 to October 2021.

Source: Texas A& M: Economic Impact of Nitrogen Prices on U.S. Corn Producers

[https://dt176nijwh14e.cloudfront.net/file/486/FINAL\\_Economic%20Impact%20of%20Nitrogen%20Markets%20on%20U%20HB-1%202.pdf](https://dt176nijwh14e.cloudfront.net/file/486/FINAL_Economic%20Impact%20of%20Nitrogen%20Markets%20on%20U%20HB-1%202.pdf)

# Monthly Average Crop and Fertilizer Prices, Jan. 2000 - Dec. 2019





**I MEAN, I'M DROWNING HERE,  
AND YOU'RE DESCRIBING THE  
WATER!**

**SO, WHAT CAN YOU DO?**

# Reducing Input Costs

- Not an easy task and will require creativity. “Right place, right time, and right amount to maximize returns.”
  - Soil testing – know what you have.
  - Alternative nutrient sources – poultry litter, manure, other.
  - Lime / PH adjustment?
  - Variable rate application.
  - Eliminate / reduce products that are not contributing to sufficient yield gains relative to cost.
  - You will need a plan A, B, C.... If “typical” inputs are not available.
  - Crop rotation and species composition.
  - Crop share leases – balance the risk/reward.
  - Maximum Return to Nitrogen (MRTN).
  - Protect output prices / manage the margin.



# Crop Share Arrangements

	<u>2022</u>	<u>2021</u>
Price (\$/bu)	\$5.65	\$4.60
Yield (bu/acre)	180	180
Expenses (excluding land)	\$771	\$530
Revenue	\$1,017	\$828
<b>1/4 Revenue Share</b>	<b>\$254</b>	<b>\$207</b>
Profit	\$(8)	\$91

Need to have conversations with landowners if you are using a crop share arrangement.

The risk profile has changed dramatically.

Possible solutions: Move to cash rent or negotiate a portion of the expenses to the landowner.

## Rates and Charts

State: Ohio

Number of sites: 228

Rotation: Corn Following Soybean

Nitrogen Price (\$/lb): 0.40

Corn Price (\$/bu): 4.17

Price Ratio: 0.10

MRTN Rate (lb N/acre): 182

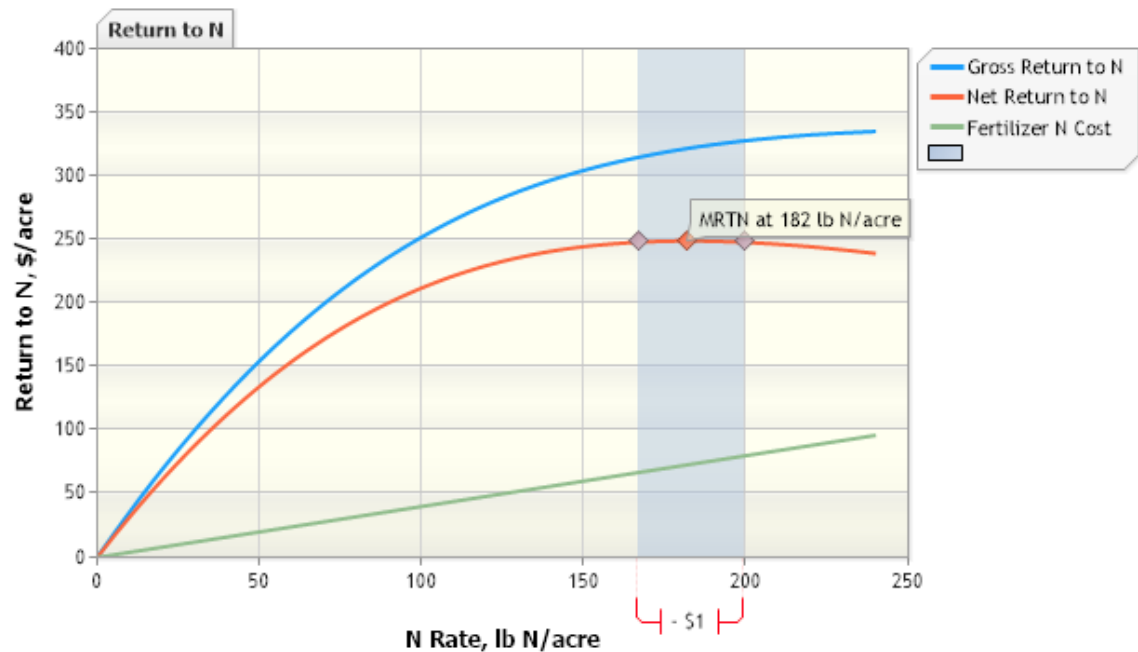
Profitable N Rate Range (lb N/acre): 166 - 199

Net Return to N at MRTN Rate (\$/acre): \$248.82

Percent of Maximum Yield at MRTN Rate: 98%

2021

Urea (45% N) at MRTN Rate (lb product/acre): 404  
Urea (45% N) Cost at MRTN Rate (\$/acre): \$72.80



## Rates and Charts

State: Ohio

Number of sites: 228

Rotation: Corn Following Soybean

Nitrogen Price (\$/lb): 0.91

Corn Price (\$/bu): 5.50

Price Ratio: 0.17

MRTN Rate (lb N/acre): 151

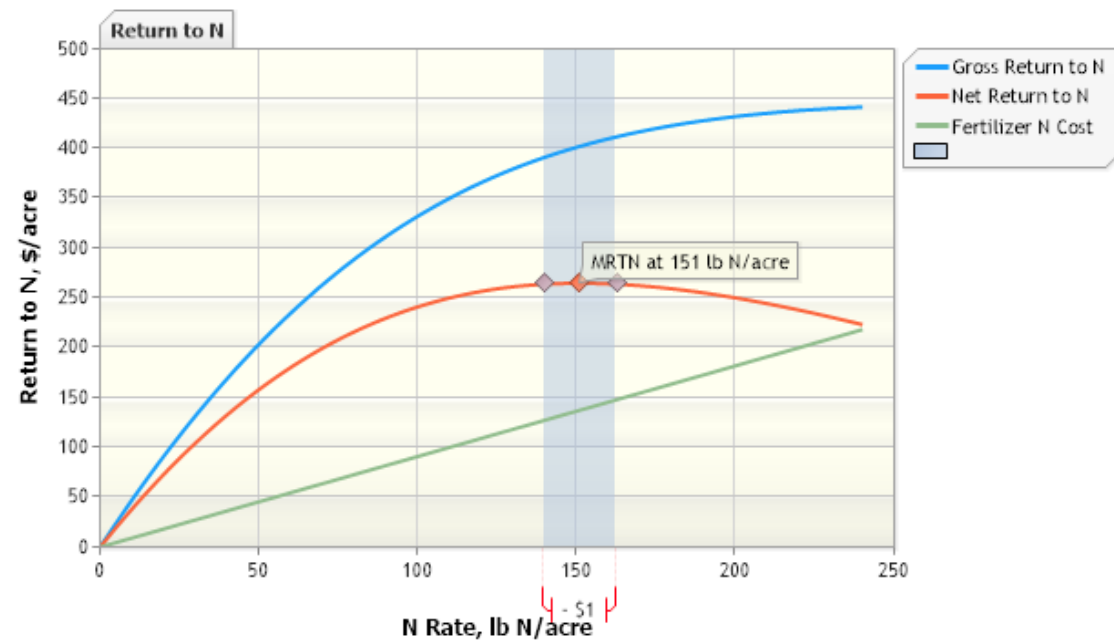
Profitable N Rate Range (lb N/acre): 139 - 162

Net Return to N at MRTN Rate (\$/acre): \$264.88

Percent of Maximum Yield at MRTN Rate: 96%

2022

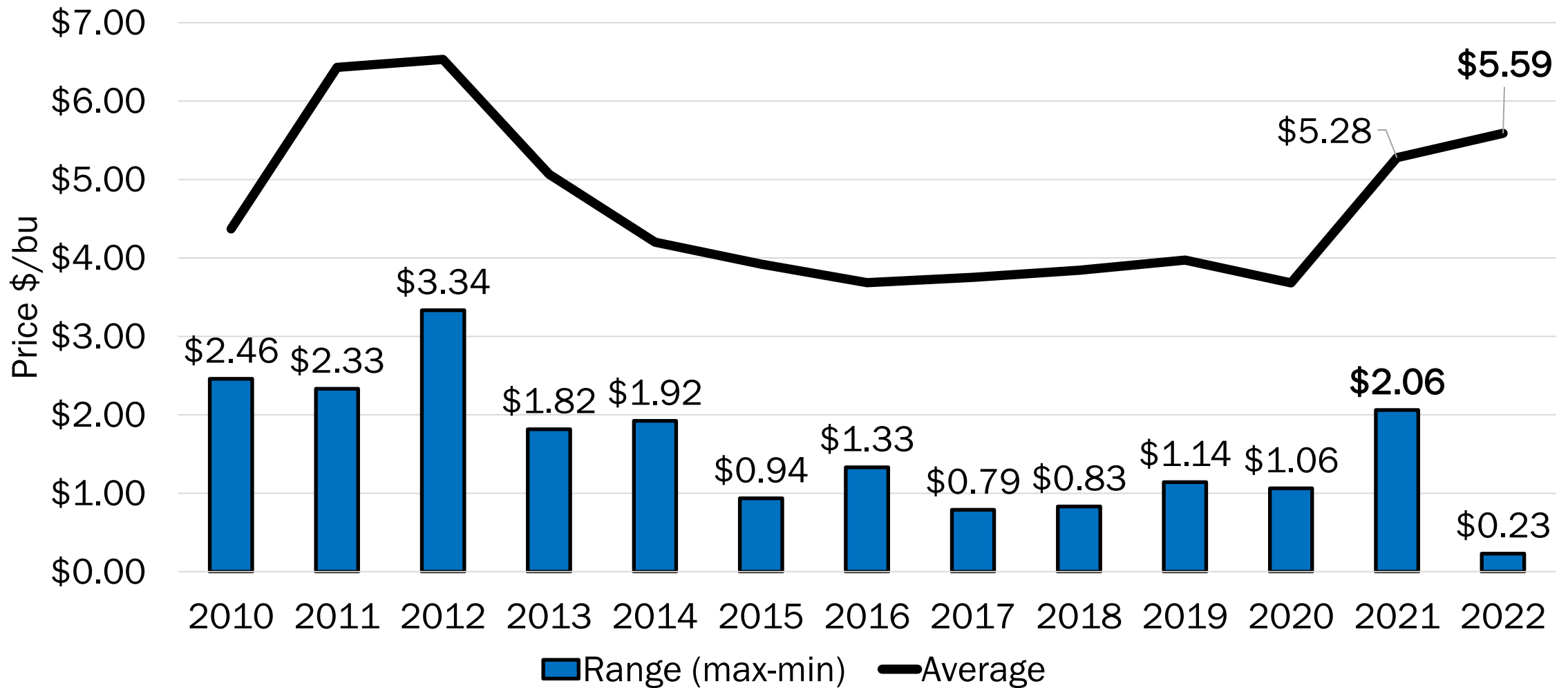
Urea (45% N) at MRTN Rate (lb product/acre): 335  
Urea (45% N) Cost at MRTN Rate (\$/acre): \$137.41



# Need for Risk Management

- For producers, there are more risk management tools available to manage output price risk than input price risk.
- Risk management tools need to be utilized this fall/winter to avoid potential catastrophic outcomes.

# Corn Average December Futures Price and Price Range (Max-Min), January to Contract Expiration plus USDA MYA Price

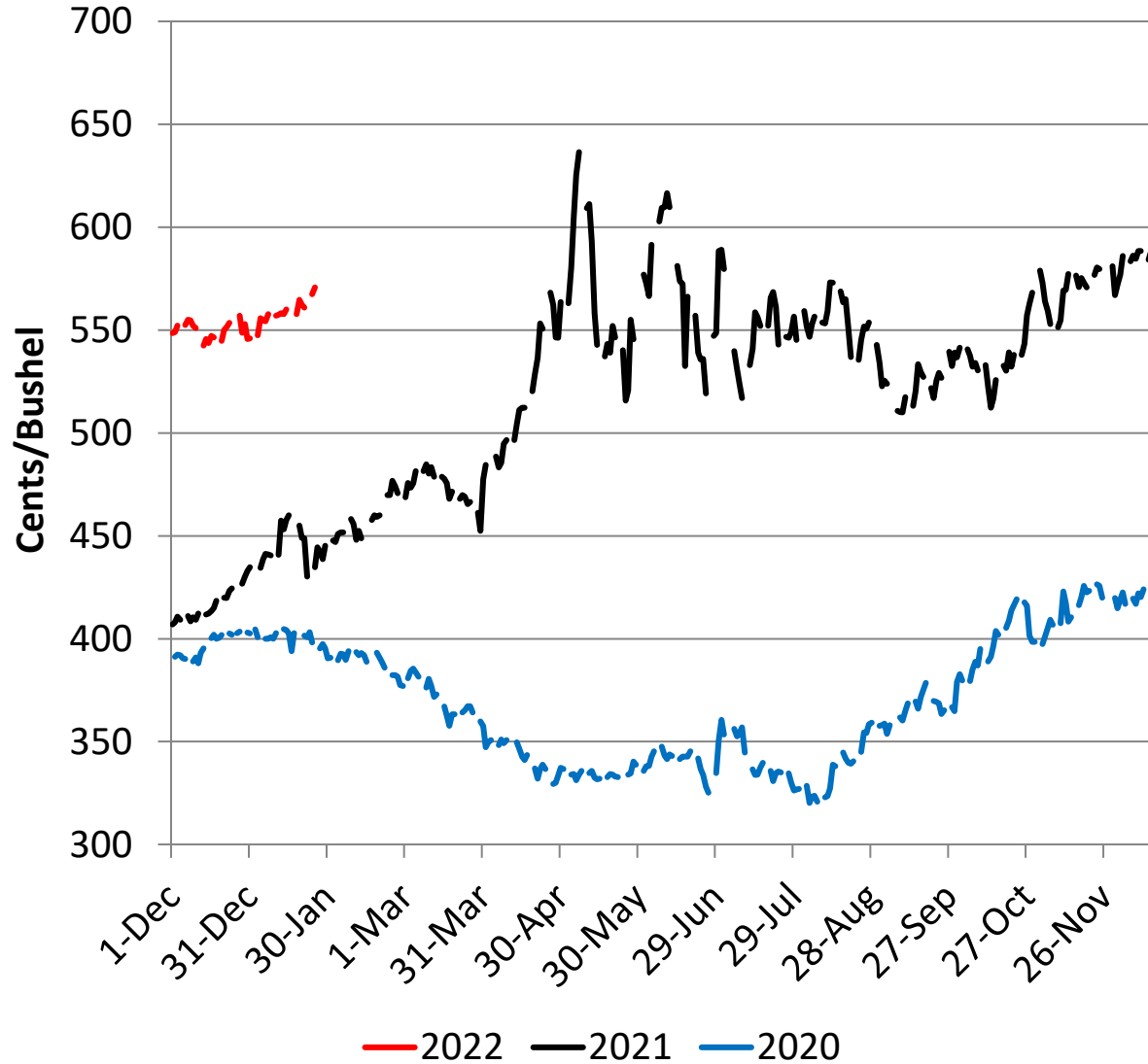


# What About Corn in 2022?

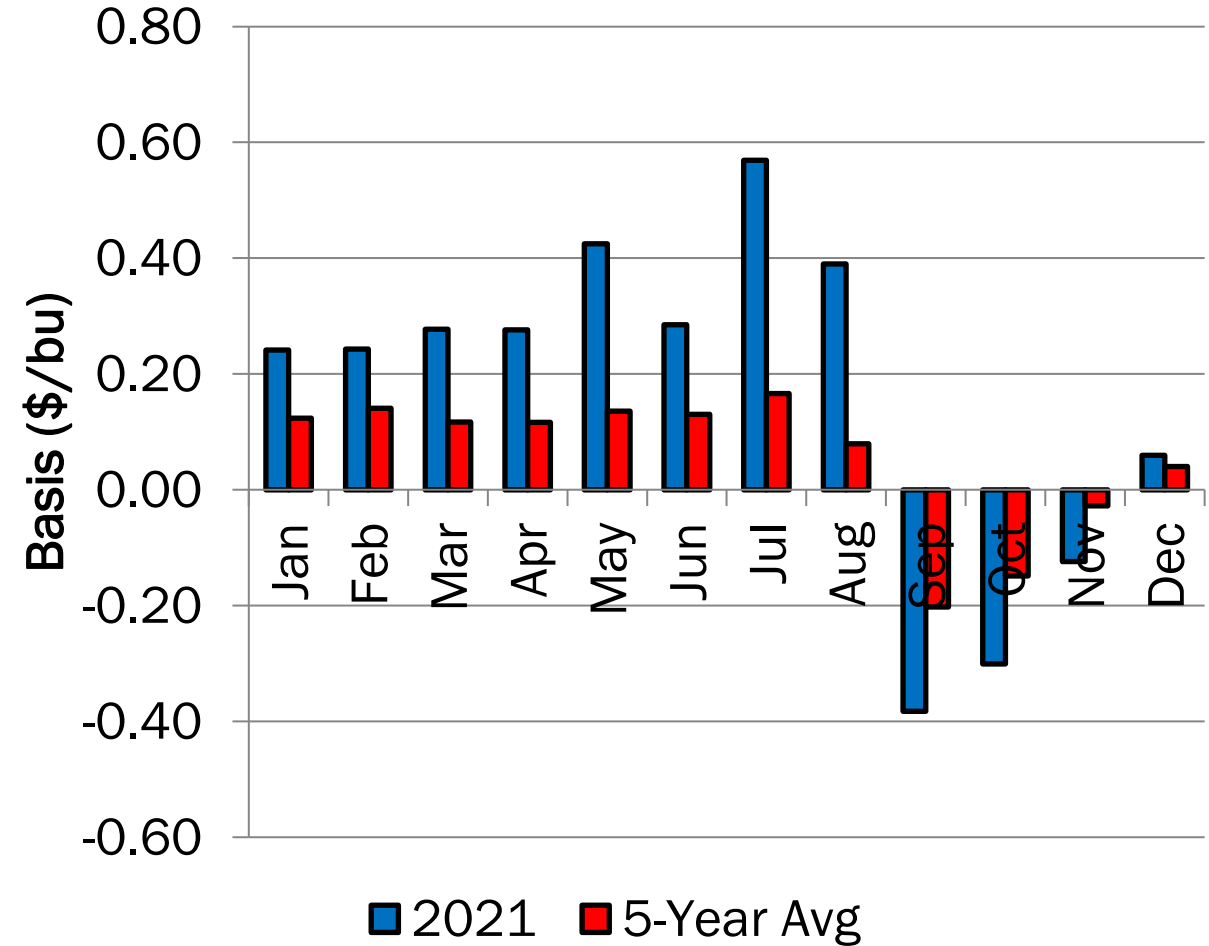


- December 2022 contract average since January 1 = **\$5.59**
- 2021 Range of \$2.06
- +/- \$1.03
- +/- \$2.06

### December Corn Futures



### Tennessee Average Monthly Corn Basis (Elevators and Barge Points), 5-Year Average and 2021





## 2022 Corn, No-Till, Non-Irrigated Budget

	<u>Unit</u>	<u>Quantity</u>	<u>Price</u>	<u>Total</u>
<b>Revenue<sup>1</sup></b>		<b>Gross Revenue (\$/Acre)</b>		
Corn	Bu/acre	180	\$5.65	\$1,017.00
		<b>Total Revenue</b>		<b>\$1,017.00</b>
<b>Variable Expenses</b>				
Seed <sup>2</sup>	Thous.	32	\$3.65	\$116.80
Fertilizer & Lime (Table 1)	Acre	1	\$328.63	\$328.63
Chemical (Table 2)	Acre	1	\$64.79	\$64.79
Crop Scout or Consultant	Acre	1	\$15.00	\$15.00
Repair & Maintenance (Table 3)	Acre	1	\$43.89	\$43.89
Fuel, Oil & Filter (Table 3)	Acre	1	\$19.66	\$19.66
Operator Labor (Table 3)	Acre	1	\$13.98	\$13.98
Crop Insurance <sup>6</sup>	Acre	1	\$15.91	\$15.91
Operating Interest <sup>7</sup>	%	\$618.66	4.35%	\$13.46
		<b>Total Variable Expenses</b>		<b>\$632.12</b>
		<b>Return Above Variable Expenses</b>		<b>\$384.88</b>
<b>Fixed Expenses</b>				
Machinery				
Capital Recovery (Table 3)	Acre	1	\$103.81	\$103.81
General Overhead	Acre	1	\$20.00	\$20.00
Cash Rent <sup>8</sup>	Acre	1	\$170.00	\$170.00
Management Labor	Acre	1	\$25.00	\$25.00
		<b>Total Fixed Expenses</b>		<b>\$318.81</b>
		<b>Total Expenses</b>		<b>\$950.93</b>
		<b>Return Above Specified Expenses</b>		<b>\$66.07</b>

# What do you have invested in the crop?

## Year-Over-Year Increase in Expenses

Corn: Up 31-39%  
Cotton: Up 21-27%  
Soybeans: Up 18-29%

# Corn - Net Return Table (\$/acre): \$950/acre COP

		Yield (bu/acre)										
		150	160	170	180	190	200	210	220	230	240	250
Price (\$/bu)	3.25	(463)	(431)	(398)	(366)	(333)	(301)	(268)	(236)	(203)	(171)	(138)
	3.50	(426)	(391)	(356)	(321)	(286)	(251)	(216)	(181)	(146)	(111)	(76)
	3.75	(388)	(351)	(313)	(276)	(238)	(201)	(163)	(126)	(88)	(51)	(13)
	4.00	(351)	(311)	(271)	(231)	(191)	(151)	(111)	(71)	(31)	9	49
	4.25	(313)	(271)	(228)	(186)	(143)	(101)	(58)	(16)	27	69	112
	4.50	(276)	(231)	(186)	(141)	(96)	(51)	(6)	39	84	129	174
	4.75	(238)	(191)	(143)	(96)	(48)	(1)	47	94	142	189	237
	5.00	(201)	(151)	(101)	(51)	(1)	49	99	149	199	249	299
	5.25	(163)	(111)	(58)	(6)	47	99	152	204	257	309	362
	5.50	(126)	(71)	(16)	39	94	149	204	259	314	369	424
	5.75	(88)	(31)	27	84	142	199	257	314	372	429	487
	6.00	(51)	9	69	129	189	249	309	369	429	489	549
	6.25	(13)	49	112	174	237	299	362	424	487	549	612
	6.50	24	89	154	219	284	349	414	479	544	609	674
	6.75	62	129	197	264	332	399	467	534	602	669	737
	7.00	99	169	239	309	379	449	519	589	659	729	799

When  
am I  
making  
money?

		2022	2021
Price of Corn		\$5.65	\$4.40
Variable	Seed	20.7	24.0
	<b>Fertilizer &amp; Lime</b>	<b>56.4</b>	<b>33.7</b>
	Chemical	11.5	13.9
	Consultant	2.7	2.3
	R&M	7.8	9.5
	Fuel, Oil & Filter	3.5	3.5
	Operator Labor	2.5	2.6
	Crop Insurance	2.8	2.5
	Operating Interest	2.3	2.1
Total Variable Expenses		110.0	94.2
Fixed	Capital Recovery	18.4	22.7
	General Overhead	3.5	0.0
	Cash Rent	18.4	22.0
	Management Labor	4.4	4.1
Total Fixed Expenses		44.7	48.8
Total Expenses		154.8	143.0
Bushels Above Specified Expenses		20.2	32.0

## # of Bushels to Cover Specified Expenses

- Price risk management or sales to offset production costs for specified expense categories.
- Example:
  - 500 acres of corn x 56.4 bu/acre to cover fertilizer expense = 28,200 bushels (32% of anticipated production @ 175 bu/acre).
- Avoid exchanging price risk for production risk.
- Price risk management and final cash sales are not the same.
- Always adjust prices for basis.

# Risk Management Tools

- Crop insurance
  - Options
  - Futures
  - Contracts
  - Cash sales
  - Storage
- In the current market environment, options are a great alternative to remove downside price risk while maintaining upward price mobility.

## Example #1: Bridging Price Risk Gaps

- Buy a \$5.30 December 2022 put option for 31 cents, sets a \$4.99 per bushel futures price floor.
  - If Dec FC > \$5.30, then option has no intrinsic value.
  - If Dec FC < \$4.99, then value = \$4.99 - Dec FC
- Assuming a projected yield of 175 bu/acre
  - Provides a projected revenue floor(not accounting for basis) of \$873/acre (175 bu/acre x \$4.99).
  - \$950 - \$873 = \$77/acre, unprotected if yield is achieved.
- Cost for 500 acres
  - 175 bu acre x 500 = 87,500 bu
  - 87,500 x \$0.31 = \$27,125
- Remove 87% of the futures price risk (\$4.99/\$5.70)
- Can keep the put option or exit the position and recoup the time value of the put option.

# Concluding Thoughts

- Prices are strong, but volatility will continue, and there is downside price risk.
- Between now and planting, nobody knows definitively if input prices will be higher, the same, or lower than current prices.
- The risk profile has dramatically changed compared to recent years.
- If you are buying inputs, protect the value of the output through risk management.
- Inaction is a decision, usually not the correct one.



# Thank you

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