Market Outlook and Payments for Carbon Credits

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Take Home Message

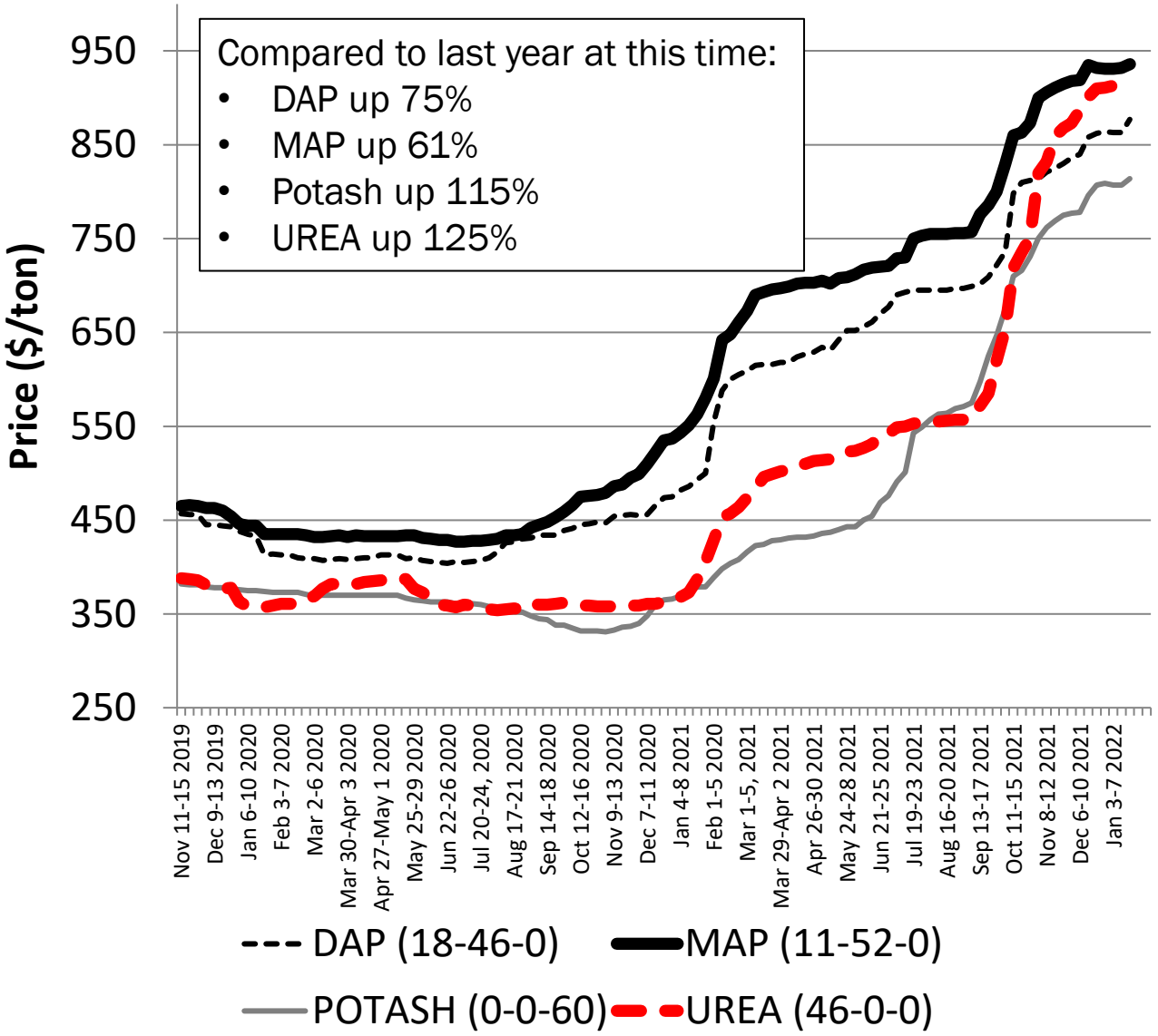
- Input prices are likely to remain high and availability may be a concern for some products.
- Commodity prices are high providing opportunities, but downside risk is a concern.
- Need to be thinking about profit maximizing decisions not yield or price maximizing.
- More aggressive with output price risk management in 2022.

Inputs Prices and Availability

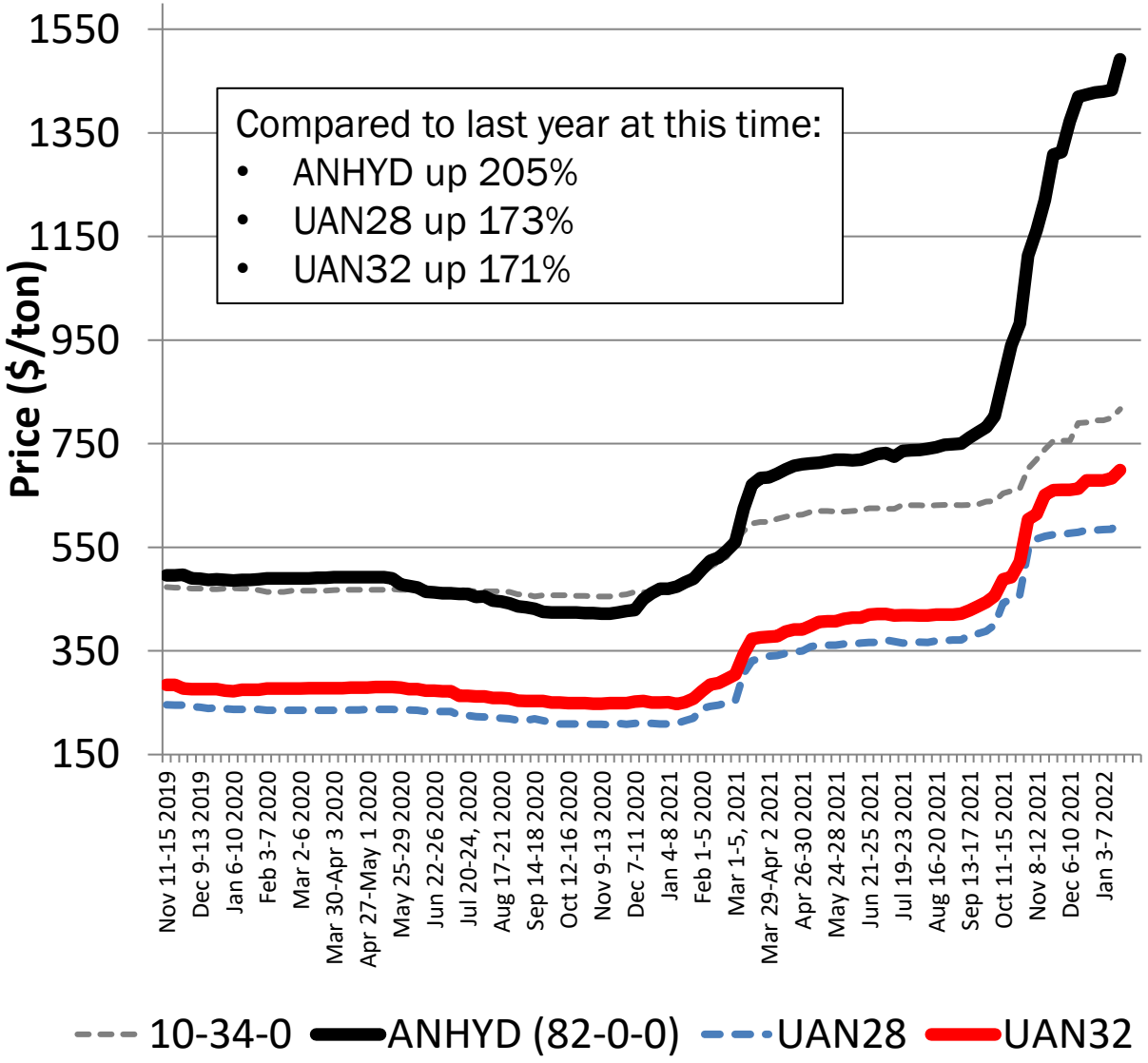
- Land prices and rents are up.
- Prices for most crop protection products and fertilizers are up substantially.
- Availability of inputs is currently a concern.
- Machinery costs are up.
- Labor shortages.
- Trucking and logistical issues.
  - Port delays.
  - 11 hour driving time?

- **Will prices be cheaper before they are needed in 2022?**

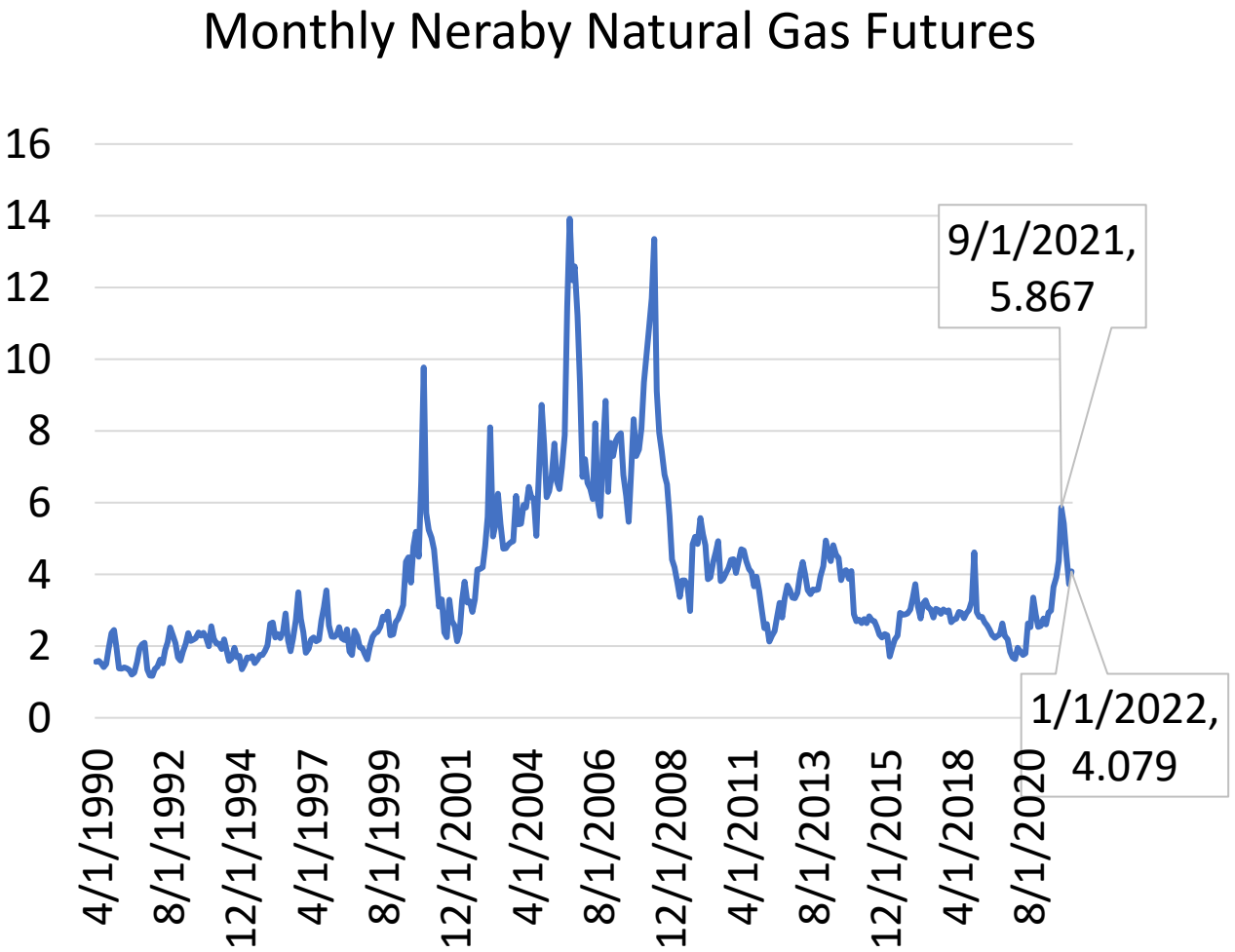
Dry Fertilizer Price, 2019-2022



Liquid Fertilizer Price, 2019-2021



Is There Hope For Lower Fertilizer Prices?



- 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.
- Texas A&M estimated an increased value in natural gas only accounted for about 15% of the increase in nitrogen fertilizer cost.
- **Lower natural gas prices should help with lowering nitrogen costs..... but there are a lot of other factors in fertilizer prices.**

Crop Share Arrangements

	2022	2021
Price ($/bu)	$5.65	$4.60
Yield (bu/acre)	180	180
Expenses (excluding land)	$771	$530
Revenue	$1,017	$828
1/4 Revenue Share	**$254**	**$207**
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.

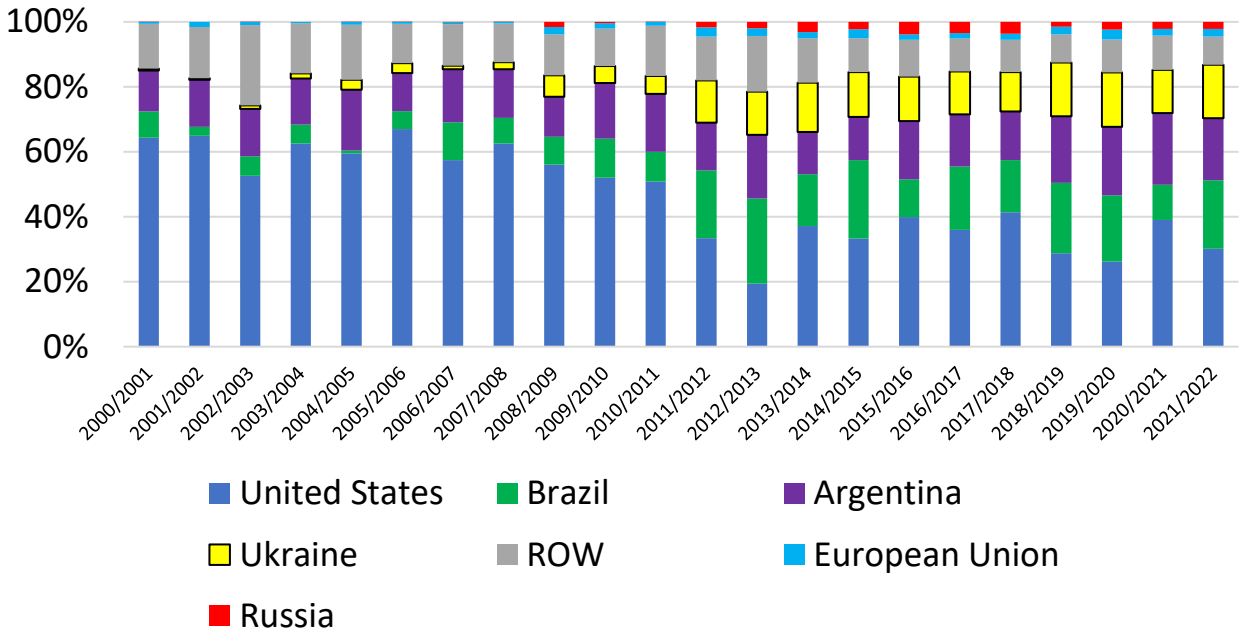
Reducing Input Costs

- Not an easy task and will require creativity.
  - Soil testing – know what you have.
  - Alternative nutrient sources – poultry litter, manure, other.
  - Eliminate products that are not contributing to sufficient yield gains relative to costs.
  - You will need a plan A, B, C…. If “typical” inputs are not available.
  - Crop rotation.
    - High input cost versus low input cost commodities.
    - Profitability comparison and mange price risk.
  - Crop share leases – balance the risk/reward.
  - Maximum Return to Nitrogen (MRTN).
  - Protect output prices / manage the margin.

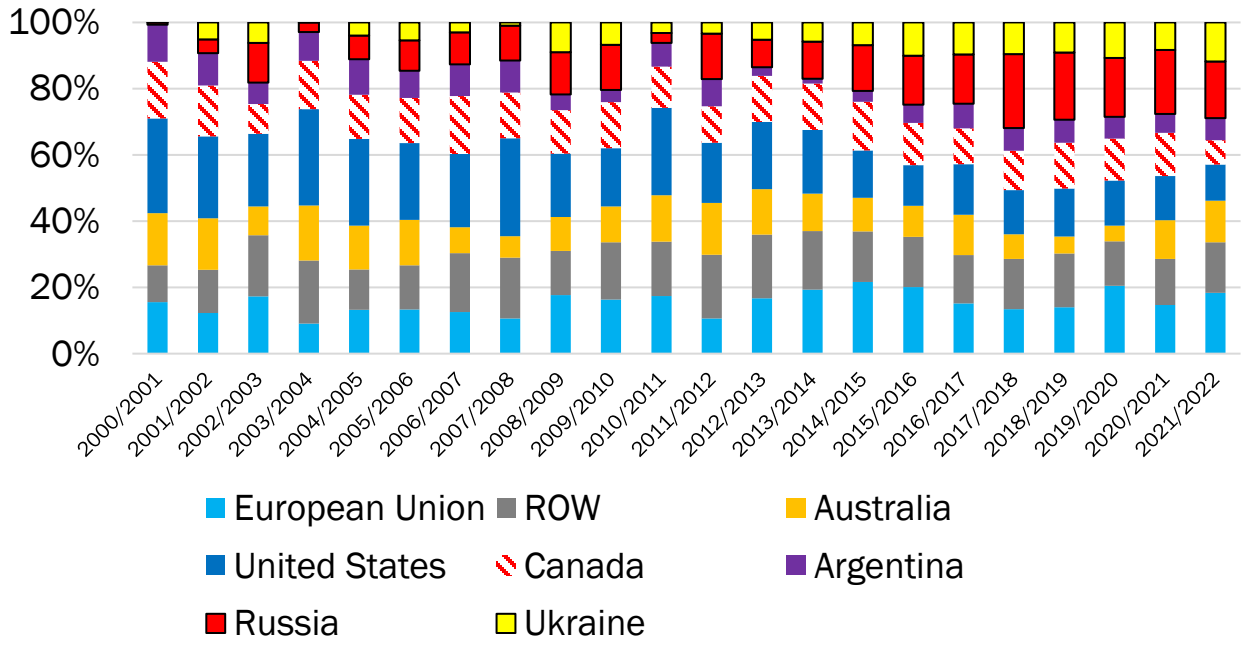
Corn and Soybeans

PRICES, SUPPLY, AND DEMAND

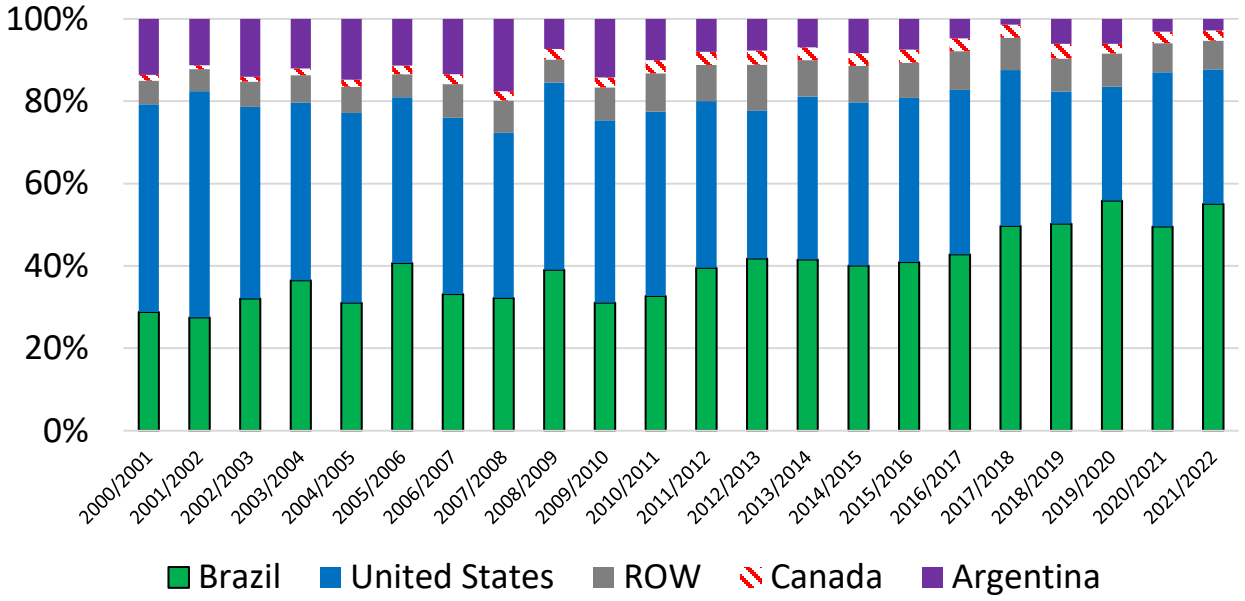
Share of Global **Corn** Exports, 2000-2021



Share of Global **Wheat** Exports, 2000-2021

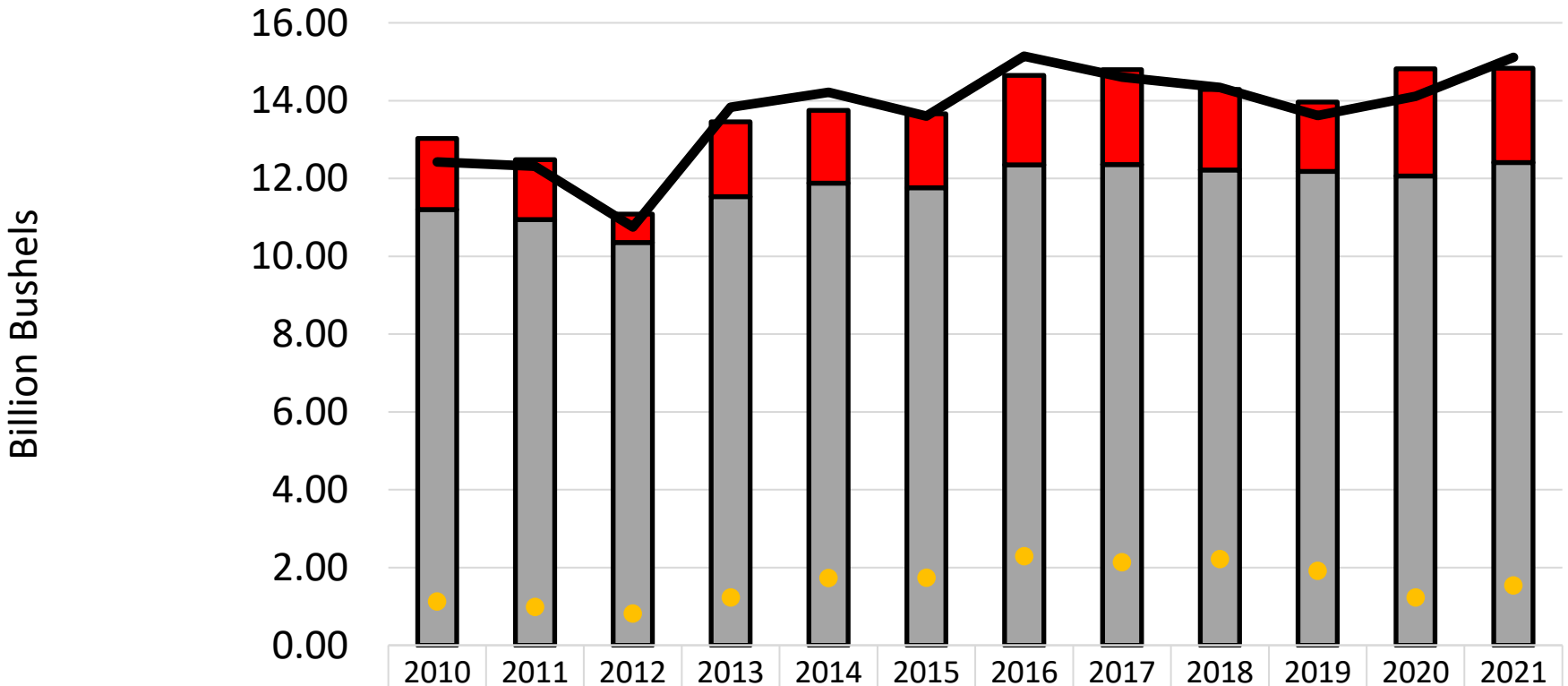


Share of Global **Soybean** Exports, 2000-2021



- Global influences on grain markets in Q1 2022.
  - Ukraine-Russia
  - S.A. Drought
  - China purchases

US Corn Supply and Demand, 2010-2021



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Exports	1.83	1.54	0.73	1.92	1.87	1.90	2.30	2.44	2.07	1.78	2.75	2.42
Domestic Consumption	11.20	10.94	10.35	11.53	11.88	11.76	12.35	12.36	12.22	12.19	12.07	12.41
Production	12.43	12.31	10.76	13.83	14.22	13.60	15.15	14.61	14.34	13.62	14.11	15.12
Ending Stocks	1.13	0.99	0.82	1.23	1.73	1.74	2.29	2.14	2.22	1.92	1.23	1.54

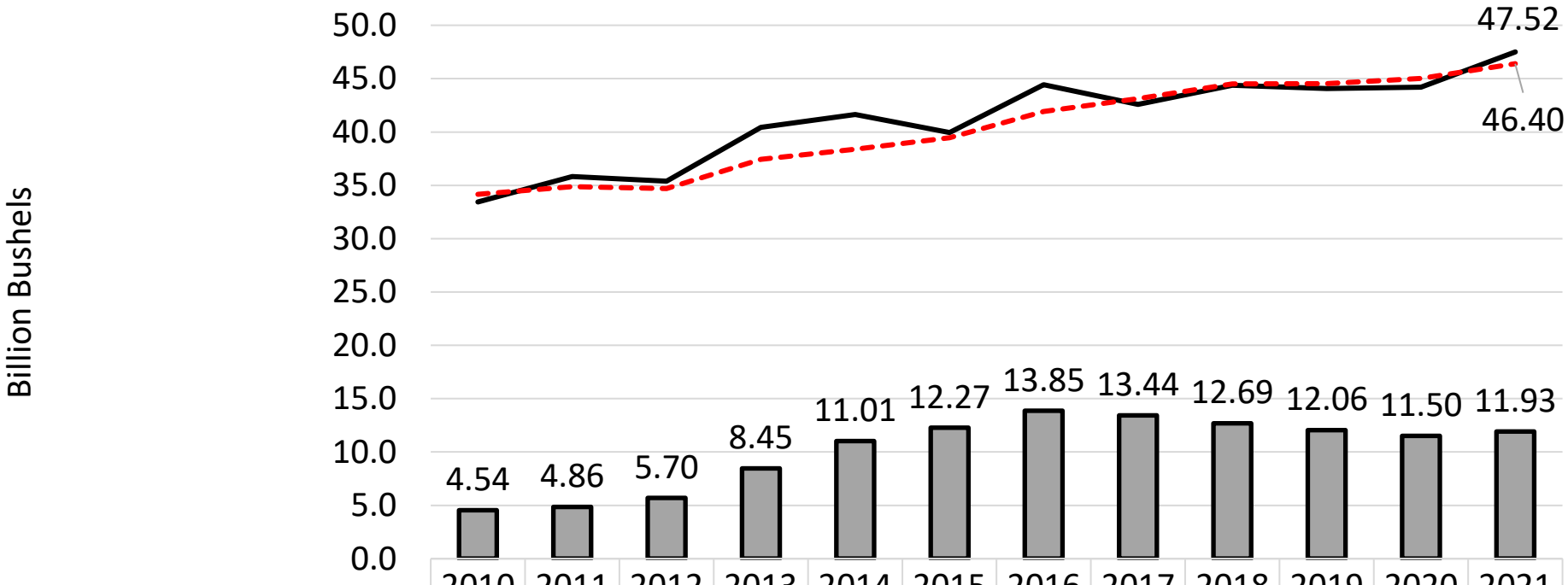
Export demand will be key in 2022.

Stocks-to-use is projected at 10.4% up from 8.3% at the end of the 2020/21 MY.

Ethanol use has returned to near pre-pandemic levels.

Planted acres in 2022?

Global Corn Supply and Demand, 2010-2021



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Ending Stocks	4.54	4.86	5.70	8.45	11.01	12.27	13.85	13.44	12.69	12.06	11.50	11.93
Production	33.44	35.84	35.38	40.45	41.64	39.96	44.43	42.58	44.39	44.08	44.20	47.52
Domestic Consumption	34.16	34.88	34.71	37.43	38.39	39.46	41.92	43.13	44.52	44.53	45.03	46.40

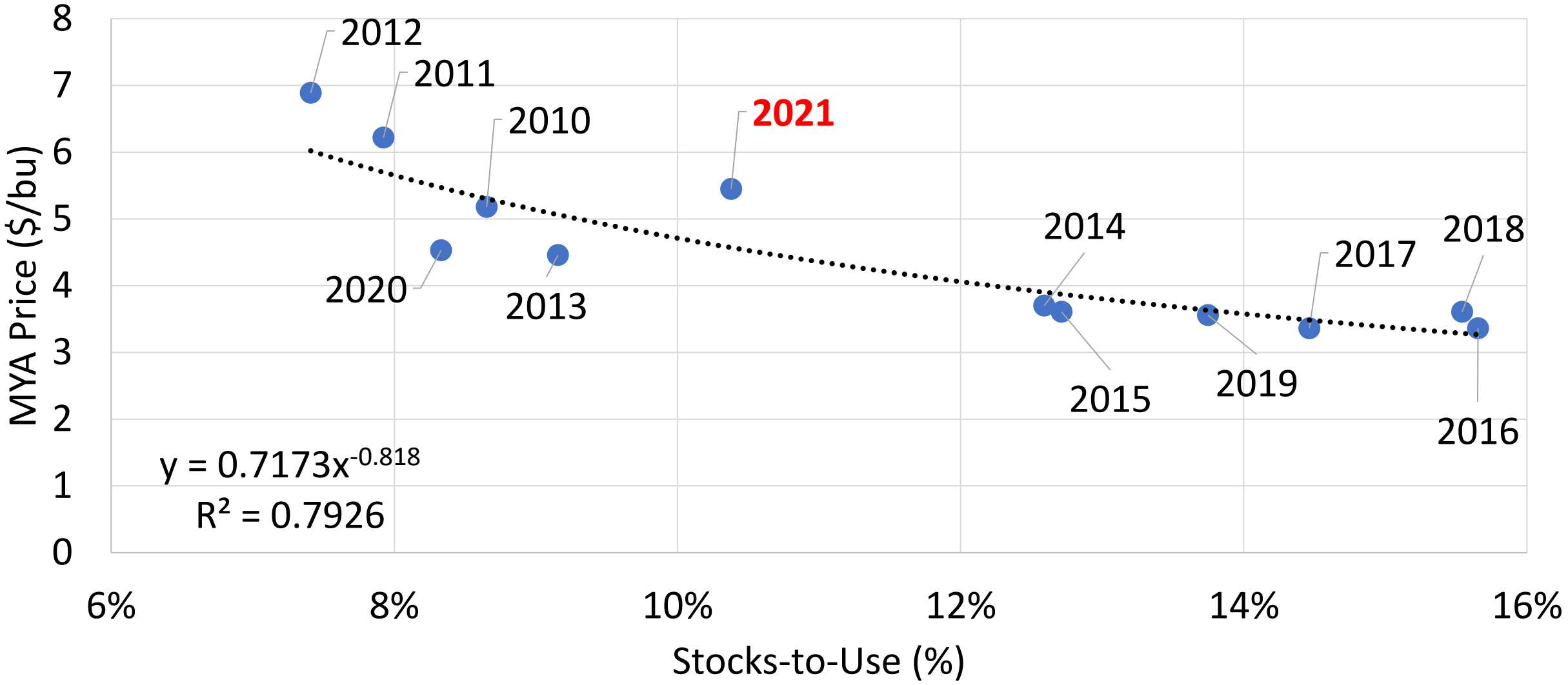
Brazil second crop corn in 2022.

Chinese export purchases.

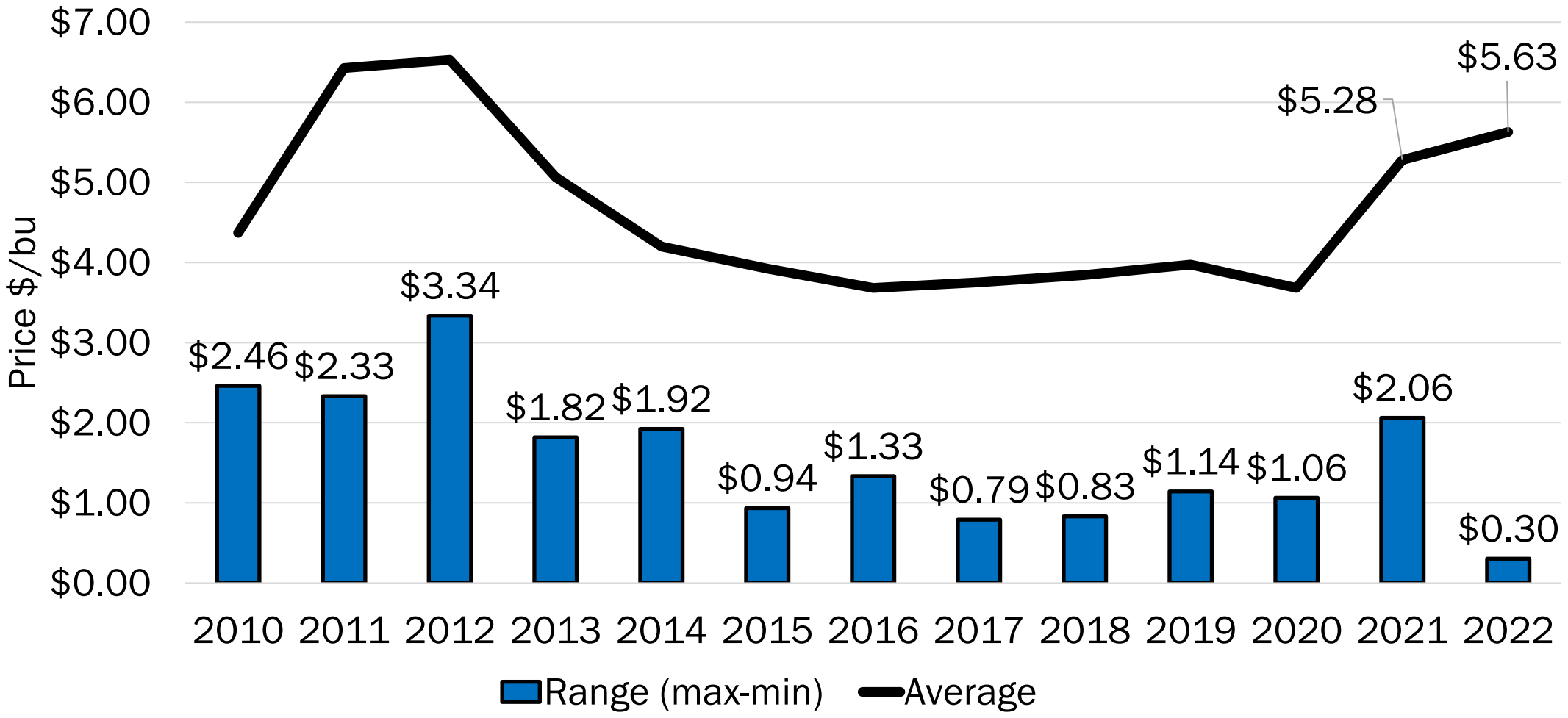
US planted acres.

Trend line yields with high fertilizer prices?

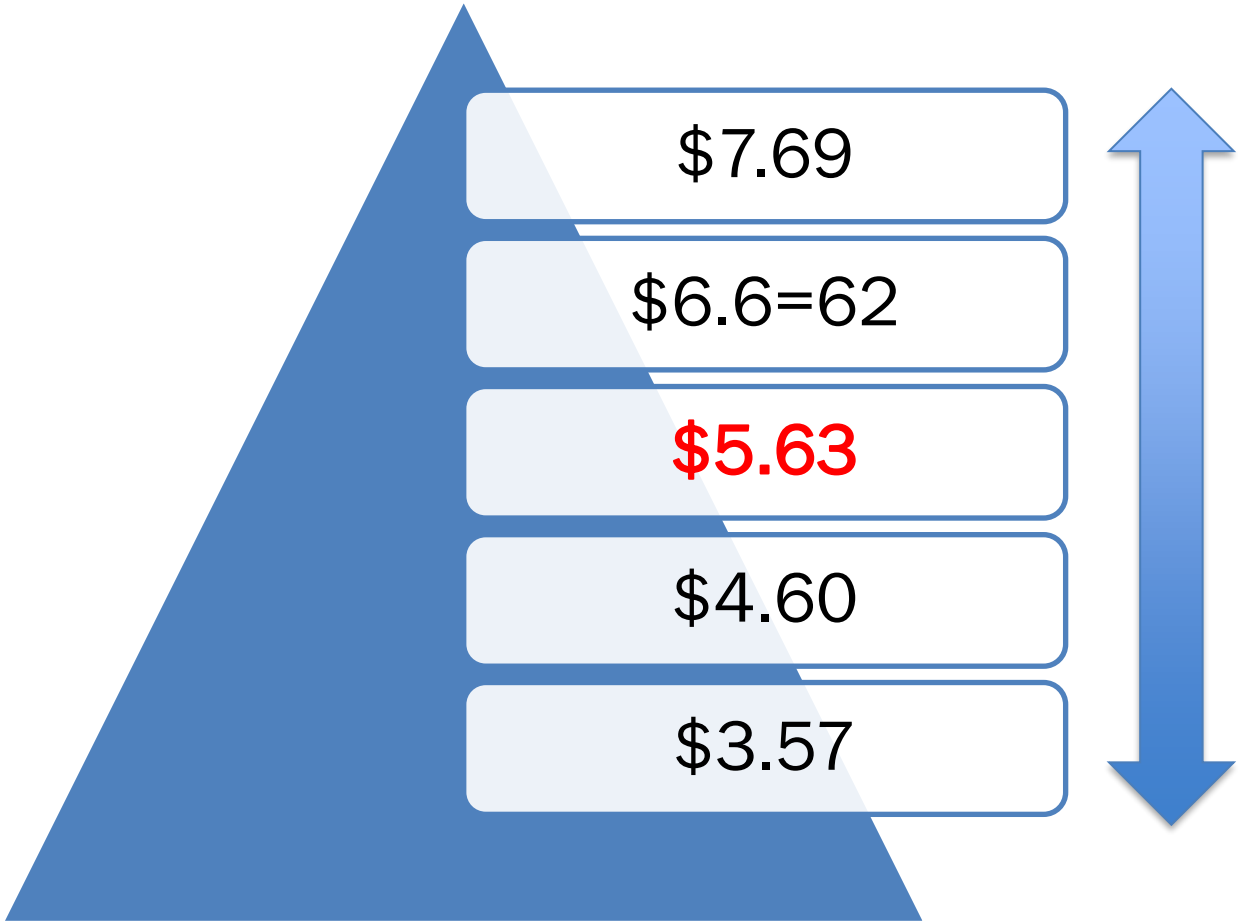
U.S. Corn Stocks-to-Use and Price Relationship, 2010-2021



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

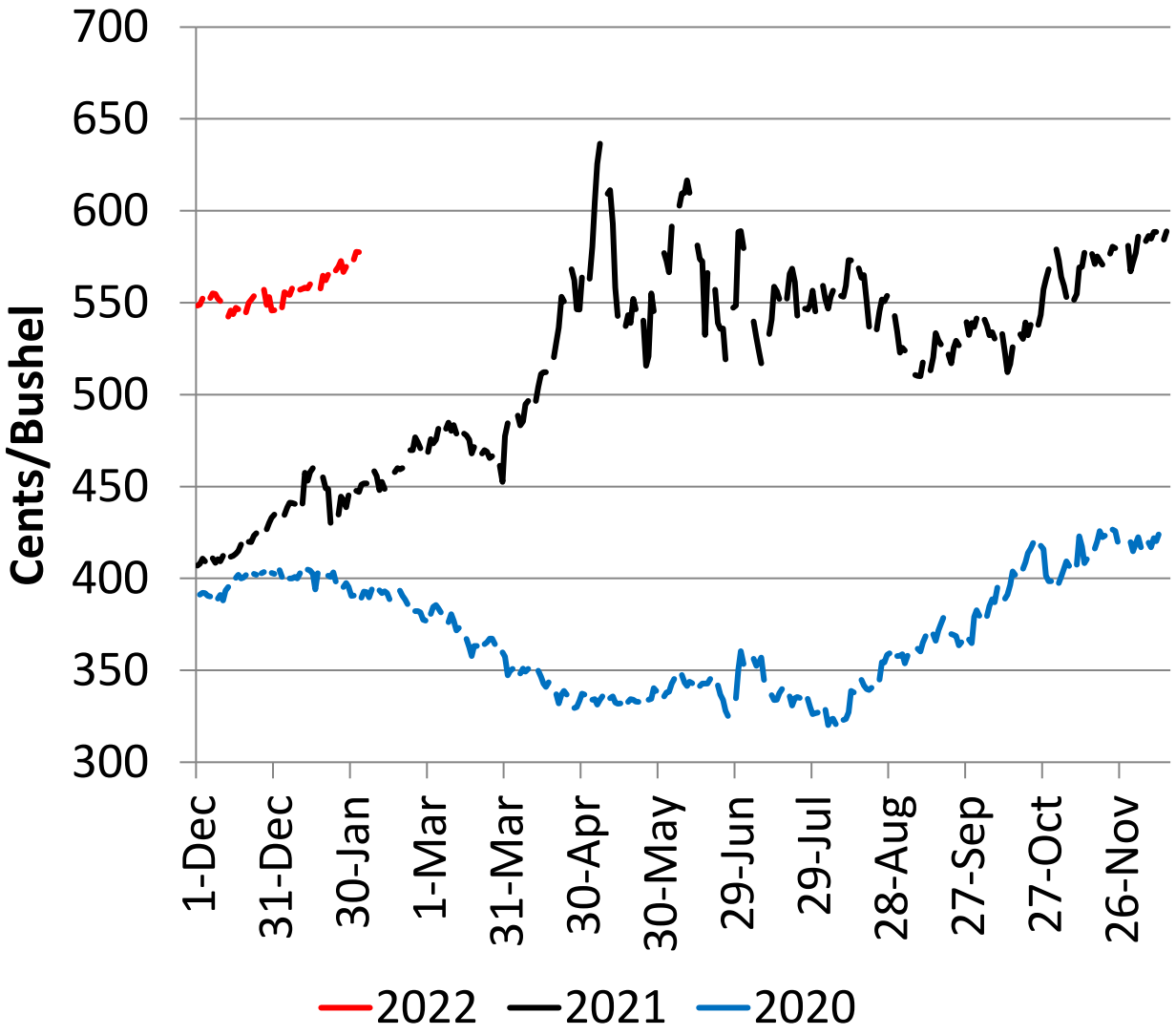


What About Corn in 2022?

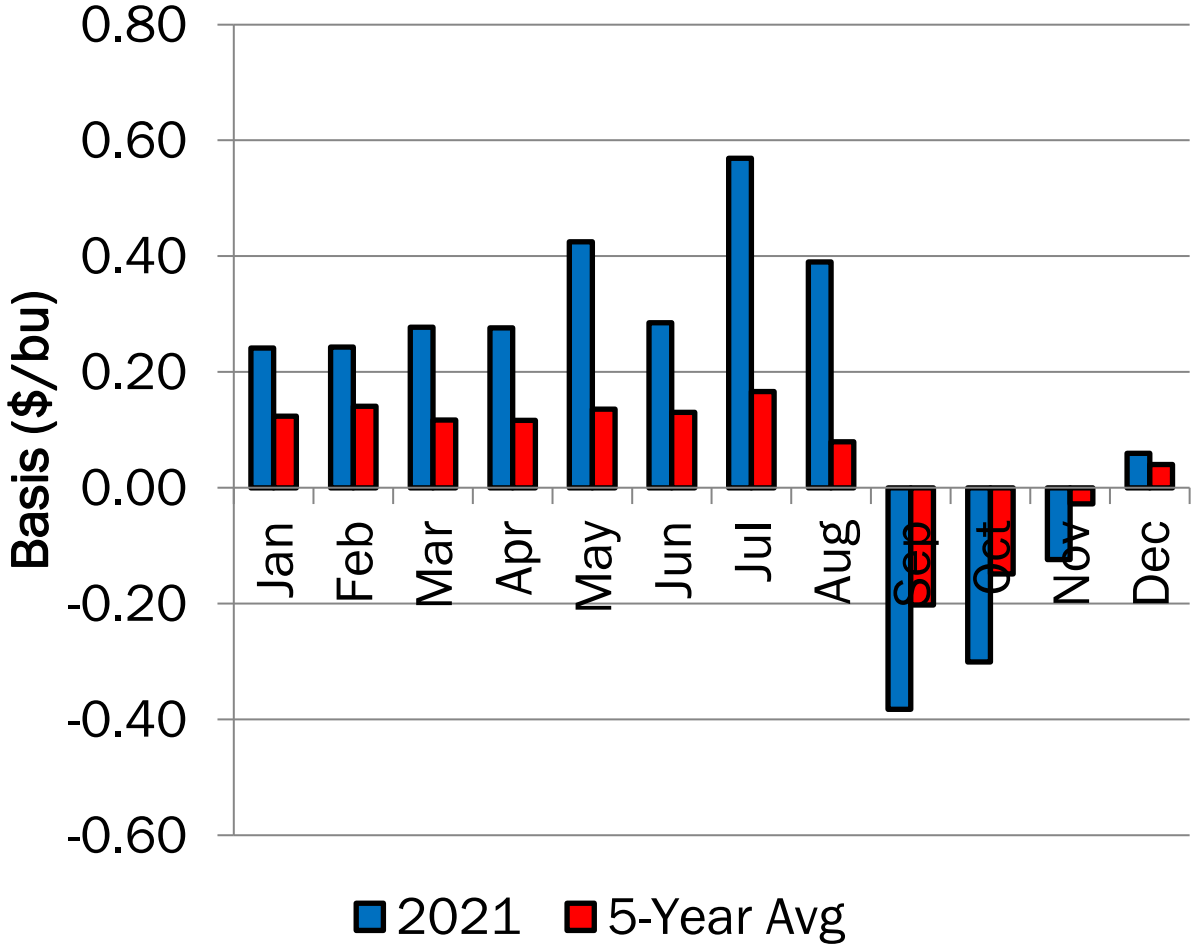


- December 2022 contract average since January 1 = **$5.63**
- 2021 Range of $2.06
- +/- $1.03
- +/- $2.06

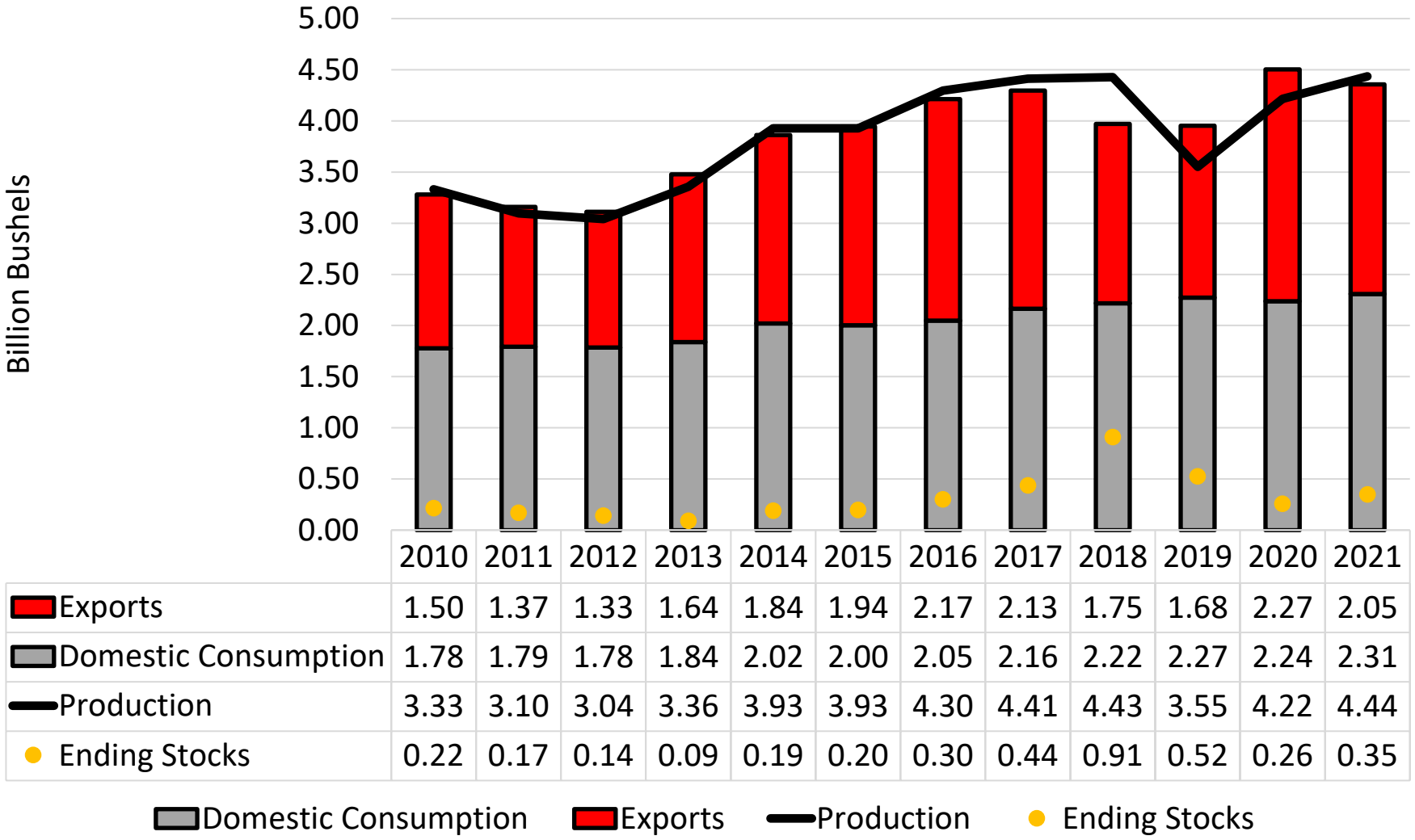
December Corn Futures



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



US Soybean Supply and Demand, 2010-2021



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Exports	1.50	1.37	1.33	1.64	1.84	1.94	2.17	2.13	1.75	1.68	2.27	2.05
Domestic Consumption	1.78	1.79	1.78	1.84	2.02	2.00	2.05	2.16	2.22	2.27	2.24	2.31
Production	3.33	3.10	3.04	3.36	3.93	3.93	4.30	4.41	4.43	3.55	4.22	4.44
Ending Stocks	0.22	0.17	0.14	0.09	0.19	0.20	0.30	0.44	0.91	0.52	0.26	0.35

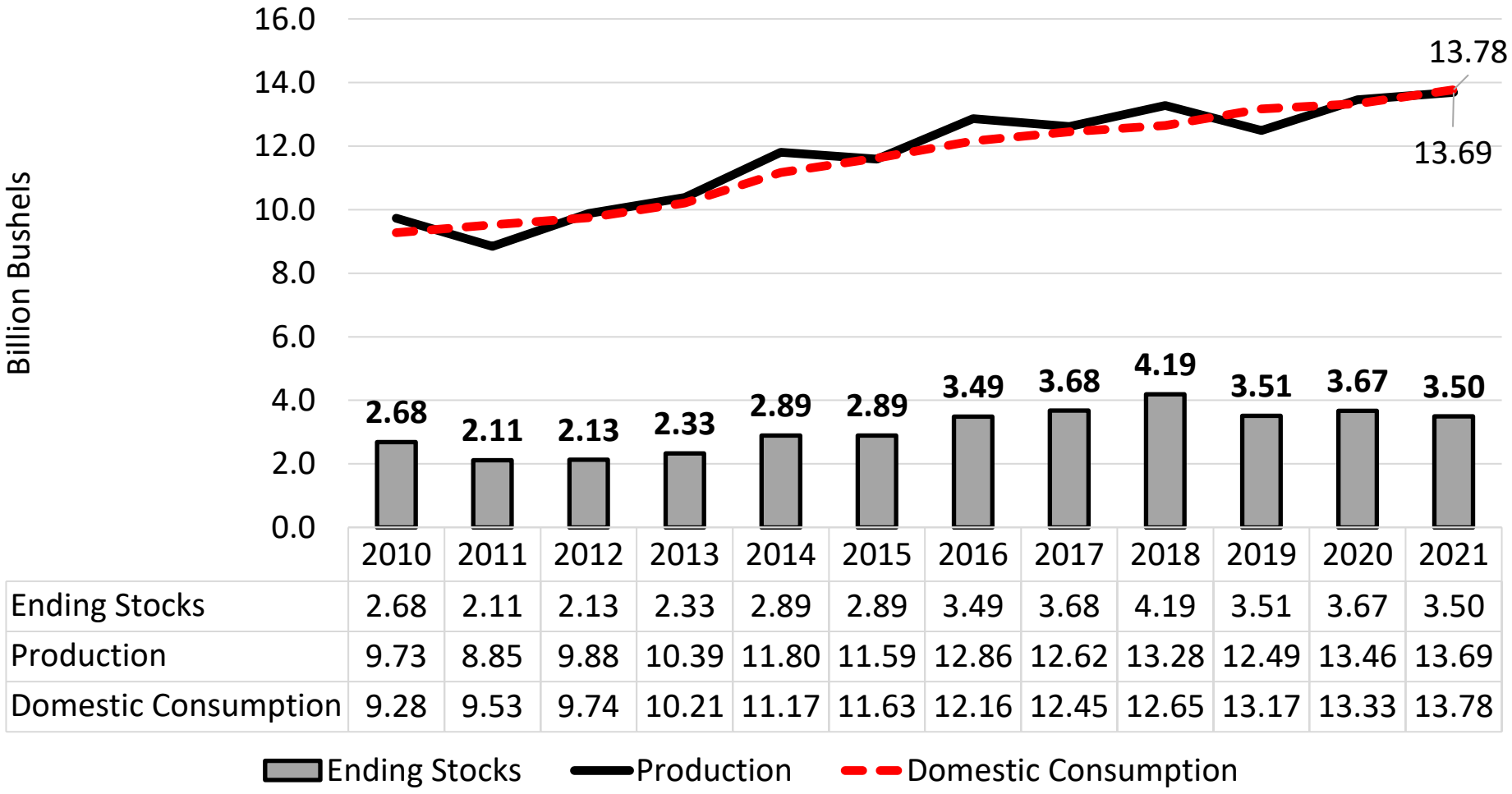
Next 2 months will be key to determine SA production and global supplies.

Stocks-to-use is projected at 8.0% up from 5.7% at the end of the 2020/21 MY.

Biodiesel / domestic crush demand very strong – crush margins are almost double historical levels.

Planted acres in 2022?

Global Soybean Supply and Demand, 2010-2021



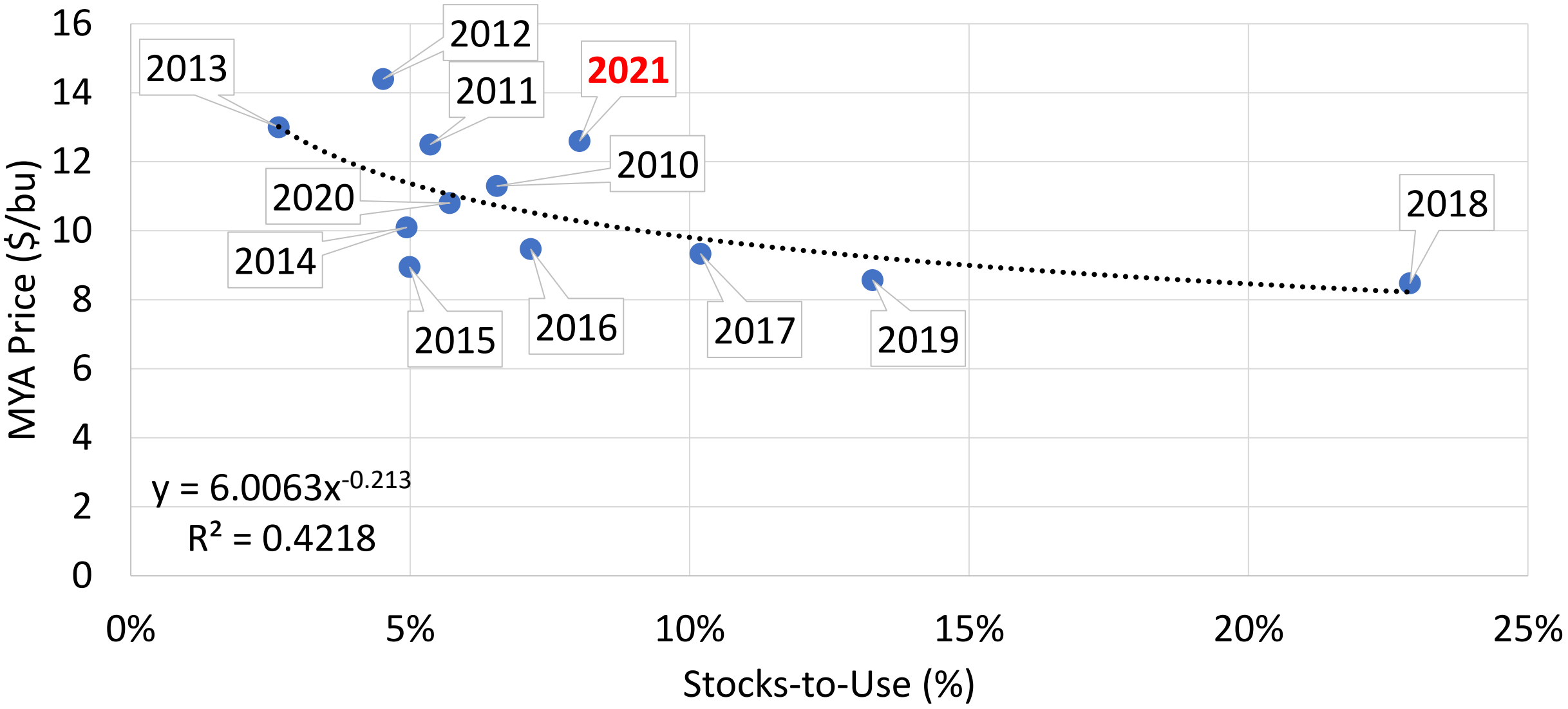
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Ending Stocks	2.68	2.11	2.13	2.33	2.89	2.89	3.49	3.68	4.19	3.51	3.67	3.50
Production	9.73	8.85	9.88	10.39	11.80	11.59	12.86	12.62	13.28	12.49	13.46	13.69
Domestic Consumption	9.28	9.53	9.74	10.21	11.17	11.63	12.16	12.45	12.65	13.17	13.33	13.78

South American production will dictate price direction for the first quarter of 2022.

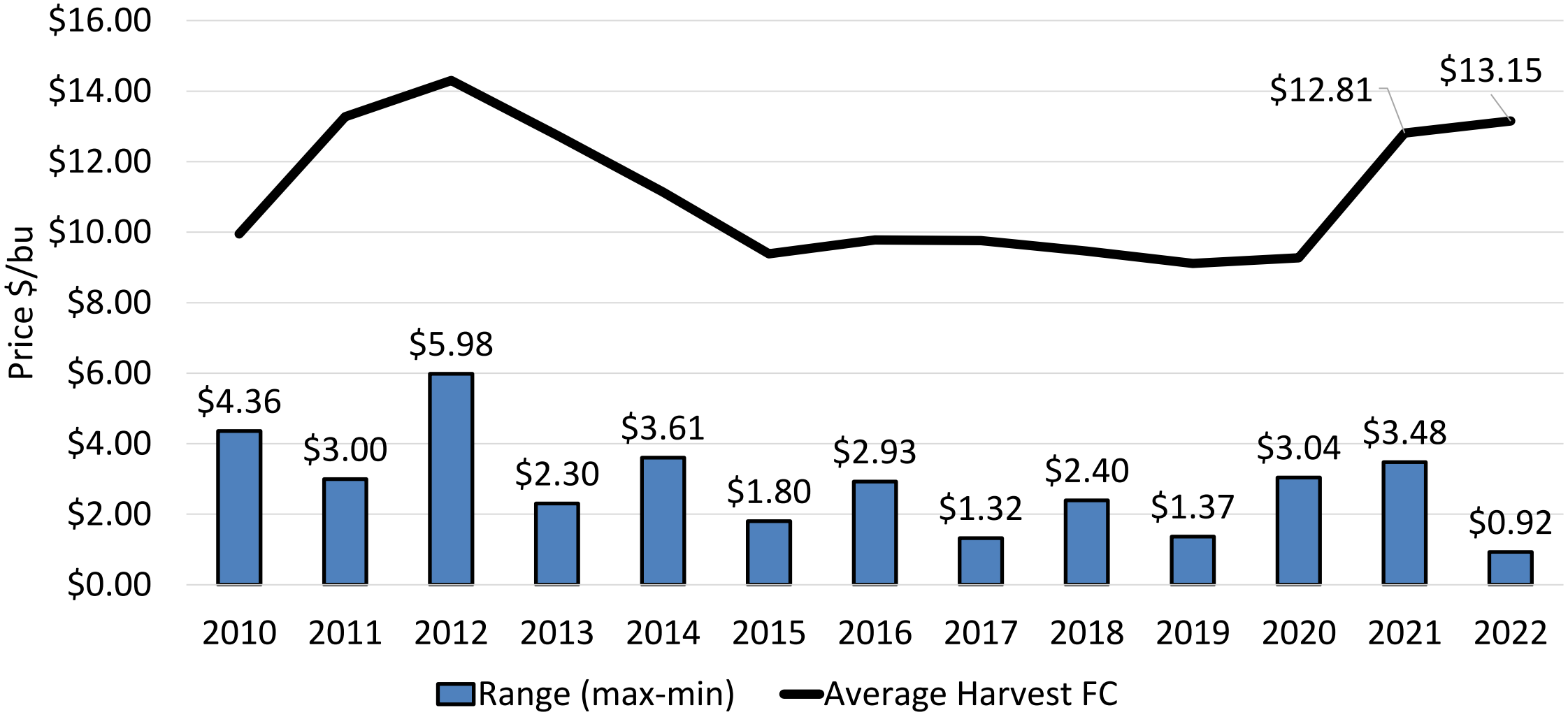
Chinese demand will continue. The question is how much do they source from SA versus NA.

What is the future for Biodiesel?

U.S. Soybean Stocks-to-Use and Price Relationship, 2010-2021

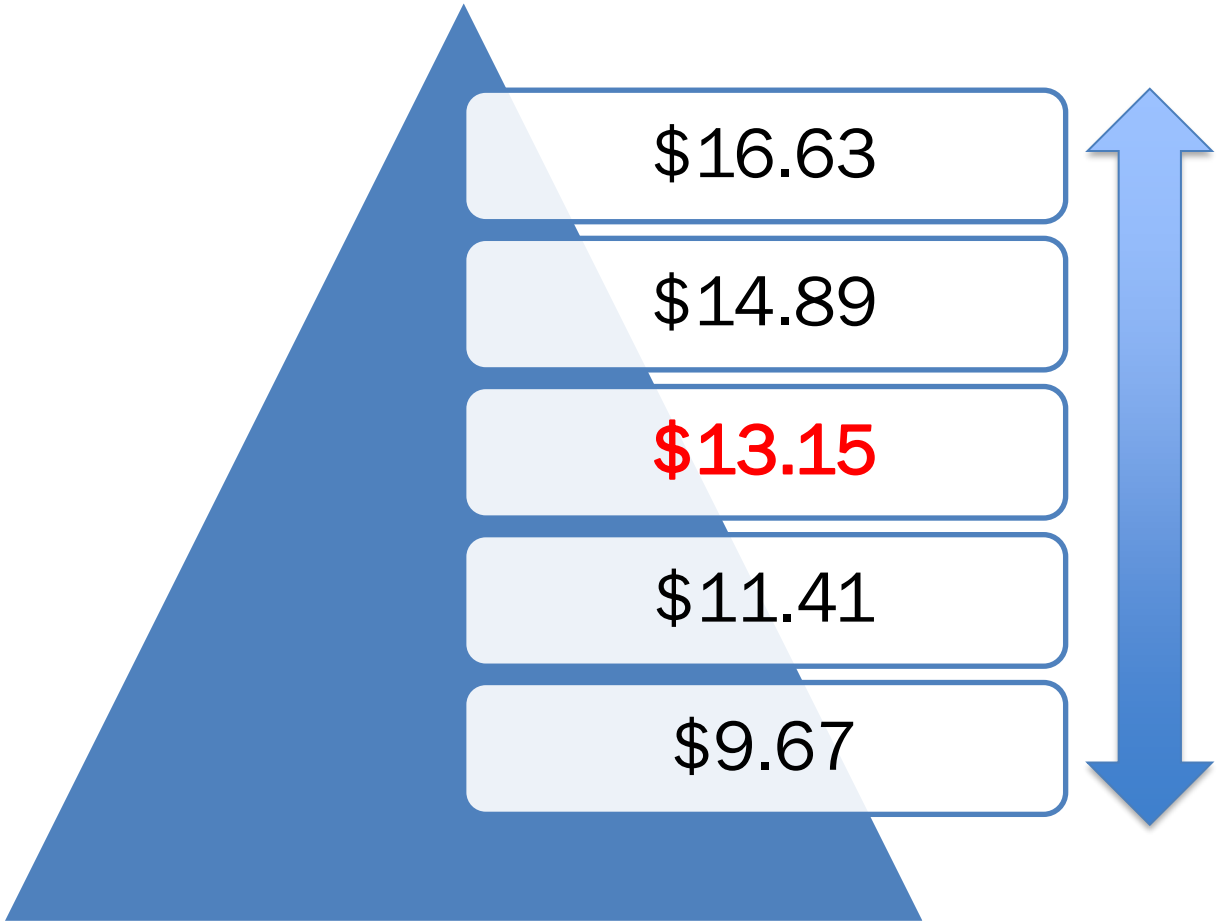


Soybean Average November Futures Price and Price Range (Max-Min), January to Contract Expiration plus USDA MYA Price



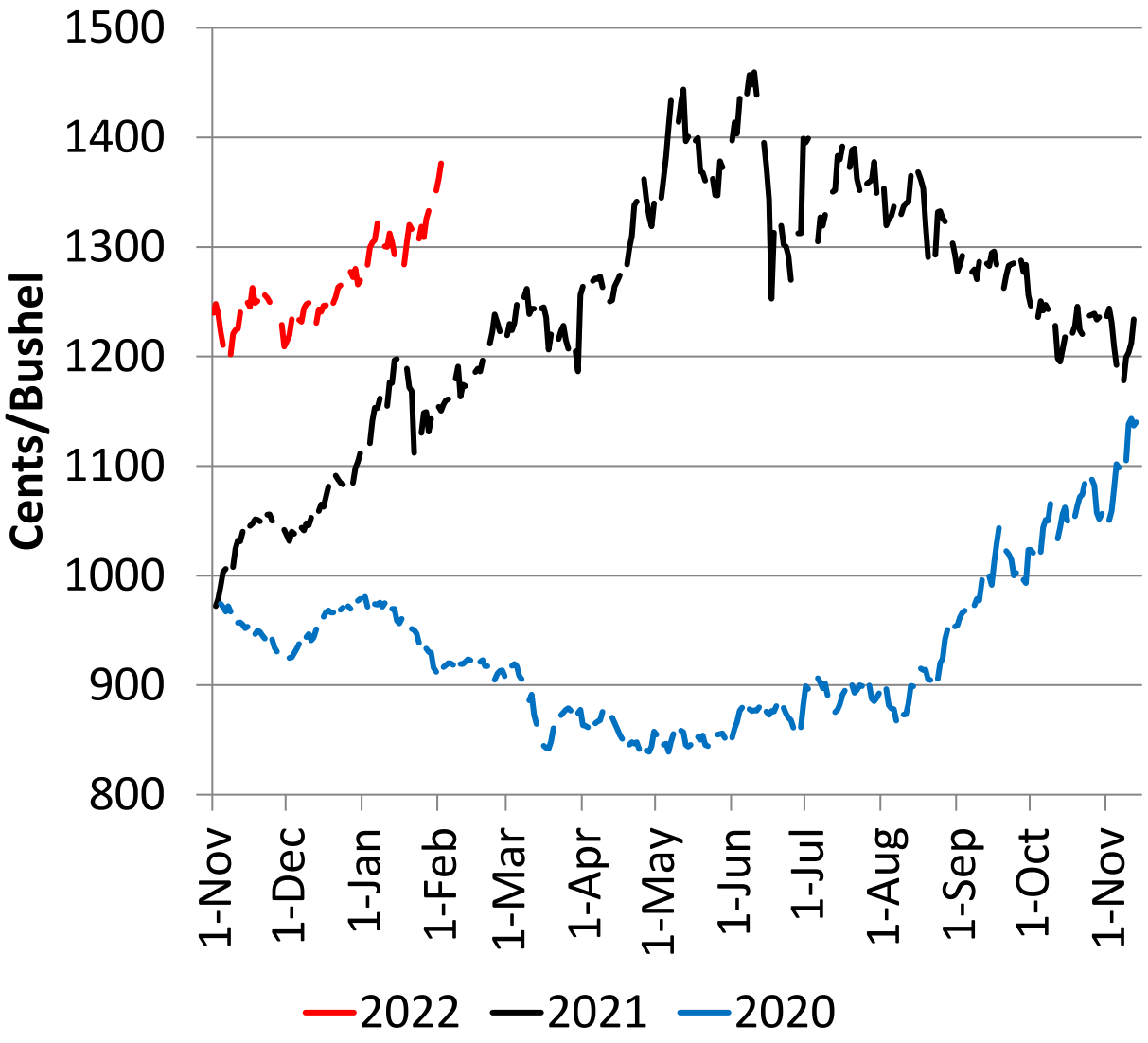
Volatility is likely to persist in 2022.

What About Soybeans in 2022?



- November 2022 contract average since January 1 = **$13.15**
- 2021 Range of $3.48
- +/- $1.74
- +/- $3.48

November Soybean Futures



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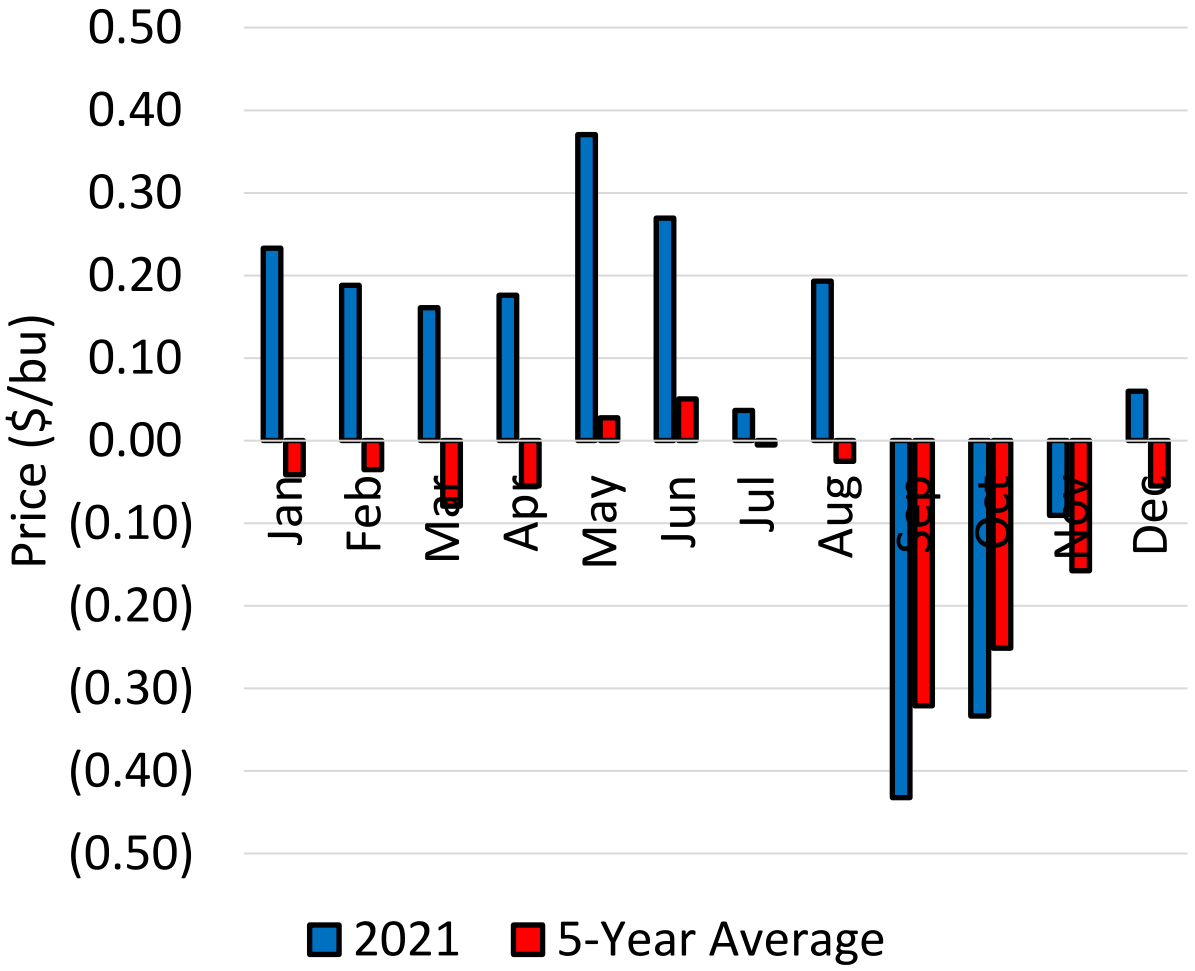


2022 Factors

- South America
- US plantings
- Weather
- Global production
- Interest and exchange rates
- Global / US economic growth
- China demand and policy
- Trade
- Domestic Policy
- COVID-19 Disruptions

Bridging Price Risk Gaps and Managing Profit

MARKETING

2022 Corn, No-Till, Non-Irrigated Budget

	Unit	Quantity	Price	Total
Revenue		**Gross Revenue ($/Acre)**		
Corn	Bu/acre	175	$5.65	$988.75
			Total Revenue	**$988.75**
Variable Expenses				
Seed	Thous.	32	$3.65	$116.80
Fertilizer & Lime	Acre	1	$318.44	$318.44
Chemical	Acre	1	$64.79	$64.79
Crop Scout or Consultant	Acre	1	$15.00	$15.00
Repair & Maintenance	Acre	1	$43.89	$43.89
Fuel, Oil & Filter	Acre	1	$19.66	$19.66
Operator Labor	Acre	1	$13.98	$13.98
Crop Insurance	Acre	1	$15.91	$15.91
Operating Interest	%	$608.47	4.35%	$13.23
			Total Variable Expenses	**$621.71**
			Return Above Variable Expenses	**$367.04**
Fixed Expenses				
Machinery				
Capital Recovery	Acre	1	$103.81	$103.81
General Overhead	Acre	1	$20.00	$20.00
Cash Rent	Acre	1	$104.00	$104.00
Management Labor	Acre	1	$25.00	$25.00
			Total Fixed Expenses	**$252.81**
			Total Expenses	**$874.52**
			Return Above Specified Expenses	**$114.23**

What do you have invested in the crop?

Expenses Compared to Last Year

Corn: Up 31-39%

Cotton: Up 21-27%

Soybeans: Up 18-29%

Corn - Net Return Table ($/acre): $875/acre COP

Price ($/bu) \ Yield (bu/acre)	145	155	165	175	185	195	205	215	225	235	245
3.50	(367)	(332)	(297)	(262)	(227)	(192)	(157)	(122)	(87)	(52)	(17)
3.75	(331)	(293)	(256)	(218)	(181)	(143)	(106)	(68)	(31)	7	44
4.00	(295)	(255)	(215)	(175)	(135)	(95)	(55)	(15)	25	65	105
4.25	(258)	(216)	(173)	(131)	(88)	(46)	(3)	39	82	124	167
4.50	(222)	(177)	(132)	(87)	(42)	3	48	93	138	183	228
4.75	(186)	(138)	(91)	(43)	4	52	99	147	194	242	289
5.00	(150)	(100)	(50)	0	50	100	150	200	250	300	350
5.25	(113)	(61)	(8)	44	97	149	202	254	307	359	412
5.50	(77)	(22)	33	88	143	198	253	308	363	418	473
5.75	(41)	17	74	132	189	247	304	362	419	477	534
6.00	(5)	55	115	175	235	295	355	415	475	535	595
6.25	32	94	157	219	282	344	407	469	532	594	657
6.50	68	133	198	263	328	393	458	523	588	653	718
6.75	104	172	239	307	374	442	509	577	644	712	779
7.00	140	210	280	350	420	490	560	630	700	770	840
7.25	177	249	322	394	467	539	612	684	757	829	902

When am I making money?

When Are Expenses Incurred?

	Time Period
Seed	PP
Fertilizer & Lime	PP/P/I
Chemical	PP/I
Crop Scout or Consultant	I
Repair & Maintenance	P/I/H
Fuel, Oil & Filter	P/I/H
Operator Labor	P/I/H
Crop Insurance	PP
Operating Interest	PP/P/I/H
Machinery Capital Recovery	PP
General Overhead	PP
Cash Rent	PP
Management Labor	PP/P/I/H

PP = Preplant
P = Planting
I = In season
H= Harvest

When are inputs purchased?

When are inputs used?

How Many Bushels Does it Take to Cover Specified Expenses?

				Bushels to Cover Expense			
Yield Target = 175 bu/acre			2022 ($/acre)	2022	2022	2022	2021
Price of Corn ($/bu)				**$5.65**	**$5.00**	**$4.40**	**$4.40**
Variable	Seed		$117	20.7	23.4	26.5	24.0
	Fertilizer & Lime		**$318**	**56.4**	**63.7**	**72.4**	**33.7**
	Chemical		$65	11.5	13.0	14.7	13.9
	Crop Scout or Consultant		$15	2.7	3.0	3.4	2.3
	Repair & Maintenance		$44	7.8	8.8	10.0	9.5
	Fuel, Oil & Filter		$20	3.5	3.9	4.5	3.5
	Operator Labor		$14	2.5	2.8	3.2	2.6
	Crop Insurance		$16	2.8	3.2	3.6	2.5
	Operating Interest		$13	2.3	2.6	3.0	2.1
Total Variable Expenses			$622	110.0	124.3	141.3	94.2
Fixed	Machinery Capital Recovery		$104	18.4	20.8	23.6	22.7
	General Overhead		$20	3.5	4.0	4.5	0.0
	Cash Rent		$104	18.4	20.8	23.6	22.0
	Management Labor		$25	4.4	5.0	5.7	4.1
Total Fixed Expenses			$253	44.7	50.6	57.5	48.8
Total Expenses			**$875**	**154.8**	**174.9**	**198.8**	**143.0**

Number of Bushels to Cover Specified Expenses

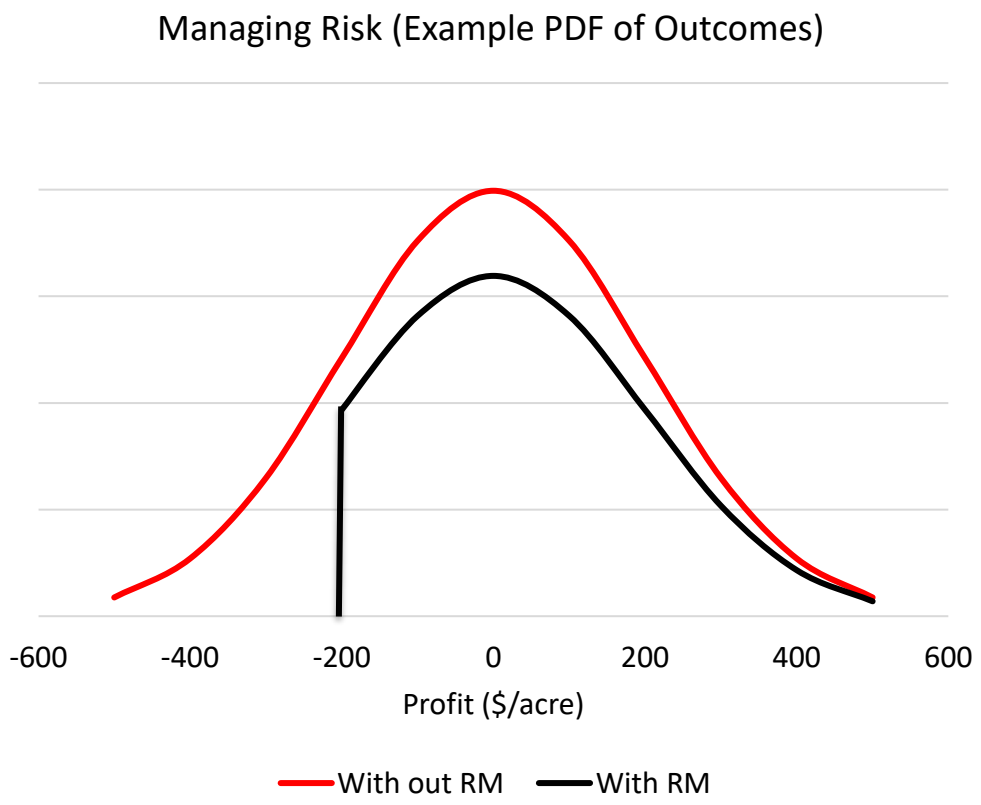
- Price risk management or sales to offset production costs for specified expense categories.

- 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.

Uncertainty versus Risk



- Uncertainty – situations under which either the outcomes and/or their probabilities of occurrences are unknown to the decision-maker.
- Risk - decision-making situations under which all potential outcomes and their likelihood of occurrences are known to the decision-maker.
- Risk Management – reducing or mitigating the possibility of a known undesirable / negative outcome.

Marketing 2022 – Identify risk gaps and fill

- How much can you store?
- Crop insurance.
- Futures or options.
- Cash sales or contracts.

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 of intrinsic value.
- 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).
  - $875 - $873 = $2/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.

Checklist

- Write down your risk management and marketing plan.
- Know your cost of production.
- Identify risk gaps / key times of the year.
- Evaluate storage versus anticipated production.
- Identify tools you are comfortable using.
- Seek expert advice.
- Execute.
- Revisit your plan regularly.

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.

Current Carbon Market Programs (and Growing)

Potential for increased revenue?

CARBON MARKETS AND CARBON CREDITS

What We Currently Know

- Contracts are being offered in the private sector.
- Massive variation in payment mechanisms, terms, and conditions in contracts.
- Measurement, verification, registration and carbon credit retirement processes (permanence) need clarity.
- Individual contracts can be evaluated on financial merits.
  - Revenue less cost, accounting for risk.

Select Large Companies Carbon Neutrality Commitments

Amazon announced a goal to be carbon neutral by **2040**.

Apple announced its plan to become carbon neutral across its entire business, manufacturing supply chain and product life cycle by **2030**.

BP set a goal to become carbon neutral by **2050** at the latest.

FedEx announced a goal to achieve carbon-neutral operations globally by **2040**.

Ford Motor Company announced in June 2020 that it aims to achieve carbon neutrality by **2050**.

General Motors, the largest automaker in America, announced that it plans to be carbon neutral by **2040**.

IBM announced that it will achieve net-zero greenhouse gas emissions by **2030**.

Ikea has pledged to be "climate positive" by **2030** -- a term that means that it plans to reduce more greenhouse gas than it emits.

Intuit announced in September 2019 that it planned to be a climate positive company by **2030**.

Microsoft has taken the carbon-neutral pledge -- the software giant announced in January 2020 that it would be carbon negative by **2030**.

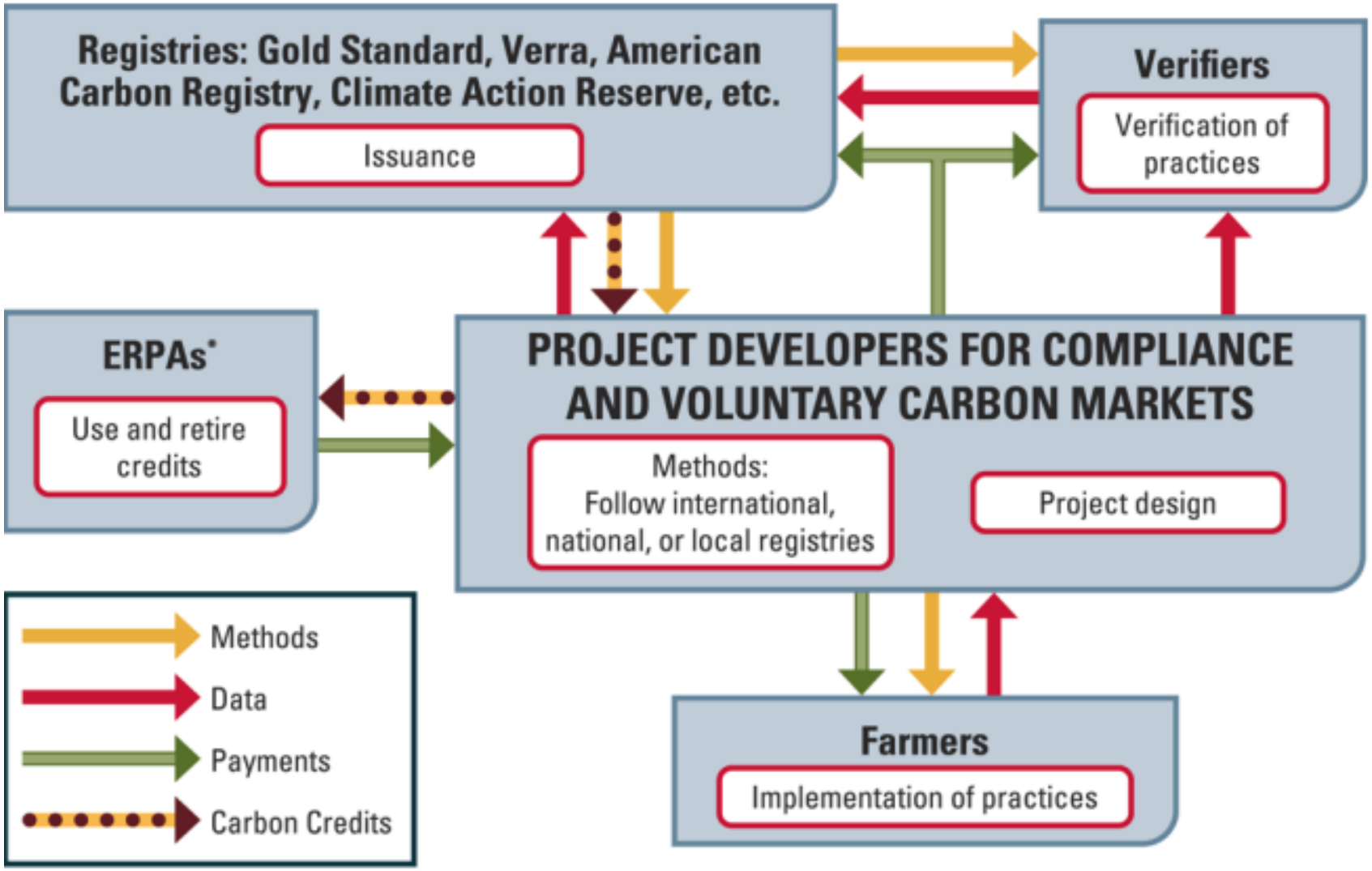
PepsiCo pledged to achieve net-zero emissions by **2040**.

Unilever announced its plan to achieve net zero emissions from all its products by **2039**.

Verizon announced that it will go carbon neutral by **2035**.

Walmart -- zero emissions by 2040 and to protect, manage or restore 50 mil acres of land and one million sq. miles of ocean by **2030**.

Figure 1. Traditional Carbon Offset Generation



* ERPAs: Emission Reduction Purchase Agreements

Source – Plastina- https://www.extension.iastate.edu/agdm/crops/pdf/a1-77.pdf

Carbon Contracts

- Enrollment length varies but most carbon programs are 1 to 10-year plus contracts with potential additional retention period of continued practices.
- Baseline / additionality varies.
- Eligible locations vary.
- Minimum acres to enroll.
- Penalty to withdrawal.
- Don’t typically pay for additional costs (e.g., machinery, inputs, verification).
- Land ownership changes?
- New technology required for data collection and reporting (e.g. Climate FieldView, remote sensing, other precision ag technologies)

What Should Producers Look for in a Contract?

- Land use (pasture, forest, cropland) and crop mix (corn, soybean etc.)
- What are you being paid for
- Practices to be implemented
- Length of contract
- Reporting / data sharing /validation requirements
- Property access requirements
- Payment mechanism
- Payment timing
- Will payments cover implementation costs?
- Does this restrict participation in other programs?
- Clauses and definitions
- Exit / failure to deliver

Ensure that you can comply with the contract for the entire life of the agreement.

Beware of fine print and definitions.

Always obtain legal advice.

Partial Net Returns Analysis

- Quantify the expected change in revenue and expenses as a result of the entrance, implementation, and compliance costs of the contract.

- Revenue = Price of carbon ($/ton or $/acre) x Quantity (tons or acres)
  - Short term / long term production reduction?

- Expenses = $/acre plus $/hr costs plus fixed costs
  - Capital purchases
  - Production expenses
  - Transaction costs
  - Opportunity cost of time

- Need to account for risk / uncertainty!

Summary

- Carbon markets and prices are still in the developmental stage.
- Driven by companies focused on climate change, environmental consumers and shareholders (will these targets be realized?).
- Additionality, verification, permanence, and enforceability are vital and need clarity.
- Current prices may not offset the cost and economic risks to implement the contract…RISK VS. REWARD
  - What is the producer share of revenue?
- What is a fair price?
- Should landowners or producer's signup now?……probably not until more information is available, but you can evaluate the financial merits of the contract.

Thank you

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