

Farmer Production Decision-Making

Lessons from Precision Conservation Management

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Consumer &
Environmental Sciences

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farmdoc



Precision Conservation Management



Goal

Study how farmers make production decisions over time concerning their fields

Result:

- Most farmers have one or two production plans that they apply to all their corn and soybean fields in a given year
- That plan changes slowly over time

Farm Incomes, Environmental Outcomes



Precision Conservation Management



Program Features

Access to Experts

Cost-Share Opportunities

Personal Data Analysis



Precision Conservation Management

www.precisionconservation.org

Precision Conservation Management Practice Standards

Reduced Tillage

Nutrient Management

Cover Crops

PCM data identifies conservation practices that effectively address environmental issues without risking the farmers' bottom line.

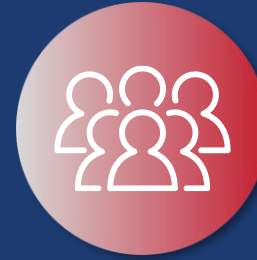
PCM Today

PCM now serves farmers in 4 states

PCM works with farmers in primary watersheds in Illinois, Kentucky, Missouri and Nebraska.



in 2025



620
farmers enrolled



681,765
acres assessed



30+
partners

PCM Impact, 2025 Conservation Acres

314,017

**Reduced
Tillage**

7,916

**N Applied at
MRTN Rate
(corn)**

136,550

Cover Crops



www.precisionconservation.org



Partnerships

30+ Partner Companies

PCM strategically partners with state commodity organizations, supply chain companies, government agencies and more. Each of these partnerships strengthens our ability to provide meaningful insights and opportunities for farmers.



PCM Specialists



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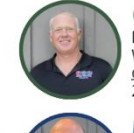
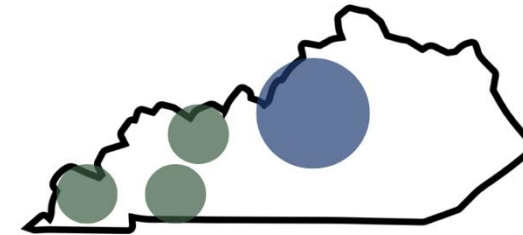
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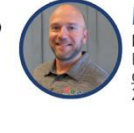
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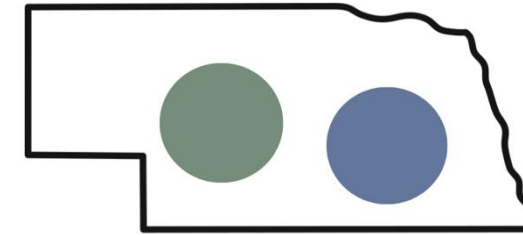
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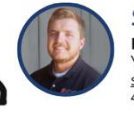
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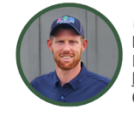
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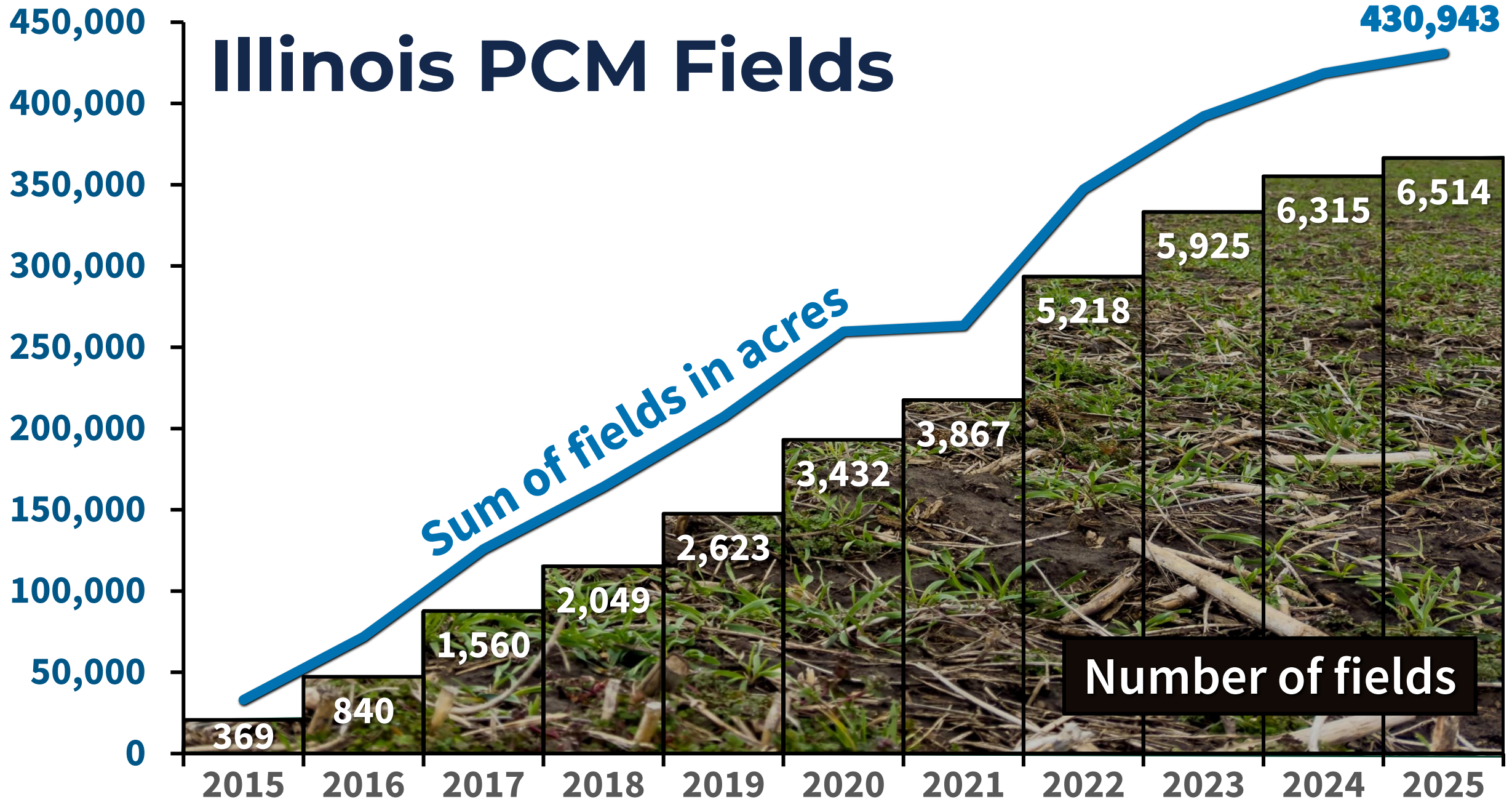


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Illinois PCM Fields



Examples of field plans: Soybeans

No till

1. Fall fertility (DAP & Potash)
2. Spray (pre-plant)
3. Plant
4. Post herbicide application
5. Fungicide (last summer)
6. Harvest

One pass

1. Fall: Vertical till
2. Fall fertility (DAP & Potash)
3. Spray (pre-plant)
4. Plant
5. Post herbicide application
6. Post herbicide application
7. Fungicide (last summer)
8. Harvest

Tillage (Standards)

No-till: No tillage passes

Strip-tillage: One tillage pass (usually in fall) with a strip till bar (or fall tillage pass + spring freshener pass) to create a strip 8-12 inches wide where the crop is planted

One-pass light: One tillage pass in fall or spring

Two-pass: Two tillage passes

Three plus: Three or more tillage passes

Combination tool

likely in one-pass system



Leaving residue on the top



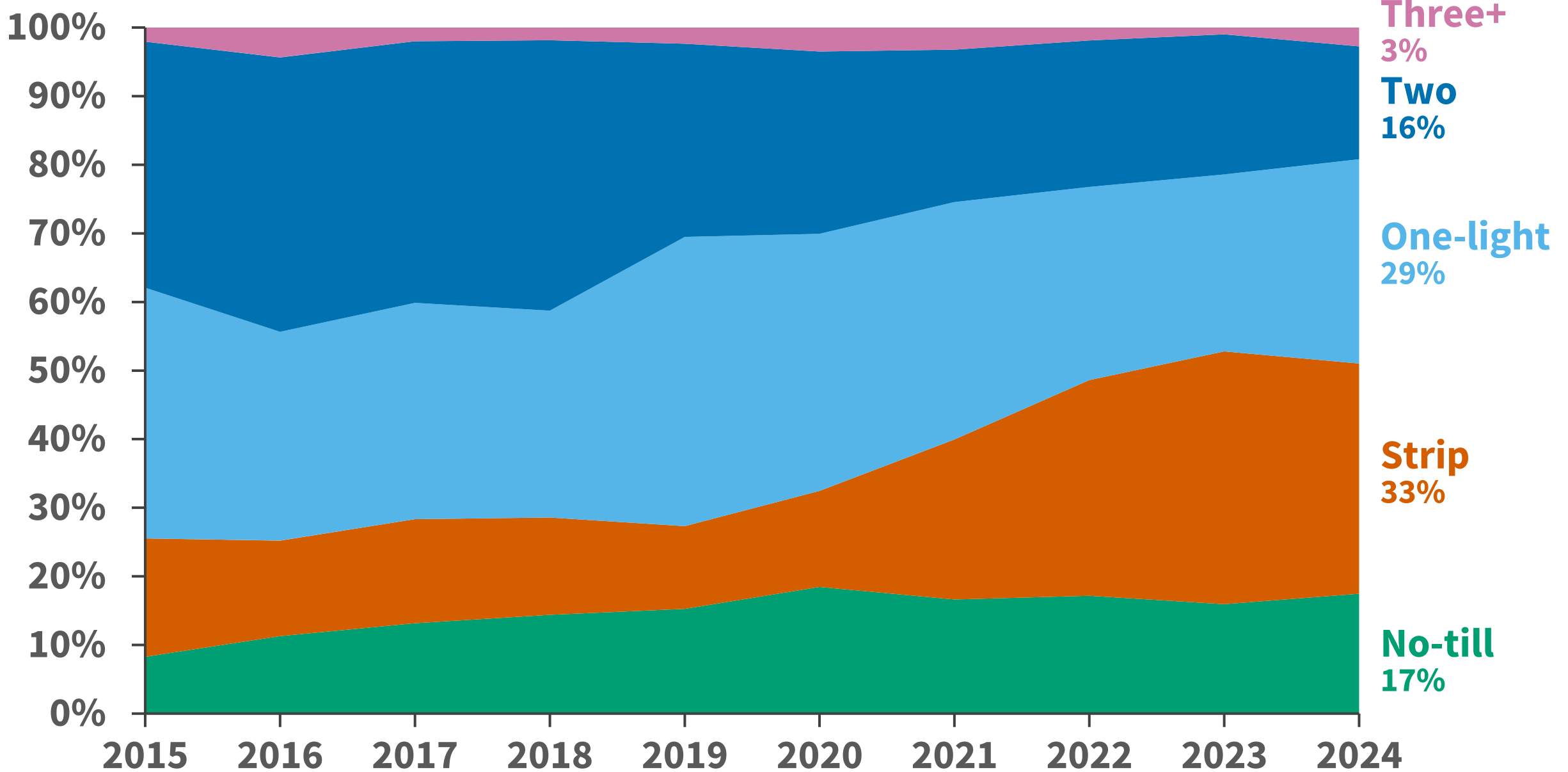
Strip Tillage



Economic and Environmental Considerations

- Excessive tillage is costly
- Some tillage generally has yield advantage, but may not be cost effective
- Less tillage is better from soil erosion and carbon intensity standpoints, although relies on herbicides. Glyphosate was key to the adoption of no-till

Fields by Tillage Benchmarks Over Time, Corn



Three+
3%

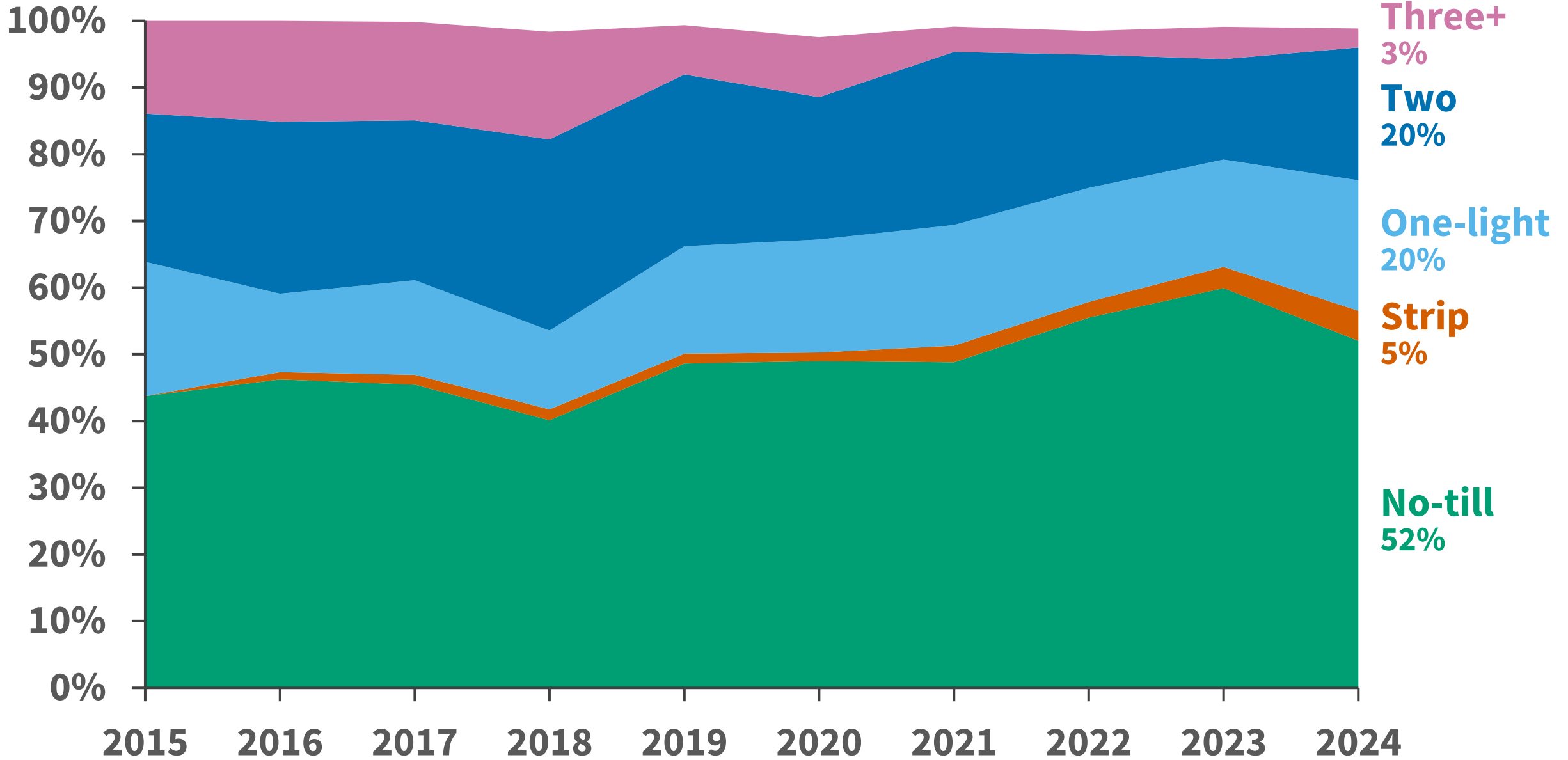
Two
16%

One-light
29%

Strip
33%

No-till
17%

Fields by Tillage Benchmarks Over Time, Soybeans



Farms: Same Tillage Systems

Percent of farms with only one or two benchmarks, Corn

No of Benchmarks	2021	2022	2023	2024
One benchmark	78%	79%	81%	71%
Two benchmarks	18%	19%	17%	29%

Percent of farms with only one or two benchmarks, Soybeans

No of Benchmarks	2021	2022	2023	2024
One benchmark	74%	76%	74%	66%
Two benchmarks	22%	19%	22%	27%

Transition matrix across Tillage Benchmark

Soybean, 2023 to 2024



		To					
		No-Till	Strip	1-Pass Light	2 Passes	3+	Mixed
From	No-Till	79%	7%	3%	3%	0%	3%
	Strip	2%	89%	2%	2%	0%	5%
	1-Pass Light	2%	7%	62%	5%	2%	22%
	2 Passes	3%	6%	21%	65%	0%	6%
	3+	0%	0%	0%	25%	25%	50%
	Mixed	12%	17%	10%	15%	0%	46%

Nitrogen Application Timing Standards

Fall: Majority of N applied in fall

Pre-plant Spring: Majority of N applied before planting

Post-plant: Majority of N applied after planting

Two-way: 50/50 split (pre-plant & post-plant)

Three-way: Distributed (Fall, pre-plant & post-plant)

Diversity of N Application Practices

Custom N application with Variable Rate

Fall Anhydrous Ammonia

Biological N Products & other N Enhancing Products

N Rate Decision Support
N Rate Determined by MRTN
N Rate Recommended by Custom Applicator/Retailer
N Rate Determined by Yield Goal/NUE

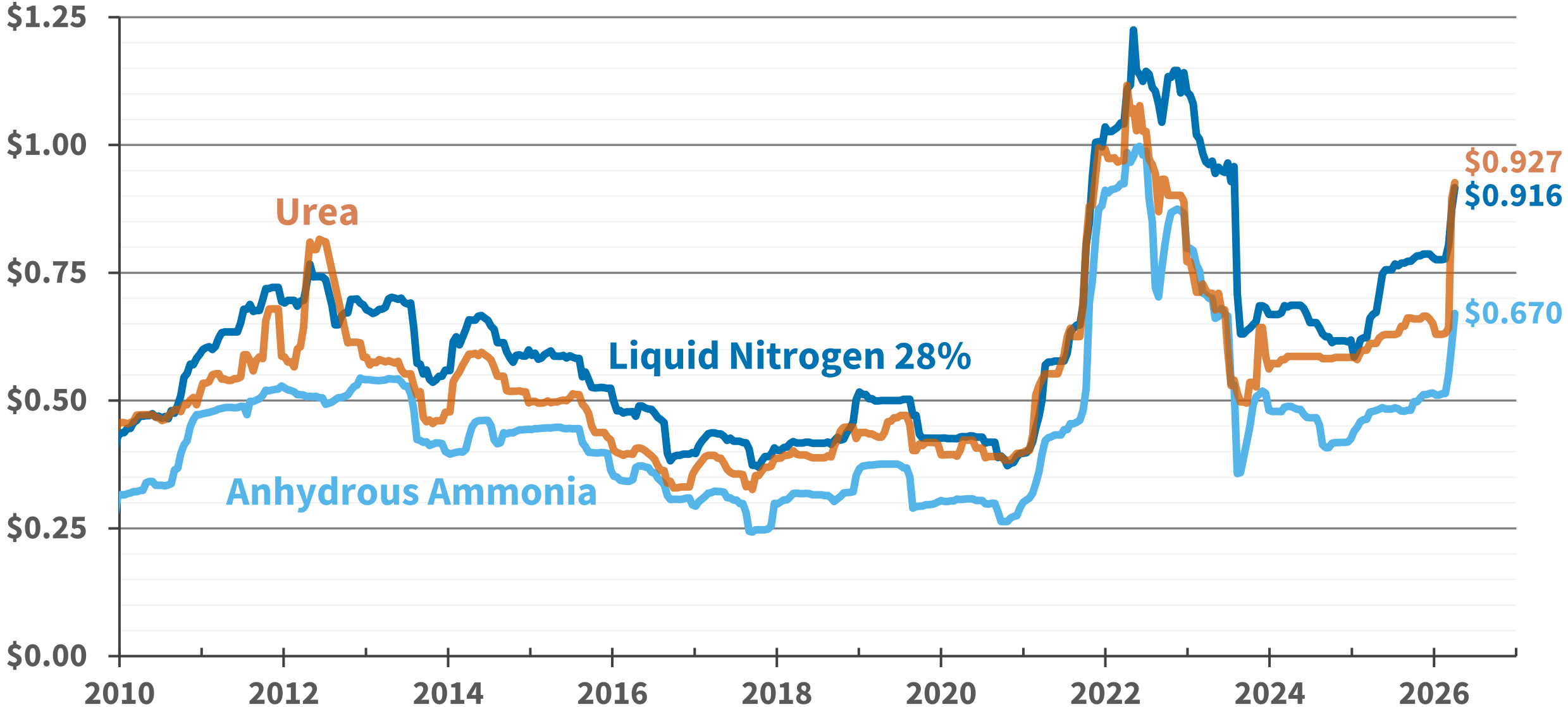
28

Nitrification Inhibitors/Stabilizer Options
N-Serve for Fall Nitrification Inhibition
Centuro for Fall Nitrification Inhibition
Other Fall Nitrification Inhibitors
Nitrification Inhibitors with Spring Pre-Plant or Sidedress Application
N-Serve for Spring Pre-Plant or Sidedress Nitrification Inhibition
Instinct for Spring Pre-Plant or Sideress Nitrificiation Inhibition
Centuro for Spring Pre-Plant or Sidedress Nitrification Inhibition
Other Spring Pre-Plant or Sidedress Nitrification Inhibition

N Application Timing Options
Fall-Only
Spring Pre-Plant Only
At-Planting Only
Sidedress Only
Fall and Spring Pre-Plant
Fall and At-Planting
Fall, Spring Pre-Plant, and Sidedress
Fall, At-Planting, and Sidedress
Fall, Spring Pre-Plant, and At-Planting
Fall, Spring Pre-Plant, At-Planting, and Sidedress
Fall and Sidedress
Spring Pre-Plant and At-Planting
Spring Pre-Plant, At-Planting, and Sidedress
At-Planting and Sidedress

Nitrogen Prices in per pound of Nitrogen

2010 to April 3, 2026



MRTN Rates in Central Illinois for Corn following Soybean



Growing Season	Nitrogen Fertilizer Price (\$/lb)	Corn Price (\$/bu)	MRTN Rate in lbs of N per acre
2014	\$0.42	\$3.75	169
2015	\$0.41	\$3.70	163
2016	\$0.34	\$3.45	168
2017	\$0.29	\$3.30	172
2018	\$0.29	\$3.65	176
2019	\$0.34	\$3.90	181
2020	\$0.30	\$3.90	185
2021	\$0.34	\$5.25	198
2022	\$0.70	\$6.50	180
2023	\$0.79	\$4.90	161
2024	\$0.46	\$4.05	177
2025	\$0.46	\$4.05	183

Anhydrous Ammonia



Anhydrous Ammonia (side dressed)

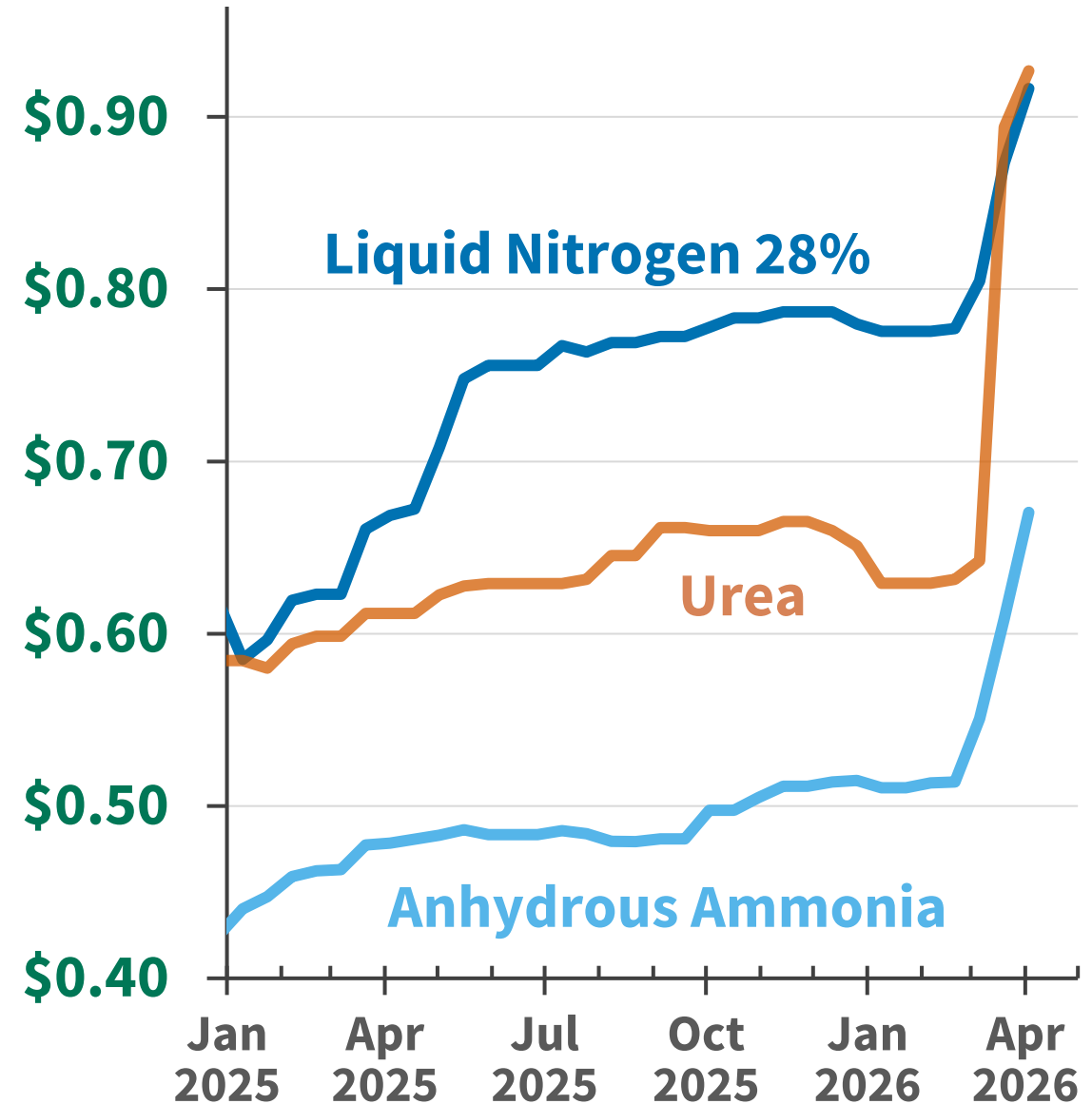


N solution (post plant)



Economic Considerations

- Fewer passes have lower costs / higher profits
- Maximum Return to Nitrogen (MRTN) is often 175 to 180 pounds
- Anhydrous ammonia is the least expensive source of N

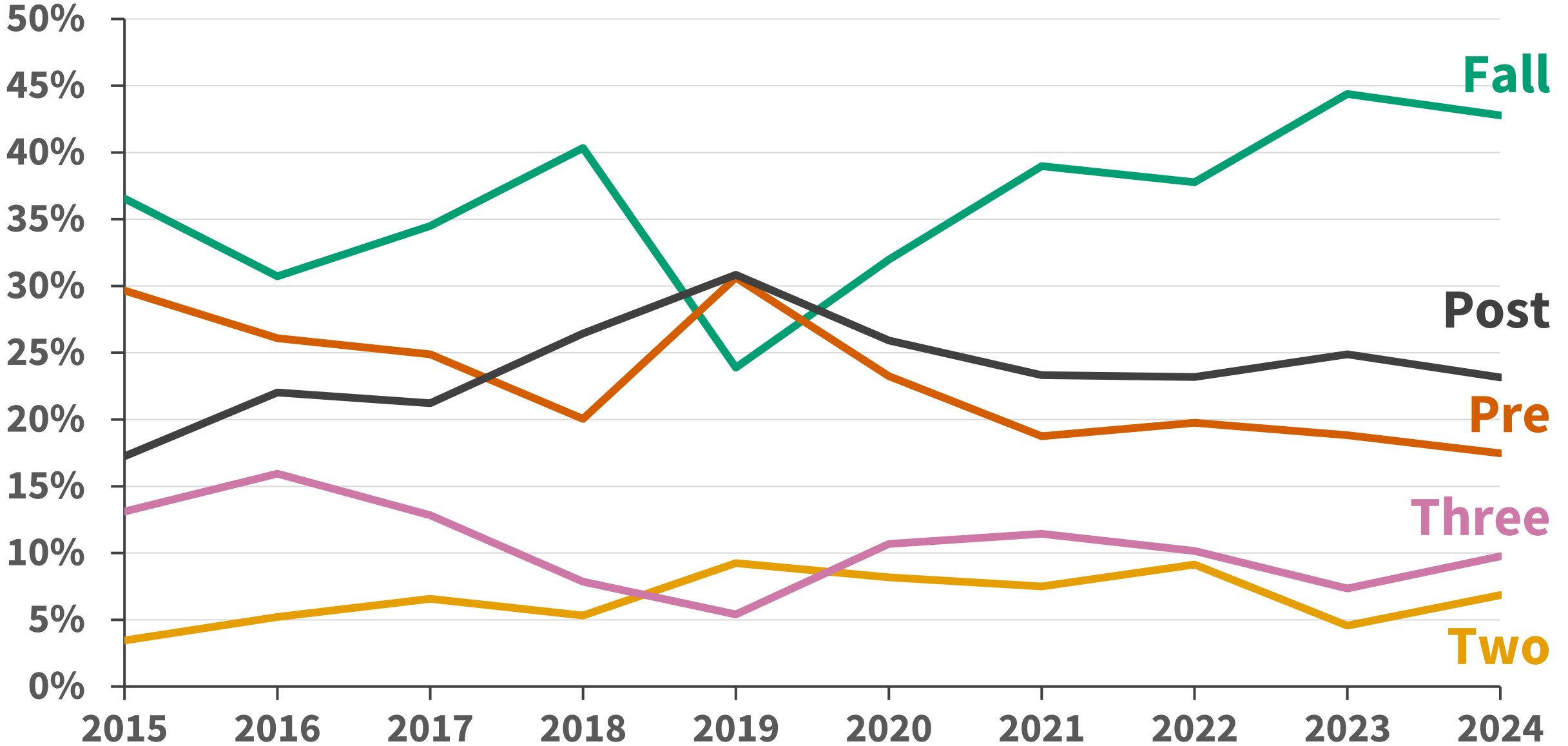


Environmental Considerations

- More commercial nitrogen put on closer to planting have “better” environmental outcomes
- Lower rates have “better” environmental outcomes



Fields by Nitrogen Benchmarks Over Time



Farms: Same Nitrogen Benchmark: All Fields

Percent of farms with only one or two benchmarks, corn

No of Benchmarks	2021	2022	2023	2024
One benchmark	79%	82%	83%	82%
Two benchmarks	19%	16%	14%	17%

Rate difference across fields, within ranges

Rate Diff	2021	2022	2023	2024
Less than 10 pounds	68%	73%	68%	70%
10 to 20 pounds	7%	8%	9%	8%
20 to 30 pounds	6%	7%	10%	9%

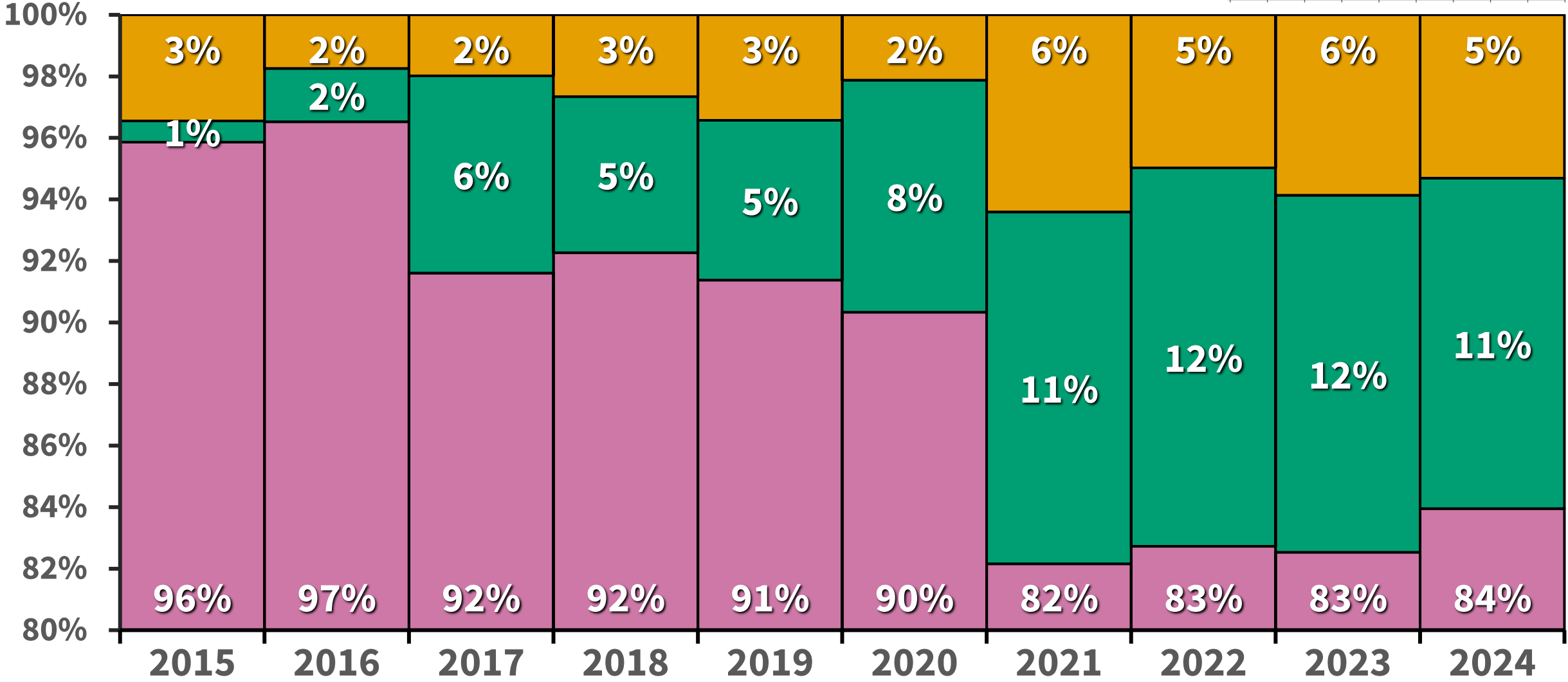
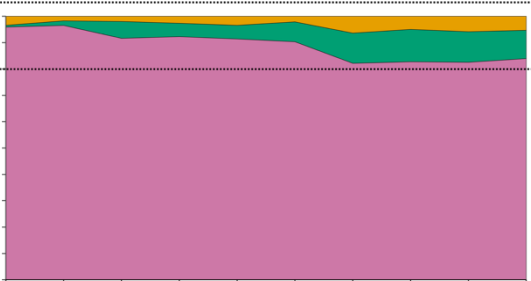
Transition matrix across Nitrogen Standards

Corn 2023 to 2024

		To					
		Fall	Preplant	Post Plant	2 In Season	3-way	Mixed
From	Fall	85%	3%	3%	0%	0%	10%
	Preplant	19%	56%	3%	3%	3%	16%
	Post Plant	2%	4%	74%	4%	4%	13%
	2 in Season	0%	13%	0%	38%	50%	0%
	3-way	7%	7%	13%	20%	40%	13%
	Mixed	19%	8%	17%	8%	6%	42%

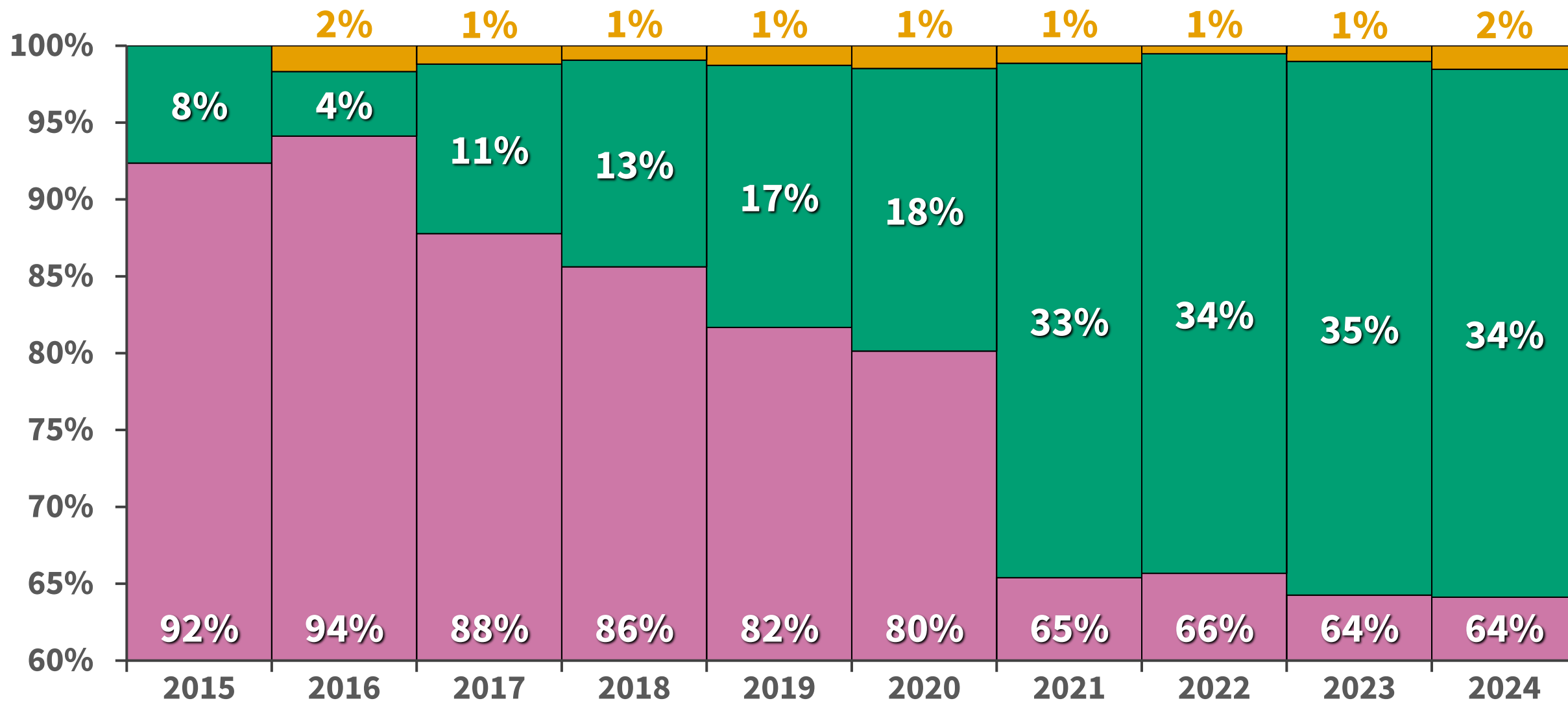
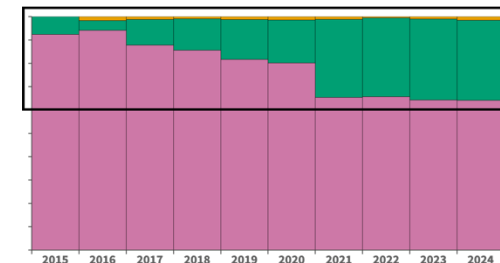
Corn Fields and Cover Crops

No cover crops, Over-Wintering, and Terminal / Winter-Kill



Soybean Fields and Cover Crops

No cover crops, Over-Wintering, and Terminal / Winter-Kill



Cover Crops:

Economic and Environmental Considerations

6% of farmers have cover crops on all soybean fields in PCM

Economic

- Difficult to show profitability without subsidies
- We find no yield increase

Environmental

- Significantly reduces nitrogen in water leaving the field
- Increases soil carbon over time very slowly

Examples of field plans: Soybeans

No-till

1. Fall fertility (DAP & Potash)
2. Spray (pre-plant)
3. Plant
4. Post herbicide application
5. Fungicide (last summer)
6. Harvest

No-till, Cover Crop

1. Fall fertility (DAP & Potash) and **Cover Crop**
2. Spray (pre-plant)
3. Plant
4. Post herbicide application
5. Fungicide (last summer)
6. Harvest

Examples of field plans: Soybeans

One pass

1. Fall: vertical till
2. Fall fertility (DAP & Potash)
3. Spray (pre-plant)
4. Plant
5. Post herbicide application
6. Post herbicide application
7. Fungicide (last summer)
8. Harvest

One pass, cover crop

1. Fall: vertical till
2. Fall fertility (DAP & Potash) and **Cover Crop**
3. Spray (pre-plant)
4. Plant
5. **Post herbicide application**
6. **Post herbicide application**
7. Fungicide (last summer)
8. Harvest

Implications

A sunset over a farm. The sun is a bright white circle in a dark orange sky. In the foreground, a dark field is visible. In the middle ground, a tractor is pulling a large tank or piece of equipment. In the background, there are some buildings and trees.

Farmers are moving to conservation on tillage & cover crops

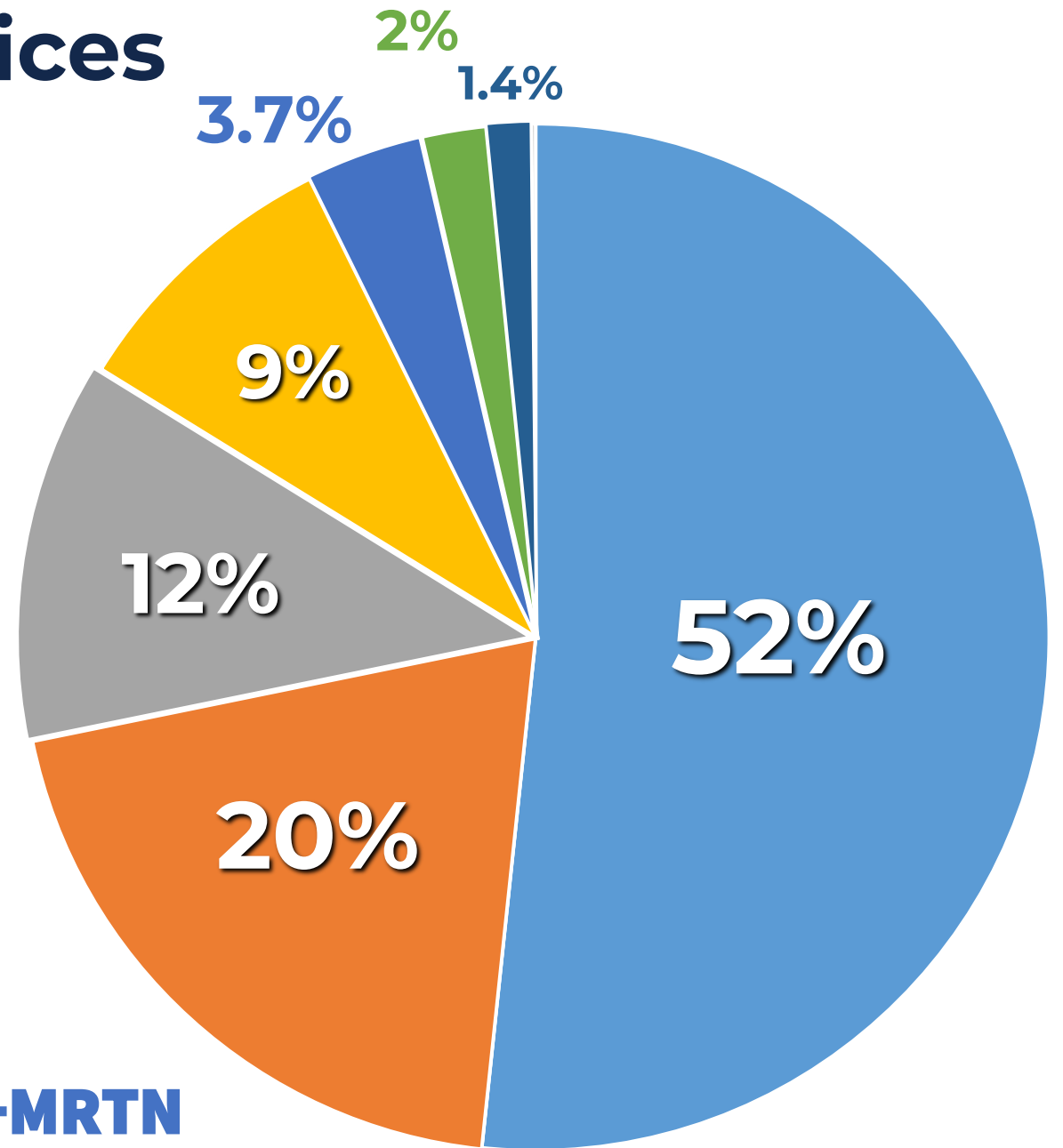
Not so much on applying nitrogen fertilizer at MRTN rate

“Try it on one field” is not likely to be a good selling point

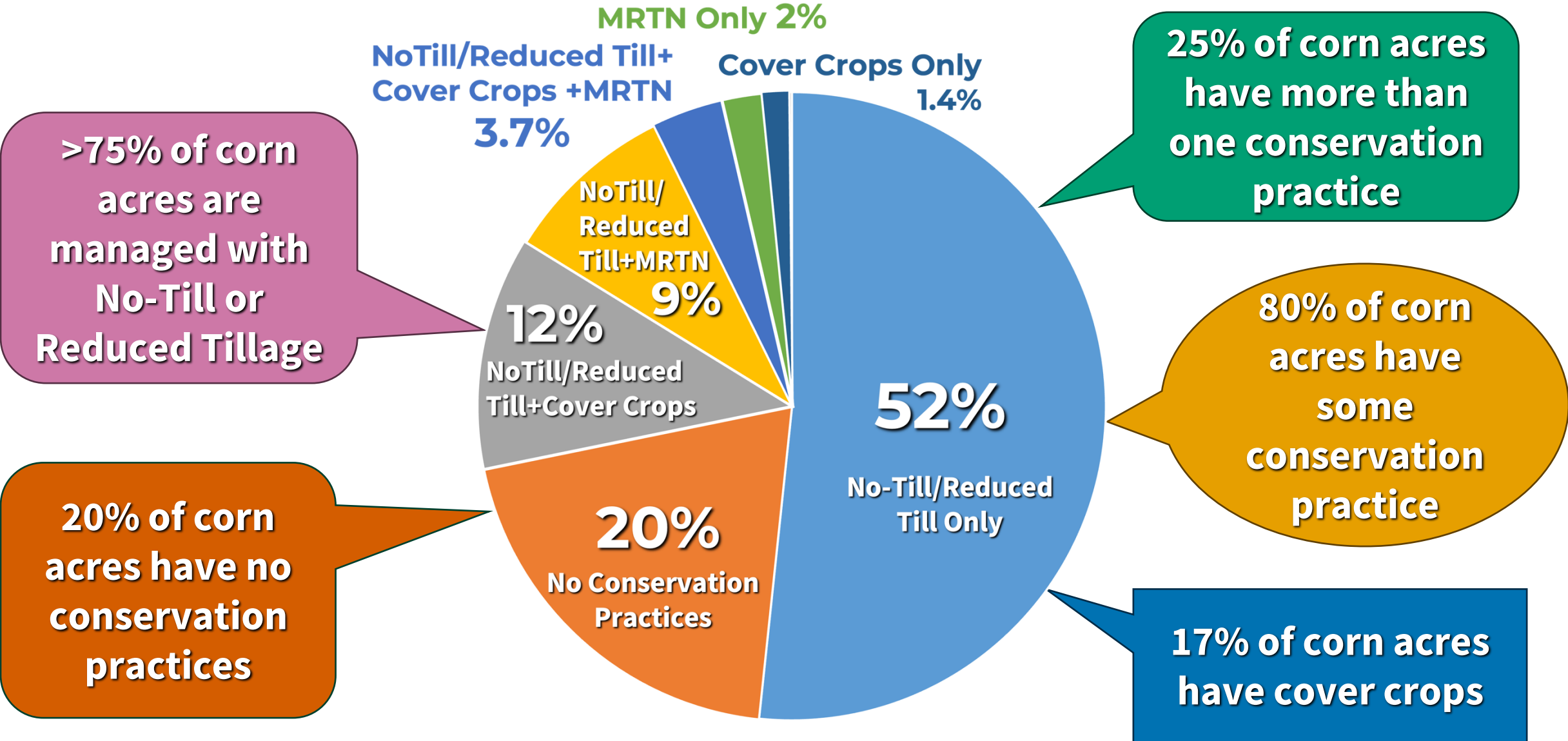
Farmers, in general, are not experimenting on their fields,
which is not to say they are not learning

PCM Conservation Practices Corn

- **No Conservation Practices**
- **No-Till/Reduced Till Only**
- **No-Till/Reduced Till+Cover Crops**
- **No-Till/Reduced Till+MRTN**
- **Cover Crops Only**
- **Cover Crops+MRTN (only 0.17%)**
- **MRTN Only**
- **No-Till/Reduced Till+Cover Crops +MRTN**



Conservation Practices on Corn Acres



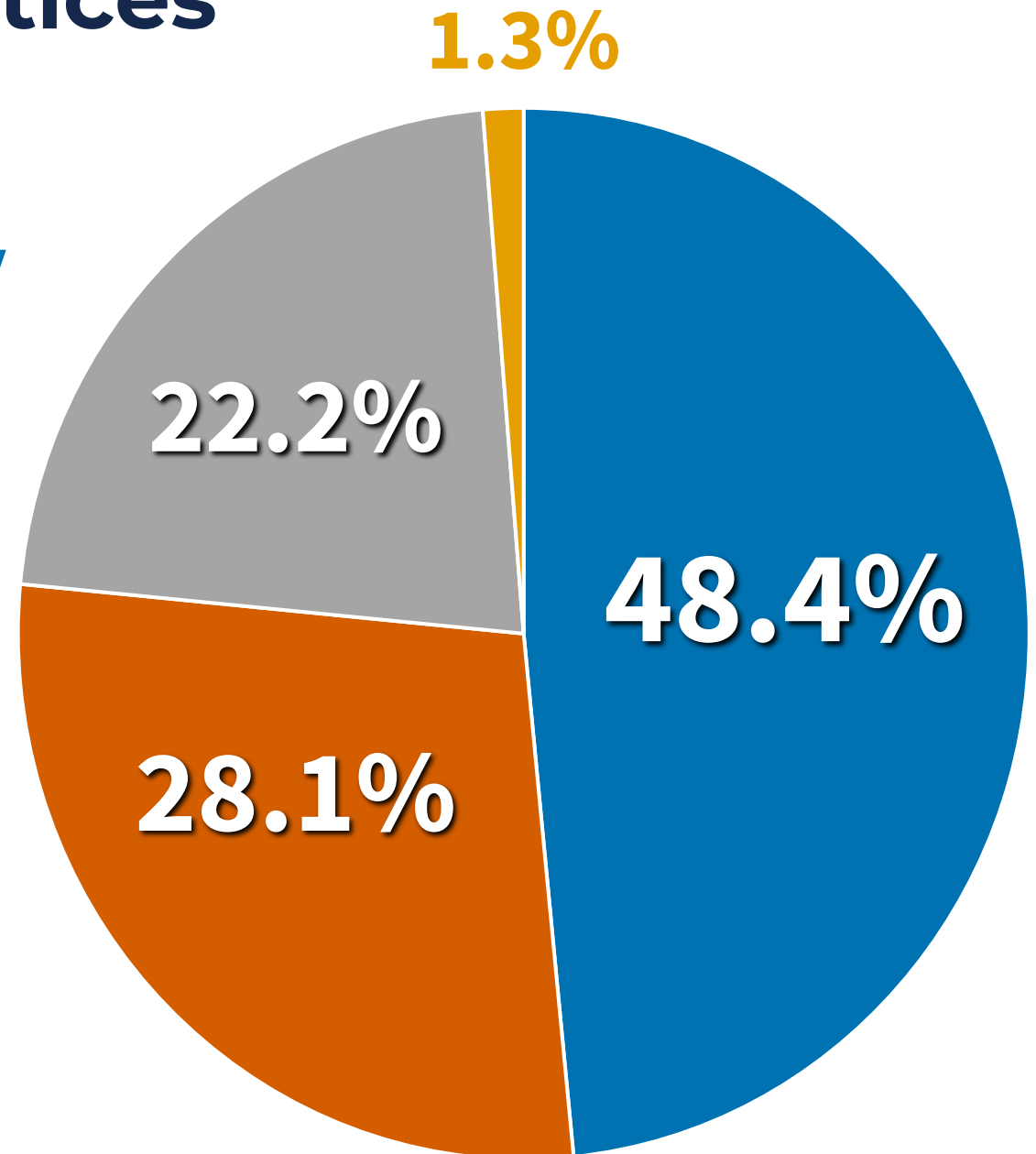
PCM Conservation Practices *Soybean*

No-Till/Reduced Till Only

**Cover Crops and
No-Till/Reduced Till**

No Conservation

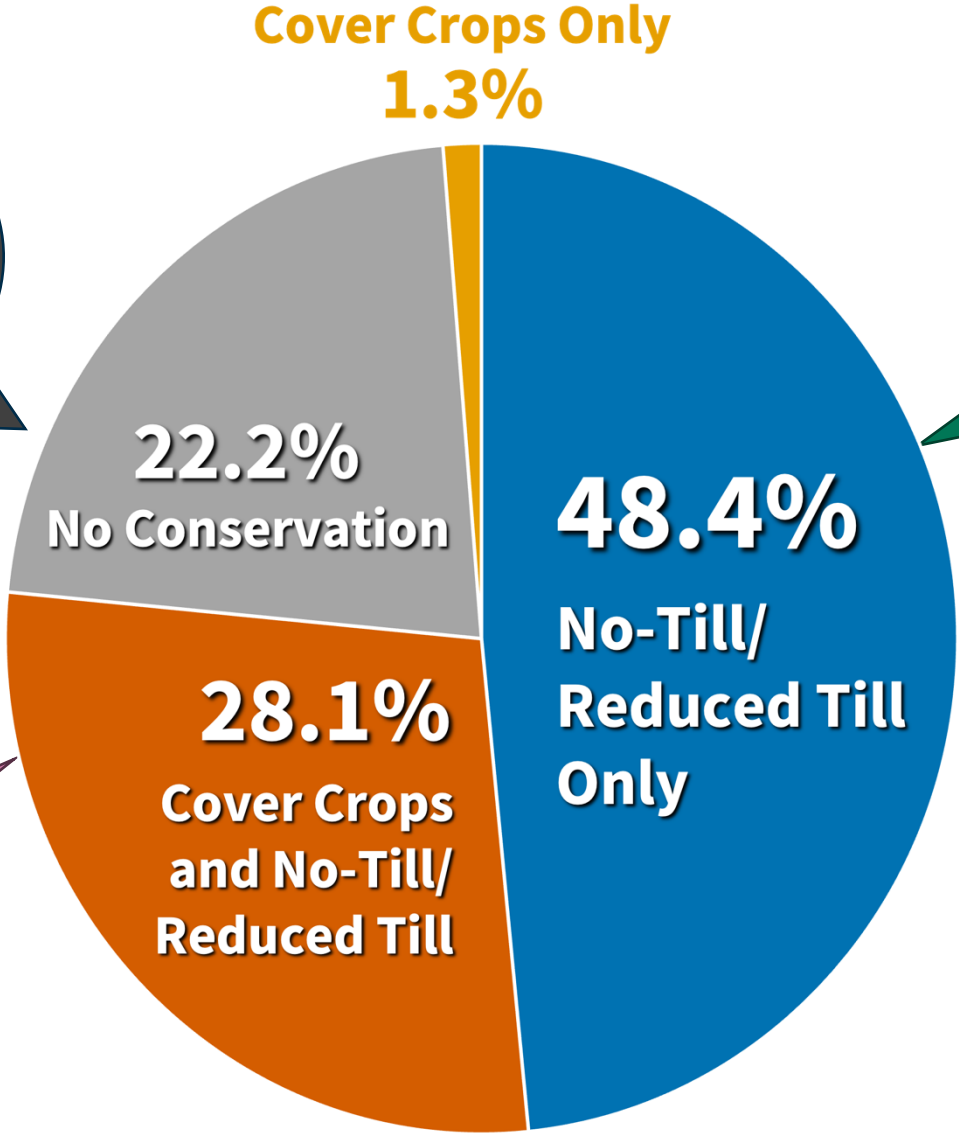
Cover Crops Only



Conservation Practices on Soybean Acres

22% of soybean fields are not managed using any conservation practices

29% of soybean fields receive a cover crop



>75% of soybean fields are managed with no-till/reduced tillage

How does PCM conservation use compare?

2024 NASS Conservation Effects Assessment Project

- 81% of survey respondents reported using conservation practices
- 58.5% No-Till/Minimum Till “to manage pests”

2022 Census of Agriculture, Illinois:

- No-Till: 6.4M acres = 30% of IL row crop acres
- Reduced Tillage: 8.9M acres = 41% of IL row crop acres
- Cover Crops: 881k acres = 4% of IL row crop acres

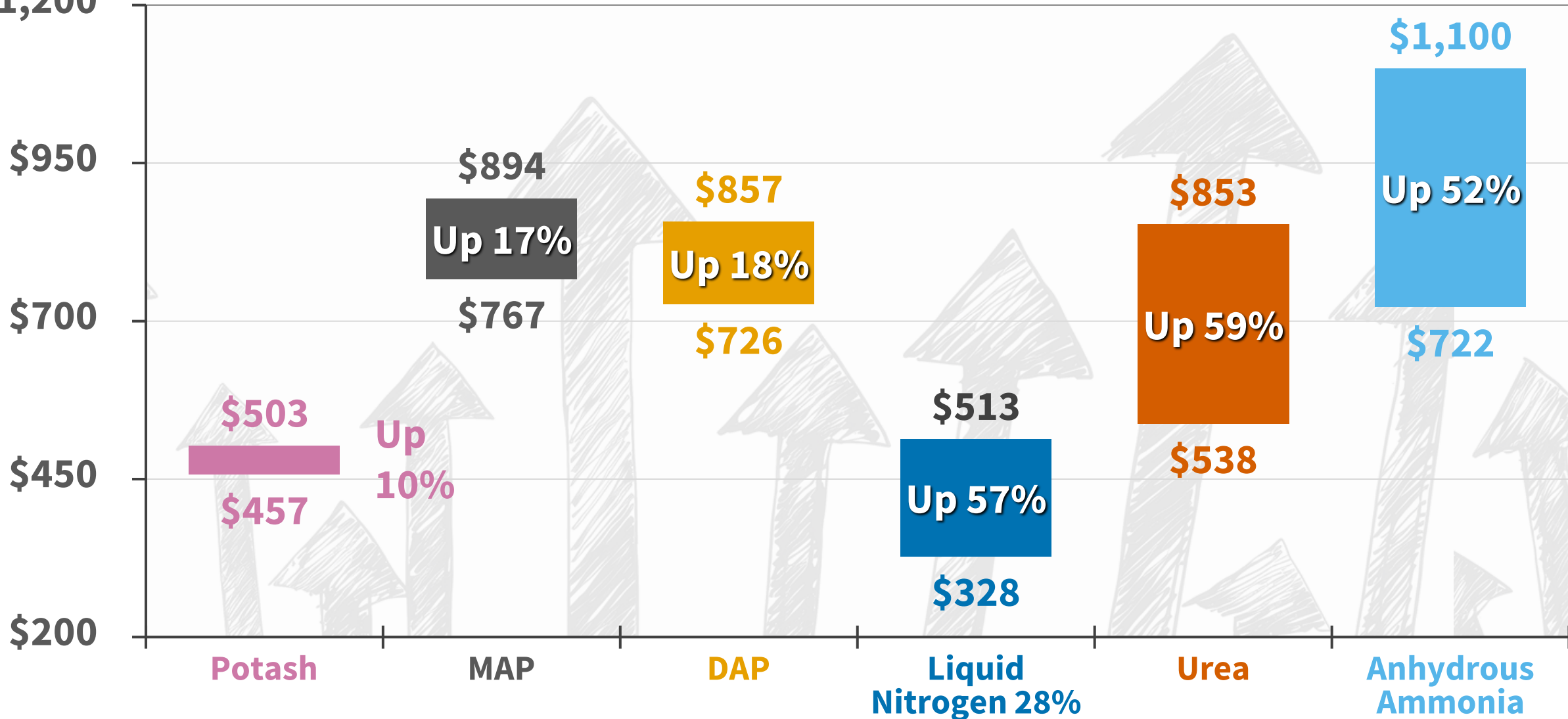
Iowa State Center for Agricultural and Rural Development

- Cover Crops, 2022: 3.8% of IL row crop acres

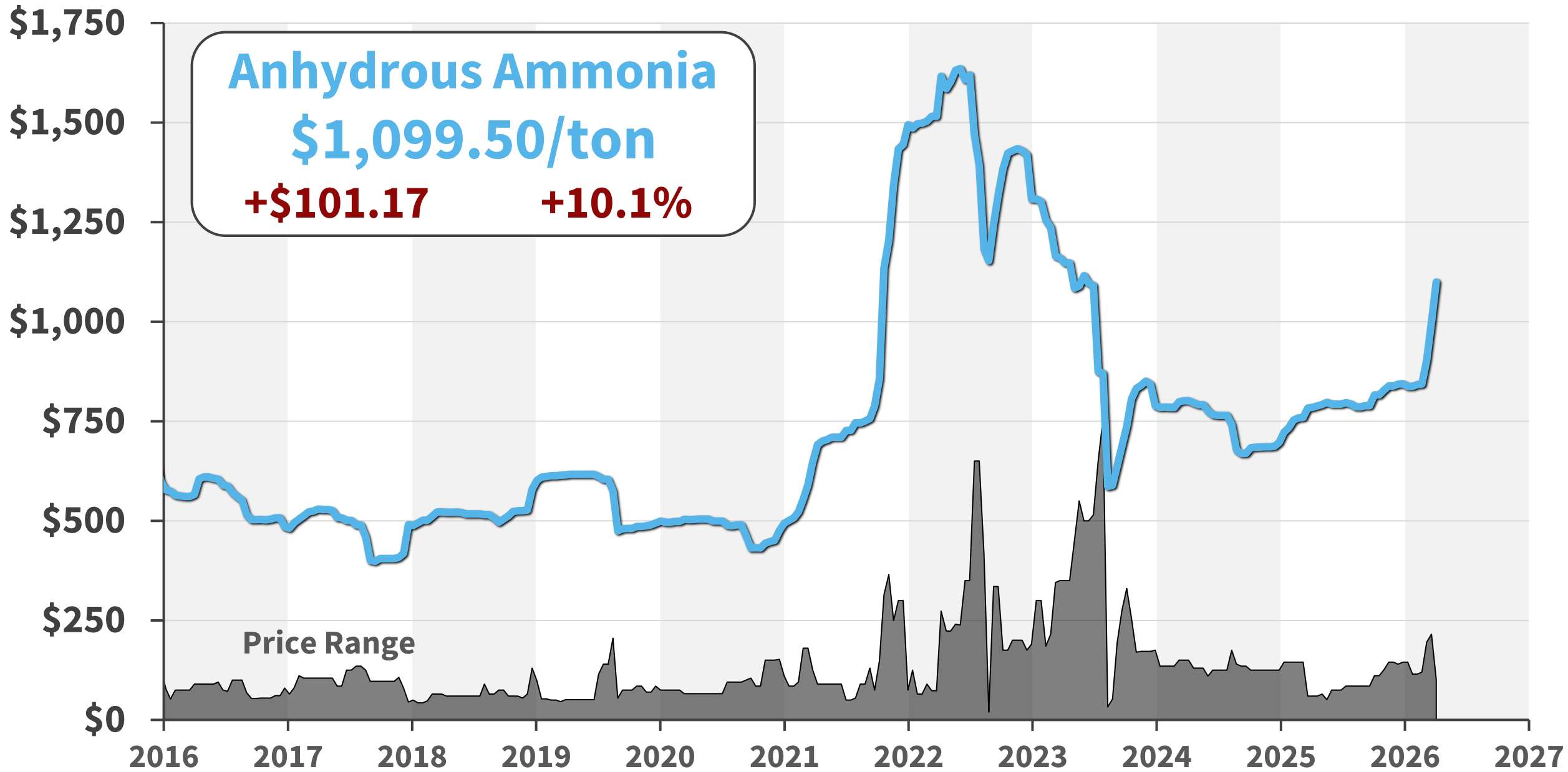
Changes in Fertilizer Prices

from Jan 10, 2025 to April 3, 2026 in U.S. Dollars per Ton

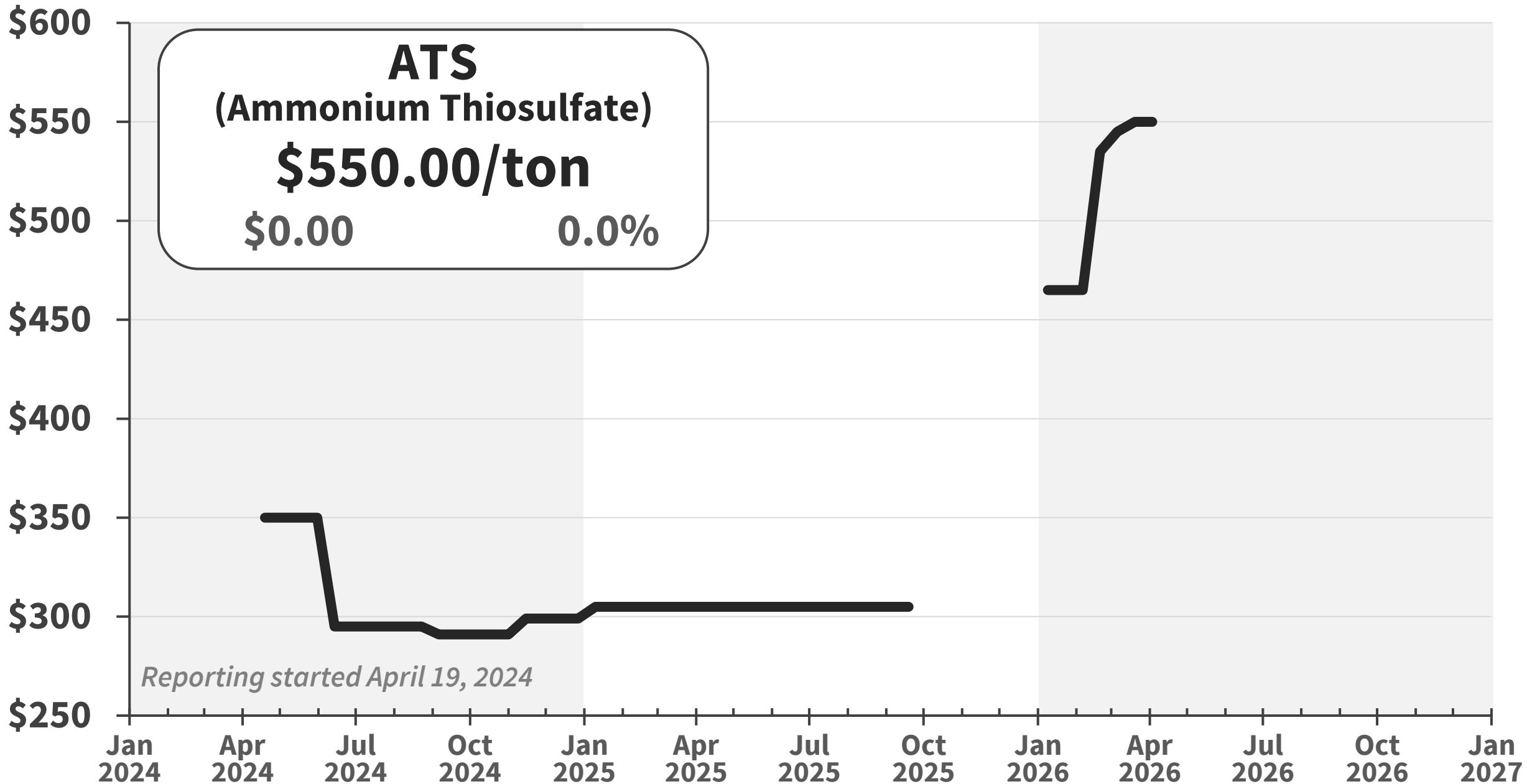
\$1,200



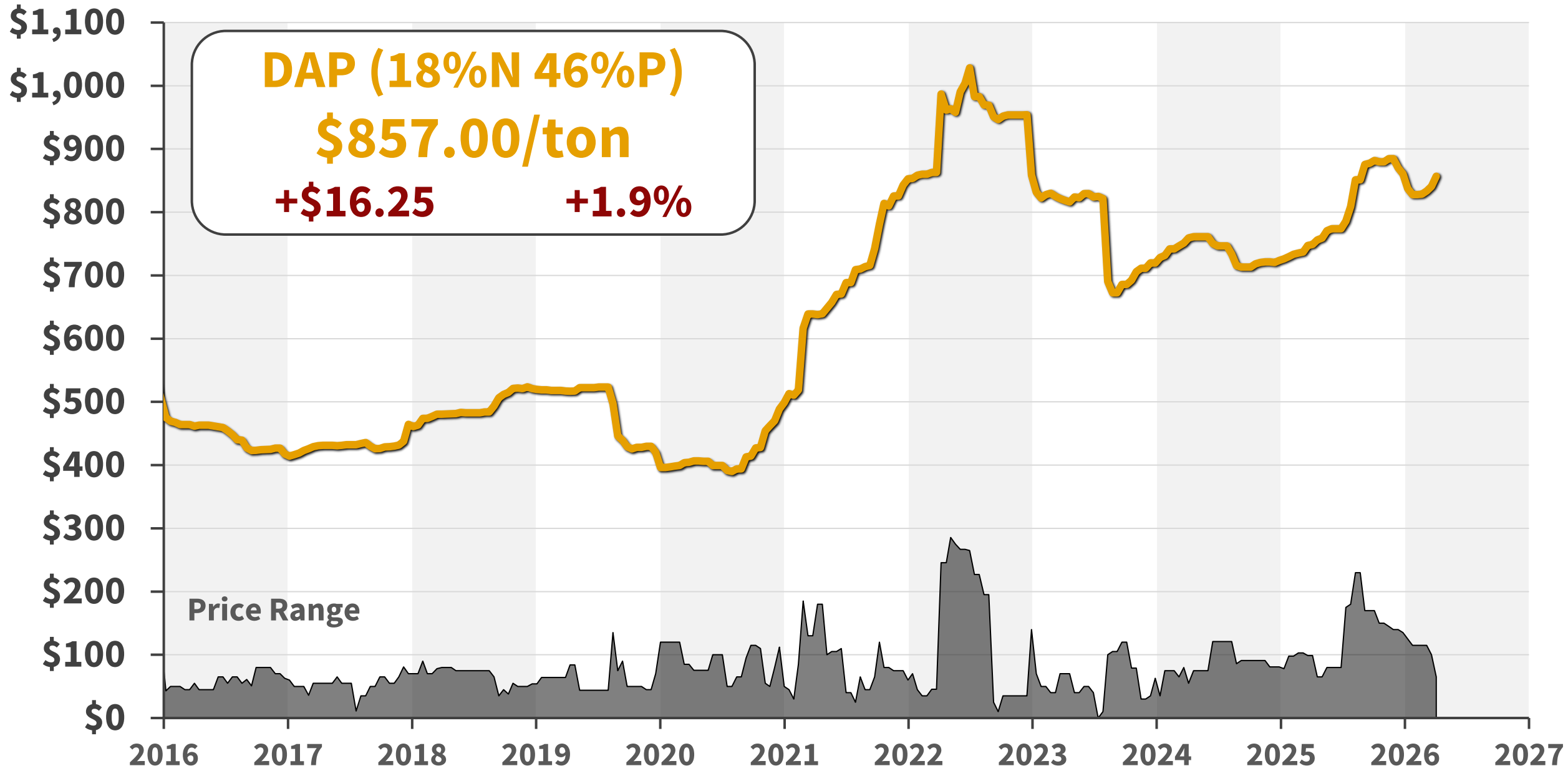
Illinois Fuel & Fertilizer Cost Report for week ending April 3, 2026



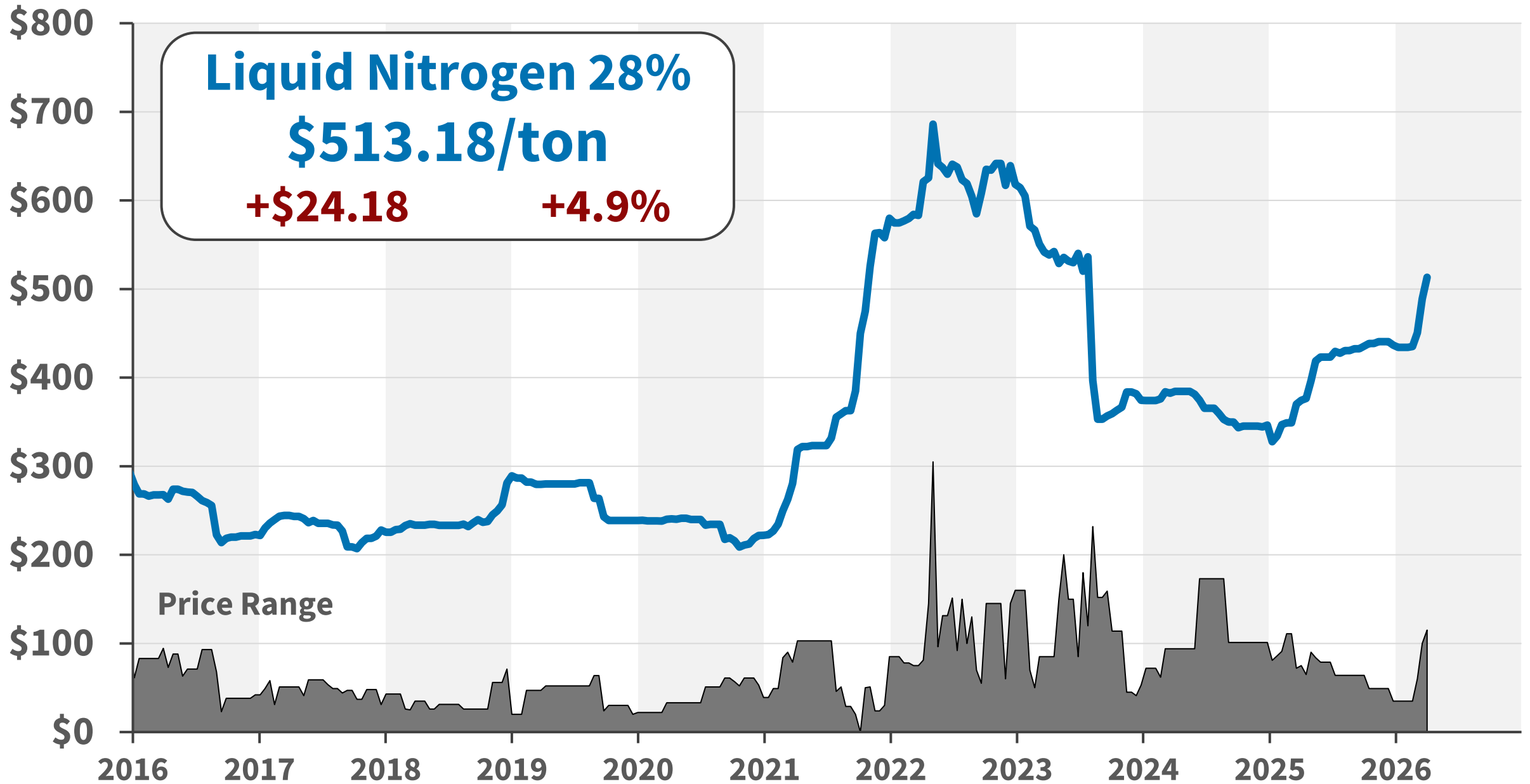
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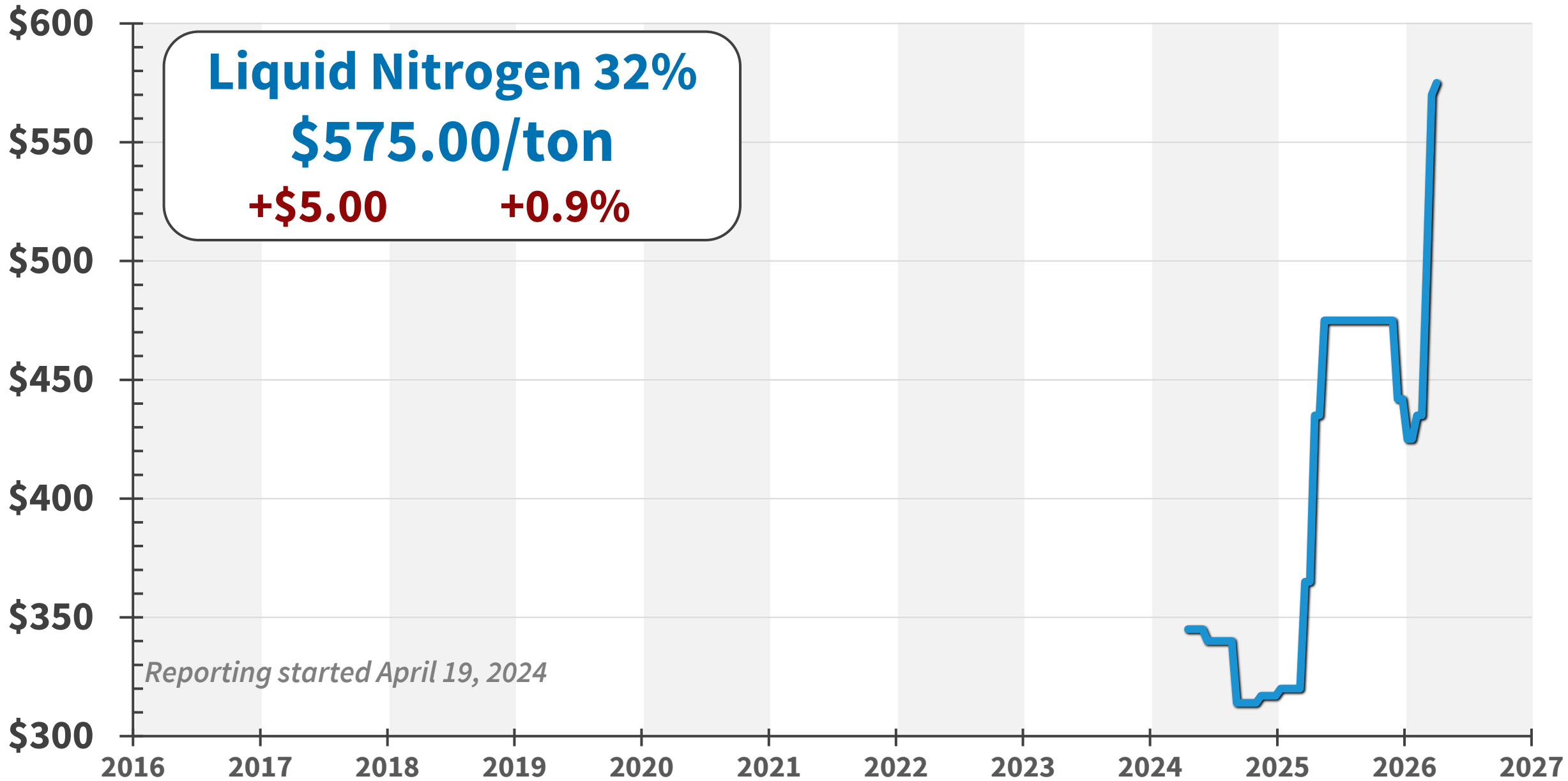
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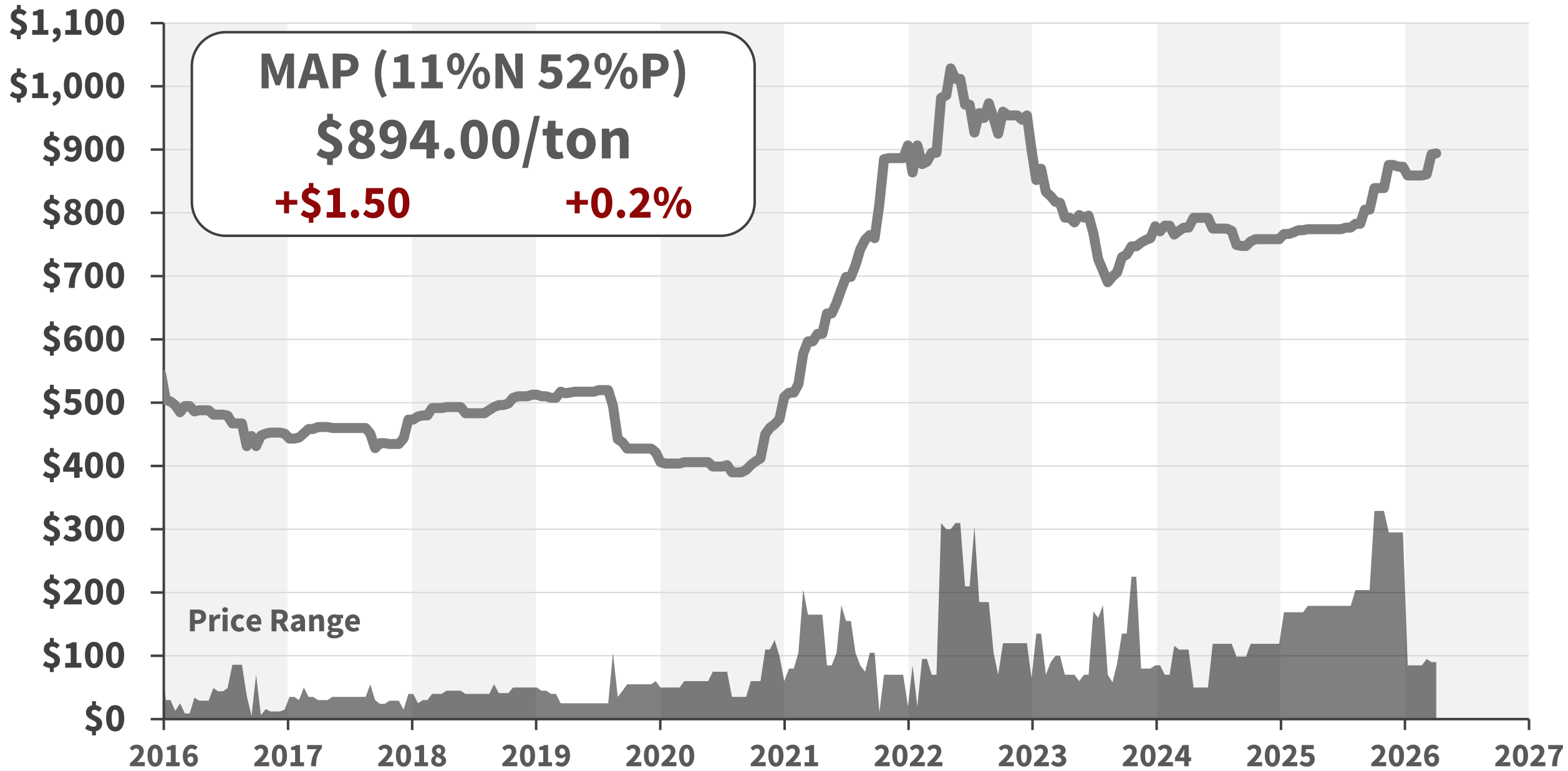
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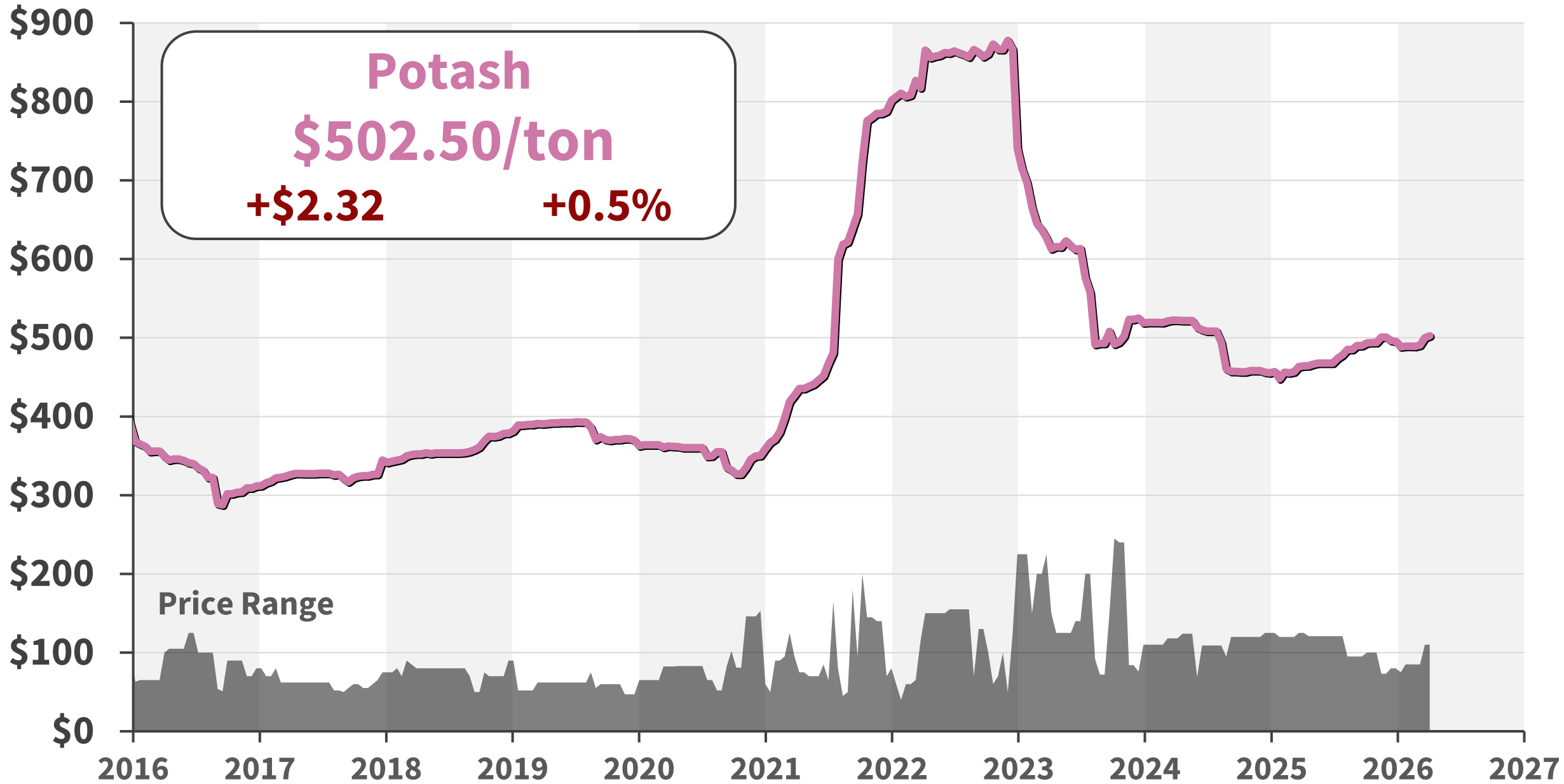
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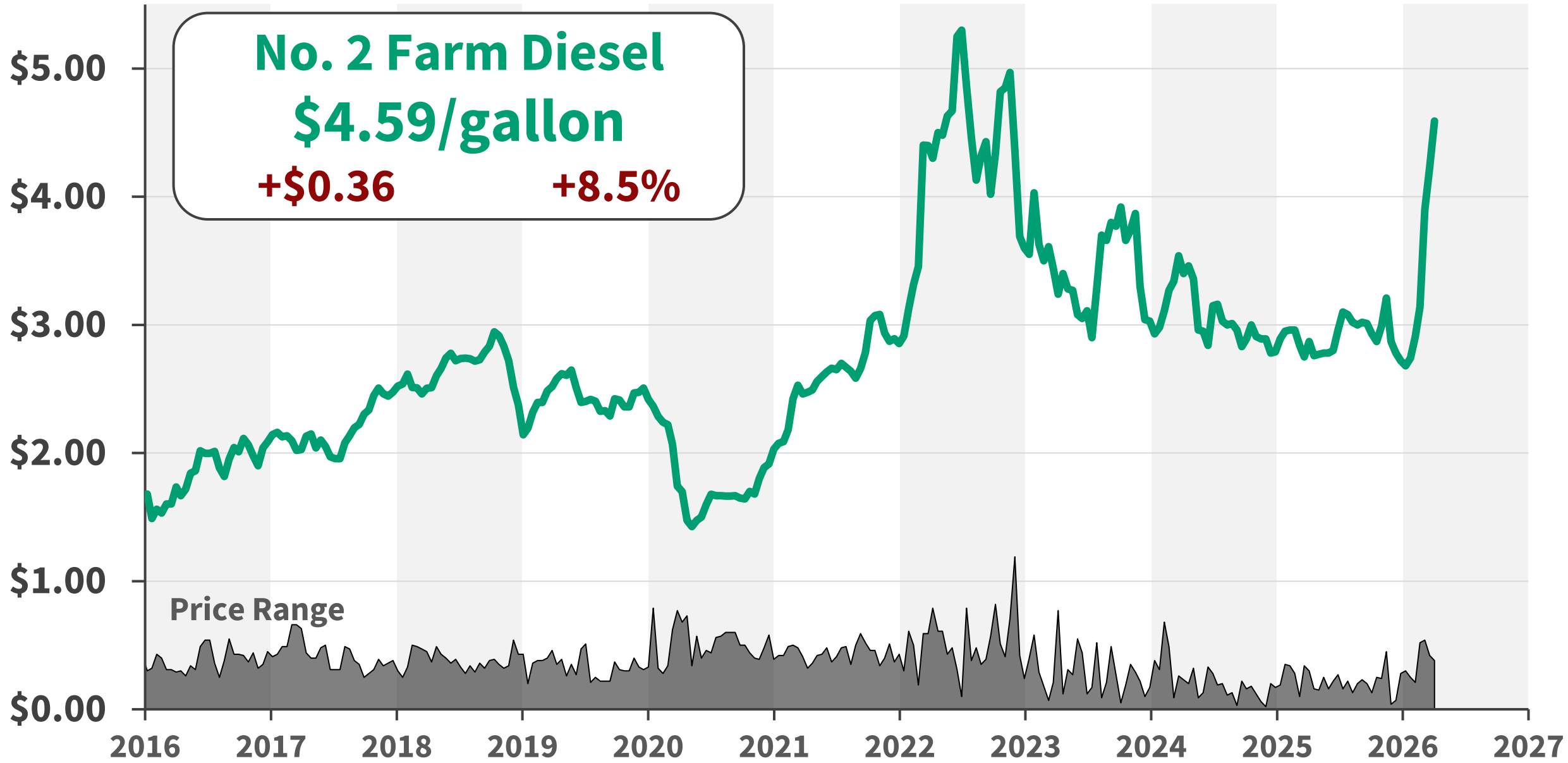


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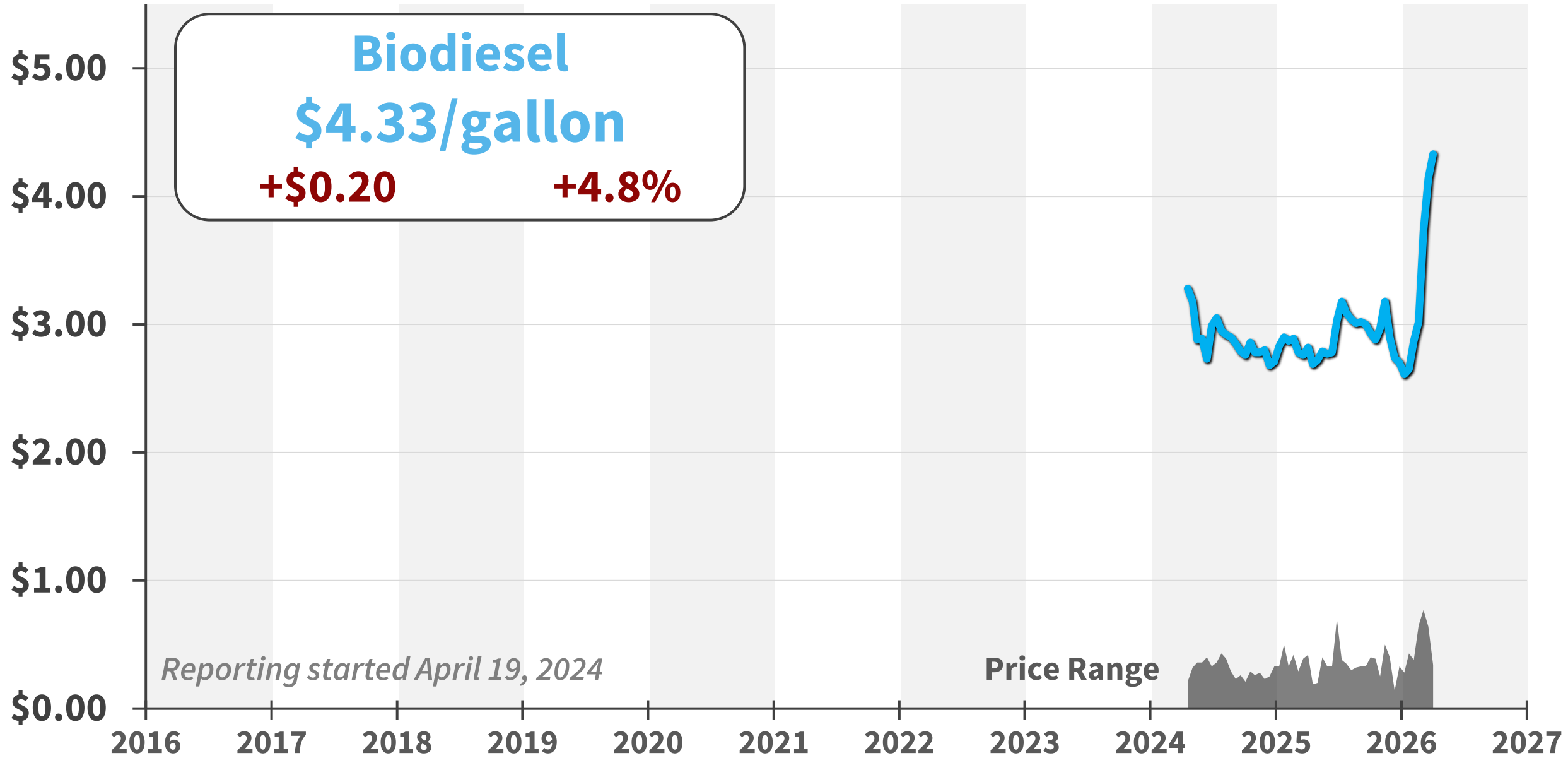


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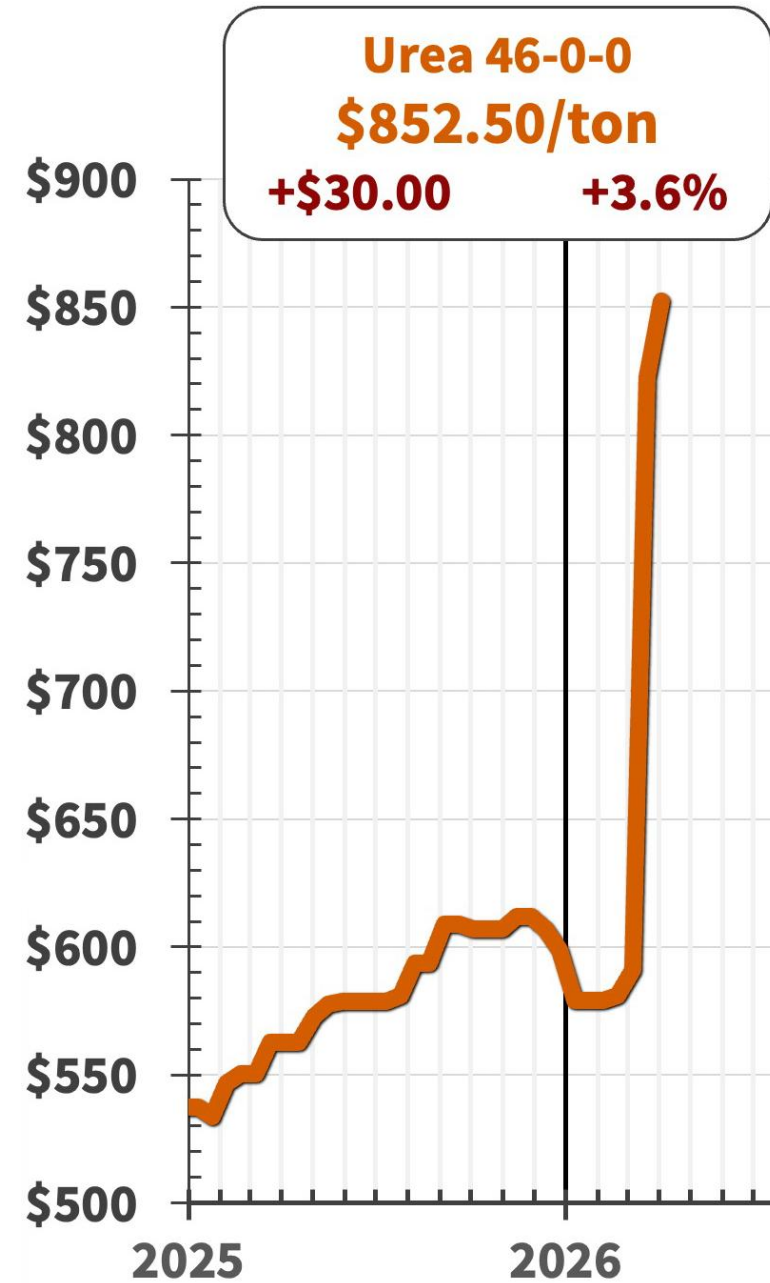
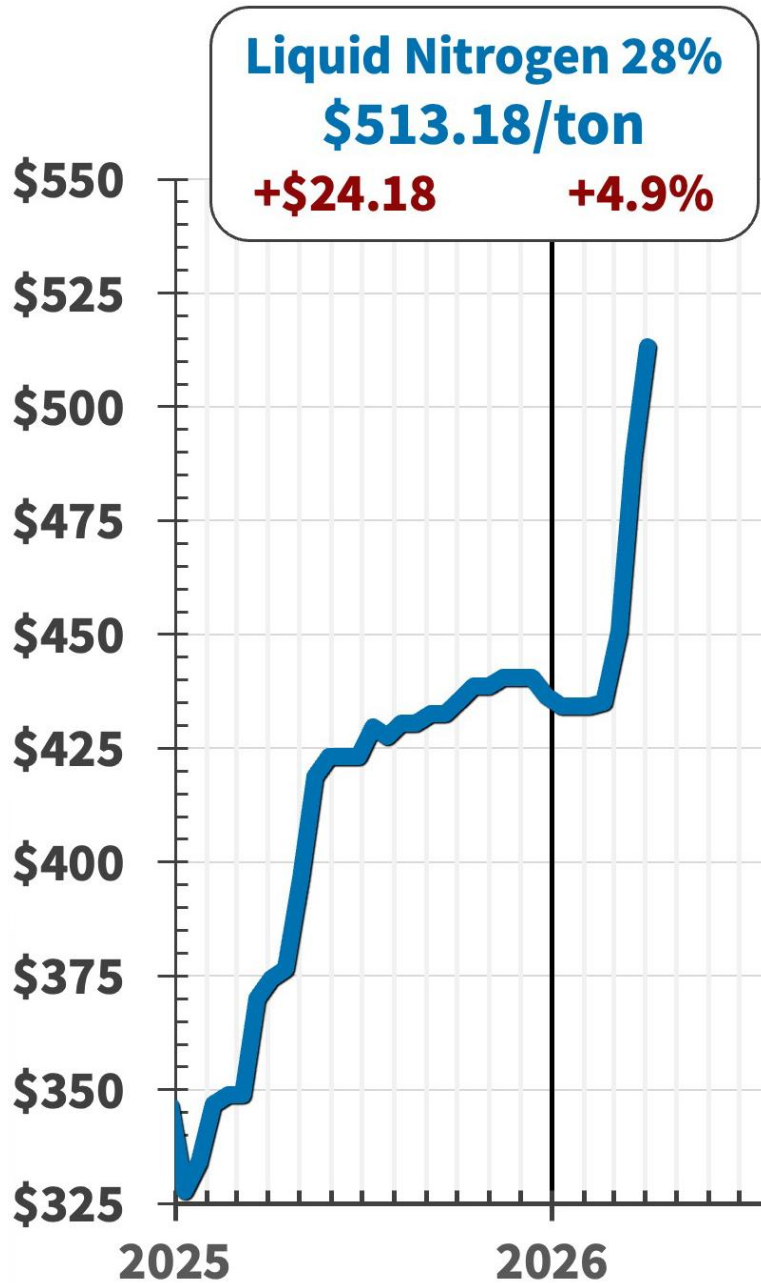
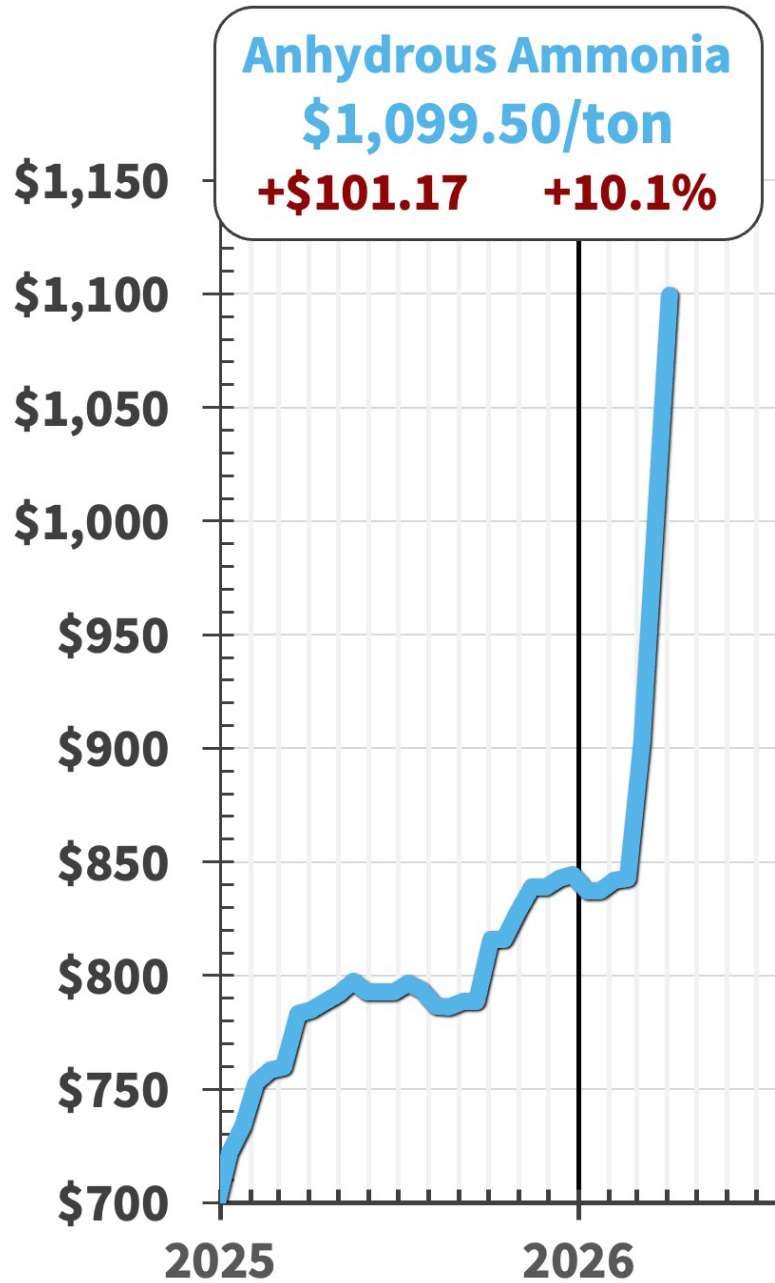




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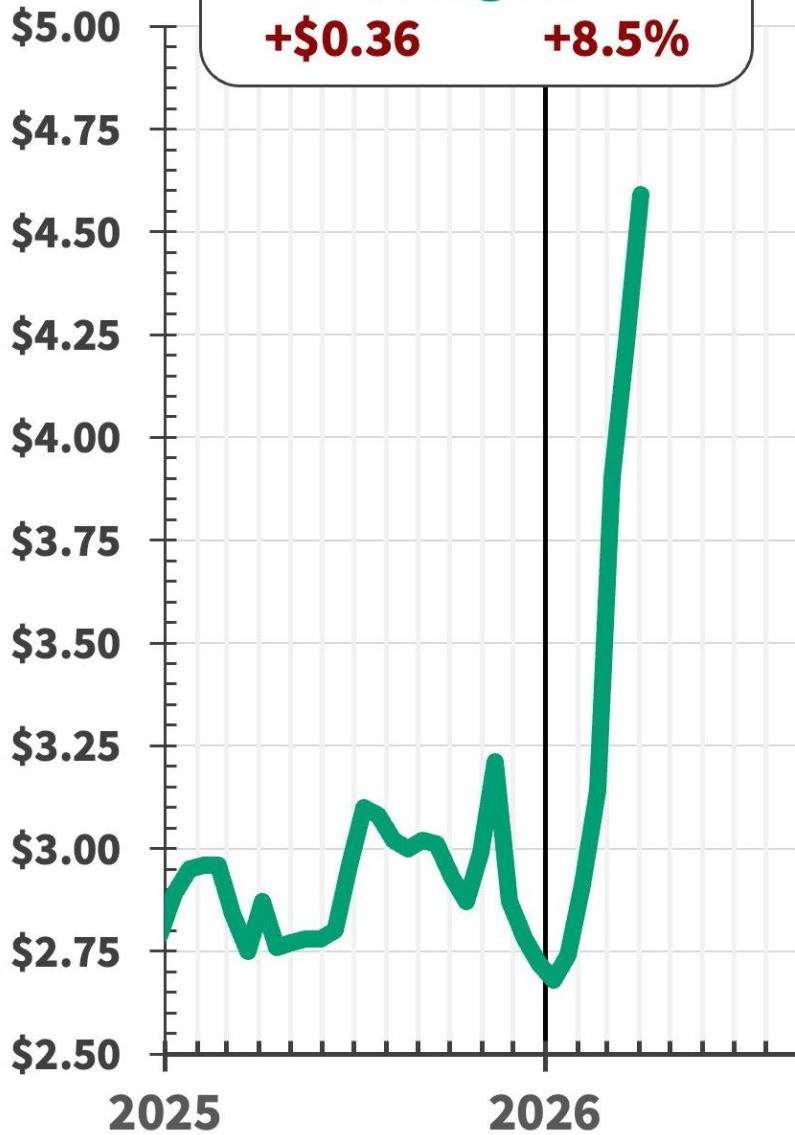
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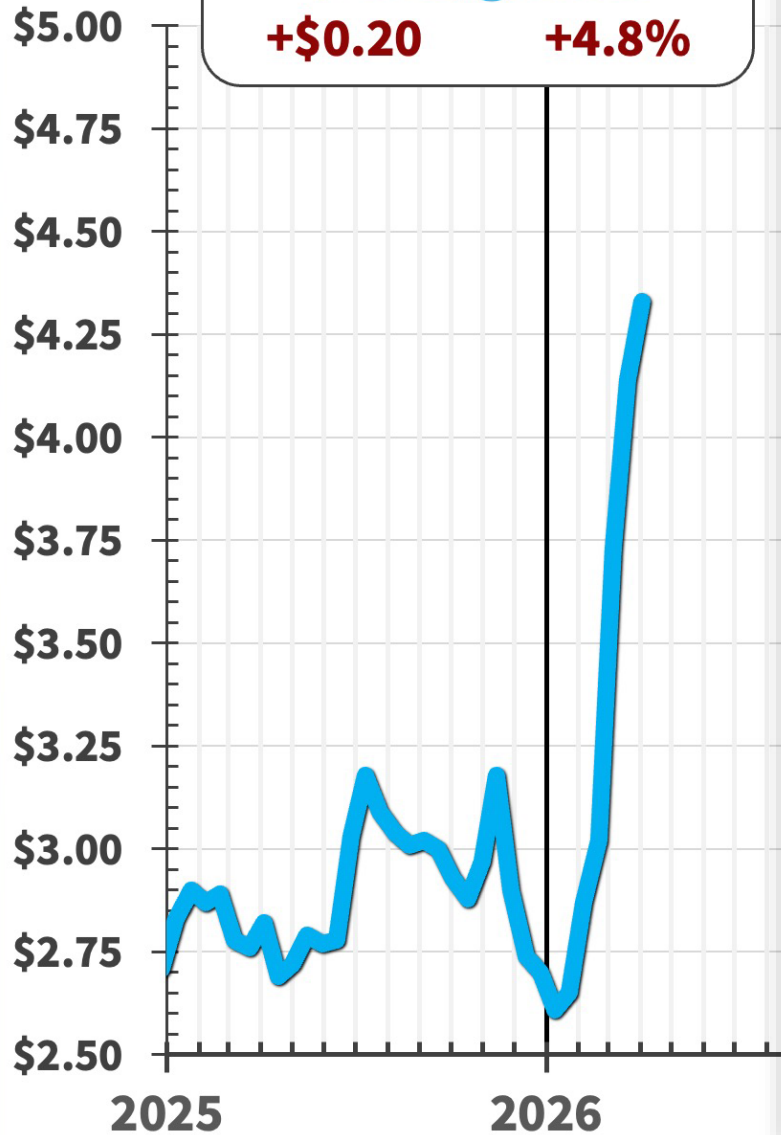
No. 2 Farm Diesel
\$4.59/gallon

+\$0.36 **+8.5%**



Biodiesel
\$4.33/gallon

+\$0.20 **+4.8%**



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