

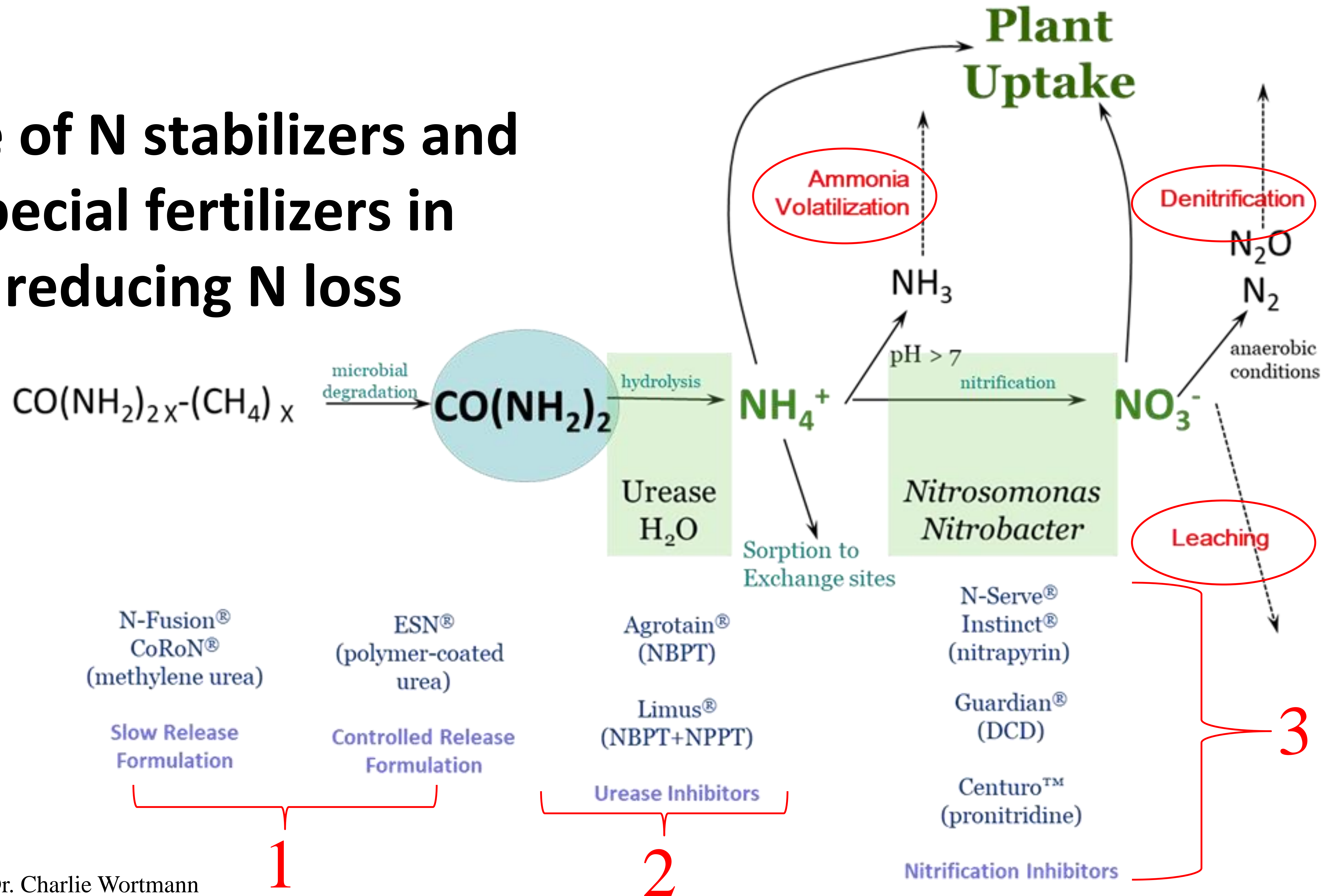
## On-Farm Research Nitrogen Management Studies

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# Role of N stabilizers and special fertilizers in reducing N loss





- N-Serve® by Corteva Agriscience™, is a product with known efficacy for inhibiting nitrification (product information is provided at right).
- The chemical compound nitrapyrin in N-Serve® temporarily inhibits populations of the bacteria that convert ammonium to nitrite (*Nitrosomonas*) and nitrite to nitrate (*Nitrobacter*).



**N-Serve® 24**  
Optinyte™ technology

**NITROGEN STABILIZER**

®™ Trademarks of Dow AgroSciences, DuPont or Pioneer and their affiliated companies or respective owners

**Use to delay nitrification of ammoniacal and urea nitrogen fertilizer compositions in the soil by controlling the nitrification process.**

Active Ingredients:

nitrapyrin: 2-chloro-6-(trichloromethyl)	
pyridine.....	22.2%
Other Ingredients.....	77.8%
Total .....	100.0%

Contains petroleum distillates

Contains 2 lb of active ingredients per gallon.

Product information from: [https://s3-us-west-1.amazonaws.com/agrian-cg-fs1-production/pdfs/N-Serve\\_24\\_Label1d.pdf](https://s3-us-west-1.amazonaws.com/agrian-cg-fs1-production/pdfs/N-Serve_24_Label1d.pdf)

# 2019 N-Serve Study York County

## Location 1

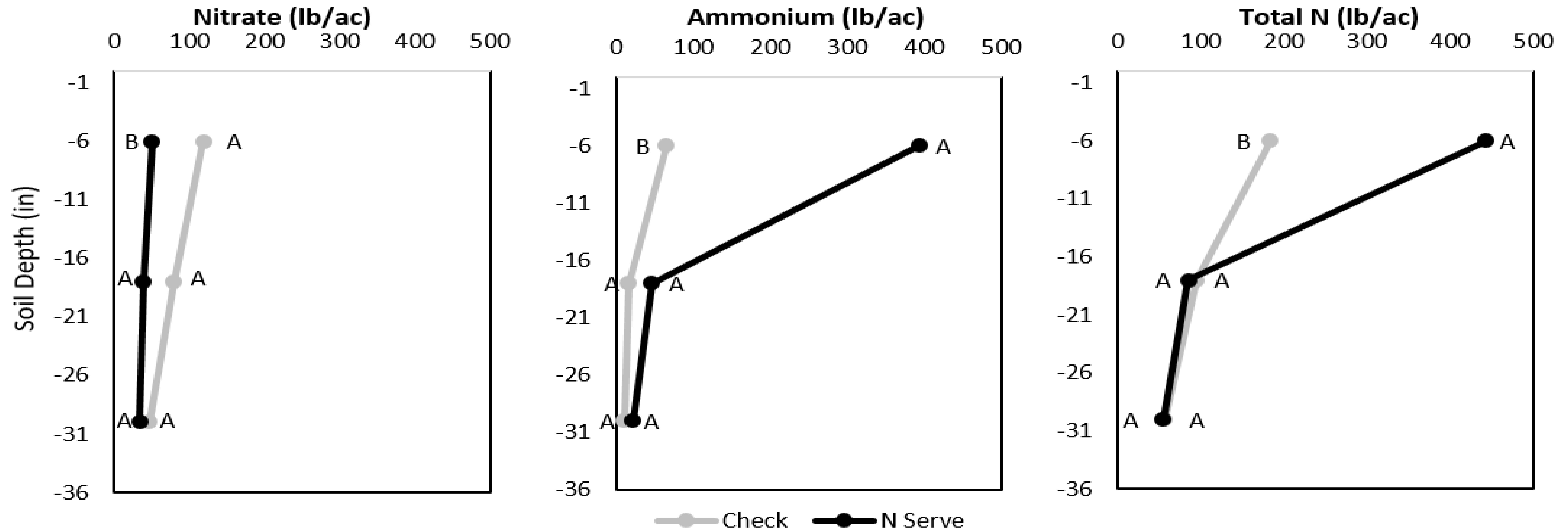
- 180 lb/ac N anhydrous ammonia on April 10, 2019
- 1 qt/ac N-Serve<sup>®</sup> (recommended rate)
- Previous crop: soybean
- Ridge-Till
- Sampled for ammonium + nitrate at V7 (1', 2', 3') 2" off anhydrous band

## Location 2

- 160 lb/ac N anhydrous ammonia on April 8, 2019
- 1 qt/ac N-Serve<sup>®</sup> (recommended rate)
- Previous crop: soybean
- No-Till
- Sampled for ammonium + nitrate at V7 (1', 2', 3') 2" off anhydrous band



# 2019 York Site 1 Results



Soil ammonium-N and nitrate-N for check (180 lb N/ac anhydrous ammonia with no inhibitor) and N-Serve (180 lb N/ac anhydrous ammonia with 1 qt/ac N-Serve inhibitor) treatments on June 17, 2019 at 1', 2', and 3' depths. Within a sampling depth, points with the same letter are not statistically different at the alpha=0.1 level.

# 2019 York Site 1 Yield Results

	Stand Count (plants/ac)	Stalk Rot (%)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ (\$/ac)
Check	32,500 A*	13.21 A	17.9 A	250 A	957.74 A
N-Serve®	31,750 A	7.14 A	18.0 A	251 A	949.65 B
P-Value	0.182	0.190	0.436	0.370	0.036

\*Values with the same letter are not significantly different at a 90% confidence level.

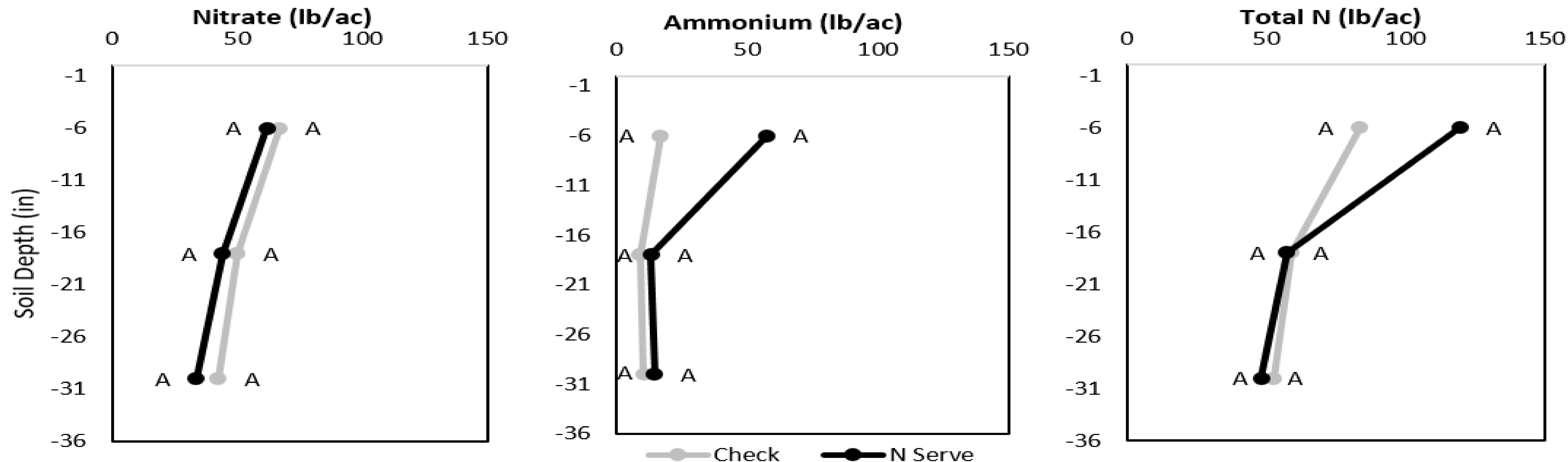
†Bushels per acre adjusted to 15.5% moisture.

‡Marginal net return based on \$3.83/bu corn and \$11/ac (\$47.95/gal) for N-Serve.





# 2019 York Site 2 Results



Soil ammonium-N and nitrate-N for check (160 lb N/ac anhydrous ammonia with no inhibitor) and N-Serve (160 lb N/ac anhydrous ammonia with 1 qt/ac N-Serve inhibitor) treatments on June 13 at 1', 2', and 3' depths. Within a sampling depth, points with the same letter are not statistically different at the alpha=0.1 level.

# 2019 York Site 2 Results

	Stand Count (plants/ac)	Stalk Rot (%)	Moisture (%)	Yield (bu/ac) <sup>†</sup>	Marginal Net Return <sup>‡</sup> (\$/ac)
Check	31,750 A*	12.08 A	15.0 A	264 A	1,010.51 A
N-Serve <sup>®</sup>	30,917 A	9.58 A	14.9 A	264 A	998.71 A
P-Value	0.080	0.638	0.084	0.908	0.131

\*Values with the same letter are not significantly different at a 90% confidence level.

<sup>†</sup>Bushels per acre adjusted to 15.5% moisture.

<sup>‡</sup>Marginal net return based on \$3.83/bu corn and \$11/ac (\$47.95/gal) for N-Serve.





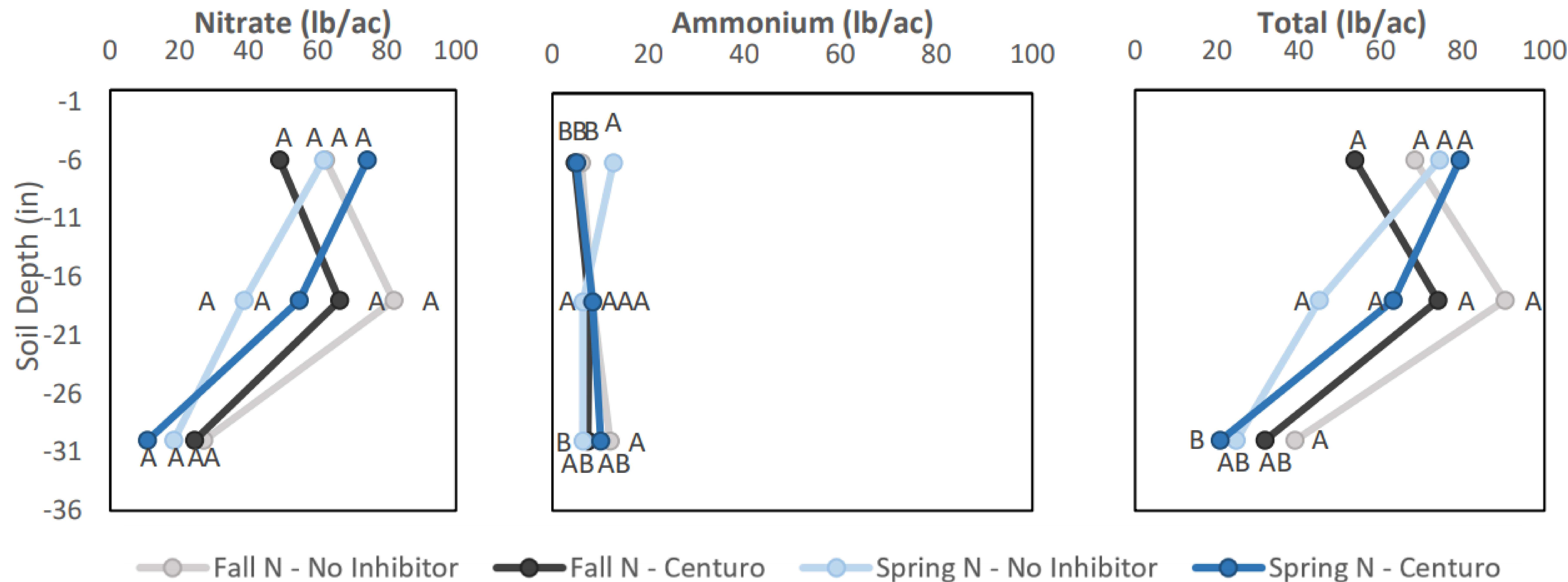
# 2020 Area Inhibitor Studies

**\*Partly sponsored by Upper Big Blue NRD**

- **York 1:** 150 lbs. Fall vs. Spring Anhydrous w/ and w/o Centuro®
  - November 15, 2019 and March 7, 2020
- **Fillmore:** 115 lb/ac Spring 32% UAN w/ and w/o Instinct® II
  - Received 70 lb/ac sidedress application of 32% on June 10 (no inhibitor)
  - April 1, 2020
- **York 2:** 44 gal/ac Spring 32% UAN, + Instinct® II, + ATS, + Biovante™
  - April 1, 2020
- **York 3:** 45 gal/ac Spring 32% UAN, + Inhibitor Concoction (ATS, humic acid, sugar)
  - April 11, 2020



## 2020 York 1



**Figure 1.** June 5 soil samples at 1', 2', and 3' depths for ammonium (lb/ac), nitrate (lb/ac), and total N (lb/ac) for the fall and spring anhydrous applications and with and without the CENTURO™ inhibitor.



## 2020 York 1

	Stand Count (plants/ac)	Stalk Rot (%)	Greensnap (%)	R2 Foliar N (%)†	Moisture (%)	Yield (bu/ac)††	Marginal Net Return‡ (\$/ac)
Fall, no inhibitor	30,167 A*	10.00 A	5 A	2.71 A	16.3 A	269 A	902.61 A
Fall, CENTURO™	33,167 A	8.33 A	1 A	2.78 A	16.4 A	267 A	876.77 B
Spring, no inhibitor	31,500 A	7.50 A	1 A	2.74 A	16.4 A	269 A	903.49 A
Spring, CENTURO™	31,333 A	7.50 A	3 A	2.77 A	16.4 A	270 A	885.54 B
P-Value	0.151	0.892	0.191	0.151	0.560	0.269	0.0003

\*Values with the same letter are not significantly different at a 90% confidence level.

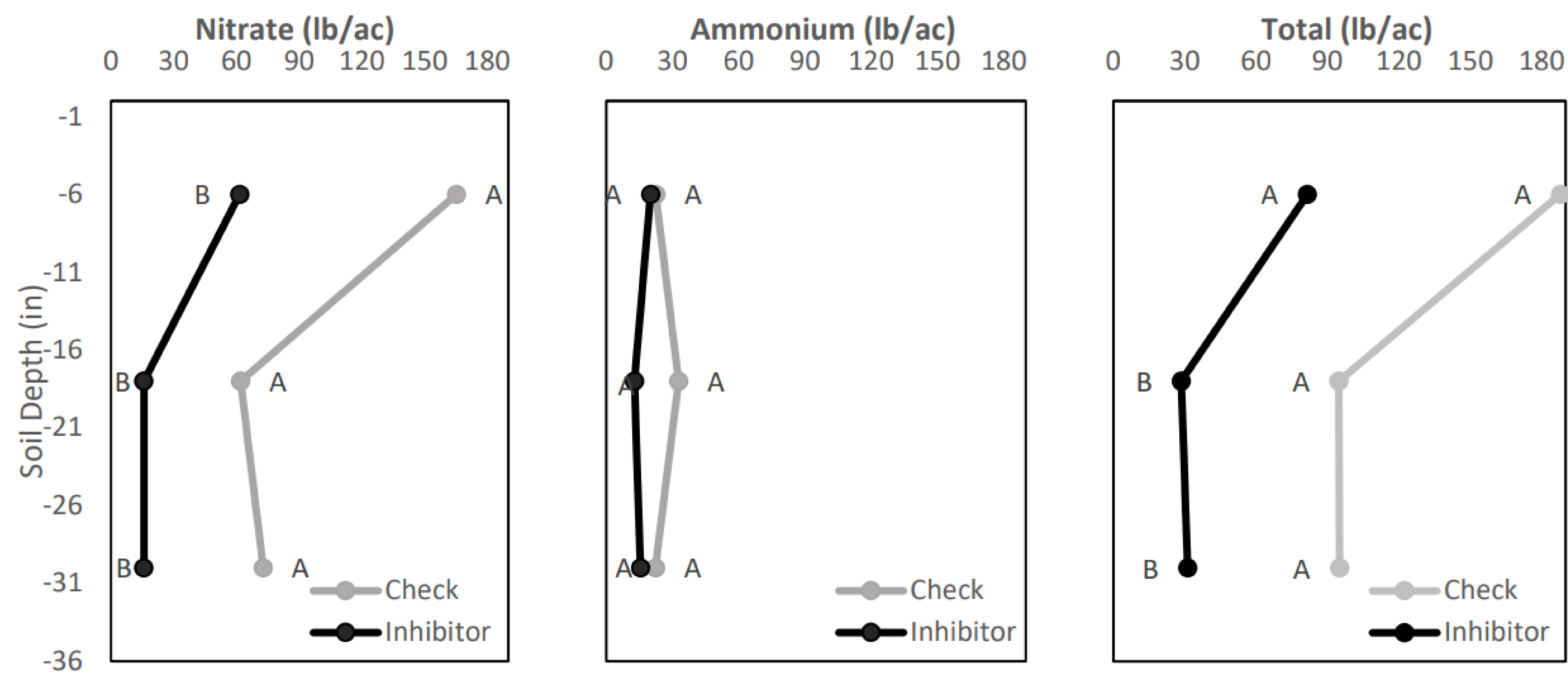
†Midwest Lab's sufficient level for in tissue sample is 3.4; Ward Lab's sufficiency level is 2.71.

††Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on \$3.51/bu corn, \$445/ton anhydrous ammonia (\$40.70/ac for the without inhibitor treatment), and \$22.50/gal for Centuro™ (\$61.28/ac for the with inhibitor treatment).



## 2020 Fillmore



**Figure 1.** June 8 soil samples at 1', 2', and 3' depths for ammonium (lb/ac), nitrate (lb/ac), and total N (lb/ac) for the check and inhibitor products.



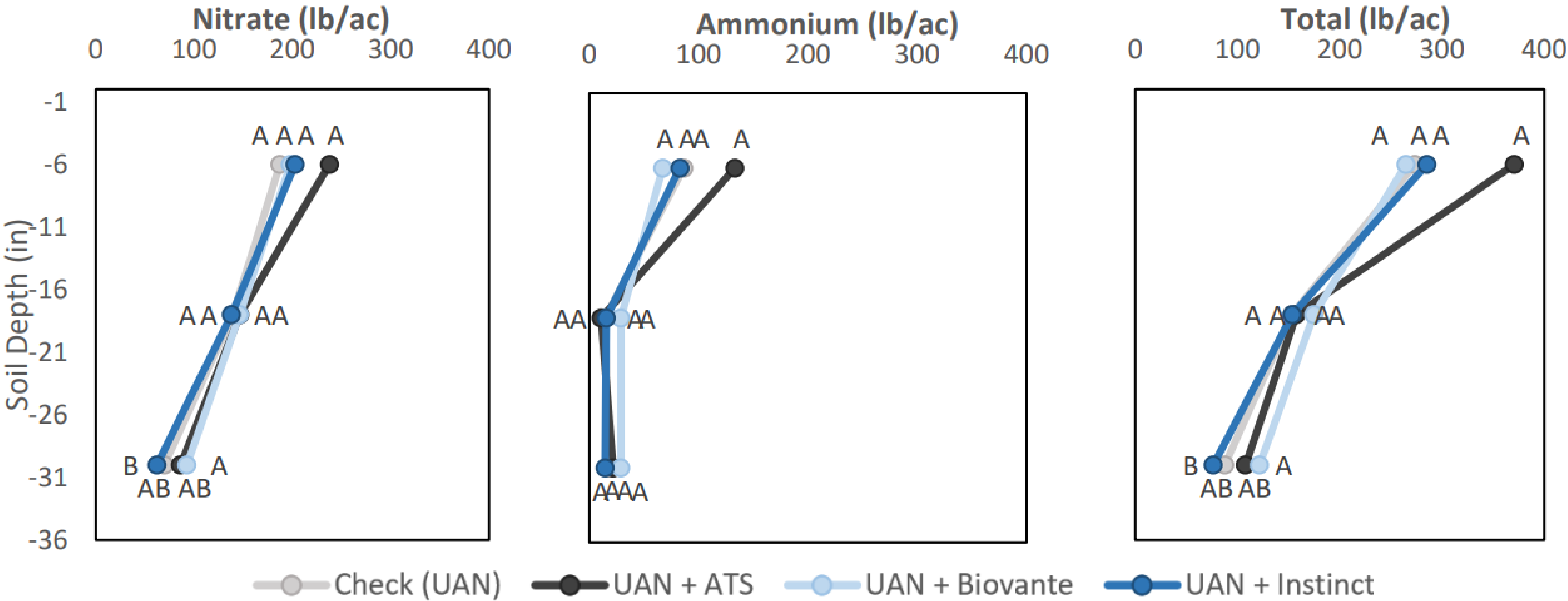
## 2020 Fillmore

	Stand Count (plants/ac)	VT Foliar N (%)†	Moisture (%)	Yield (bu/ac)††	Marginal Net Return‡ (\$/ac)
Check	33,214 A*	3.22 A	19.0 A	213 A	746.24 A
Instinct® II	32,500 A	3.21 A	19.0 A	213 A	739.43 A
P-Value	0.211	0.923	0.530	0.679	0.259

\*Values with the same letter are not significantly different at a 90% confidence level.  
†Midwest Lab’s sufficient level for in tissue sample is 3.4; Ward Lab’s sufficiency level is 2.71.  
††Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.  
‡Marginal net return based on \$3.51/bu corn and \$9.23/ac for Instinct® II.



## 2020 York 2



**Figure 1.** June 8 soil samples at 1', 2', and 3' depths for ammonium (lb/ac), nitrate (lb/ac), and total N (lb/ac) for the check and inhibitor products.



## 2020 York 2

	Stand Count (plants/ac)	Stalk Rot (%)	Greensnap (%)	V14 Foliar N (%)†	Moisture (%)	Yield (bu/ac)††	Marginal Net Return‡ (\$/ac)
Check	28,875 A*	2.50 A	15 A	2.99	18.2 A	209 B	734.76 AB
ATS	25,500 A	0.00 A	23 A	3.21	18.3 A	215 A	745.62 A
Biovante™	26,125 A	0.00 A	21 A	2.97	18.2 A	212 AB	725.64 B
Instinct® II	28,750 A	0.63 A	16 A	3.13	18.2 A	212 AB	730.65 AB
P-Value	0.105	0.524	0.448	N/A	0.635	0.104	0.064

\*Values with the same letter are not significantly different at a 90% confidence level.

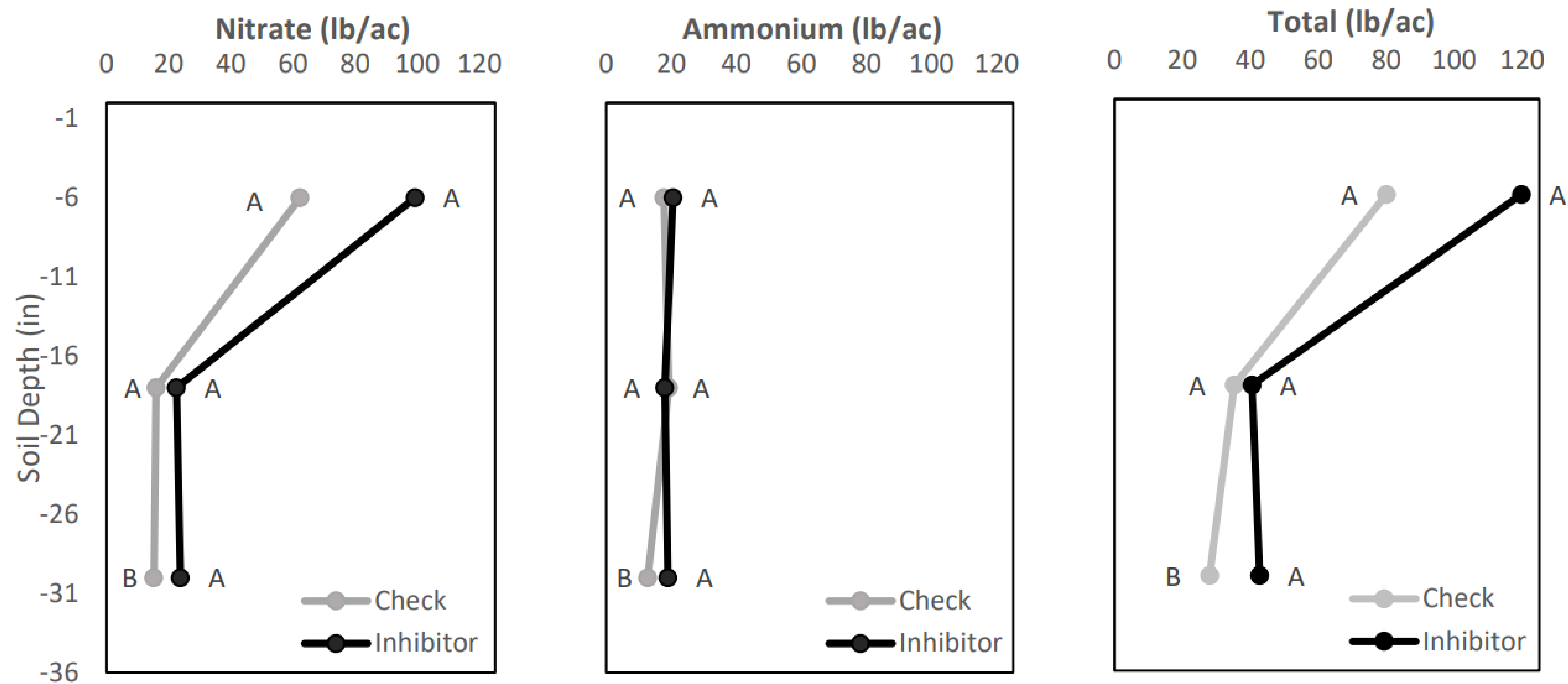
†Samples were submitted to Midwest Labs. Midwest Lab's normal level for %N in tissue sample is 3.4; therefore, all the samples were considered low or sufficient-low. The Ward Lab sufficiency level is 2.71; therefore, by Ward Lab's standard, all foliar N tissue samples are sufficient.

††Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on \$3.51/bu corn, \$7.86/ac for ATS, \$17.31/ac for Biovante™ BioRed™ and Assist™, and \$12.30/ac for Instinct® II.



## 2020 York 3



**Figure 1.** June 11 soil samples at 1', 2', and 3' depths for ammonium (lb/ac), nitrate (lb/ac), and total N (lb/ac) for the check and inhibitor concoction.



## 2020 York 3

	Stand Count (plants/ac)	Stalk Rot (%)	VT Foliar N (%)†	Moisture (%)	Yield (bu/ac)† †	Marginal Net Return‡ (\$/ac)
Check	29,750 A*	0.63	3.10 A	16.1 A	220 A	711.55 A
Inhibitor Concoction	29,375 A	0.63	3.05 A	15.9 B	221 A	705.68 A
P-Value	0.681	N/A	0.647	0.060	0.797	0.695

\*Values with the same letter are not significantly different at a 90% confidence level.

†Midwest Lab's sufficient level for in tissue sample is 3.4; Ward Lab's sufficiency level is 2.71.

††Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on \$3.51/bu corn, UAN cost of \$58.75/ac for the check treatment with 45 gal/ac of UAN, UAN cost of \$52.22/ac for the inhibitor treatment with 40 gal/ac UAN, \$7.47/ac for 4.5 gal/ac ATS, \$4.75/ac for nano humic acid, and \$4/ac for Nano brown sugar.

# Take Home Points: Inhibitors

- Inhibitors may protect applied N but residual nitrate-N deep in the rooting depth is not protected and is the first lost to leaching
- Yield benefit and N leaching reduction due to a nitrification inhibitor likely to be small for SiL or SiCL soil.
- Nitrification inhibitor likely to reduce leaching for fertilizer-N applied to sandy soil in spring but less likely with fall application or with in-season application in June
- The duration of inhibitor effects depends on soil temperature and may be effective for only 2 weeks but longer with low soil temperatures.
- The Iowa Nutrient Reduction Plan credits use of a nitrification inhibitor with anhydrous ammonia with 7% reduction in nitrate loss to tile drainage
- Nitrification inhibitors can have a small role in nitrate-N reduction when use is **timely and well-targeted to high risk situations**



# Additional Resources

- Several years of on-farm research studies conducted with inhibitor products. More info. at: <http://resultsfinder.unl.edu/>
- Nitrogen Extenders and Additives for Field Crops:  
<https://www.ag.ndsu.edu/publications/crops/nitrogen-extend-ers-and-additives-for-field-crops>

## 2020 Rate & Timing Study-Hamilton Co.

**\*Partly sponsored by Upper Big Blue NRD**

***Fall 205 lb/ac:*** 180 lb/ac N as fall anhydrous ammonia and 25 lb/ac N with herbicide

***Fall 255 lb/ac:*** 230 lb/ac N as fall anhydrous ammonia and 25 lb/ac N with herbicide

***Spring 205 lb/ac:*** 180 lb/ac N as spring anhydrous ammonia and 25 lb/ac N with herbicide

***Spring 255 lb/ac:*** 230 lb/ac N as spring anhydrous ammonia and 25 lb/ac N with herbicide

***Split 205 lb/ac:*** 120 lb/ac N as spring anhydrous ammonia, 25 lb/ac N with herbicide, and 60 lb/ac N sidedressed at V8

***Split 255 lb/ac:*** 170 lb/ac N as spring anhydrous ammonia, 25 lb/ac N with herbicide, and 60 lb/ac N sidedressed at V8



# Soil Samples:

Treatment	6/30/20 Nitrate – N ppm N	6/30/20 Nitrate-N lb N/ac	7/17/20 Nitrate-N ppm N	7/17/20 Nitrate-N lb N/ac	10/19/20 Nitrate-N ppm N	10/19/20 Nitrate-N lb N/ac
			0-12"			
Fall 205 lb/ac	48.4	174	21.3	77	3	13
Fall 255 lb/ac	32.2	116	8	29	3.2	12
Spring 205 lb/ac	56.5	203	16.5	59	5.8	19
Spring 255 lb/ac	35.2	127	12.8	46	3.3	12
Split 205 lb/ac	24.9	90	27.7	100	2.3	8
Split 255 lb/ac	22.1	80	23.3	84	6.4	0
			12-24"			
Fall 205 lb/ac	19.1	69	5.3	19	0.7	3
Fall 255 lb/ac	16	58	4.6	17	0.6	2
Spring 205 lb/ac	18.7	67	4.6	17	0.7	2
Spring 255 lb/ac	11.1	40	4.8	17	1.8	7
Split 205 lb/ac	13.6	49	3.9	14	0.4	1
Split 255 lb/ac	8.8	32	15.5	2.85	0.6	0
			24-36"			
Fall 205 lb/ac	3.3	12	3.3	12	0.2	1
Fall 255 lb/ac	4.5	16	5.1	18	0.4	1
Spring 205 lb/ac	7.5	27	3.3	12	0.1	0
Spring 255 lb/ac	3.8	14	4.6	17	0.2	1
Split 205 lb/ac	4.4	16	1.9	7	0.1	0
Split 255 lb/ac	0.6	2	1	11	0	0
			36-72"			
Fall 255 lb/ac	-	-	2.8	30	0.1	2
Split 255 lb/ac	-	-	1	11	<0.1	0

## 2020 Hamilton

	Stand Count (plants/ac)	Stalk Rot (%)	Greensnap (%)	lbs N/bu grain	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ (\$/ac)
Fall 205 lb/ac	26,667 A*	0.01 A	6 A	1.03 B	16.2 A	199 A	629.85 A
Fall 255 lb/ac	26,500 A	0.00 A	2 A	1.27 A	16.3 A	201 A	625.49 A
Spring 205 lb/ac	25,833 A	0.00 A	7 A	1.02 B	16.5 A	201 A	638.30 A
Spring 255 lb/ac	26,000 A	0.00 A	6 A	1.24 A	16.5 A	206 A	641.70 A
Split 205 lb/ac	26,833 A	0.00 A	3 A	1.00 B	16.6 A	205 A	645.69 A
Split 255 lb/ac	26,833 A	0.00 A	5 A	1.24 A	16.6 A	206 A	633.50 A
P-Value	0.920	0.465	0.588	<0.0001	0.669	0.238	0.564

\*Values with the same letter are not significantly different at a 90% confidence level.

†Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on \$3.51/bu corn, \$0.28/lb N as anhydrous ammonia, \$8.00/ac for anhydrous ammonia application, \$0.35/lb for UAN applied with herbicide or as sidedress, and \$3/ac for sidedress UAN application.



## 2020 Nitrogen Rate Study-York Co.

\*Partly sponsored by Upper Big Blue NRD

	Harvest Stand Count (plants/ac)	Stalk Rot (%)	Greensnap (%)	lbs N/bu grain	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ (\$/ac)
135 lb/ac N	26,750 A*	2.50 A	0 A	0.73 C	17.1 B	184 A	599.14 A
185 lb/ac N	26,875 A	0.63 A	3 A	0.98 B	16.9 B	189 A	600.38 A
235 lb/ac N	27,125 A	2.50 A	1 A	1.23 A	17.9 A	191 A	594.88 A
P-Value	0.736	0.785	0.183	<0.0001	0.028	0.246	0.903

\*Values with the same letter are not significantly different at a 90% confidence level.

†Bushels per acre corrected to 15.5% moisture.

‡Marginal net return based on \$3.51/bu corn, \$8/ac for the anhydrous application cost, \$0.28/lb N as anhydrous, and \$0.35/lb N as UAN.

# Take Home Points: Nutrient Management Studies

- **Check vs. Inhibitor Studies:** No yield differences in 5 studies from 2019-2020.  
In 6<sup>th</sup> study, addition of ATS increased yield over 32% UAN check treatment.
- **Rate vs. Timing Studies:**
  - No yield differences when nitrogen was applied in fall vs. spring vs. split.
  - No yield differences between nitrogen applied +/- 50 lbs/ac.
  - Shows same yields can be obtained with reduced nitrogen application amounts.





<https://cropwatch.unl.edu/nebraska-farm-research-network-results-update-meetings-2021>

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# Nebraska On-Farm Research Network Results Update Meetings 2021

## FEBRUARY 25 AND 26, 2021

RELIABLE, RESEARCH BASED INFORMATION FOR YOUR FARM



## Opportunities for On-Farm Research

### Precision Nitrogen Management

- <https://cropwatch.unl.edu/precision-nitrogen-management-farm-research-project>
- Stipend \$1300 + up to \$1200 for technology costs



- \$300 reimbursement of sampling expenses



**INTERESTED IN AN  
INHIBITOR STUDY?  
[HTTPS://GO.UNL.EDU/4RVW](https://go.unl.edu/4rvw)**

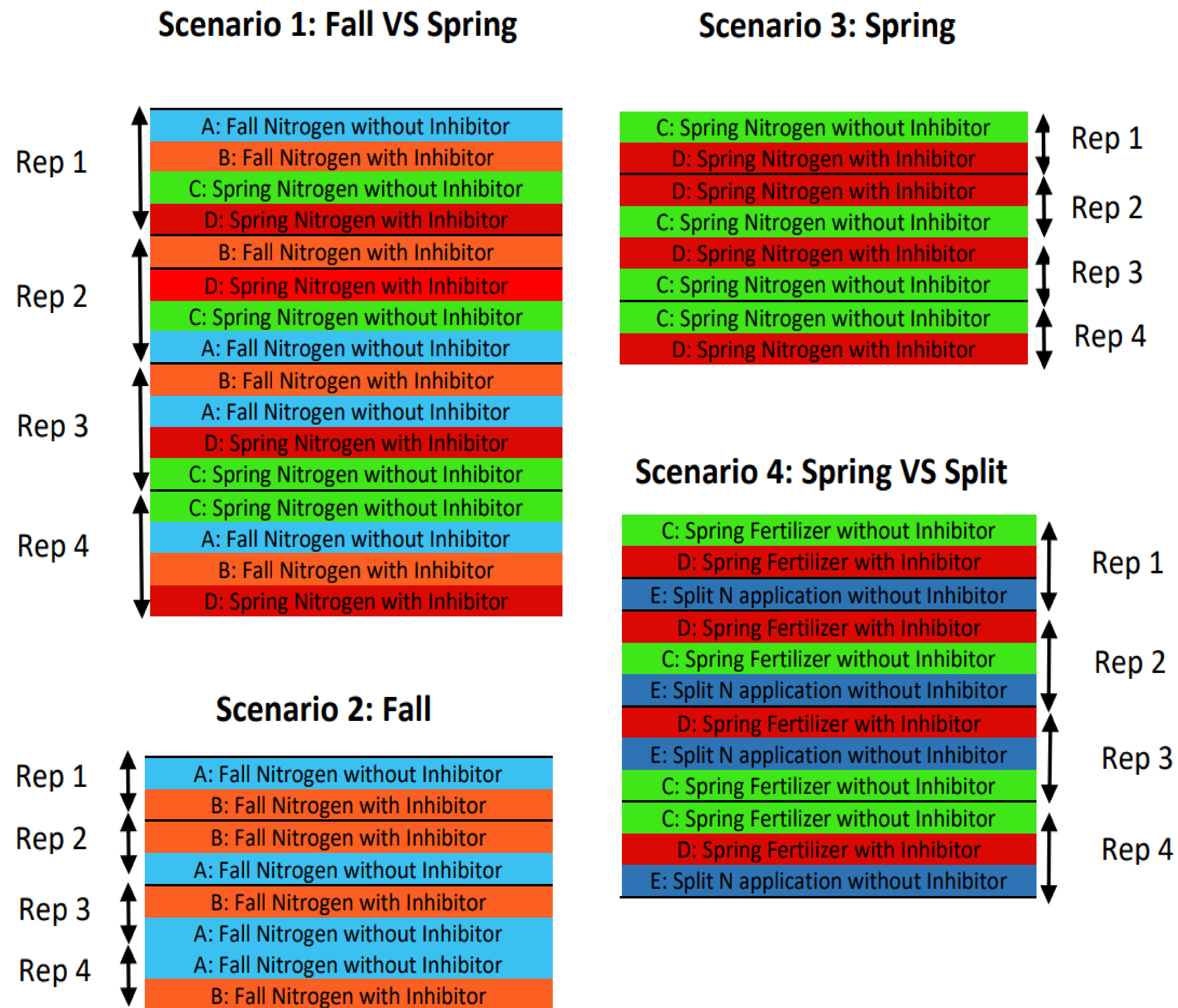


Figure 1. Possible scenarios for comparing nitrogen application with and without inhibitors

## On-Farm Research Inhibitor Studies for Nitrogen Management

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