The Business Case for Conservation

A Summary of Farm Financial and Environmental Data from Precision Conservation Management

Illinois Corn Growers Association

PCM
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Gary Schnitkey Laura Gentry Sarah Sellars

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NEW REPORT INSIDE!

Conservation practices analyzed for their ROI

A program of the

Illinois Corn Growers Association

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Topics

- What is PCM?
- Data Collection
- Calculating economic returns
- Tillage results
- Nitrogen results
- Cover crop results
- Summary

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Speakers

Laura Gentry

Director of Water Quality

Illinois Corn Growers Association

Gary Schnitkey

Professor of Farm Management

ILLINOIS
Agricultural & Consumer Economics
COLLEGE OF AGRICULTURAL, CONSUMER & ENVIRONMENTAL SCIENCES

Sarah Sellars

Graduate student

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What is PCM?

PRECISION CONSERVATION MANAGEMENT

- Understand how conservation practices impact farm net returns
- Address water quality concerns. Prevent agricultural regulation.
- Position farmers to benefit from positive conservation outcomes


Justin Durdan, 4th generation farmer, Utica, IL

- 1-on-1 technical support
- Data collection platform
- Individualized yearly RAAP report
  - Economic cost tables
  - Environmental assessments
  - Local practice comparisons
- $750 participation payment
- Exclusive program offers – cost share, other practice assistance
- Networking & edn opportunities

PRECISION CONSERVATION MANAGEMENT

- Understand how conservation practices impact farm net returns
- Address water quality concerns. Prevent agricultural regulation.
- Position farmers to benefit from positive conservation outcomes

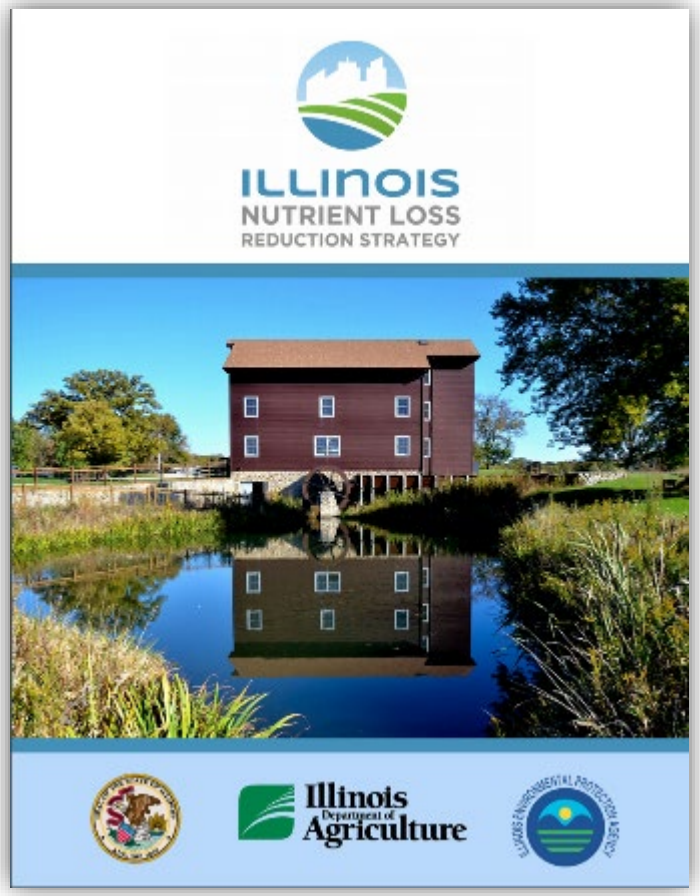

Justin Durdan, 4th generation farmer, Utica, IL

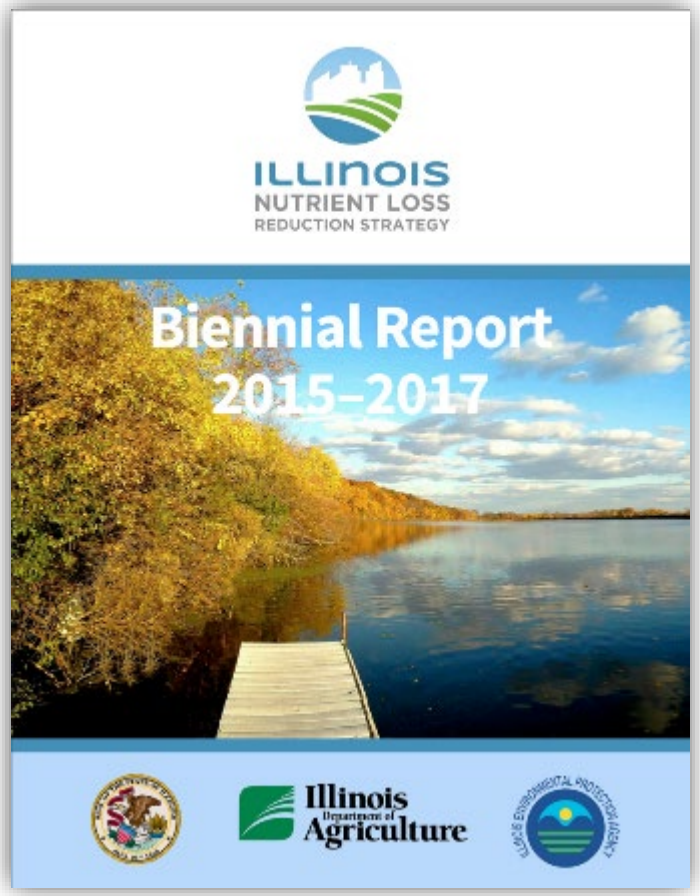
- 300 IL farmers, 300k acres
- Receive >$18M in Federal, corporate, & private funding via grants & partnerships
- PepsiCo Carbon Footprint project w/ ADM, Bunge, & Cargill
- ESMC pilot program
- NRCS CIG award w/ SHP
- Received 3 NRCS RCPP awards
- NRCS project spotlight, 2019
- Field to Market 2020 Collaboration of the Year Award
- NCGA Sustainability Action Team recognition - 2020

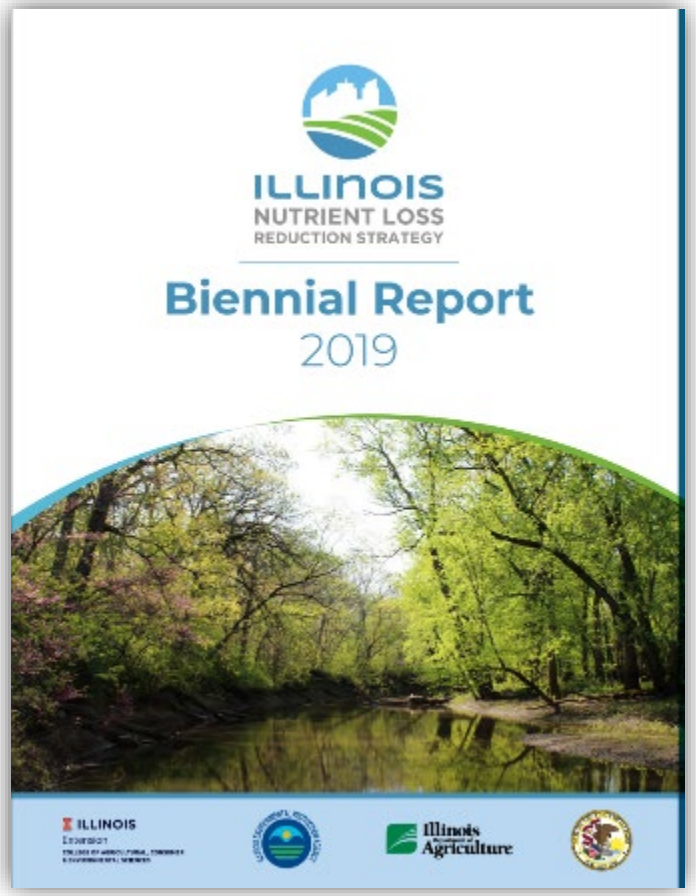
PRECISION CONSERVATION MANAGEMENT

- Understand how conservation practices impact farm net returns
- Address water quality concerns. Prevent agricultural regulation.
- Position farmers to benefit from positive conservation outcomes

Illinois Nutrient Loss Reduction Strategy

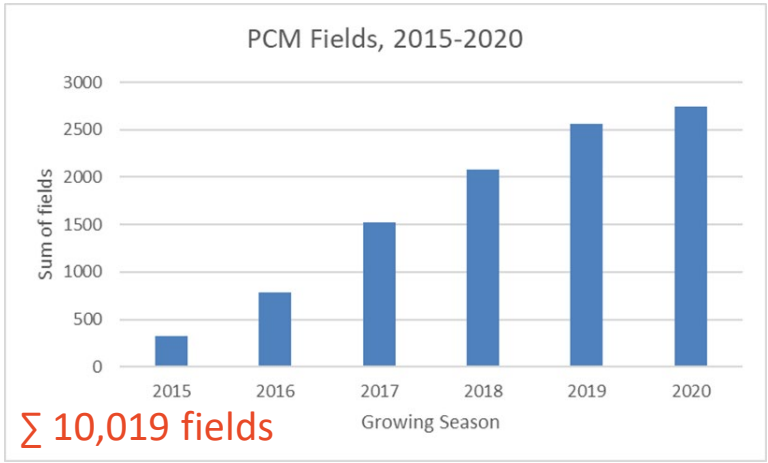




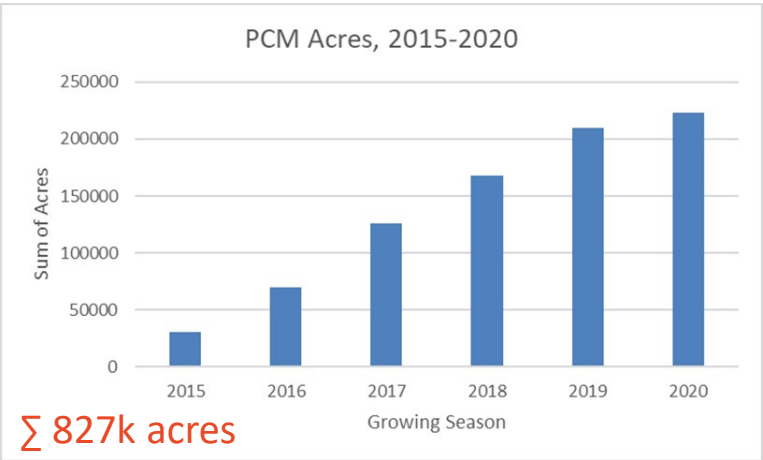


Goal: 45% Reduction in **Total N & Total P** Losses by 2035

Interim: 15% Reduction in NO_3-N & 25% Reduction in Total P by 2025



∑ 10,019 fields



∑ 827k acres

Precision Conservation Management

6 years of data

16 IL counties

10 KY counties

Growing in 2021

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PCM GROWER ENGAGEMENT

Clay Bess

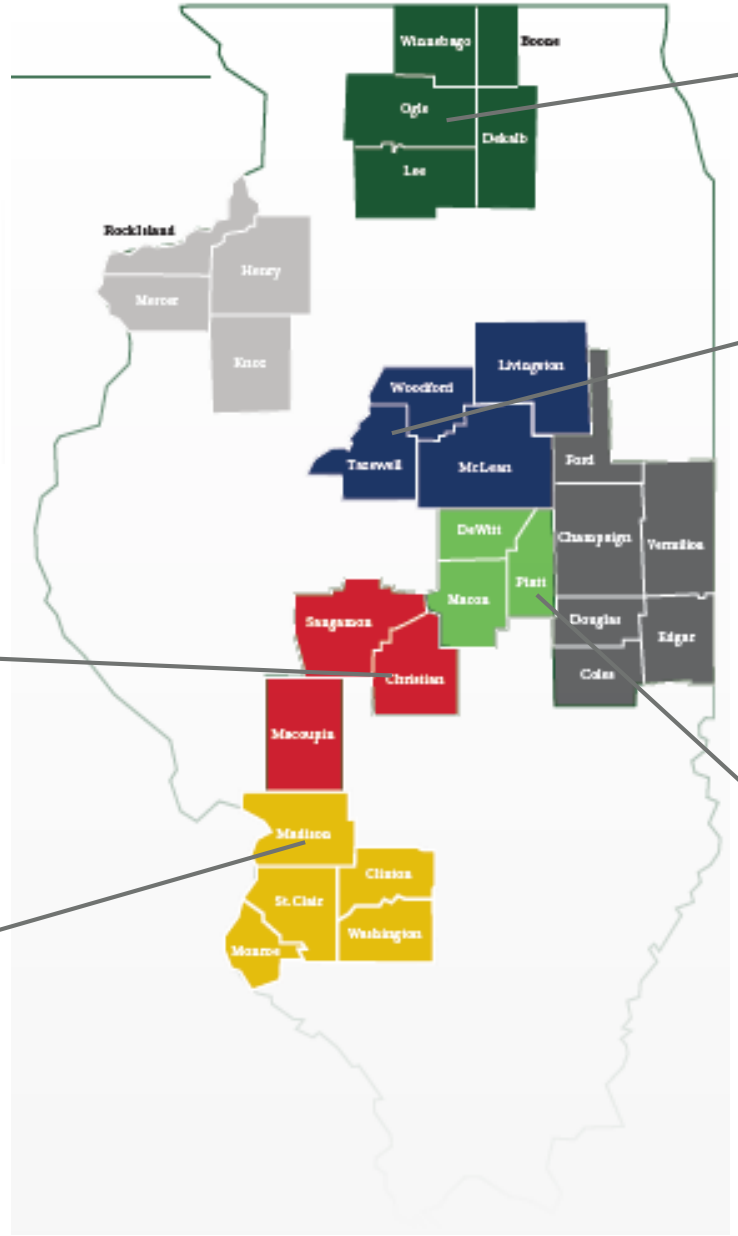
PCM Operations Manager
cbess@precisionconservation.org
309-445-0278

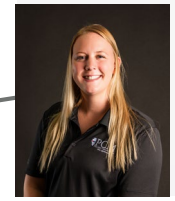
Shane Sinclair

PCM Specialist, Christian, Macoupin and Sangamon Counties
ssinclair@precisionconservation.org
309-445-5017

Andrea Kohring

PCM Specialist, Monroe, St. Clair, Madison, Clinton & Washington Counties
akohring@precisionconservation.org
309 319-8809



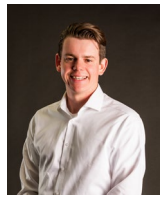


Alexa Rutherford

PCM Specialist, Ogle, Lee, DeKalb, Boone & Winnebago Counties
arutherford@precisionconservation.org
309-336-9779

Kiela Martin

PCM Specialist, PCM Specialist, Livingston, McLean, Tazewell & Woodford Counties
kmartin@precisionconservation.org
309-445-2418



Aidan Walton

PCM Specialist, Champaign, Douglas, Edgar, Ford, Vermilion Counties
awalton@precisionconservation.org

Luke Rund

PCM Specialist, Piatt, DeWitt & Macon Counties
lrund@precisionconservation.org
309-336-0765

Chris Stewart

PCM Specialist, Select Counties in Kentucky
cstewart@precisionconservation.org
270-205-2258

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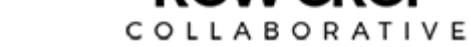
PCM PARTNERS!



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PCM Impact, 2020
Management Practices

85% use reduced tillage

63% apply the majority of N application in-season for corn

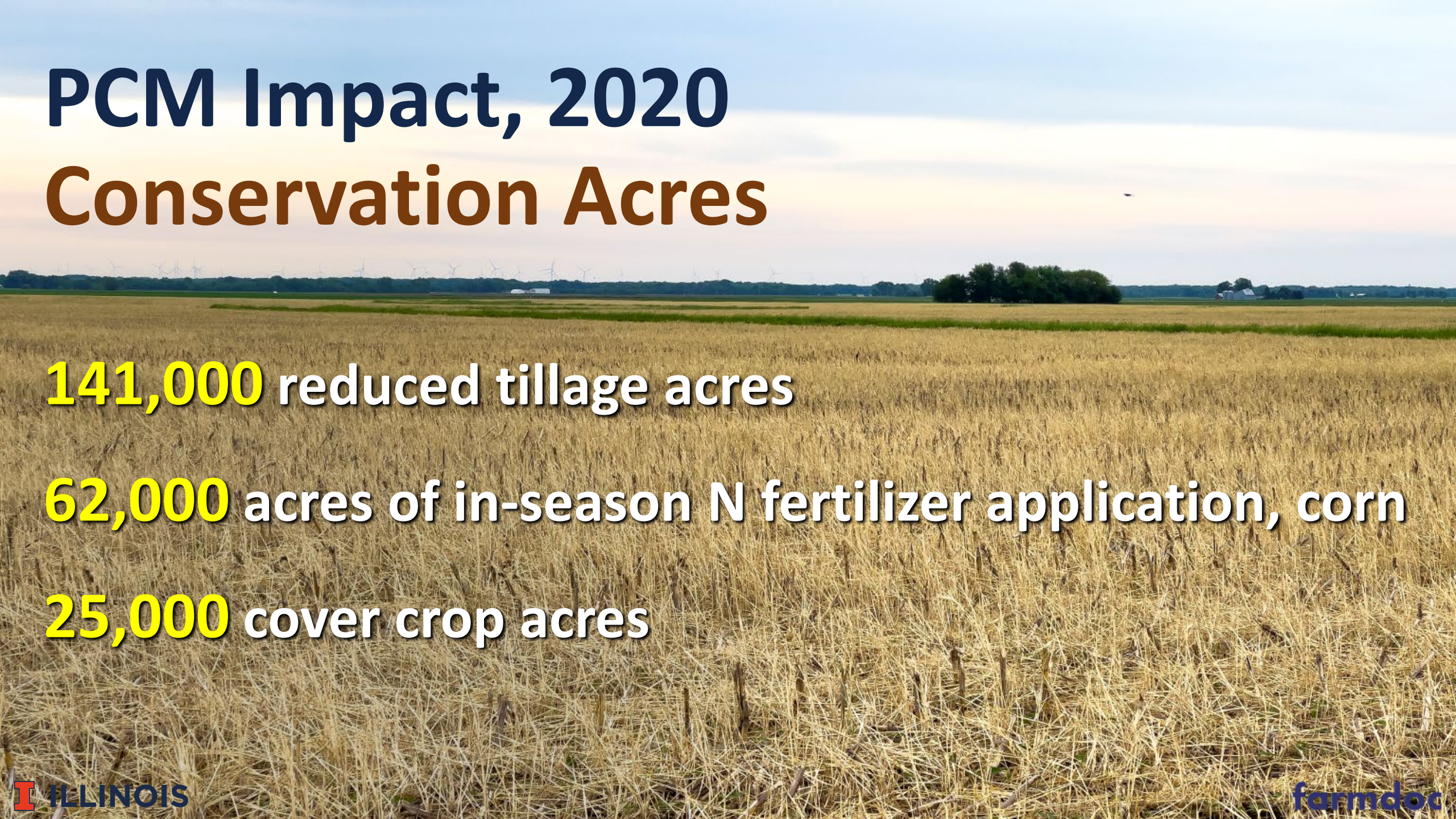
35% grow an overwintering cover crop

PCM Impact, 2020
Environmental Outcomes

615,000 lb NO_3-N loss reductions

90,000 lb P loss reductions

127,000 tons sediment loss reductions



PCM Impact, 2020
Conservation Acres

141,000 reduced tillage acres

62,000 acres of in-season N fertilizer application, corn

25,000 cover crop acres

PCM Data Collection & Reports

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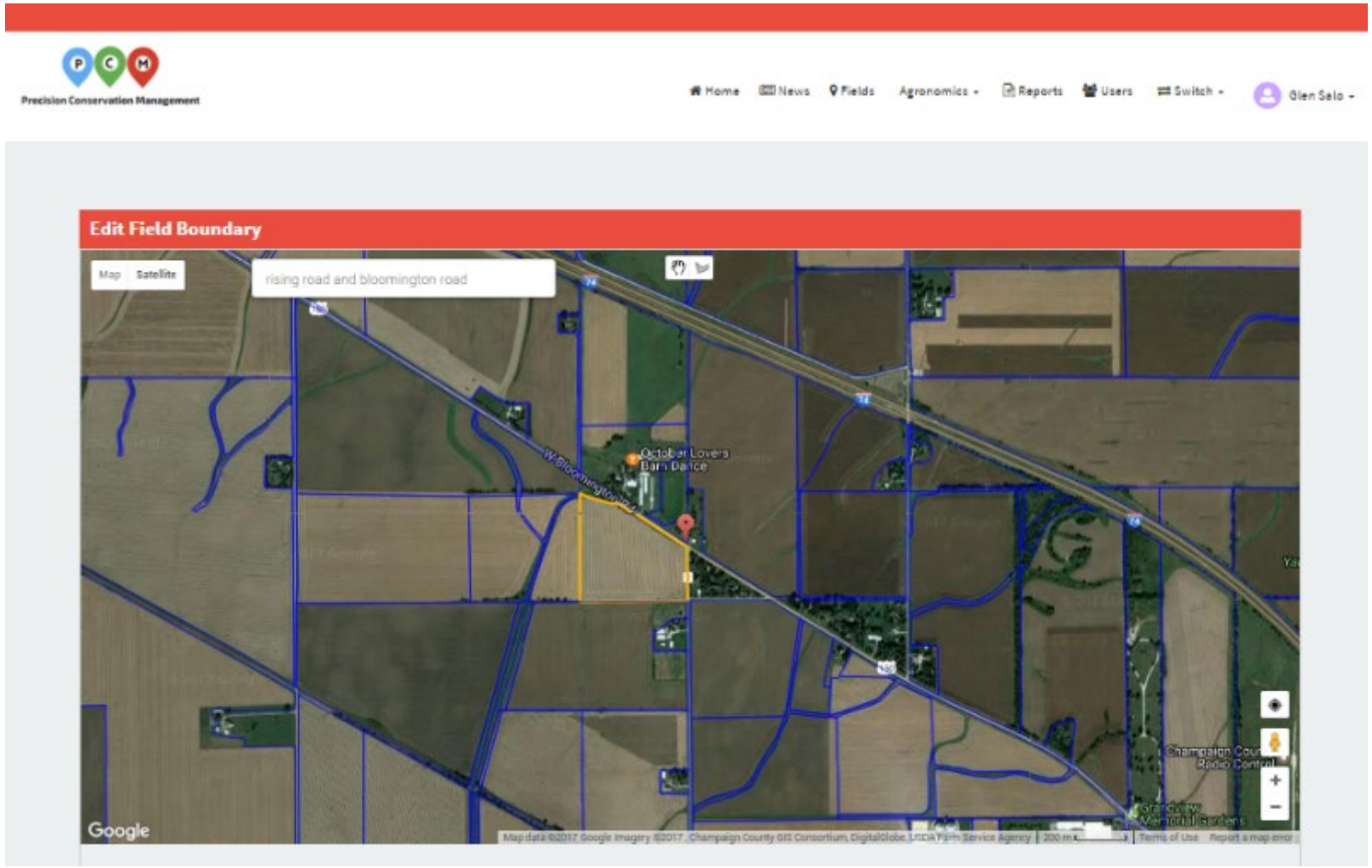
Data Collection

1. Fields
2. Crops
3. Systems
   - Conventional
   - Non-GMO
   - Seed Corn/Bean
   - Organic/Transitioning
4. Programs
   - Every Pass Across Field
   - Inputs; Rates



PCM Practice Standards

1. Tillage
2. Cover Crops
3. Nutrient Management

Calculating Economic Returns

Field Passes (Soybeans to Corn)

Cover Crop

1. Plant cover crop seed
2. Apply DAP
3. Spray per-plant with N
4. Plant
5. Spray
6. Post-plant apply nitrogen
7. Harvest

Conventional

1. Apply DAP
2. Perform primary tillage
3. Apply anhydrous ammonia as fall N
4. Spring tillage
5. Plant
6. Spray
7. Apply fungicide
8. Harvest

Number of fields	928	952
	Corn	Soybeans
SPR	134	134
Nitrogen applied -- total	210	2
-- in DAP/MAP	21	1
-- in Anhydrous Ammonia	93	0
-- in UAN	65	0
Revenue		
Yield per acre	205	65
Crop Revenue	714	613
ARC/PLC or ACRE	22	22
Crop Insurance		
Other Farm Receipts		
Gross Revenue	**735**	**635**
Expenses		
P, K and Lime	75	8
Nitrogen	62	0
Pesticides	46	40
Insecticides	1	1
Seed	121	57
Seed - cover crop	0	0
Drying	7	0
Storage	21	6
Crop Insurance	22	15
Direct Costs	**354**	**128**
Field work	15	14
Planting - crop	14	14
Planting - cover crop	0	1
Machine hire/lease/application cost	34	21
Harvest	36	32
Power Costs	**101**	**81**
Overhead Costs	36	30
Total Non-Land Costs	**491**	**240**
Operator and Land Return	**244**	**395**

Economic Report

- Revenue and Cost calculations
  - Gross revenue, inputs and power costs are assigned according to standard commodity prices, input costs and field operation costs
    - Based on annual reports from IL FBFM and USDA-ERS
  - Direct costs reflect the farmer's rate and source for inputs
  - Power costs reflect the farmer's tillage practices
- Summaries are prepared based on aggregated values, by standard

Operator and land returns

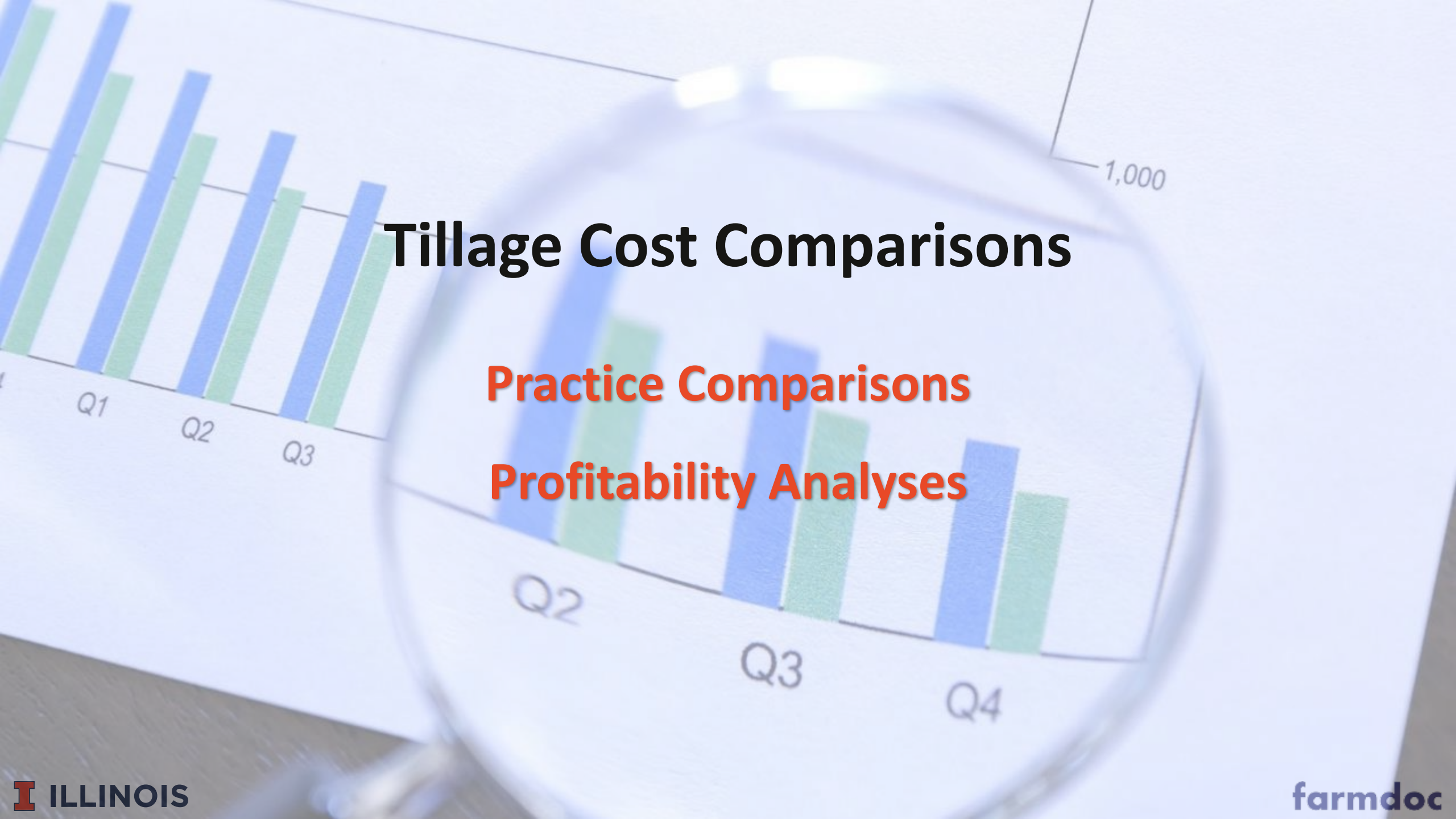
Crop revenue (Yield times the same price per year)

- Direct costs (fertilizer, seed, chemicals)

- Power costs (each pass has a cost)

- Overhead costs (same for each farm)

Operator and land return



Tillage Cost Comparisons

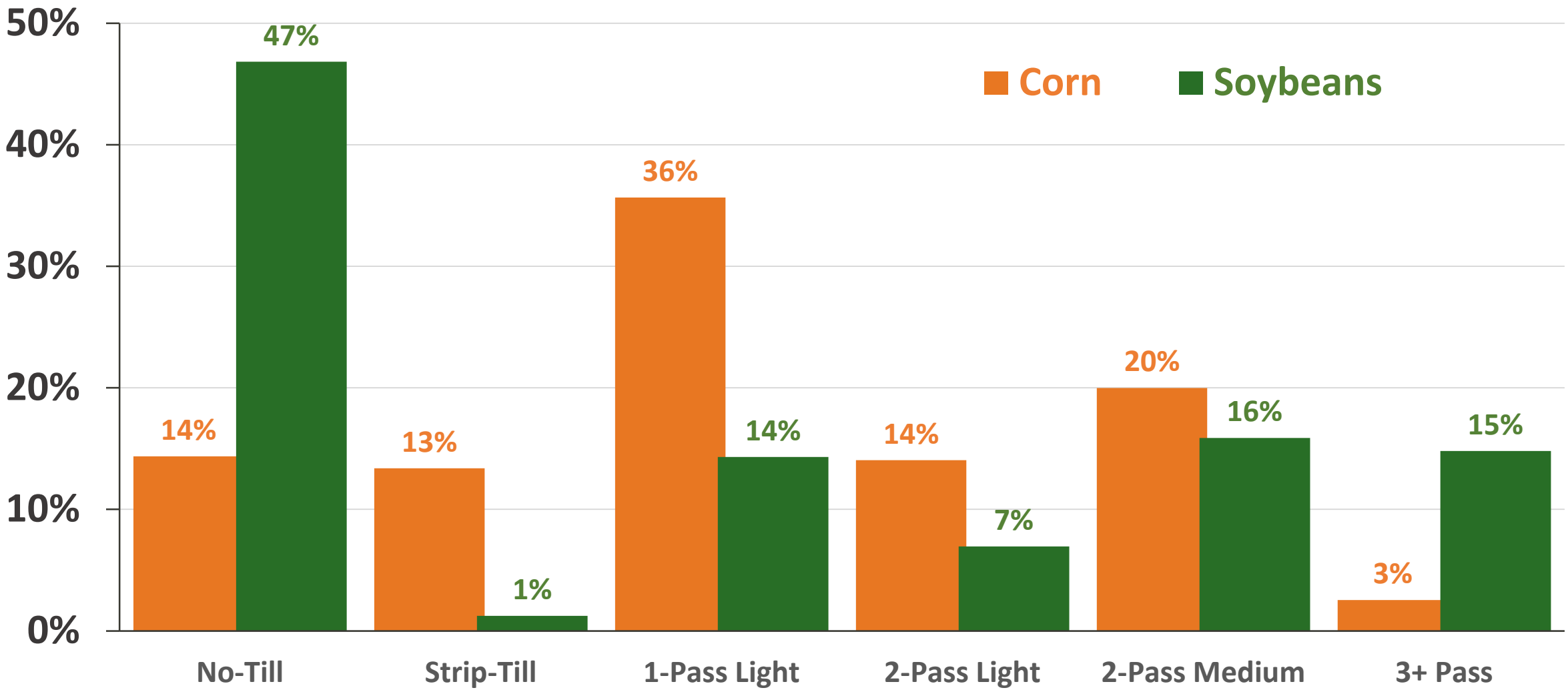
Practice Comparisons

Profitability Analyses

Tillage standards

- No-Till
- Strip-Till
- 1-pass
- 2-pass, light
- 2-pass, moderate
- 3+ pass

Tillage Benchmarks, 2015-2020



Corn

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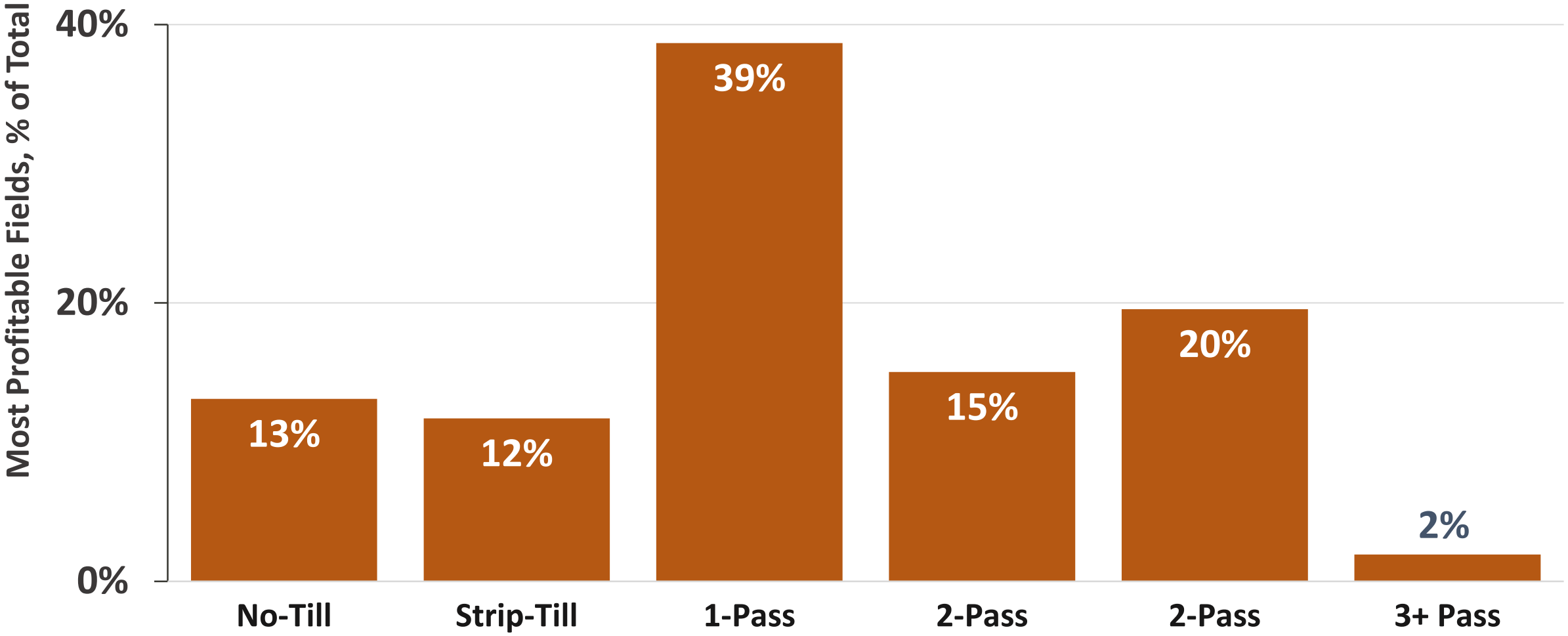
Tillage & Profitability: Corn

Top 25% Most Profitable for 2015-2020



Average Return, Yield, and Cost, High SPR, 2015-2020

	% of Fields	Operator and Land Return	Yield	Direct Cost	Power Cost	Total Non-Land Cost
No-Till	13%	272	213	384	97	519
Strip-Till	15%	256	219	401	112	550
1-Pass Light	37%	279	218	387	106	530
2-Pass Light	13%	276	224	391	116	545
2-Pass Medium	20%	261	222	391	122	550
3+ Pass	2%	247	230	414	136	588

Soybeans

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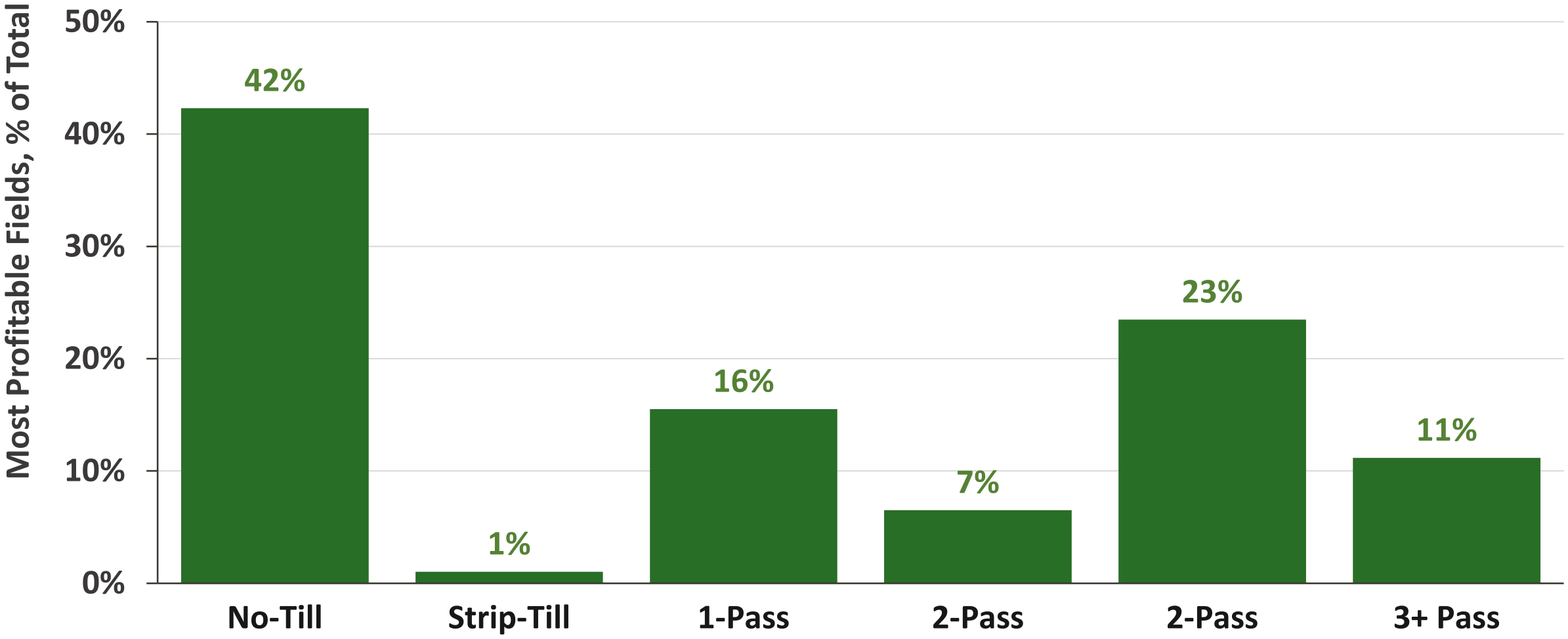
Tillage & Profitability: Soybean

Top 25% Most Profitable for 2015-2020

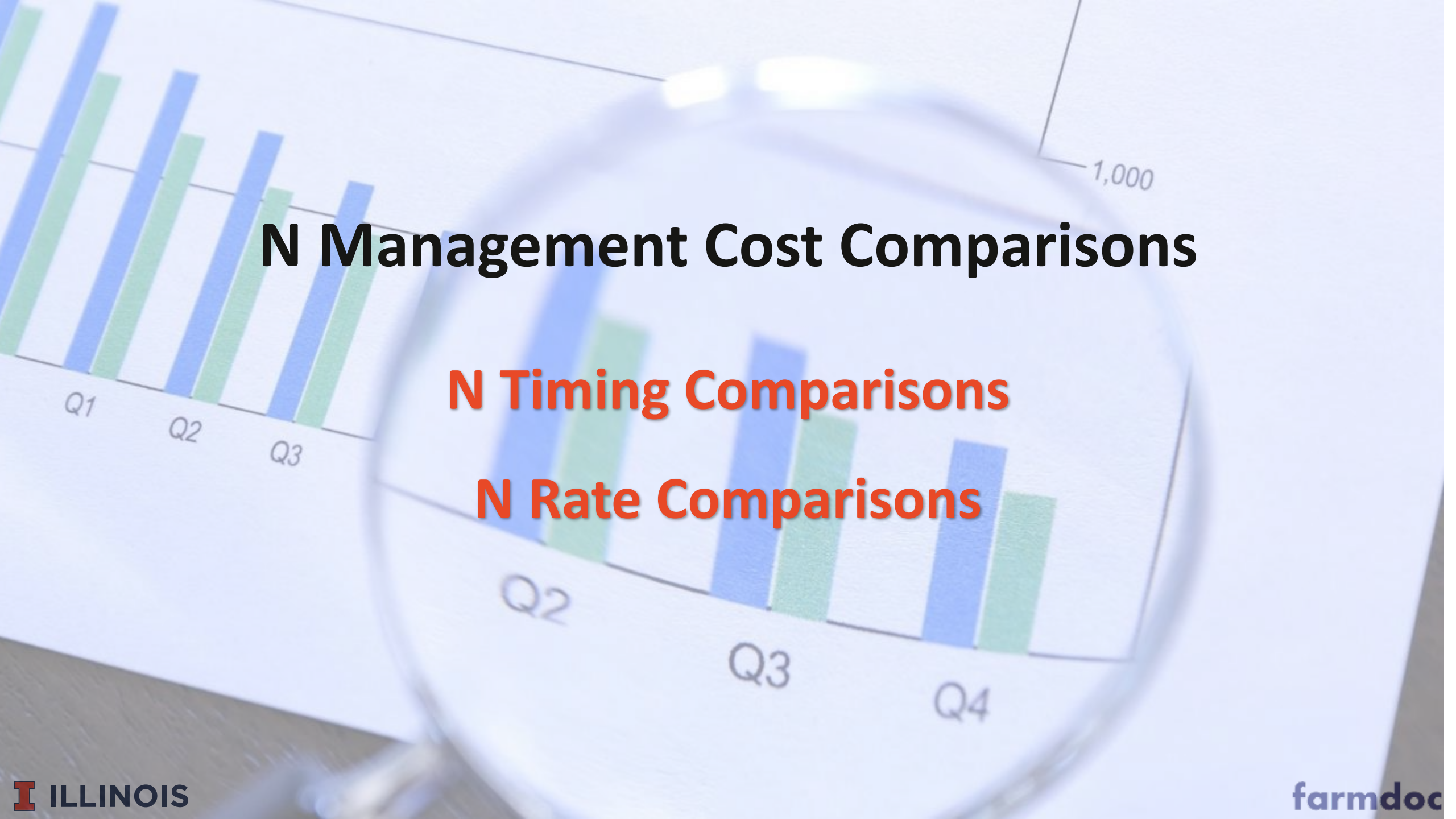


Average Return, Yield, and Cost, High SPR, 2015-2020

	% of Fields	Operator and Land Return	Yield	Direct Cost	Power Cost	Total Non-Land Cost
No-Till	45%	356	67	149	74	254
1-Pass Light	15%	362	68	143	84	258
2-Pass Light	5%	364	68	135	89	255
2-Pass Medium	19%	379	73	150	97	277
3+ Pass	14%	345	68	132	110	273

Summary

- Three or more pass systems are consistently **less profitable**
- Of the 25% more profitable, we see them in all systems
- Higher yields are important in all tillage benchmarks



N Management Cost Comparisons

N Timing Comparisons

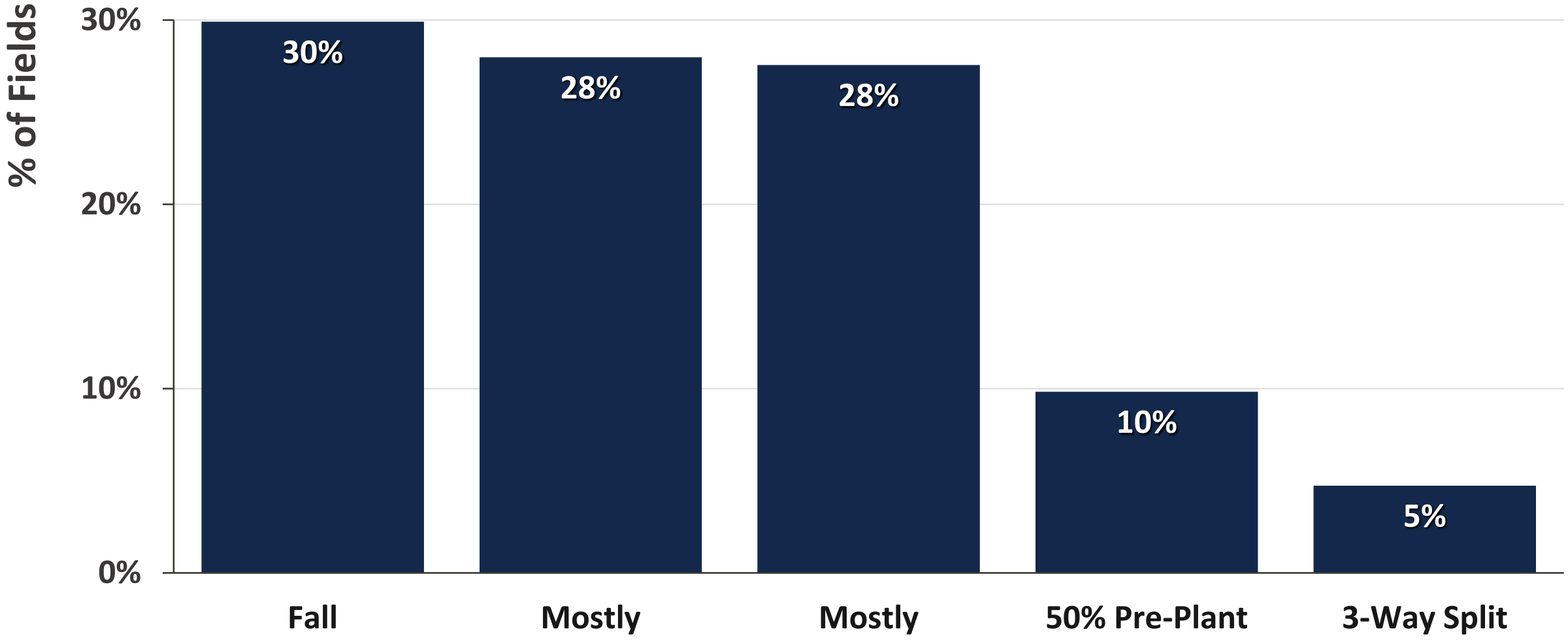
N Rate Comparisons

Nitrogen standards

- Fall – >40% of total nitrogen is applied in fall
- Mostly pre-plant – majority of nitrogen is applied in spring before planting or at planting
- Mostly sidedress – majority of nitrogen is applied after planting
- 50% pre-plant / 50% sidedress – Split application
- 3-way split – split application with three passes (<40% fall-applied)

Nitrogen values are total pounds of actual N, including that in dry fertilizer (DAP, MAP)

Percent of Fields in Nitrogen Benchmarks, 2015-2020



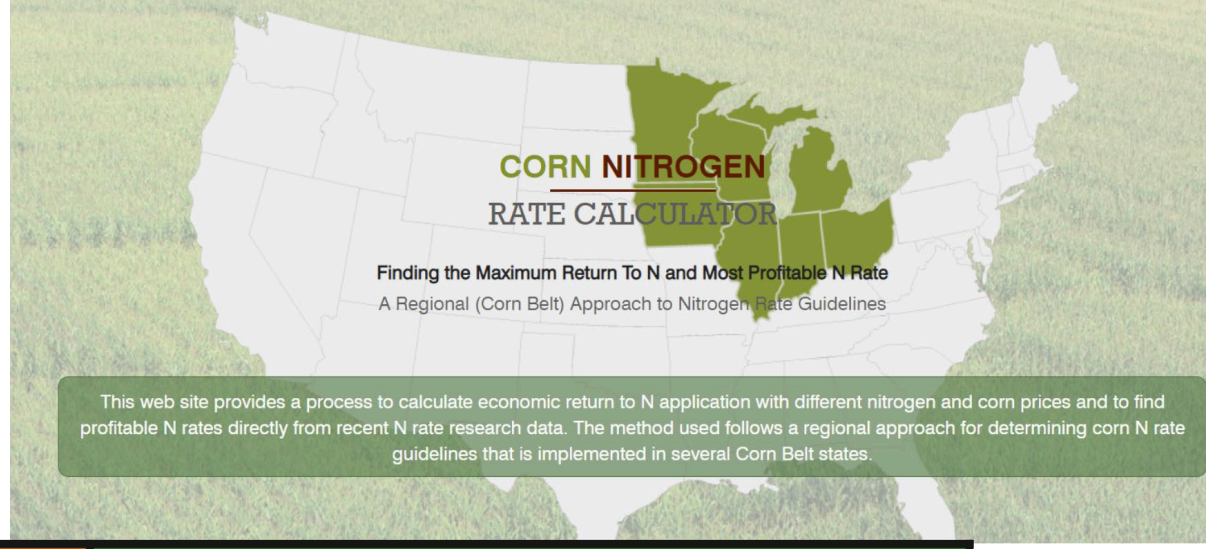
Average Return, Yield, and Cost, High SPR, 2015-2020

	% of Fields	Operator and Land Return	Yield	N Rate lb/acre	Direct Cost	Power Cost	Total Non-Land Cost
Fall	35%	258	220	212	400	113	550
Mostly Pre-Planting	24%	287	218	203	376	107	521
Mostly Sidedress	26%	276	220	201	388	112	537
50% Pre-Plant 50% Sidedress	10%	259	218	198	389	111	537
3-Way Split	5%	246	221	215	428	114	579

Average Nitrogen Cost, High SPR, 2015-2020

	2015 to 2020 $/acre	2015 $/acre	2016 $/acre	2017 $/acre	2018 $/acre	2019 $/acre	2020 $/acre
Fall	79	96	86	74	72	85	82
Mostly Pre-Planting	78	89	80	70	70	81	86
Mostly Sidedress	75	91	71	69	69	77	81
50% Pre-Plant 50% Sidedress	80	102	79	75	72	82	88
3-Way Split	91	111	91	87	79	110	90

2021 MRTN Recommendation (in pounds of N applied)[1,2]

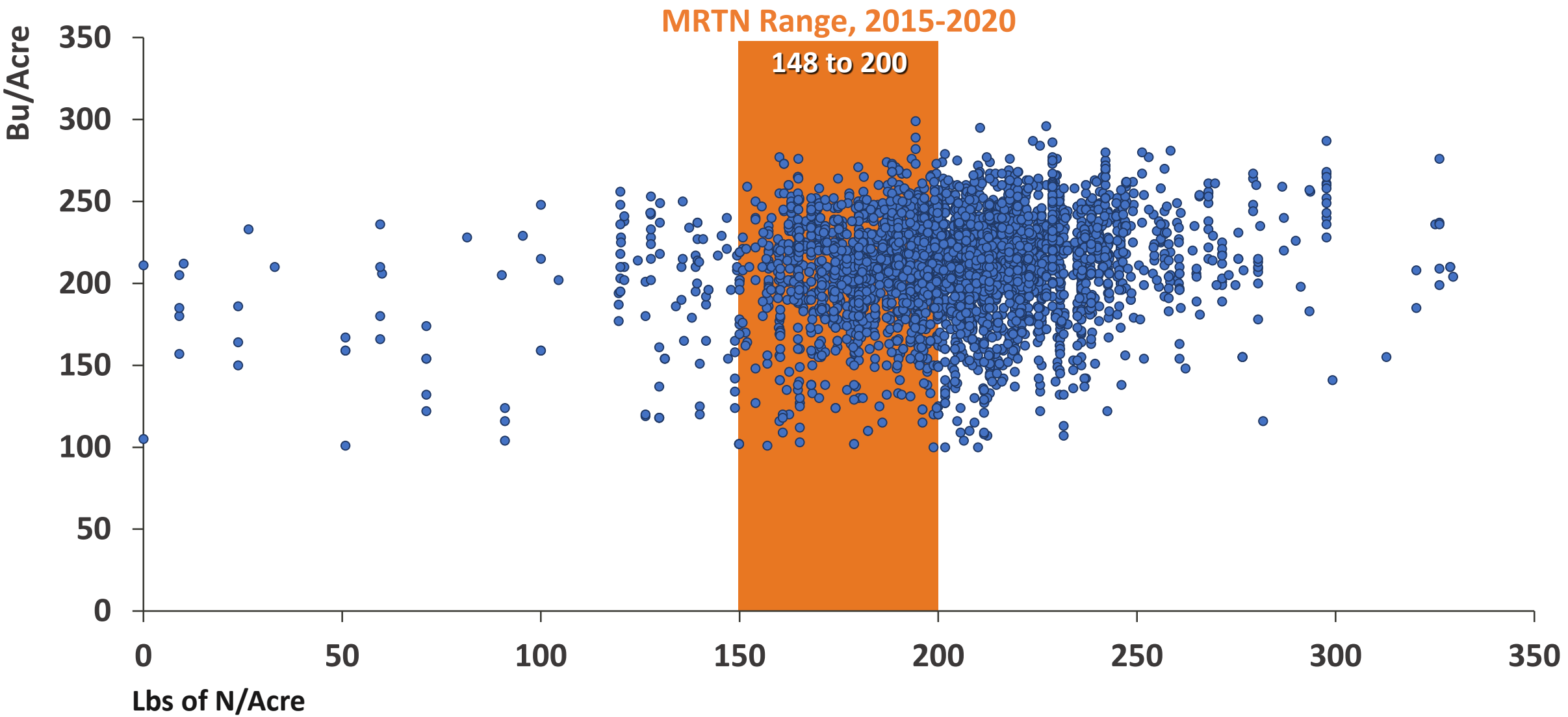


	Corn-Following-Soybeans		Corn-Following-Corn	
	Anhydrous Ammonia lbs/acre	28% Nitrogen Solution lbs/acre	Anhydrous Ammonia lbs/acre	28% Nitrogen Solution lbs/acre
North	178	159	213	194
Central	187	172	202	190
South	206	191	206	186

[1]Taken from Corn Nitrogen Rate Calculator (http://cnrc.agron.iastate.edu/nRate.aspx) on June 22, 2021

[2]MRTNs determined with a $5.00 corn price, $700 per ton anhydrous ammonia price, and $360 per ton nitrogen solution price

Nitrogen Application and Yield, 2015-2020



Yield and Returns by MRTN Nitrogen Categories

Category	Yield bu/acre	Returns $/acre
Below MRTN	-16*	-16
MRTN		
Above 1	-1	-20*
Above 2	6*	-21*
Above 3	7*	-31*
Above 4	18*	-31*

*Indicates significant different at 5% levels from MRTN category after controlling for soil productivity

Summary

1. For the PCM fields, 70% receive a nitrogen application greater than the MRTN profitable range

2. MRTN most profitable nitrogen application rates

3. On average, mostly pre-planting and mostly sidedress had the highest operator and land return

4. Mostly pre-planting and mostly sidedress also had the lowest nitrogen costs

Cover Crops: Lessons for New Adopters

Need to “experiment” with cover crops

Cover Crop Standards

- Overwintering
- Winter Terminal
- None

Cover Crop Benchmarks (2016 to 2020)

Cover crop	Soybeans			Corn		
	Yield Bu/Acre	Non-land Costs $/Acre	Return $/Acre	Yield Bu/Acre	Non-land Costs $/Acre	Return $/Acre
Overwintering	68	$269	$344	214	$545	$232
Winter Terminal	**67**	**$254**	**$371**	**218**	**$532**	**$263**
No cover crop	69	$258	$388	220	$540	$261
Count	372 overwintering 21 winter terminal 4,546 no cover crop fields			150 overwintering 65 winter terminal 2,815 no cover crop fields		

Cover Crop on Soybeans, 2016 – 2020,High SPR Fields, All fields and no-till

	All Fields		
	None	Over-wintering	diff
No of fields	2546	372	
Yield	69	68	
Gross Revenue	$628	$619	-$9
Direct non-cover costs[1]	141	139	-2
Power non-cover costs	86	72	-14
Overhead	30	30	0
Cover crop costs[2]		28	28
Total Non-land costs	$258	$269	$11
Operator and land returns	$370	$350	-$20

1 Seed, pesticides, fertilizer, drying, storage, crop insurnace.

2 Cover crop seed, planting, and termination costs

Cover Crops

- Cover crops are key to reducing nutrient losses and reducing greenhouse gas emissions
- Soybeans don't find a yield drag, particularly when control for tillage.
- Need to keep cover crop costs in line
- Expect policy innovations in this area
- Ecosystem service markets offers farmers opportunity to benefit from conservation practice

Tillage & Soil Erosion, Corn

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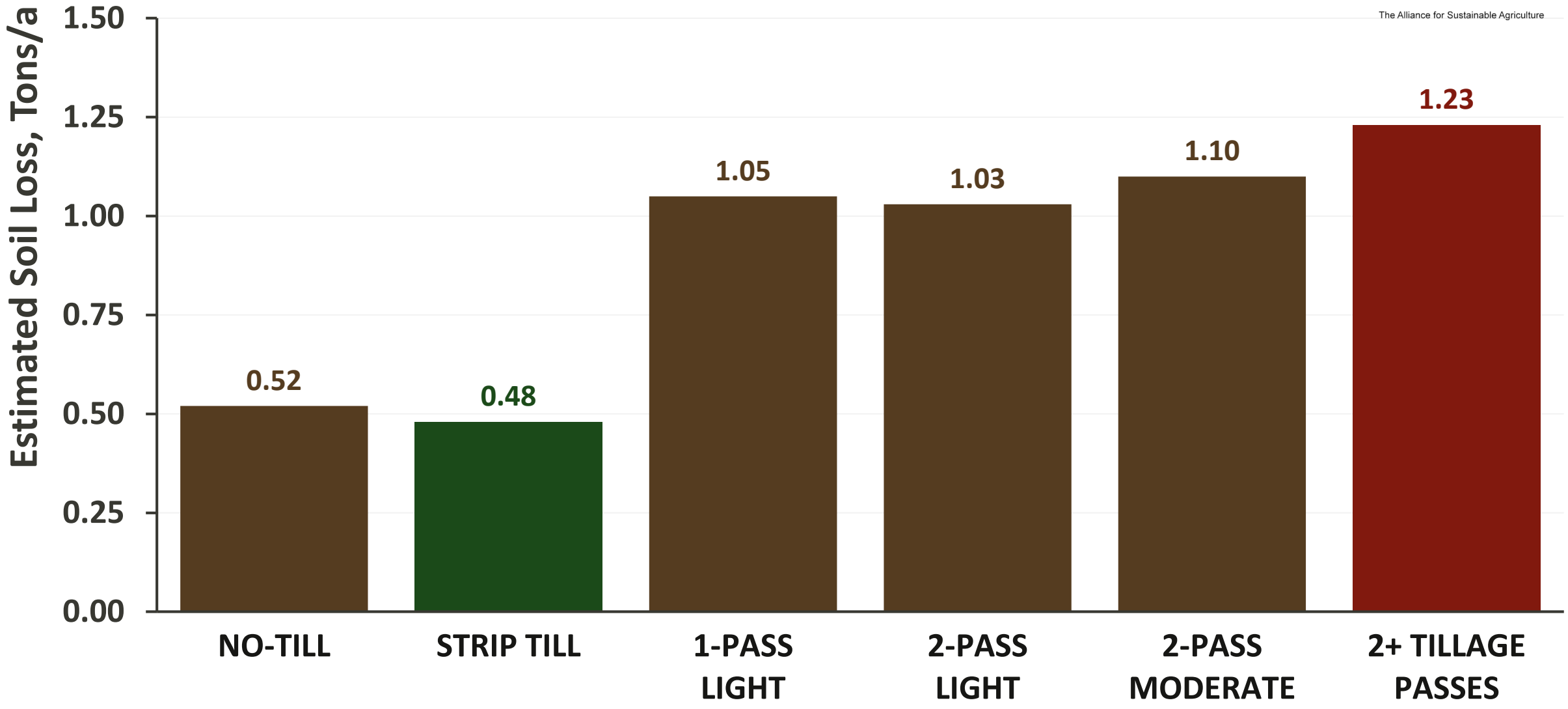
The Alliance for Sustainable Agriculture



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Cover Crops: Soil Loss

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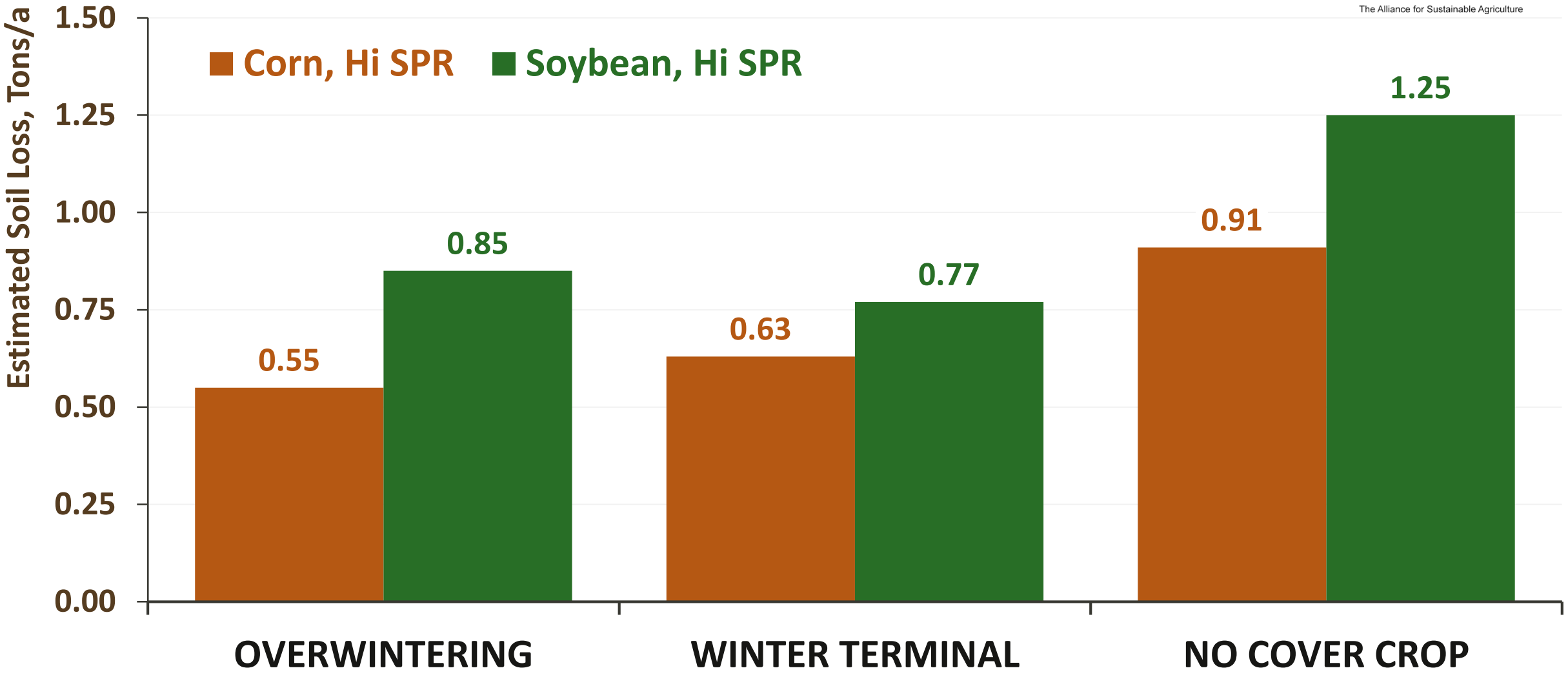

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Cover Crops: Water Quality Index

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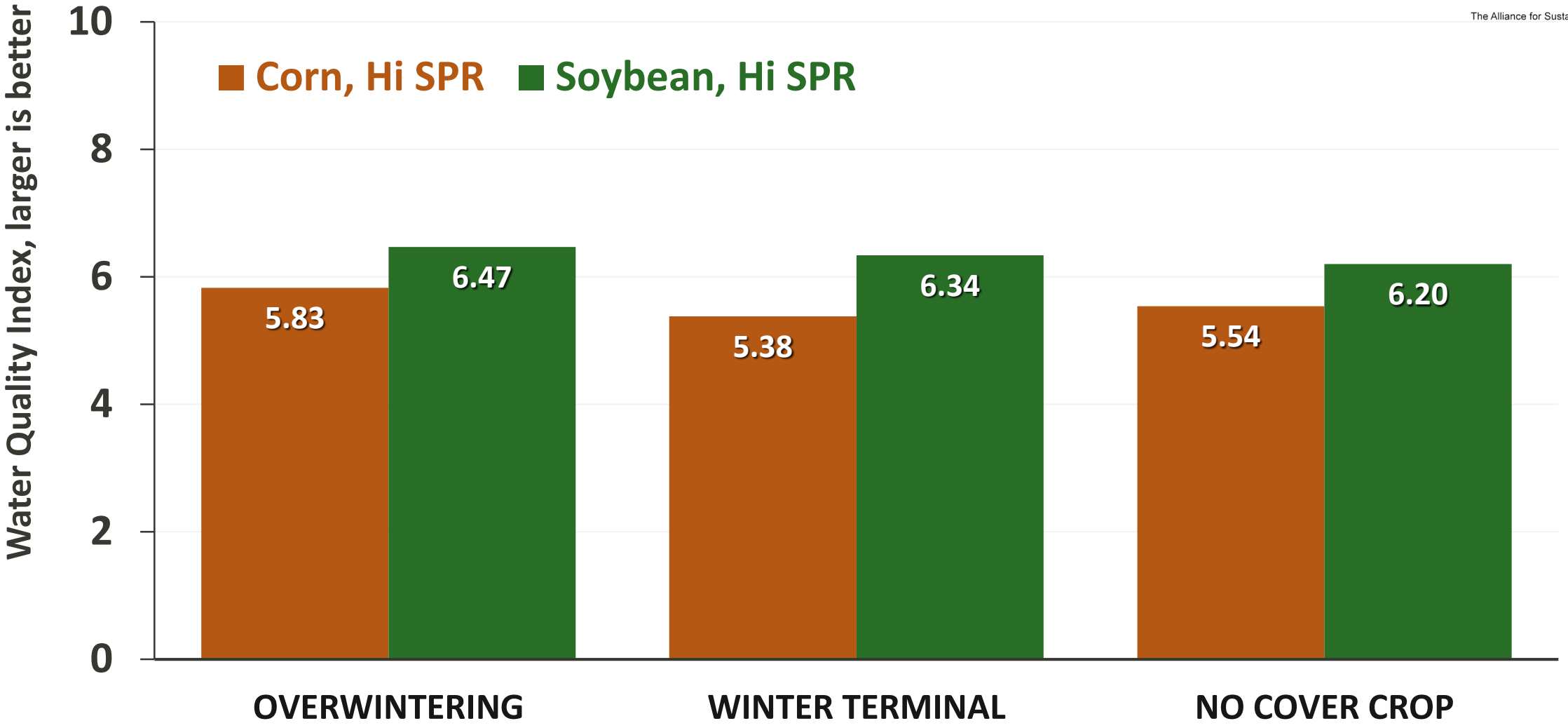

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Cover Crops: GHG Emissions

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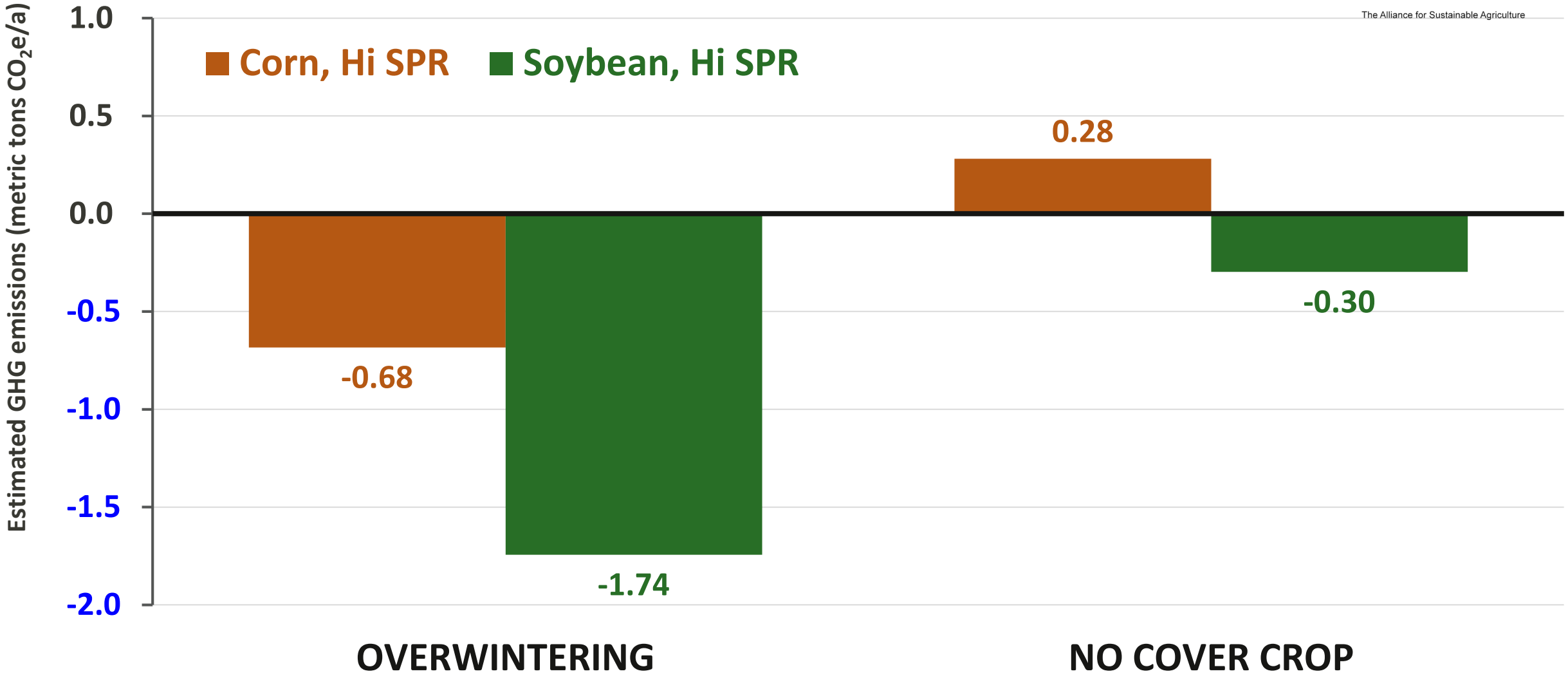

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Summary

1. Appropriate tillage levels key to profitability, expect emphasis on lowering tillage to continue into future

2. Nitrogen applications at MRTNs result in highest profitability

3. Need to keep yields at higher levels no matter the system

4. Cover crops have potential for returns in the future leading to need to experiment

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Please submit your questions

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