

THE ROLE OF TECHNOLOGY IN IMPROVING FARM PROFITABILITY

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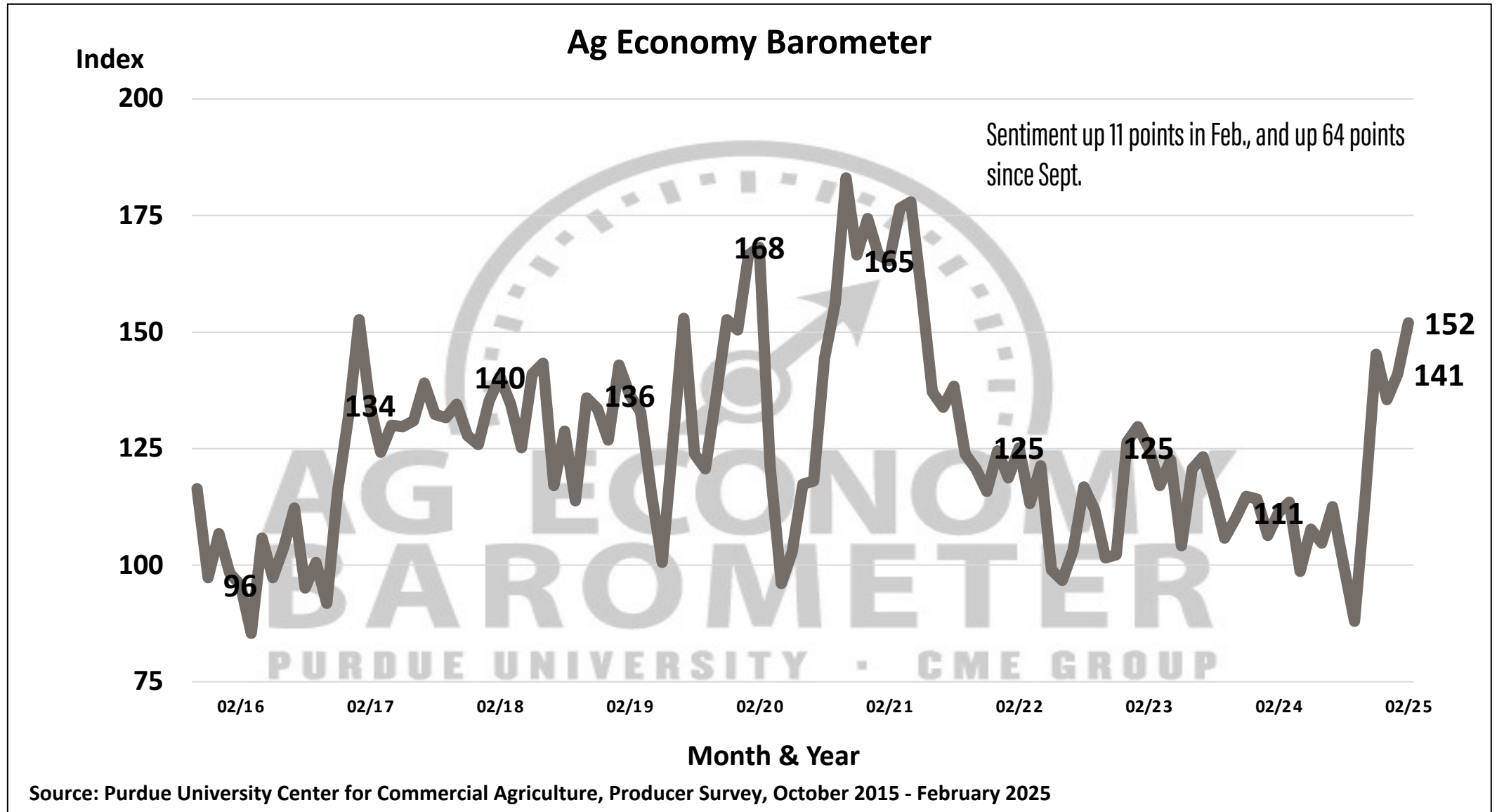
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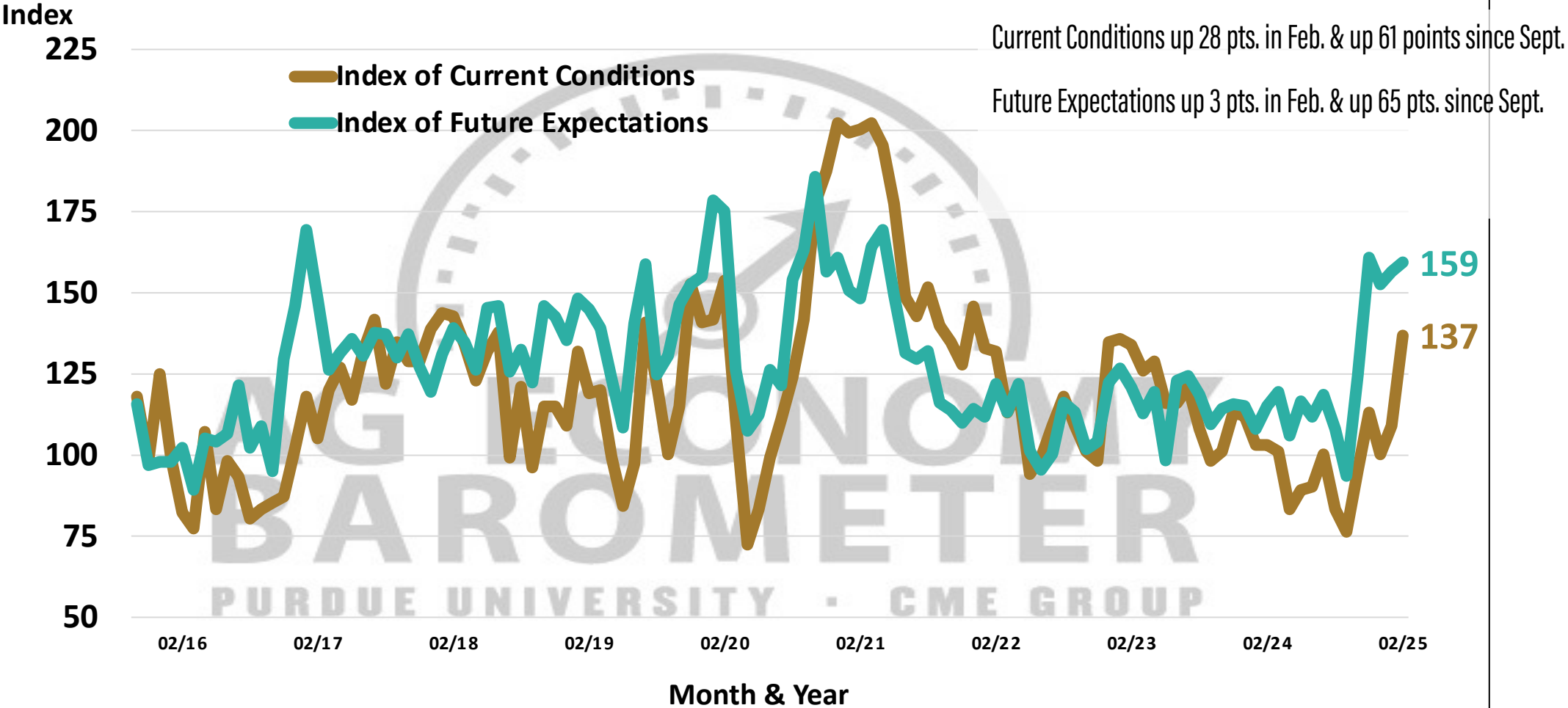
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Please take this quick survey



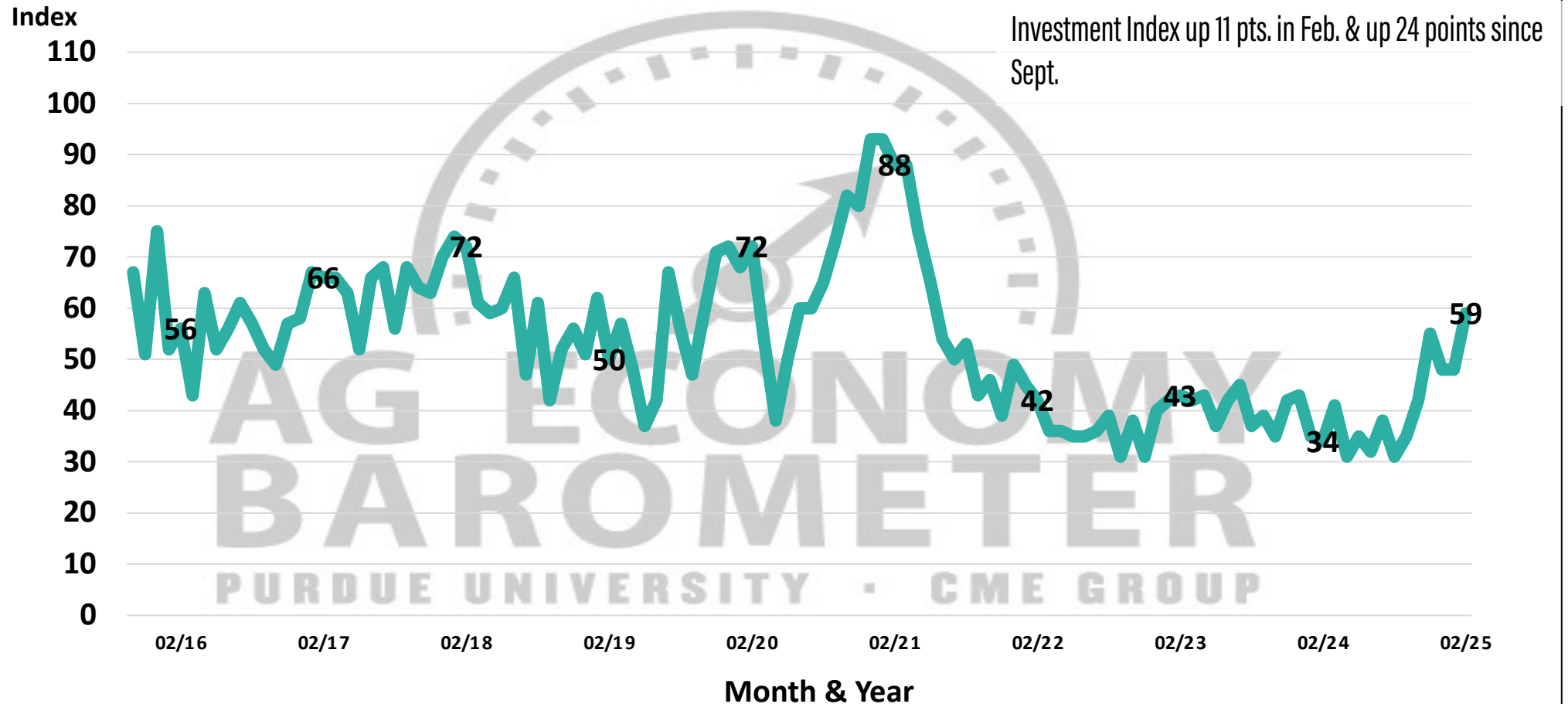


Indices of Current Conditions and Future Expectations



Source: Purdue University Center for Commercial Agriculture, Producer Survey, October 2015 - February 2025

Farm Capital Investment Index



Source: Purdue University Center for Commercial Agriculture, Producer Survey, October 2015 - February 2025

The Five Managerial Levers a Farmer Can Pull

Output Price

Manage price you get for what you produce.

Yield

Manage how much output you produce.

Costs

Manage how much it costs you to produce.

Assets

Manage your balance sheet/What tools you use to produce.

People

Manage the people that help you with the four levers above.

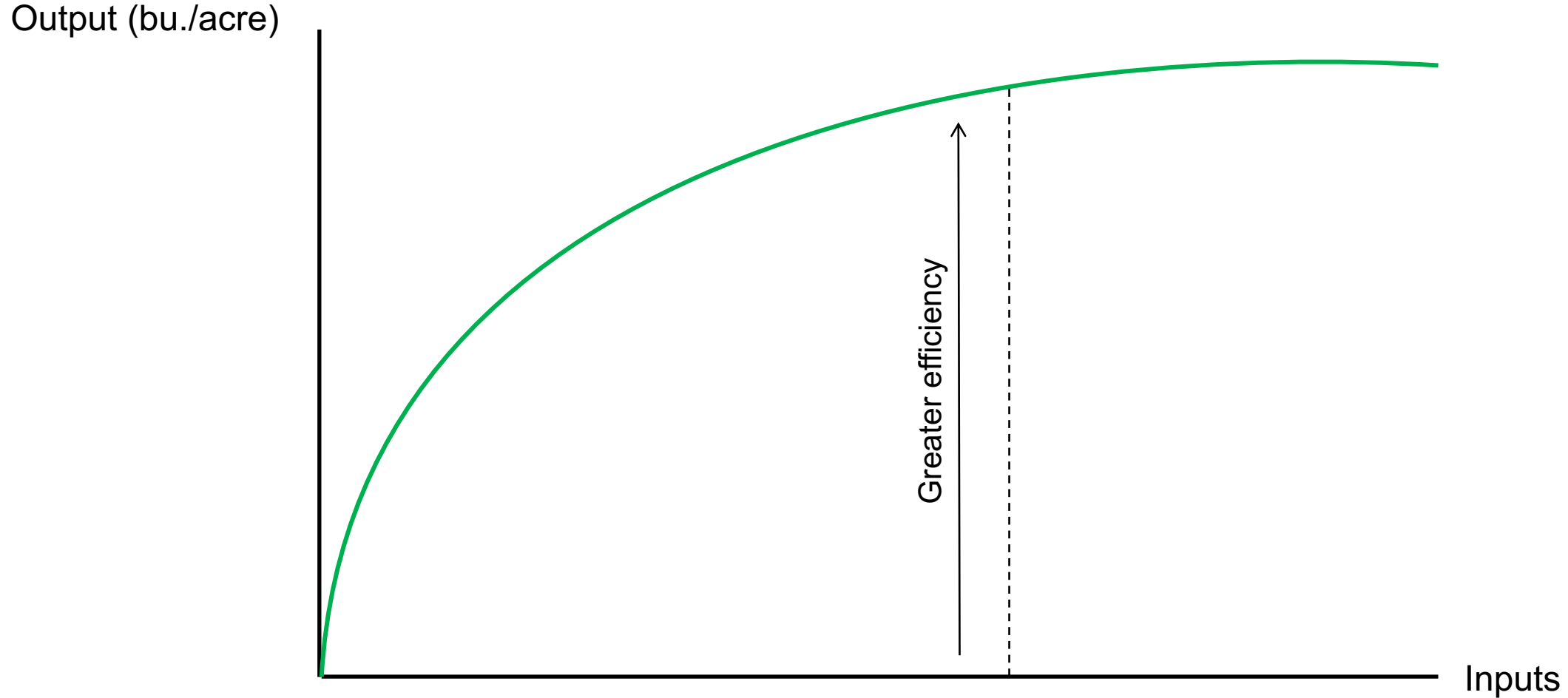
PRECISION AG TECHNOLOGY ADOPTION

	Non-adopters	Passive Adopters
PA technologies	None	Yield monitors (68%)
Avg. farm size	278 acres	550 acres
Operator characteristics	Avg. age 59 41% college	Avg. age 58 53% college

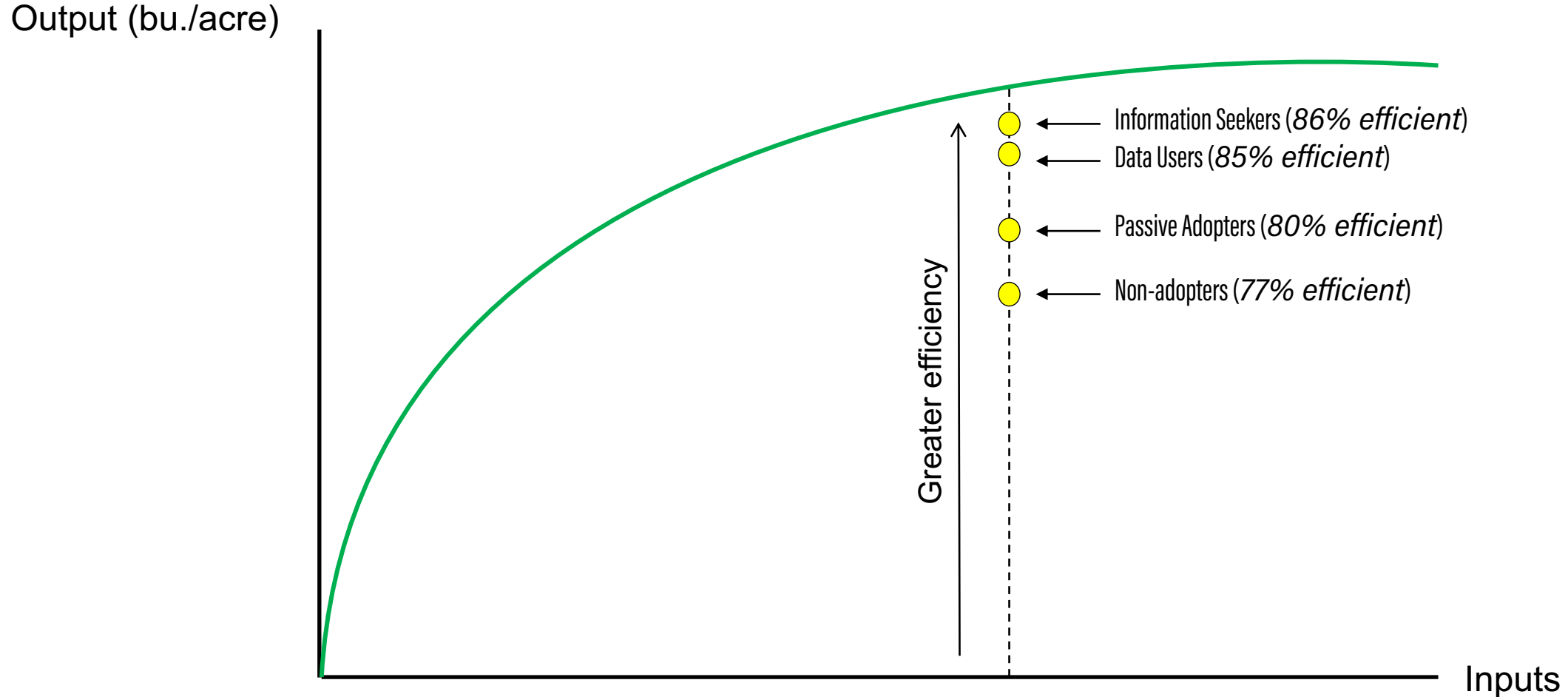
PRECISION AG TECHNOLOGY ADOPTION

	Non-adopters	Passive Adopters	Data Users	Information Seekers
PA technologies	None	Yield monitors (68%)	Yield monitors (98%) GPS yield maps (90%) GPS guidance (81%) Analyze data on computer (63%)	Yield monitors (99%) GPS yield maps (97%) GPS guidance (94%) Soil sample data (98%) GPS soil maps (94%) VRT (82%) Analyze data on computer (83%) Share data w/ service providers (69%)
Avg. farm size	278 acres	550 acres	931 acres	1,485 acres
Operator characteristics	Avg. age 59 41% college	Avg. age 58 53% college	Avg. age 54 69% college	Avg. age 54 66% college

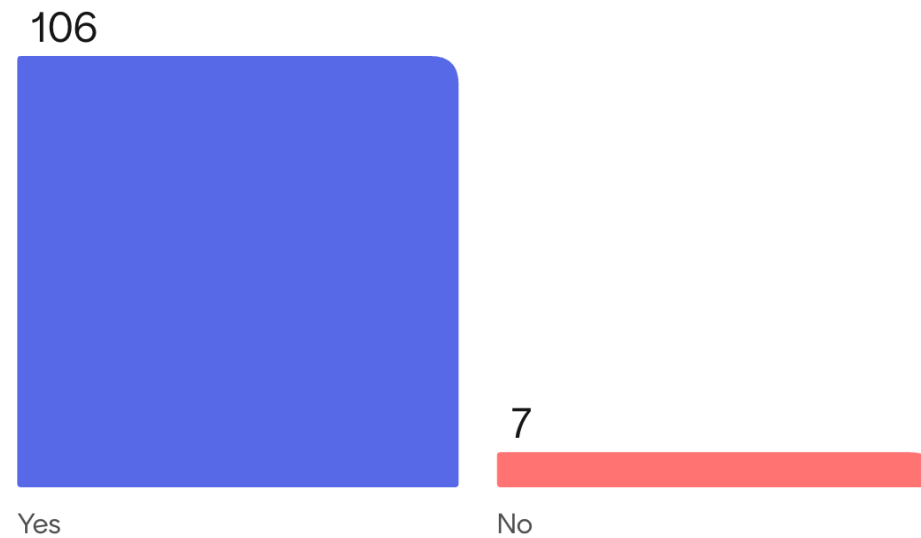
PRECISION AG USAGE & TECHNICAL EFFICIENCY



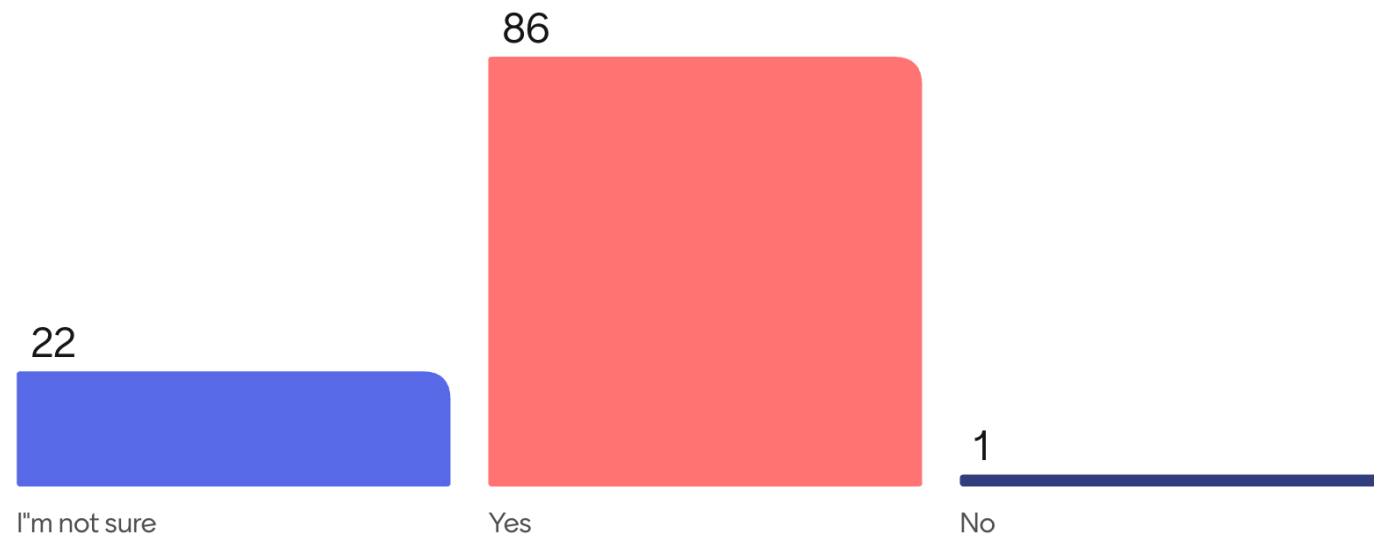
PRECISION AG USAGE & TECHNICAL EFFICIENCY



Do you use data collected on your farm to make decisions?



If you answered "yes" to the last question, has using data to make decisions made your farm more profitable?



How do you identify the “right” technologies?

- Do you love or resist technology adoption?
- Does your farm community love or resist technology adoption?
- Who are you talking to about farm technology? – Are they the right people?
- Could technology allow us to farm more acres with the current machinery
 - Could technology lower our machinery costs and investment per acre?
- Could technology lower our labor efficiency and productivity?
- Could technology allow us to grow higher value crops?
- Could technology change our crop rotations and mixes?
- Could technology get us to Florida sooner after harvest/spend more time at the lake?

1. **Will the technology increase my bushels?**
Yes – How many more bushels?
No
2. **Will the technology decrease my cost of production?**
Yes – Which inputs will be decreased and by how much?
No
3. **Will the technology allow me to manage my operation better – leading to higher output or lower cost?**
Yes – Higher price, more bushels, or lower costs and by how much?
No
4. **Does the technology make my life better – but not lead to higher output or lower cost?**
Yes – How much are you willing to pay for this better life? How much can the farm afford?
No

Add up the “Yes” amounts and subtract the cost

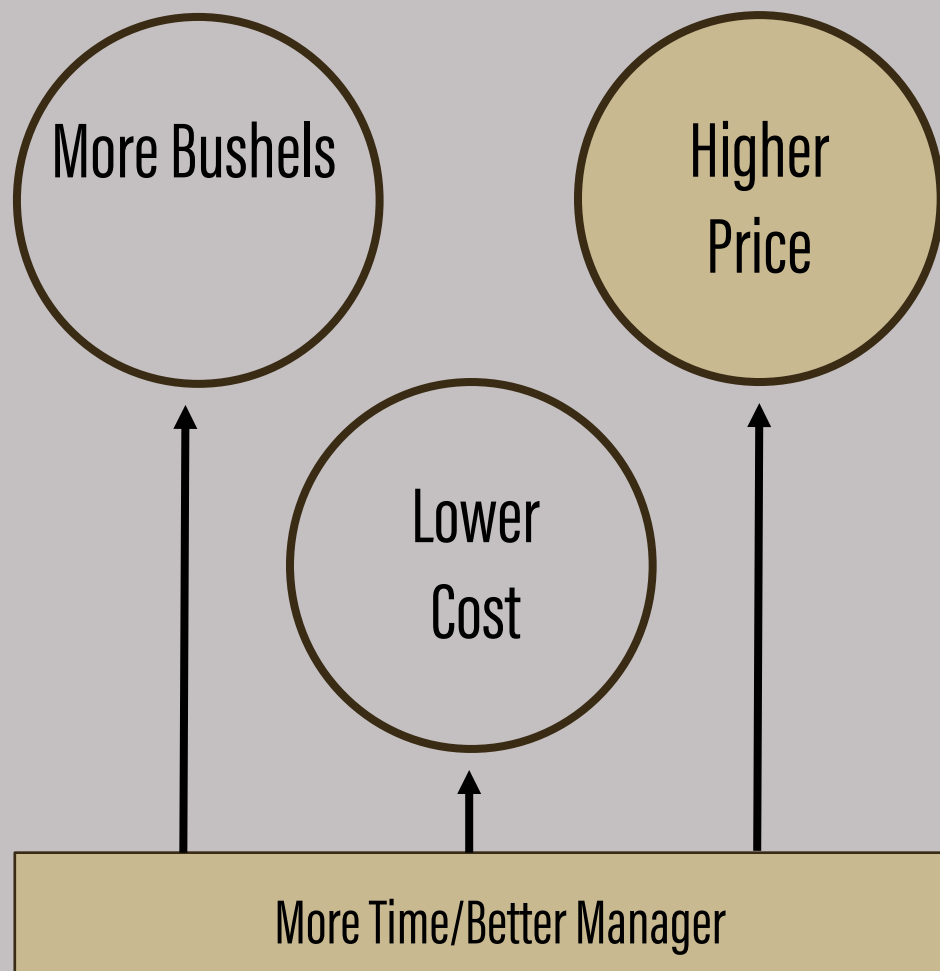
Positive number: **DO IT!!!**

Negative number: **RUN!!!**



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MORE MONEY



- How many more bushels?
- Which costs?
- How much less cost?
- How much higher price?

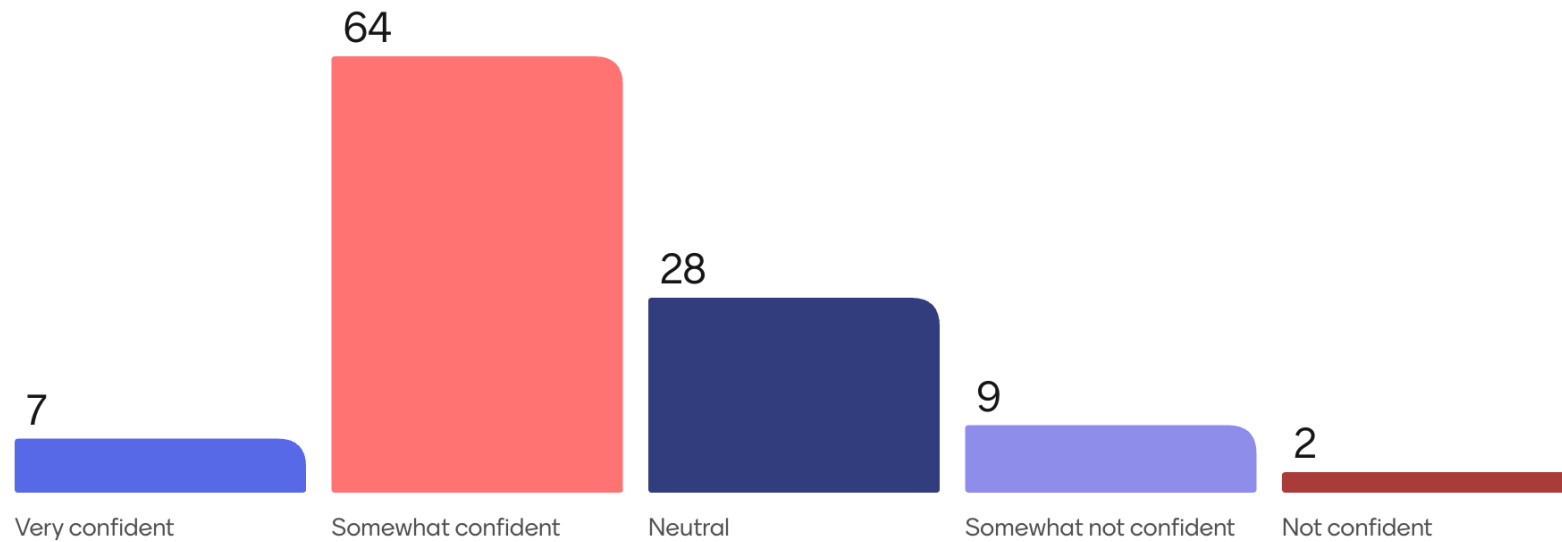
BETTER LIFE

How much can I pay – or – how much can my farm afford to pay for my better life?

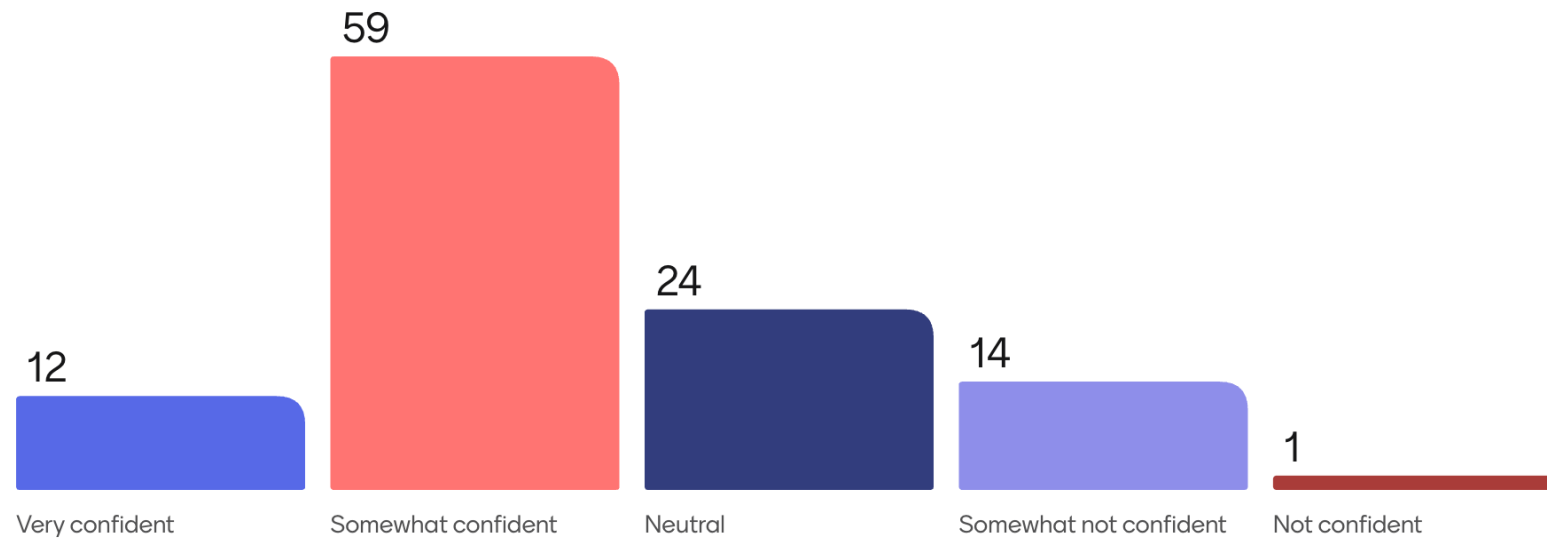
Do we purchase a self-propelled sprayer?

User input and related calculations section (blue shaded cells are inputs)					Print				
Information pertaining to sprayer depreciation and repairs									
Sprayer class		age	100 hrs	age*100hrs	repair factors		RF1	RF2	useful life
1	CaseliH-Patriot3230tankPoly750boom90	-0.061643	-0.015693	0	0.06	2	3000		
2	CaseliH-Patriot4420tankSS1200boom90	-0.049243	-0.010081	0	0.06	2	3000		
3	JD4830tankSS800boom90	-0.069865	-0.010805	0	0.06	2	3000		
4	JD4930tankSS1200boom90	-0.072455	-0.009335	0	0.06	2	3000		
5	RoGator984HtankSS900boom90	-0.074237	-0.012933	0	0.06	2	3000		
6	SpraCoupe4460tankPoly400boom80	-0.043644	-0.010642	0	0.06	2	3000		
Factors used in analysis =>		RoGator984HtankSS900boom90	-0.074237	-0.012933	0	0.06	2	3000	
Sprayer class		5	Bank interest rate (percent)				5.00%		
Sprayer age in years		0	Calculated after-tax discount rate				3.24%		
Hours on sprayer		0	State + U.S. marginal income tax rate (percent)				20%		
Purchase price of sprayer w/o trade-in		\$200,000	Self-employment tax (0 if corporation)				15.3%		
Market price of sprayer		\$200,000	Section-179 deduction (\$500,000 max)				\$0		
Cash downpayment		\$40,000	50% bonus 1st-yr dep. On new equip. (yes=1, no=0)				1		
Calculated new equivalent price (NEP)		\$200,000	Calculated bonus yr-1 depreciation				\$100,000		
			Calculated net \$ amount to depreciate				\$100,000		
No. of seasons (years) before trade (max. 20)		7	1st year MACRS depreciation rate				14.29%		
Sprayer boom width in feet		90	2nd year MACRS depreciation rate				24.49%		
Sprayer travel speed in mph		12	3rd year MACRS depreciation rate				17.49%		
Calculated acres per hour at 100% efficiency		130.91	4th year MACRS depreciation rate				12.49%		
Average expected efficiency (percent)		35.25%	5th year MACRS depreciation rate				8.93%		
Calculated acres per hour		46.15	6th year MACRS depreciation rate				8.92%		
Total acres sprayed annually		25,000	7th year MACRS depreciation rate				8.93%		
Calculated total hours accumulated annually		542	8th year MACRS depreciation rate				4.46%		
Labor			Calculated error check of depreciation rates				100.00%		
Total labor hours per sprayer engine hour		1.25	Calculated after-tax amortization factor				0.1619		
Labor cost per hour		\$15.00	Calculated first-year after-tax discount factor				0.9687		
Calculated labor cost per acre		\$0.41							
Fuel and lubrication			Tendering cost per hour				\$12.00		
Sprayer fuel consumption per hour (gallons)		10	Tendering cost per acre				\$1.20		
Average fuel price (\$/gal)		\$2.25	Calculated total tendering cost per acre				\$1.46		
Oil and lubrication percent of fuel cost		10%							
Calculated fuel and lubrication cost per hour		\$24.75	Calculated after-tax NPVc from TT section				\$185,066		
Calculated fuel and lubrication cost per acre		\$0.54	Calculated after-tax amortized NPV from TT				\$29,968		
Repairs and maintenance			Calculated pre-tax amortized NPV from TT				\$46,318		
Repair adjustment factor (0.8 to 1.2, usually 1) (RAF)		1.00	Prorated to opportunity interest				\$6,347		
Repairs per hour after useful life		\$72.00	Prorated to market depreciation				\$17,058		
			Prorated to repairs				\$21,009		
Tax, insurance, & shelter (TIS - % of value, decimal)		1.50%	Prorated to tax, insurance, & shelter (TIS)				\$1,904		

When evaluating a new technology, how confident are you in your ability to estimate its potential **benefits**?



When evaluating a new technology, how confident are you in your ability to estimate its potential **costs**?



Precision Ag and Farm Efficiency

Modeled Using Kansas Farm Management Association Records, 2002 to 2022

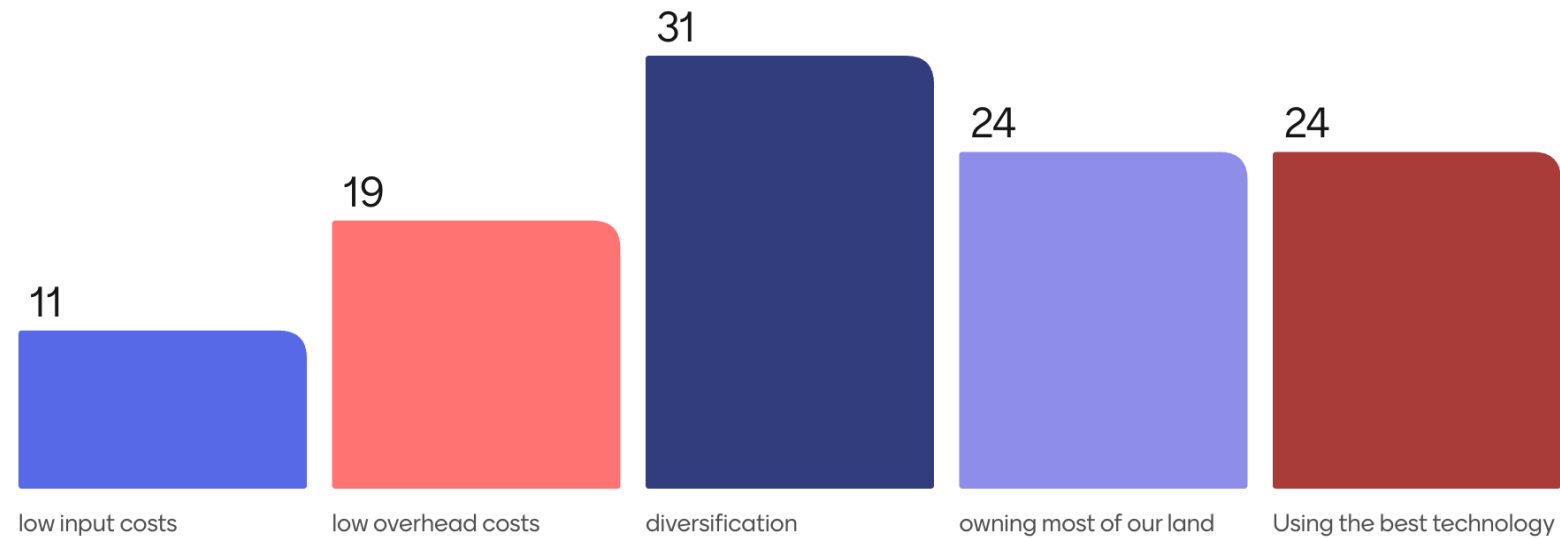
- Precision ag tech pays for itself (doesn't cost)
- Bundling precision ag technologies increases efficiency
- Less efficient farms benefit the most
 - *Up to \$78 per acre*

Large Scale Autonomous Corn and Soybean Production

Purdue Center for Commercial Agriculture Model Results

- Autonomy is never more profitable than hiring additional labor, *if labor is priced @ \$30/hour or less*
- But autonomy does make it possible to farm more acres with the same machinery & labor

Select the primary factor you believe will contribute to your farm's long-term success:



Technology Alignment

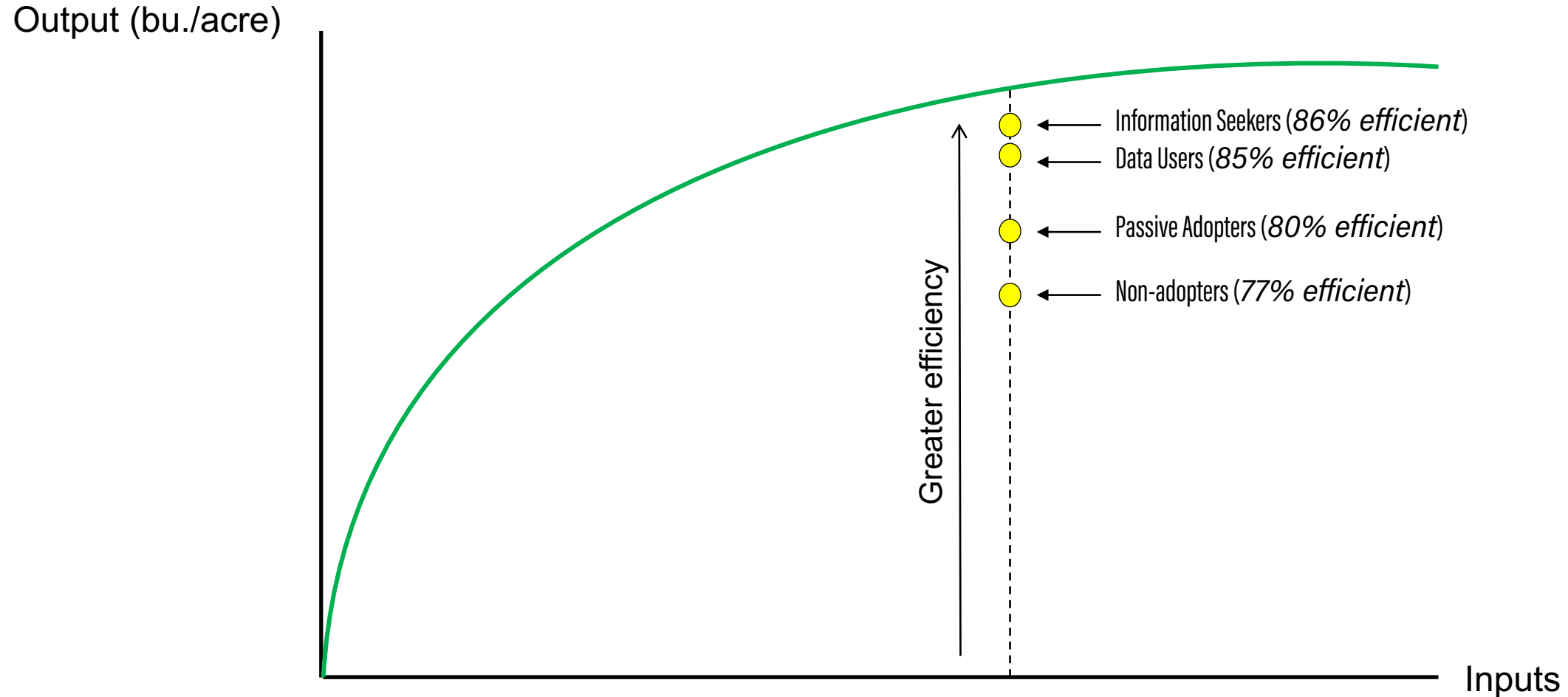
FARM

- What is our farm's root problem?
- What data would we need to make informed decisions about the root problem?

TECH

- What problem does the technology solve?
- How does solving this problem contribute to long-term success?

PRECISION AG USAGE & TECHNICAL EFFICIENCY



Technology is a system,

but only a component of the larger production system.

Adopt the system of technologies that enables your long-term farm strategy

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