

# Machinery Costs and Management



ILLINOIS

Agricultural &  
Consumer Economics

COLLEGE OF AGRICULTURAL, CONSUMER  
& ENVIRONMENTAL SCIENCES



Gary Schnitkey  
farmdocDAILY



Dale Lattz  
FBEM



# How is harvest going in your area?

- Done
- Over 75% done
- Between 50 and 75% done
- Between 25 and 50% done
- Less than 25% done

Corporate Sponsor



Platinum Sponsors





# Topics

1. Methodology
2. 2021 Cost Estimates
3. Comparison to 2019 costs
4. Machinery Management

**TIAA**

Center for  
Farmland Research



**I ILLINOIS**

Agricultural & Consumer Economics

COLLEGE OF AGRICULTURAL, CONSUMER  
& ENVIRONMENTAL SCIENCES



# Methodology





# farmdoc

Market Prices

**Sections**

Tools

Publications

Webinars/IFES

Sponsors/Donate

About Us

**EDUCATIONAL PARTNERS:**

**Dept of ACE**

**FBFM**

**EXTENSION**

Agricultural Law

Agricultural Policy

Crop Insurance

FAST Tools

Field Crop Production

Livestock Production

**Management**

Marketing & Outlook

Connect on Social Media



Subscribe for Daily



**Crop Insurance Tool**

August 31, 2021

This program calculates premiums, evaluates insurance payments, and provides historical data useful when making crop insurance decisions for multiple

Corporate Sponsor



Center for Farmland Research

Platinum Sponsor



Platinum Sponsor



**CORTEVA**  
agriscience

Platinum Sponsor



**FARM CREDIT ILLINOIS**  
Helping Farm Families Succeed



[Go to expanded Handbook page](#)

- [\\$ Cost of Operations](#)
- [Crop Budgets](#)
- [Leasing Forms](#)
- [Land and Leasing Facts](#)
- [Finance](#)
- [Whole Farm](#)

## \$ Machinery Cost of Operations Estimates

### Machinery Cost Estimates Summary

October 11, 2021

Summary of costs for Field Operations, Harvest Operations, Tractor and Forage Operations.

[Get the Report](#)

### Field Operations

October 11, 2021

This publication shows estimated costs of performing agricultural field operations.

[Get the Report](#)

### Harvest Operations

October 11, 2021

This publication shows estimated costs for combining, using grain carts, and hauling grain.

[Get the Report](#)

### Tractor Costs

October 11, 2021

Shows estimated costs for different sized tractors

[Get the Report](#)

### Forage Operations

October 11, 2021

This publication shows estimated costs for owning and operating forage machinery.

[Get the Report](#)

# Background

- Often used as a guideline in setting custom rates
- Done every 2-years
- Cost estimates based on new costs
- Using older machines should not matter
- Unlike Iowa State which is a *survey* of custom rates



# What is included in costs

## Overhead

- Depreciation
- Interest
- insurance and housing

## Variable

- Repairs
- fuel and lubrication
- labor

Formulas developed by the **American Society of Agricultural and Biological Engineers** are used to calculate costs.



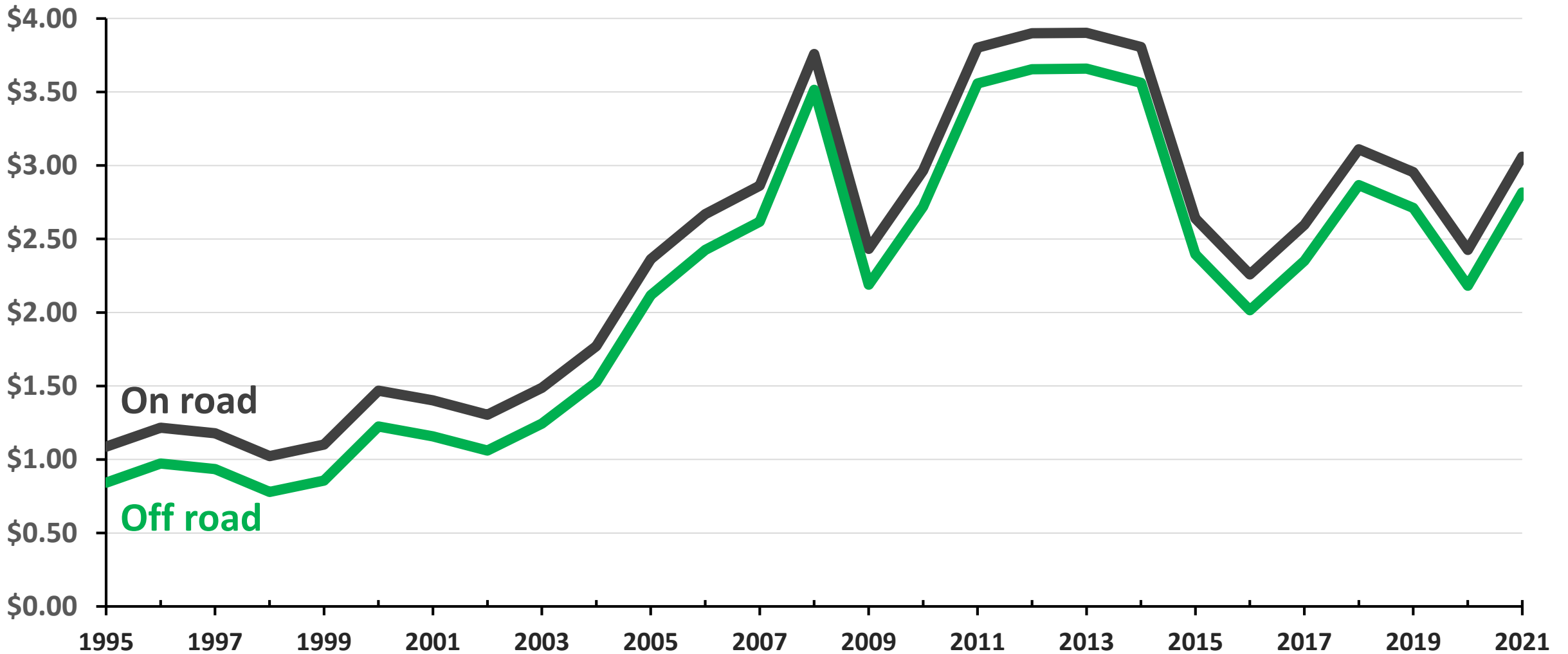


# Factors Used in Calculating Costs

<b>Purchase price</b>	85% of list price
<b>Interest rate</b>	4.5% of remaining value
<b>Insurance and housing</b>	1.0% of remaining value
<b>Diesel fuel</b>	\$2.75 per gallon
<b>Lubrication cost</b>	10% of fuel costs
<b>Hours of use per year</b>	300 per year
<b>Years of life</b>	10 years
<b>Labor charge</b>	\$20 per hour
<b>Labor time</b>	1.10 times tractor hours

# Midwest No 2 Diesel Retail Prices Annual

Tax is \$0.244 per gallon





# How much fall applied nitrogen occur compared to normal?

- More than normal
- About the same as normal
- Less than normal

Corporate Sponsor



Platinum Sponsors





# Machinery Cost Estimates 2021





[Go to expanded Handbook page](#)

- \$ Cost of Operations
- Crop Budgets
- Leasing Forms
- Land and Leasing Facts
- Finance
- Whole Farm

## \$ Machinery Cost of Operations Estimates

Machinery Cost Estimates Summary      Field Operations      Harvest Operations  
 October 11, 2021      October 11, 2021      October 11, 2021

Summ  
 Oper  
 Tract  
 Ge  
 Forag  
 Octob  
 This p  
 costs  
 forag



### Machinery Cost Estimates: Tractors

Department of Agricultural and Consumer Economics • College of Agricultural, Consumer and Environmental Sciences  
 University of Illinois at Urbana-Champaign

#### MACHINERY COST ESTIMATES: TRACTORS      September 2021

**Table 1. List Prices and Estimated Costs Per Hour for Tractors of Different Sizes.**

Tractor <sup>1</sup>	List Price <sup>2</sup>	Costs			Fuel Use
		Total	= Overhead	+ Fuel + Labor	Per Hour
	\$/tractor	\$ per hour			gal.
85 PTO Hp Tractor	123,749	<b>68.20</b>	34.90	11.30 22.00	3.7
95 PTO Hp Tractor	130,866	<b>71.50</b>	36.00	12.60 23.00	4.0

### Tractor Costs

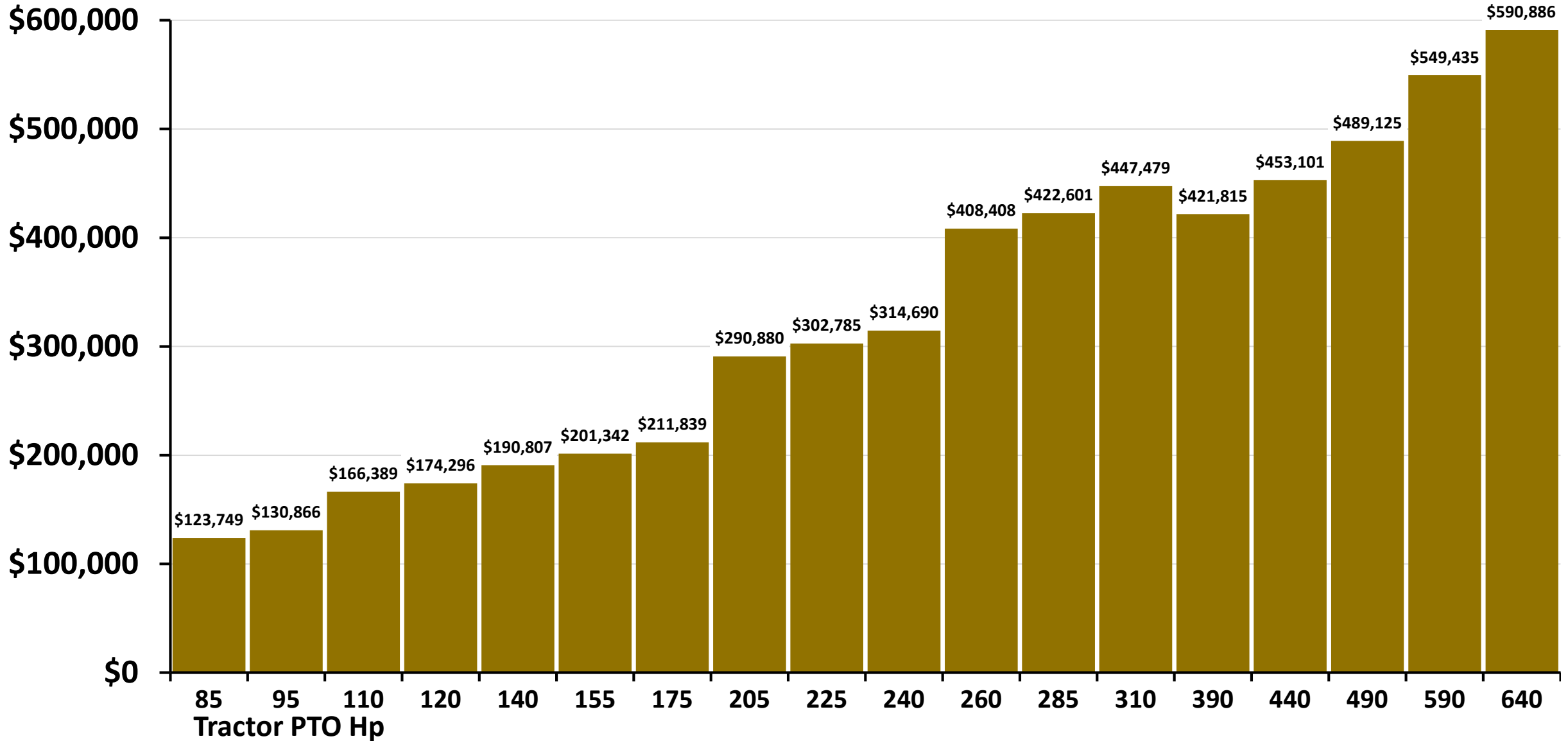
October 11, 2021

Shows estimated costs for different sized tractors

[Get the Report](#)

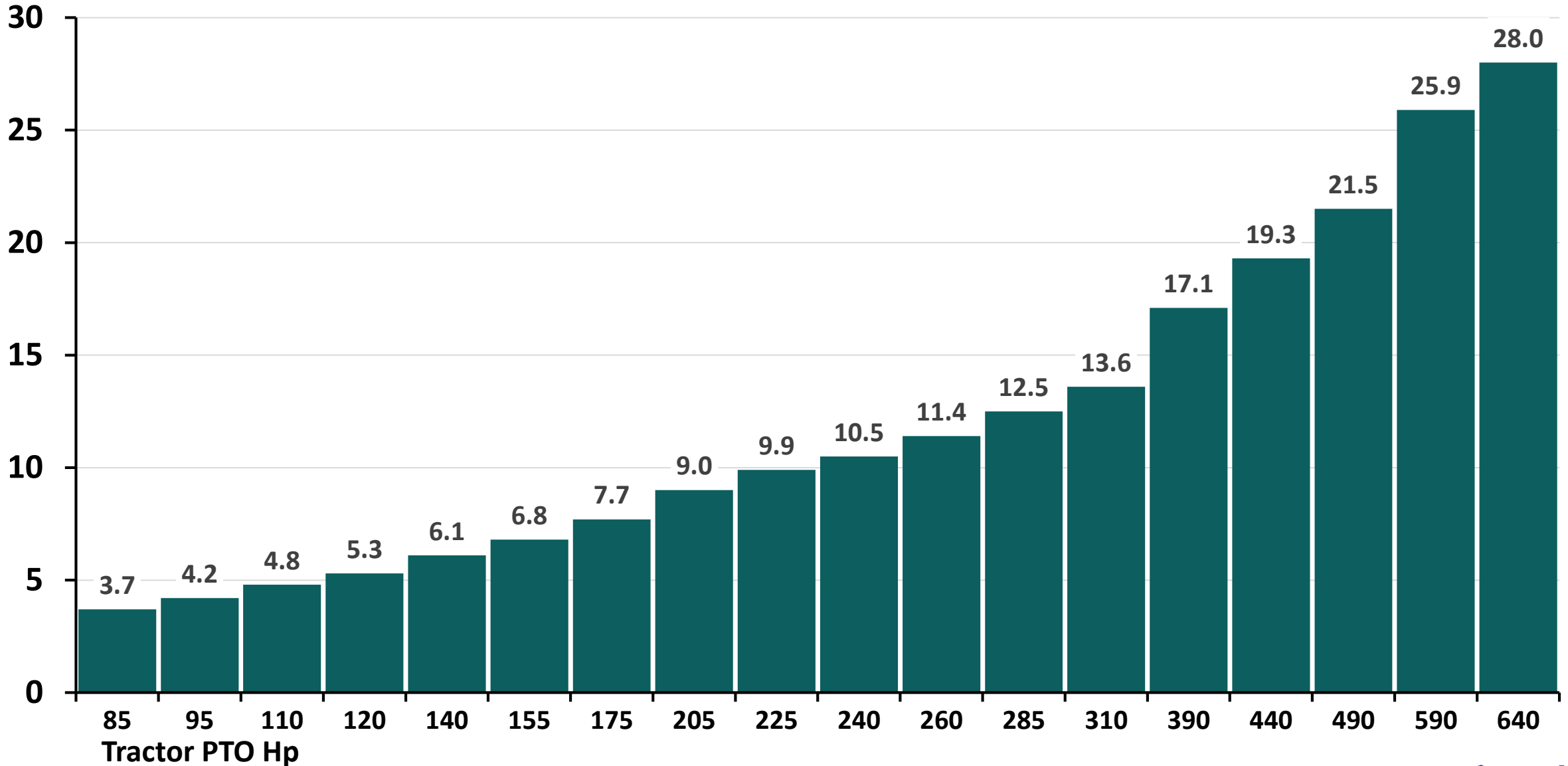
Estimated grain

# Tractor List Price

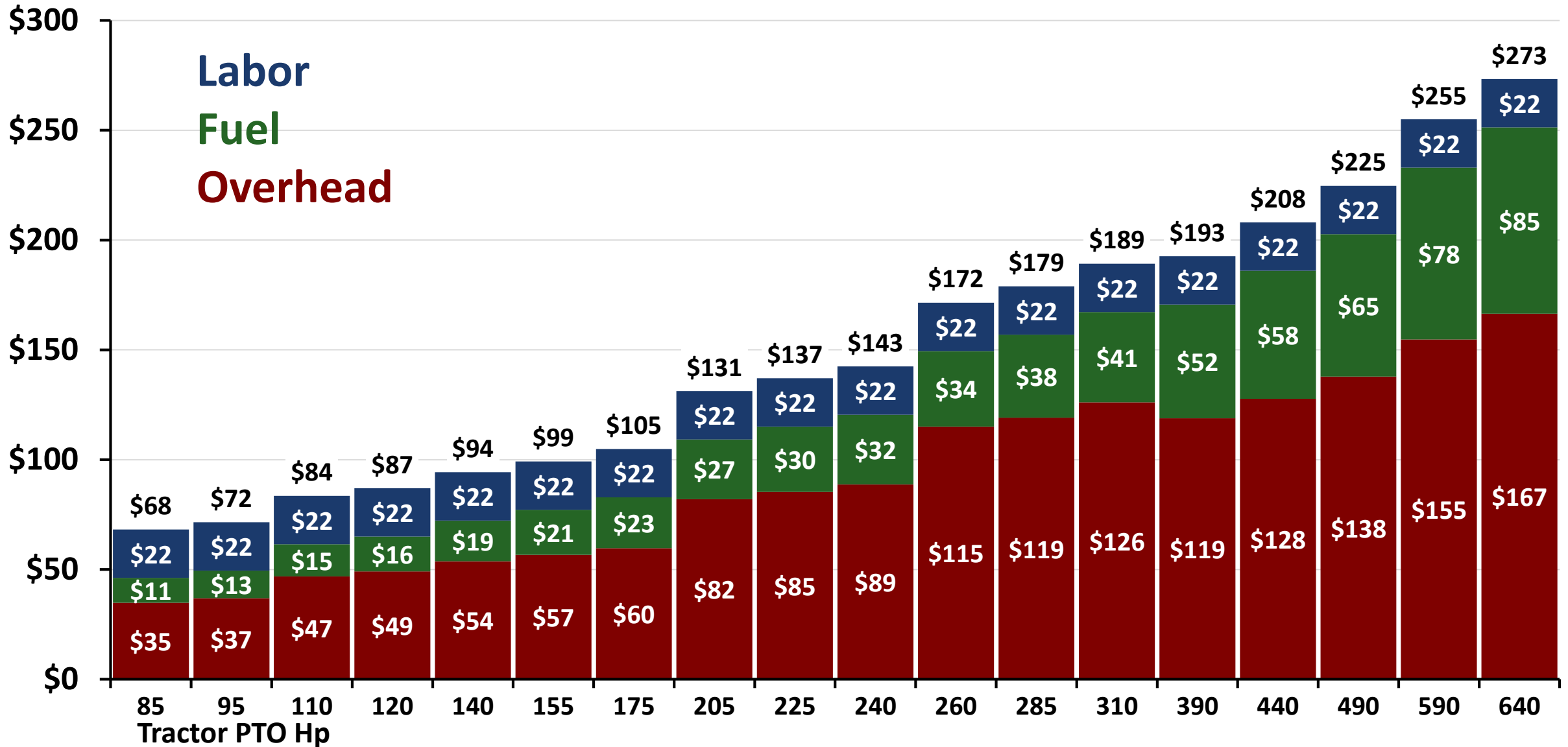




# Tractor Fuel Use per Hour



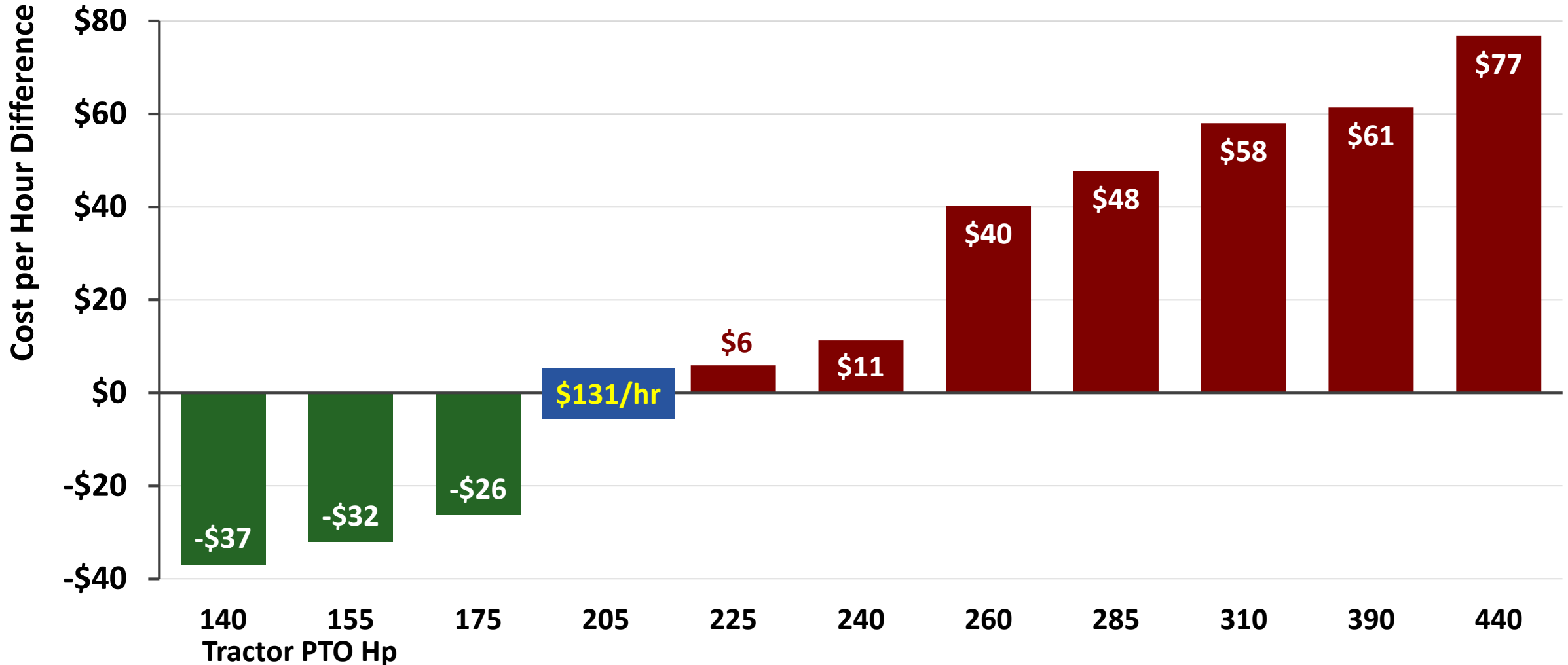
# Estimated Tractor Cost per Hour





# The Right Tractor for the Right Job

## 205 Hp Tractor Recommended



[Go to expanded Handbook page](#)

- [\\$ Cost of Operations](#)
- [Crop Budgets](#)
- [Leasing Forms](#)
- [Land and Leasing Facts](#)
- [Finance](#)
- [Whole Farm](#)

## \$ Machinery Cost of Operations Estimates

### Machinery Cost Estimates Summary

October 11, 2021

Summary of costs for Field Operations, Harvest Operations, Tractor and Forage Operations.

[Get the Report](#)

### Forage Operations

October 11, 2021

This publication shows estimated costs for owning and operating forage machinery.

[Get the Report](#)

### Field Operations

October 11, 2021

This publication shows estimated costs of performing agricultural field operations.

[Get the Report](#)

### Harvest Operations

October 11, 2021

### Tractor Costs

October 11, 2021

# FARM BUSINESS MANAGEMENT

## Machinery Cost Estimates: Field Operations

Department of Agricultural and Consumer Economics • College of Agricultural, Consumer and Environmental Sciences  
University of Illinois at Urbana-Champaign

### MACHINERY COST ESTIMATES: FIELD OPERATIONS

September 2021

Table 1. Per Acre Field Operation Costs.

Operation	Total =	Tractor Overhead +	Implement Overhead +	Fuel & Lube +	Labor	Fuel Use
<b>Primary tillage</b>	----- \$ per acre -----					gal
Chisel plow	13.60	6.00	4.60	2.00	1.00	0.7
Disk ripper (disk, chisel, rolling bk)	27.70	9.00	10.90	6.10	1.70	2.0
Combination ripper	29.10	9.40	11.60	6.40	1.70	2.1
Vertical tillage, rolling basket	13.20	4.40	6.60	1.40	0.80	0.5
Moldboard plow	40.30	17.40	12.50	5.70	4.70	1.9
Mulch tiller (disk, chisel)	21.60	10.10	5.50	3.30	2.70	1.1
Offset disk	18.80	8.50	5.20	2.80	2.30	0.9
Strip tillage	17.30	5.10	8.80	2.50	0.90	0.8



# Field Operations per Acre Costs

	Total	Tractor Overhead	Implement Overhead	Fuel & Lube	Labor	Fuel Use (Gallons)	Size
Chisel plow	\$13.60	\$6.00	\$4.60	\$2.00	\$1.00	0.7	35 ft
Disk ripper (disk, chisel, rolling bk)	\$27.70	\$9.00	\$10.90	\$6.10	\$1.70	2.0	22 ft
Combination ripper	\$29.10	\$9.40	\$11.60	\$6.40	\$1.70	2.1	18 ft
Vertical tillage, rolling basket	\$13.20	\$4.40	\$6.60	\$1.40	\$0.80	0.5	30.67 ft
Moldboard plow	\$40.30	\$17.40	\$12.50	\$5.70	\$4.70	1.9	7 bottom
Mulch tiller (disk, chisel)	\$21.60	\$10.10	\$5.50	\$3.30	\$2.70	1.1	16 foot
Offset disk	\$18.80	\$8.50	\$5.20	\$2.80	\$2.30	0.9	16 foot
Strip tillage	\$17.30	\$5.10	\$8.80	\$2.50	\$0.90	0.8	16 row
V-ripper (shanks only)	\$23.40	\$13.80	\$2.70	\$4.50	\$2.40	1.5	18 foot
Field cultivator	\$11.10	\$3.70	\$5.10	\$1.60	\$0.70	0.5	48.5 foot
Mulch finisher (disk, chisel, drag)	\$16.60	\$5.50	\$8.30	\$1.80	\$1.00	0.6	38 foot
Tandem disk	\$13.70	\$4.40	\$6.60	\$1.60	\$1.10	0.5	33.6 foot
High performance disk	\$14.30	\$4.00	\$6.60	\$3.00	\$0.70	1.0	30 foot

# Field Operations per Acre Costs

	<b>Total</b>	<b>Tractor Overhead</b>	<b>Implement Overhead</b>	<b>Fuel &amp; Lube</b>	<b>Labor</b>	<b>Fuel Use (Gallons)</b>	<b>Size</b>
<b>Broadcast seeding</b>	<b>9.10</b>	<b>4.30</b>	<b>0.70</b>	<b>1.40</b>	<b>2.70</b>	<b>0.5</b>	<b>20 foot</b>
<b>Conventional planter</b>	<b>17.20</b>	<b>4.00</b>	<b>10.80</b>	<b>1.30</b>	<b>1.10</b>	<b>0.4</b>	<b>16 row</b>
<b>Split-row planter<sup>1</sup></b>	<b>14.90</b>	<b>4.20</b>	<b>8.10</b>	<b>1.50</b>	<b>1.10</b>	<b>0.5</b>	<b>16 row</b>
<b>No-till planter</b>	<b>19.00</b>	<b>4.20</b>	<b>12.20</b>	<b>1.50</b>	<b>1.10</b>	<b>0.5</b>	<b>16 row</b>
<b>Grain drill</b>	<b>15.40</b>	<b>4.60</b>	<b>7.30</b>	<b>1.60</b>	<b>1.90</b>	<b>0.5</b>	<b>25 foot</b>
<b>No-till drill</b>	<b>27.20</b>	<b>7.70</b>	<b>13.80</b>	<b>2.60</b>	<b>3.10</b>	<b>0.9</b>	<b>15 foot</b>
<b>Air Seeder</b>	<b>18.10</b>	<b>5.60</b>	<b>9.70</b>	<b>1.80</b>	<b>1.00</b>	<b>0.6</b>	<b>44 foot</b>



# Field Operations per Acre Costs

## Spraying and ammonia application

	Total	Tractor Overhead	Implement Overhead	Fuel & Lube	Labor	Fuel Use (Gallons)	Size
Self-propelled	4.50		4.20	0.10	0.20	0.0	120' boom
Pull-type	4.60	0.70	3.20	0.30	0.40	0.1	90' boom
Anhydrous ammonia	17.10	5.20	9.30	1.60	1.00	0.5	47.5 ft
Liquid Fertilizer Applicator	7.70	2.60	3.50	0.90	0.70	0.3	40 ft



[Go to expanded Handbook page](#) 

- [\\$ Cost of Operations](#)
- [Crop Budgets](#)
- [Leasing Forms](#)
- [Land and Leasing Facts](#)
- [Finance](#)
- [Whole Farm](#)

## \$ Machinery Cost of Operations Estimates

### Machinery Cost Estimates Summary

October 11, 2021

Summary of costs for Field Operations, Harvest Operations, Tractor and Forage Operations.

[Get the Report](#)

### Forage Operations

October 11, 2021

This publication shows estimated costs for owning and operating forage machinery.

[Get the Report](#)

### Field Operations

October 11, 2021

This publication shows estimated costs of performing agricultural field operations.

[Get the Report](#)

### Harvest Operations

October 11, 2021

This publication shows estimated costs for combining, using grain carts, and hauling grain.

[Get the Report](#)

### Tractor Costs

October 11, 2021

Shows estimated costs for different sized tractors

[Get the Report](#)



# Harvesting Costs

	Corn	Soybeans	Notes
<b>Combining</b>	\$38.50 per acre	\$33.40 per acre	Based on a 470 HP combine used on 2,500 acres.
<b>Grain Cart</b>	\$15.10 per acre	\$8.40 per acre	Based on a \$68,300 grain cart used on 1,900 acres.
<b>Grain Hauling</b>	\$0.10 per bu.		Hauling costs from field to storage will vary depending on distance to storage, unloading time, and other factors.



[Go to expanded Handbook page](#) 

- [\\$ Cost of Operations](#)
- [Crop Budgets](#)
- [Leasing Forms](#)
- [Land and Leasing Facts](#)
- [Finance](#)
- [Whole Farm](#)

## \$ Machinery Cost of Operations Estimates

### Machinery Cost Estimates Summary

October 11, 2021

Summary of costs for Field Operations, Harvest Operations, Tractor and Forage Operations.

[Get the Report](#)

### Field Operations

October 11, 2021

This publication shows estimated costs of performing agricultural field operations.

[Get the Report](#)

### Harvest Operations

October 11, 2021

This publication shows estimated costs for combining, using grain carts, and hauling grain.

[Get the Report](#)

### Tractor Costs

October 11, 2021

Shows estimated costs for different sized tractors

[Get the Report](#)

### Forage Operations

October 11, 2021

This publication shows estimated costs for owning and operating forage machinery.

[Get the Report](#)



# Baling Hay Costs per Acre

	Total	Tractor Overhead	Implement Overhead	Fuel & Lube	Labor
Small Square Baler	\$31.50	\$11.30	\$8.10	\$5.40	\$6.70
1,000 lb. Square Baler	\$28.90	\$6.50	\$16.60	\$3.30	\$2.50
Round Baler	\$28.90	\$10.40	\$7.30	\$5.00	\$6.20

Type	Costs per bale
50 lb. square bale	\$0.32
1,000 lb square bale	\$7.00
1,000 lb. round bale	\$8.20

# Have you used the Machinery Cost Operation in the past?

Yes

No

**FARM BUSINESS MANAGEMENT**

**Machinery Cost Estimates: Field Operations**

Department of Agricultural and Consumer Economics • College of Agricultural, Consumer and Environmental Sciences  
University of Illinois at Urbana-Champaign

**MACHINERY COST ESTIMATES: FIELD OPERATIONS** September 2021

Table 1. Per Acre Field Operation Costs.

Operation	Tractor Implement Fuel					Fuel Use
	Total =	Overhead +	Overhead +	& Lube +	Labor	
	\$ per acre					
<b>Primary tillage</b>						
Chisel plow	13.60	6.00	4.60	2.00	1.00	0.7
Disk ripper (disk, chisel, rolling bk)	27.70	9.00	10.90	6.10	1.70	2.0
Combination ripper	29.10	9.40	11.60	6.40	1.70	2.1
Vertical tillage, rolling basket	13.20	4.40	6.60	1.40	0.80	0.5
Moldboard plow	40.30	17.40	12.50	5.70	4.70	1.9
Mulch tiller (disk, chisel)	21.60	10.10	5.50	3.30	2.70	1.1
Offset disk	18.80	8.50	5.20	2.80	2.30	0.9
Strip tillage	17.30	5.10	8.80	2.50	0.90	0.8
V-ripper (shanks only)	23.40	13.80	2.70	4.50	2.40	1.5
<b>Secondary tillage</b>						
Field cultivator	11.10	3.70	5.10	1.60	0.70	0.5
Mulch finisher (disk, chisel, drag)	16.60	5.50	8.30	1.80	1.00	0.6
Tandem disk	13.70	4.40	6.60	1.60	1.10	0.5
High performance disk	14.30	4.00	6.60	3.00	0.70	1.0
<b>Planting</b>						
Broadcast seeding	9.10	4.30	0.70	1.40	2.70	0.5
Conventional planter	17.20	4.00	10.80	1.30	1.10	0.4
Split-row planter <sup>1</sup>	14.90	4.20	8.10			
No-till planter						

Corporate Sponsor



Platinum Sponsors



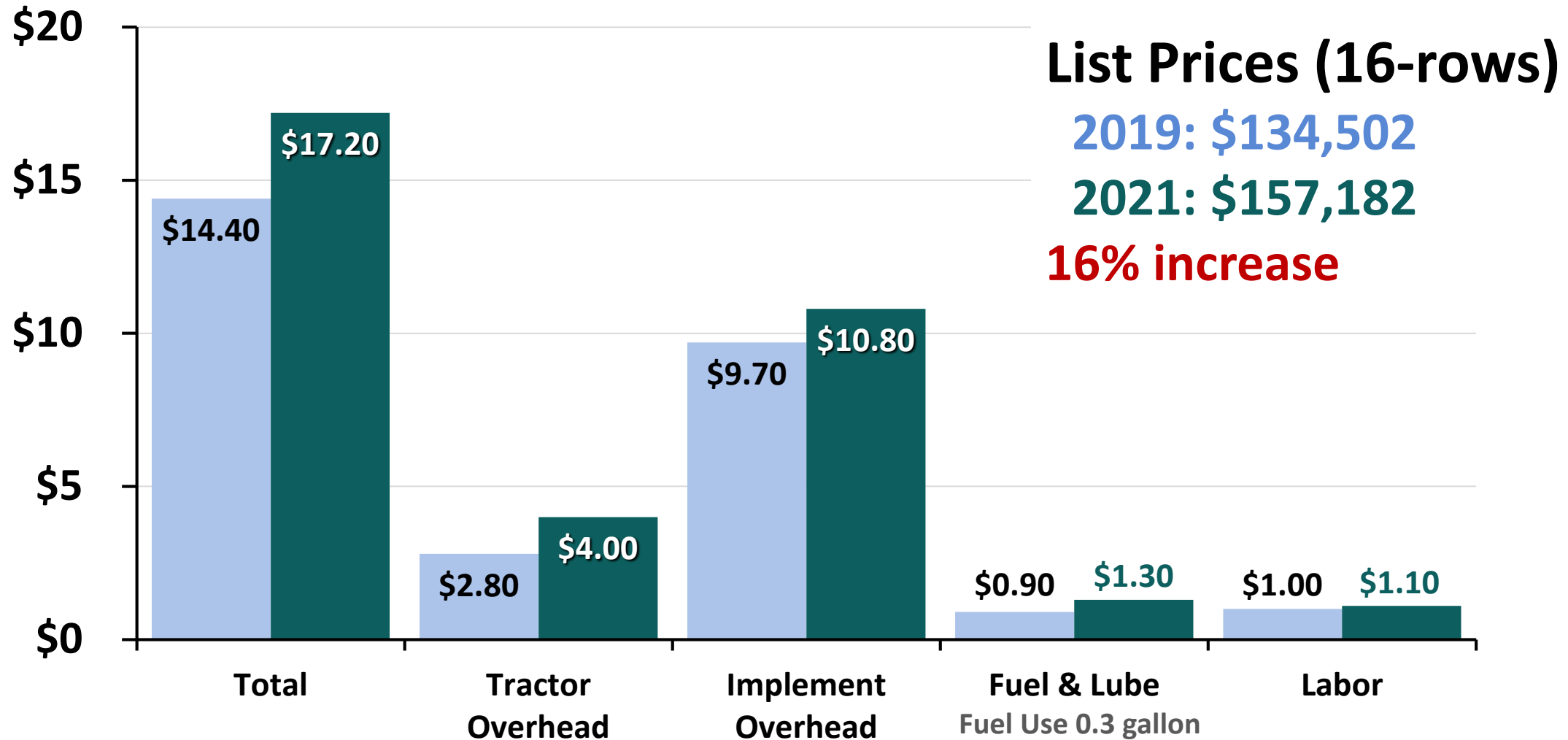


# Comparison of Costs, 2019 to 2021





# Comparison of cost in 2019 and 2021 Conventional Planter in \$ per acre





## Estimated Costs and List Prices for Select Machines and Operations in 2019 and 2021

	Estimated Costs			List Prices		
	2019	2021	Change	2019	2021	Change
	In \$ per hour					
<b>120 PTO HP Tractor</b>	\$83.80	\$87.00	3.8%	\$161,538	\$174,296	7.9%
<b>225 PTO HP Tractor</b>	\$130.30	\$137.10	5.2%	\$274,867	\$302,785	10.2%
<b>310 PTO HP Tractor</b>	\$181.10	\$189.20	4.5%	\$410,256	\$447,479	9.1%
<b>590 Engine HP Tractor <sup>1</sup></b>	\$237.70	\$255.00	7.3%	\$487,819	\$549,435	12.6%
	In \$ per acre					
<b>Combining - Corn<sup>2</sup></b>	\$37.60	\$38.50	2.4%	\$642,250	\$687,500	7.0%
<b>Combining - Soybeans<sup>2</sup></b>	\$32.70	\$33.40	2.1%	\$577,750	\$619,000	7.1%
<b>Chisel Plow <sup>3</sup></b>	\$12.70	\$13.60	7.1%	\$63,890	\$68,114	6.6%
<b>Conventional planter<sup>3</sup></b>	\$14.40	\$17.20	19.4%	\$134,502	\$157,182	16.9%

1 This was a 570 horsepower tractor in 2019

2 List price includes the separator and the head.

3 List prices are only for the field implements.

# When will supply chains get back to normal?

- 2022
- 2023
- 2024 to 2025
- We have reached a new normal

## Corporate Sponsor



## Platinum Sponsors



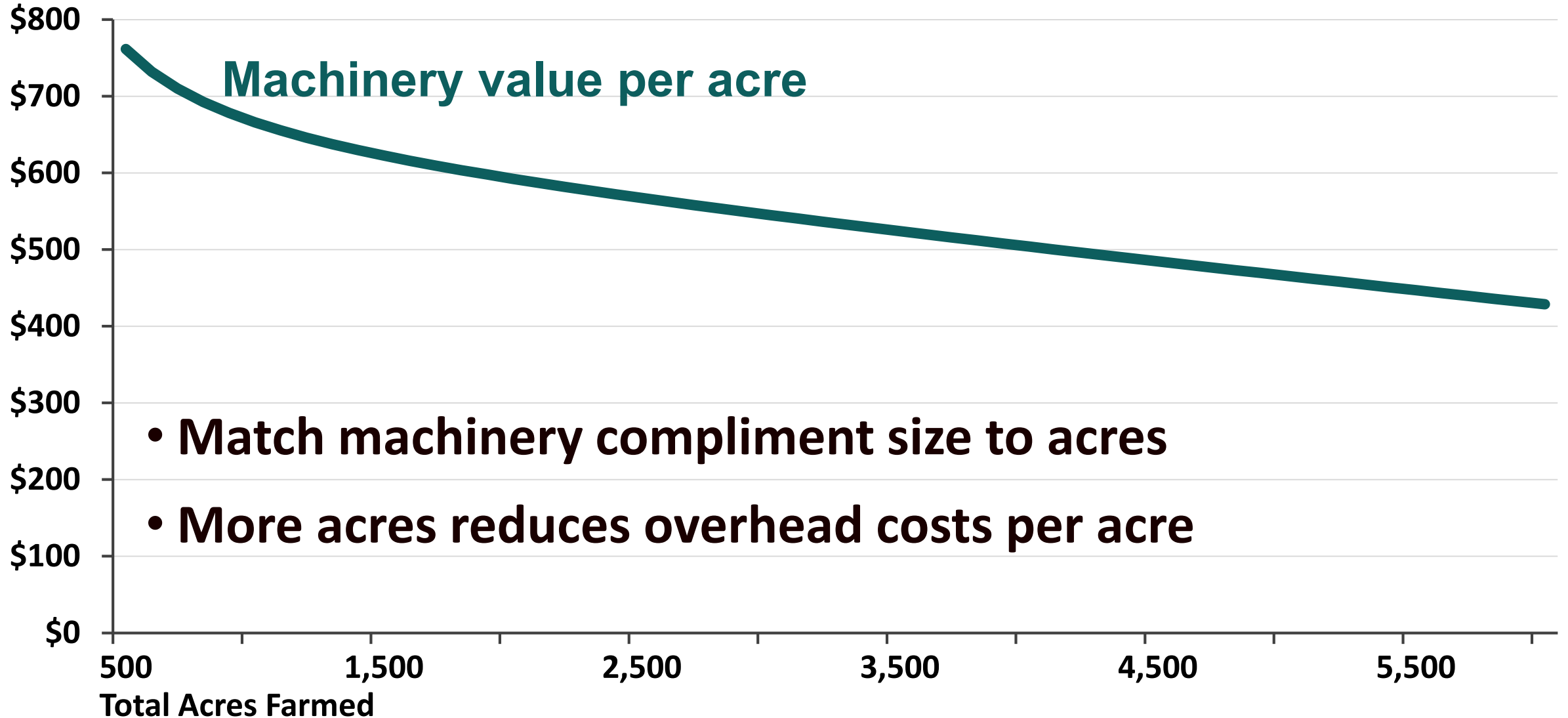


# Management Advice



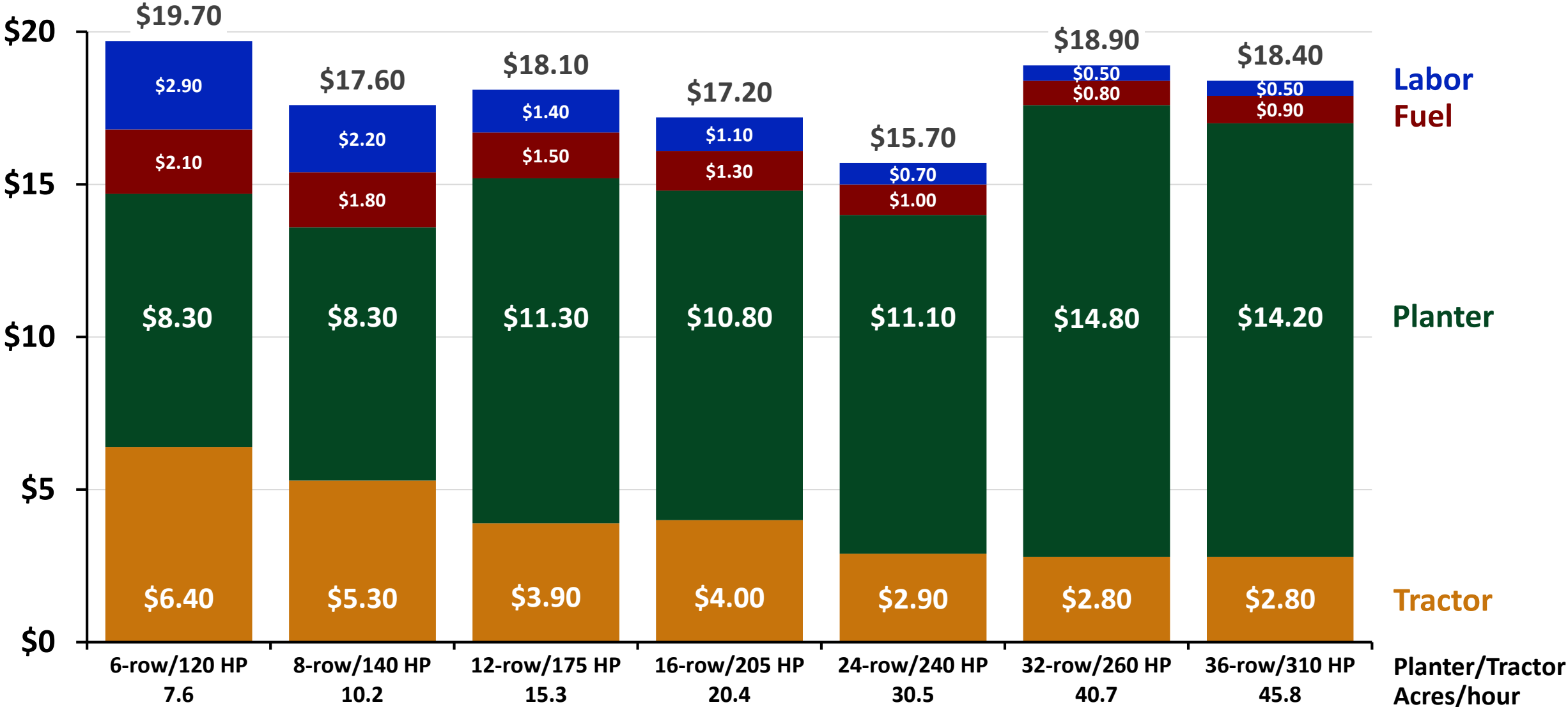


# Average Machinery Values FBFM Grain Farms



# Conventional Planter Cost per Acre Economics

Based on using 70 hours with Field Efficiency of 70%



Labor  
Fuel

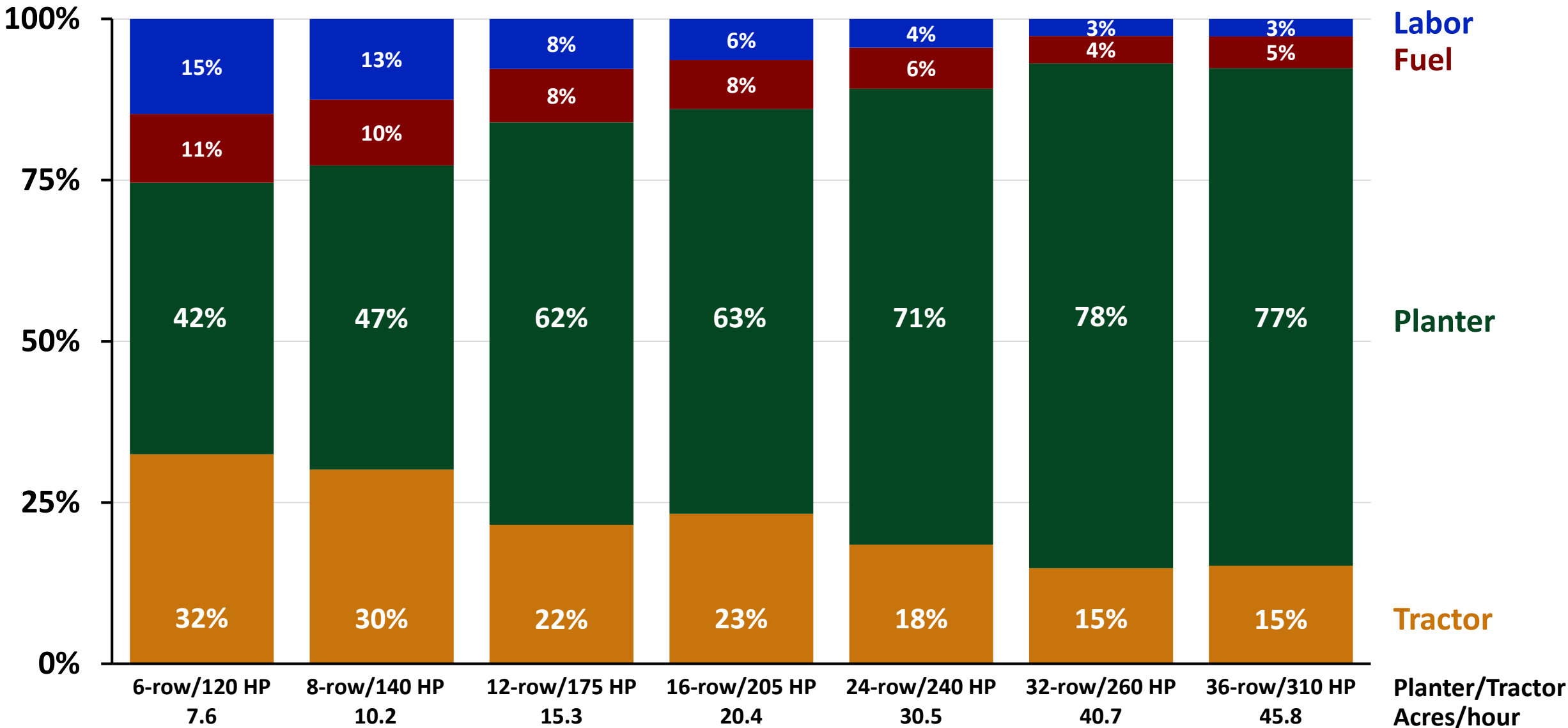
Planter

Tractor

Planter/Tractor  
Acres/hour

# Conventional Planter Economics as a Percent of Total

Based on using 70 hours with Field Efficiency of 70%

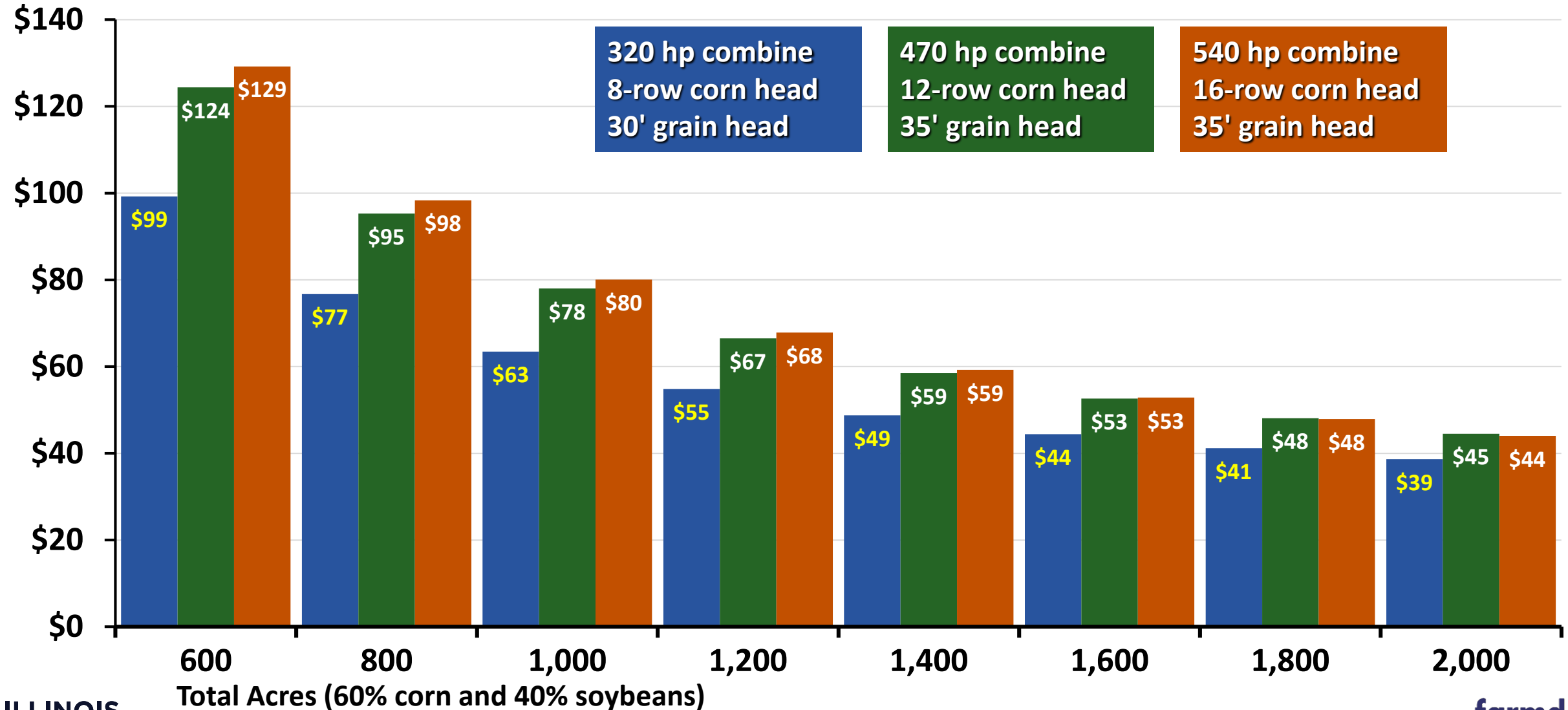




Machine description Head size	List Price <sup>1</sup>	Acres per Year	Hours per Year	----- Costs Per Acre -----				
				<b>Total</b>	Combine = Overhead +	Platform Overhead +	Fuel & Lube +	Labor
	\$/head	ac/yr	hr/yr	----- \$ per acre -----				
<b>330 Horsepower Combine (\$469,250 List Price)</b>								
8-row (30" rows) corn head	\$83,000	1,140	177	<b>42.20</b>	24.40	11.00	3.40	3.40
30 ft. grain platform	\$51,250	760	75	<b>36.30</b>	26.10	6.30	1.70	2.20
<b>470 Horsepower Combine (\$560,500 List Price)</b>								
12-row (30" rows) corn head	\$127,000	1,500	155	<b>38.50</b>	20.50	12.50	3.20	2.30
35 ft. grain platform	\$58,500	1,000	85	<b>33.40</b>	23.90	5.50	2.10	1.90
<b>540 Horsepower Combine, Rotary (\$586,750 List Price)</b>								
16-row (30" rows) corn head	\$167,500	1,890	147	<b>33.60</b>	16.10	13.00	2.80	1.70
35 ft. grain platform	\$58,500	1,260	107	<b>29.50</b>	20.80	4.40	2.40	1.90

# Combine Cost Per Acre

Weighted 60% Corn 40% Soybeans

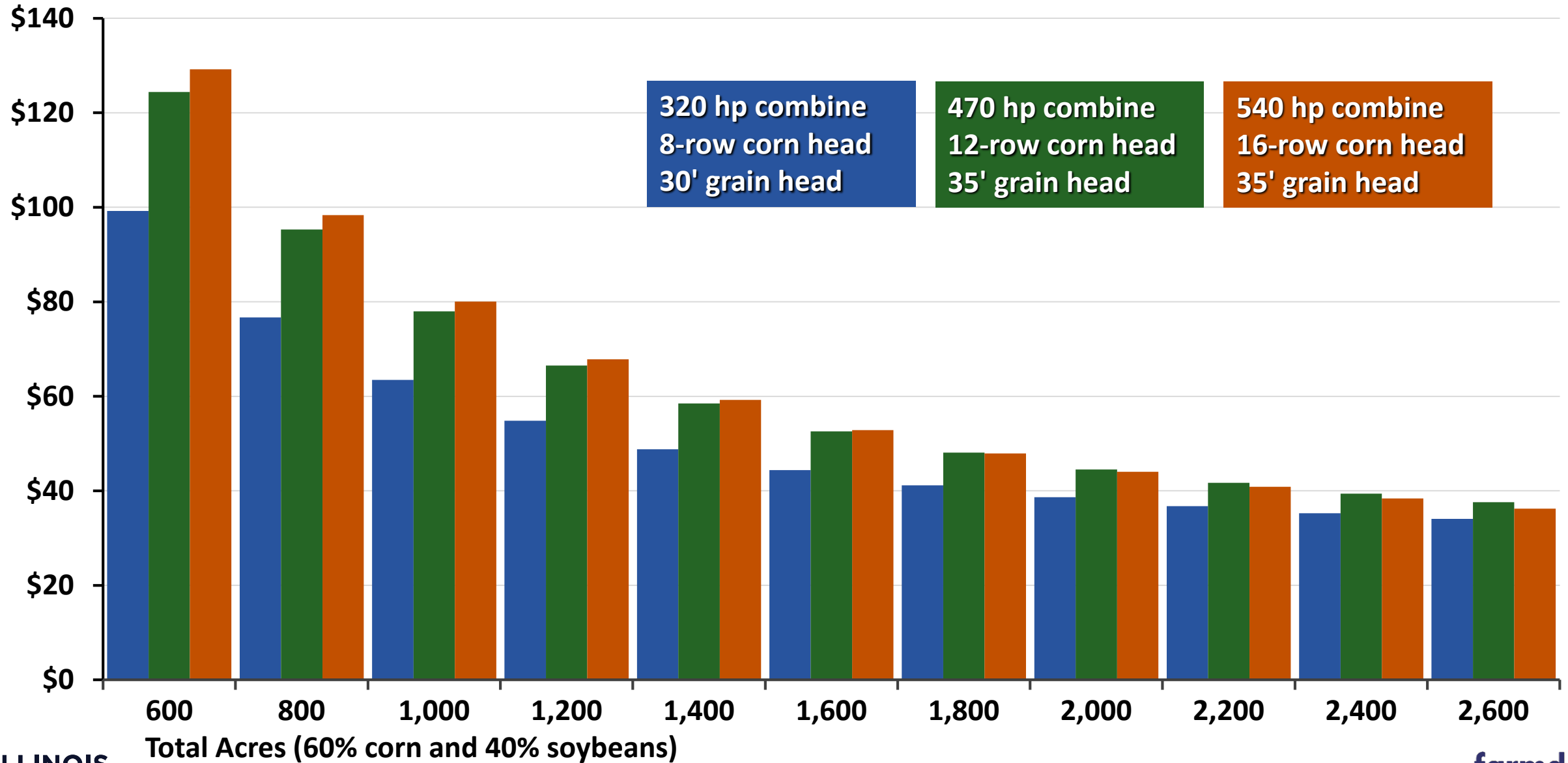


320 hp combine  
8-row corn head  
30' grain head

470 hp combine  
12-row corn head  
35' grain head

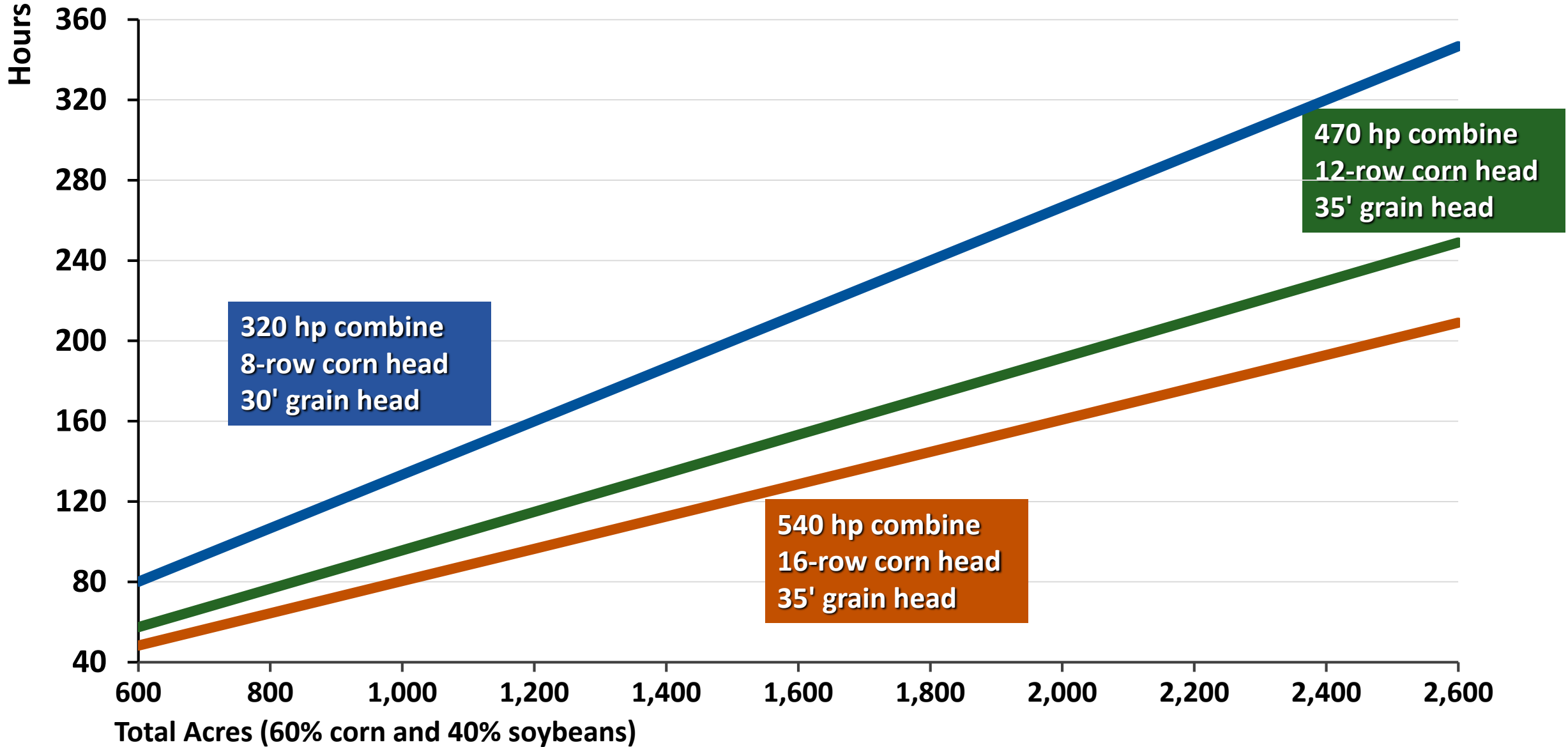
540 hp combine  
16-row corn head  
35' grain head

# Combine Cost Per Acre





# Hours to Combine



# Summary

- Costs have increased (list prices, fuel, labor)
- Cost estimates include all economic costs but **no profit included**
- Important to match machinery compliment size with acres
- More acres will reduce overhead costs

# farmdoc Sponsors

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

**TIAA**

Center for  
Farmland Research





# Thank You for joining us!

## Please submit your questions



**ILLINOIS** Our Sites: [farmdoc](#) [farmdocDAILY](#) [Farm Policy News](#)

# farmdocDAILY

[Market Prices](#) [Authors](#) [By Month](#) [Categories](#) [Series](#) [Tools](#) [Webinars/IFES](#) [Sponsors/Donate](#) [About Us](#)

**EDUCATIONAL PARTNERS:**  
[Dept of ACE](#) [FBFM](#) [EXTENSION](#)

Subscribe for Daily Email Updates

Connect on Social Media

[Twitter](#) [Facebook](#) [Instagram](#) [YouTube](#) [LinkedIn](#)

Visit us at

# farmdocDAILY

## .Illinois.edu

Subscribe for Latest News Updates

[farmdoc's coverage of the Coronavirus and Ag](#)

Latest Article

**Machinery Cost Estimates for 2021**  
October 12, 2021  
Dale Lattz and Gary Schnitkey  
Machinery cost estimates for 2021 have been released and are available on the farmdoc website (see Management section of farmdoc). Machinery costs are updated every two years, with the last update occurring in 2019. Substantial increases in list prices of...

[Read the Article](#)

Corporate Sponsor <b>TIAA</b> Center for Farmland Research	Platinum Sponsor <b>COMPEER FINANCIAL</b>
Platinum Sponsor <b>CORTEVA</b> agriscience	Platinum Sponsor <b>FARM CREDIT ILLINOIS</b> Helping Farm Families Succeed
Platinum Sponsor <b>GROWMARK</b>	Platinum Sponsor <b>www.ilcorn.org</b>
Platinum Sponsor <b>ILLINOIS SOYBEAN PROMOTION BOARD</b>	

[See all sponsors](#)

# ILLINOIS

## Agricultural & Consumer Economics

### COLLEGE OF AGRICULTURAL, CONSUMER & ENVIRONMENTAL SCIENCES



For the webinar archives and **5-minute farmdoc**  
Subscribe to our channel [YouTube.com/farmdocVideo](https://www.youtube.com/farmdocVideo)



[See the Latest News on Social Media](#)