



Economics of Equipment Purchasing: What You Should Consider Before Buying New Equipment

Brady Brewer

Department of Agricultural Economics

Kansas State University

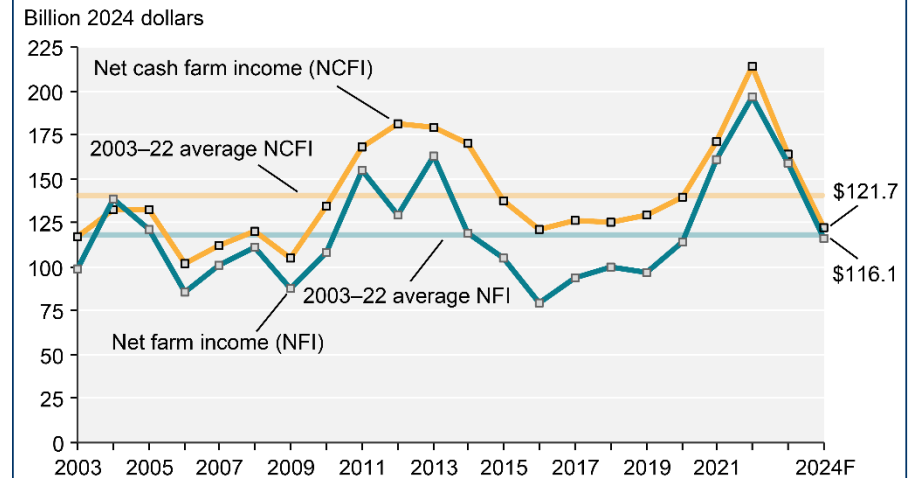
Equipment Purchasing

- Key Question to Answer: What are the considerations for choosing your next piece of equipment?
- Economics & Efficiency
- Other considerations
 - Efficiency
 - Labor
 - Timing
 - Improved Precision

Why Focus on Efficiency?

- USDA Farm Income Forecast
 - Breakeven prices for corn and soybeans are expected to decline in 2024
 - Production expenses at the highest nominal level ever
 - 2024 will be the most expensive crop to put in the ground
 - More acres means more equipment needs

U.S. net farm income and net cash farm income, inflation adjusted, 2003–24F

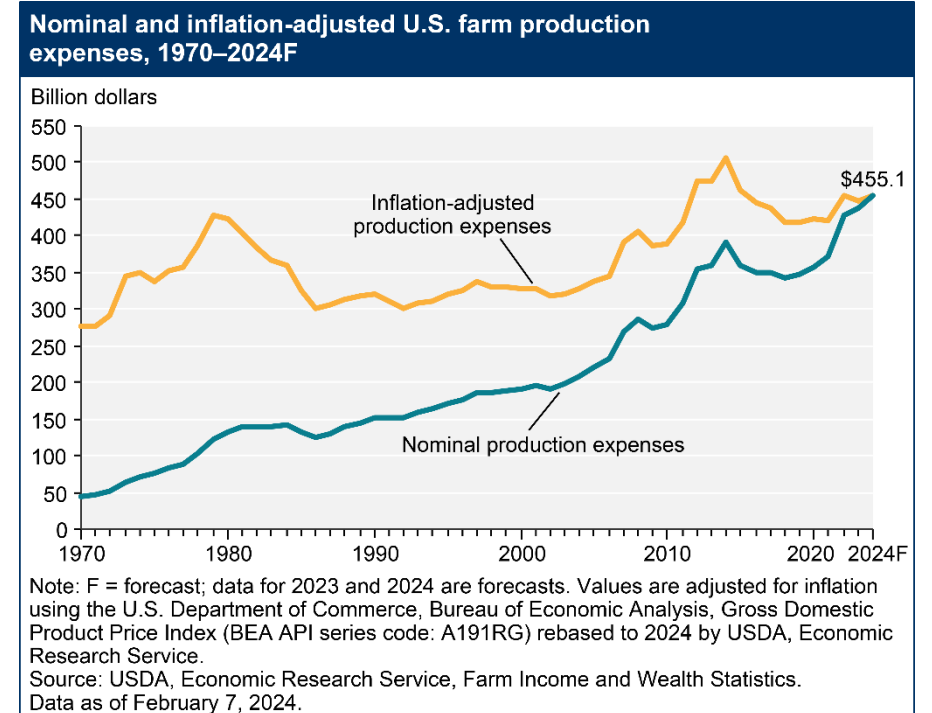


Note: F = forecast; data for 2023 and 2024 are forecasts. Values are adjusted for inflation using the U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Price Index (BEA API series code: A191RG) rebased to 2024 by USDA, Economic Research Service.

Source: USDA, Economic Research Service, Farm Income and Wealth Statistics. Data as of February 7, 2024.

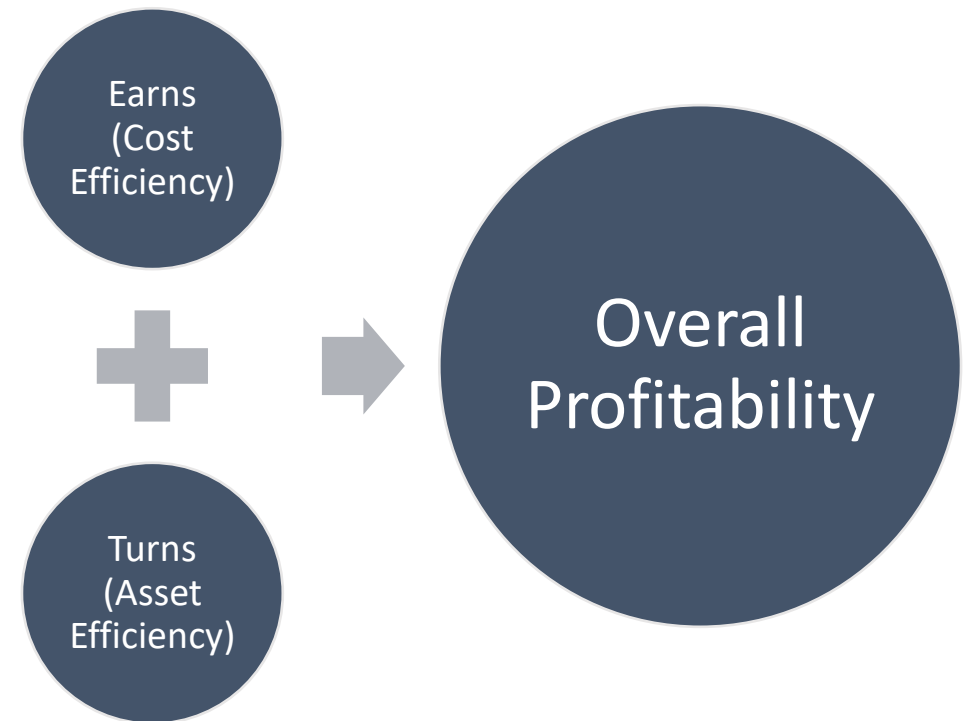
Why Focus on Efficiency?

- USDA Farm Income Forecast
 - Production expenses at the highest nominal level ever
 - 2024 will be the most expensive crop to put in the ground
 - Increased costs and decreased revenues is a margin squeeze



Why Focus on Efficiency?

- Two key inputs to profitability: Costs and Assets
 - Earns
 - How cost efficient a business is
 - Turns
 - How asset efficient a business is
- These sometimes work together, but often are at odds with each other.
 - Tradeoffs are key to understand.



The Five Strategic Levers of Profitability You Can Pull on Your Farm

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.

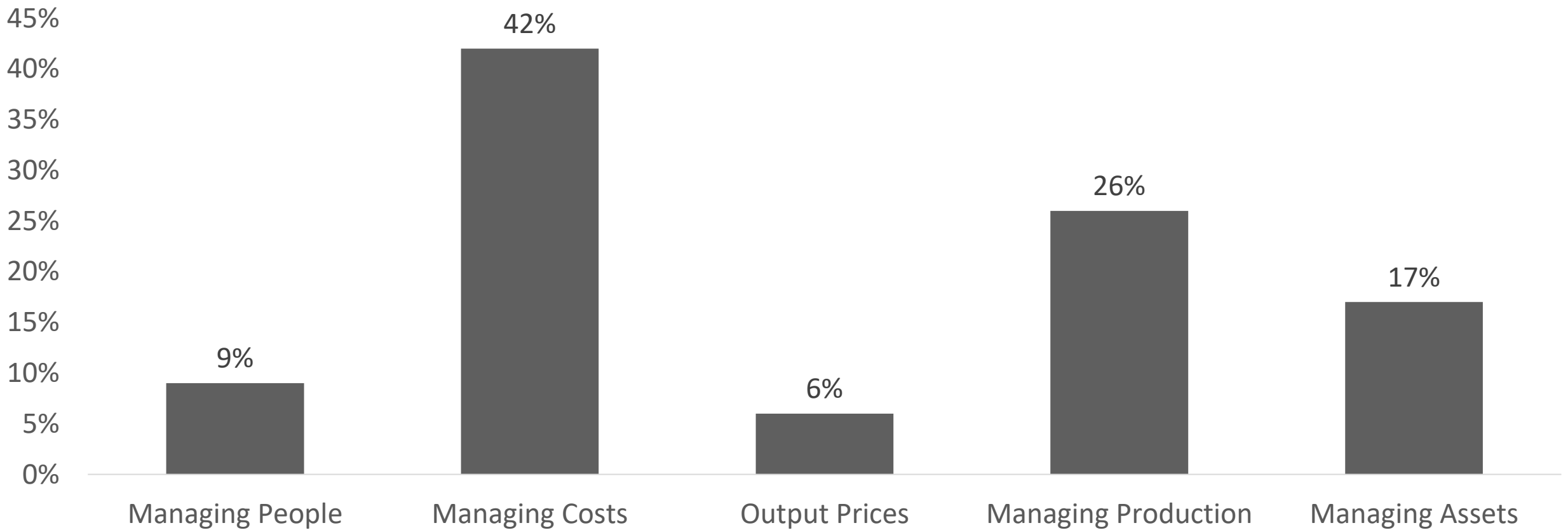
Assets

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

People

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

“Which activity is most important to your SUCCESS as a farmer?”





Equipment Purchasing

Decision Factors

Equipment Decision Checklist

Questions that need answered at the beginning

- What are the tasks that need to be performed?
- What tools/implements are necessary for accomplishing the work?
- What are the minimum horsepower requirements for those implements?
- What will owning those implements cost?
- What will owning the tractors with the minimum hp and features requirements cost?
- How much does a custom operator charge to perform the same task?
- How many acres or number of head can this purchase be divided over?
- How much do you anticipate the regular maintenance will cost?

The economics of equipment purchasing

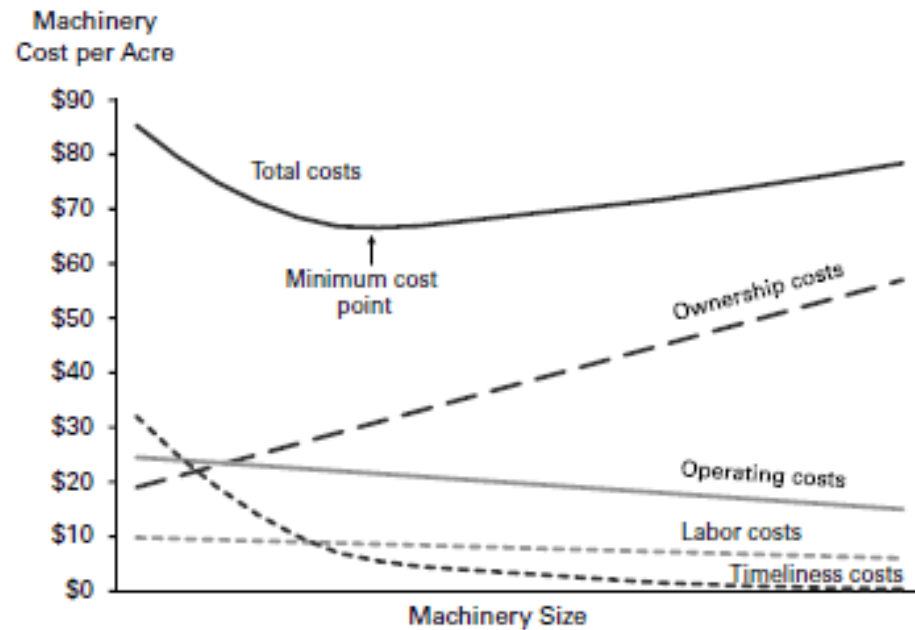
- The Goal: Reduce the per unit cost of production
 - “Do more with less”

$$\text{Average Per Unit Cost} = \frac{\text{Total Production}}{\text{Total Cost of Production}}$$

- In general, this favors larger equipment
 - While larger equipment is more expensive overall, the average cost to produce something is lower because output is typically more efficient
- There are many factors that this impacts
 - Labor, inputs, time, etc.

The economics of machinery size

Figure 1. Effect of increasing machinery size on machinery costs.



Ideal Size

- What speed do you need to cover your ground in?

$$\frac{\text{Acres to Cover}}{\text{Days Available} * \text{Hours of Field Time per Day}} = \text{Field Capacity Needed}$$

- Example: 900 acres, need to get done in 10 days, and will work 12 hours per day.

$$\frac{900 \text{ Acres}}{10 \text{ Days} * 12 \text{ Hours per Day}} = 7.5 \text{ Acres per Hour}$$

Ideal Size

- Let's Estimate Field Capacity

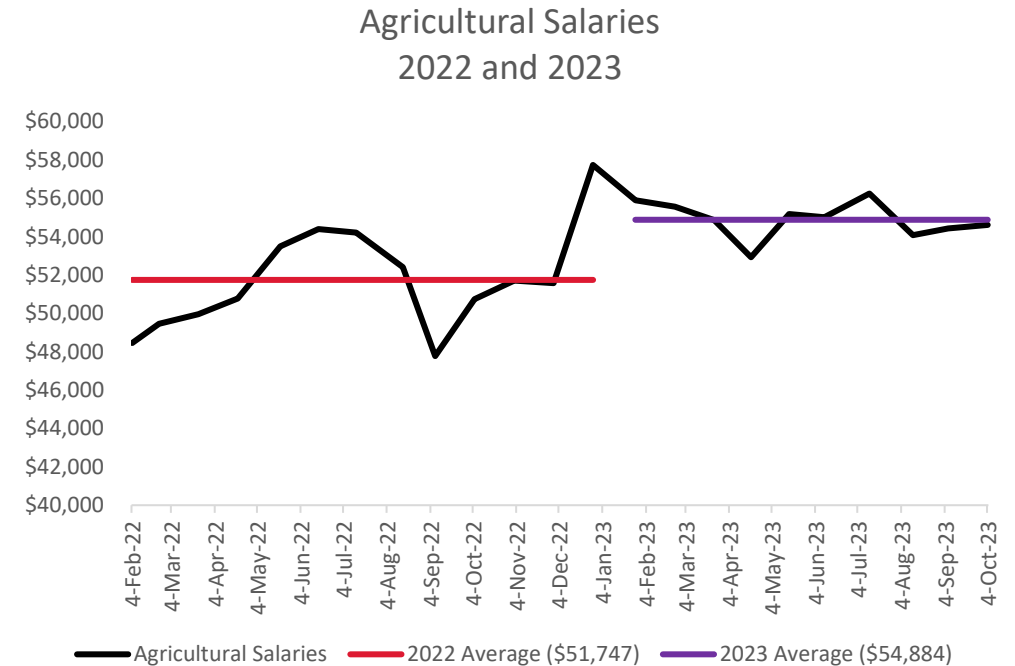
$$\frac{\text{Width (ft)} * \text{speed (mph)} * \text{field efficiency (\%)}}{8.25} = \text{Acres per Hour}$$

- Example: 24 foot implement, 6 mph, 80% efficiency

$$\frac{24 \text{ ft} * 6 \text{ mph} * 80\%}{8.25} = 14 \text{ acres per hour}$$

How does labor impact equipment purchasing?

- Availability of labor in area
- Skills needed to operate equipment
- Seasonality of labor that is needed and how this impacts demand
- Cost of labor compared to other inputs



Salaries
2022 Average: **\$51,747**
2023 Average: **\$54,884**
6% increase from 2022 to 2023

Timing

- Planting windows
- Diversification of operation
- Labor availability
- Complementary equipment size
 - Need to know what your limiting factor is. What is the “choke” point in the operation.
- Size of fields

Precision means more efficiency and decision making

- More efficient with other costs
 - Fuel
 - Fertilizer
 - Crop Protection
 - Time and labor
- Increase in plant health and yield
- Data for better decision making

What farmers benefit most from technology?

(PRELIMINARY RESEARCH): Fiechter, Brewer, Ifft

- Minimal returns to single technology implementation
- Higher returns to bundles of technology
- Impact of technology different based on the efficiency of the farm
 - Already efficient farms did not benefit from further technology adoption
 - Inefficient farms benefited the most from technology adoption



Economics of Equipment Purchasing: What You Should Consider Before Buying New Equipment

Brady Brewer

Department of Agricultural Economics

Kansas State University