



## 2024 Ethanol Production Profits: Regression to the Mean?

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The U.S. ethanol industry entered 2024 coming off one of its best three-year periods of profitability since 2007. However, the price of ethanol plunged late in 2023, leading to questions about the outlook for profits in the coming year. The purpose of this article is to estimate the profitability of U.S. ethanol production for the 2024 calendar year and assess whether the industry returned to the lofty profits of 2021 – 2023 or regressed towards the long-run mean level of profits.

### Ethanol Plant Model

A model of a representative Iowa ethanol plant is used to track the profitability of ethanol production. It is the same basic model of a representative ethanol plant that has been used in previous *farmdoc daily* articles on the subject (e.g., [February 10, 2022](#); [March 22, 2023](#); [February 12, 2024](#)). The [original version of the model](#) was developed by Don Hofstrand of Iowa State University and was meant to be representative of a typical ethanol plant constructed in the mid-2000s. There is certainly substantial variation in capacity and production efficiency across the industry and this should be kept in mind when viewing profit estimates based on the model.

Some of the original assumptions of the model have been changed based on additional analysis or changing data availability. Current model assumptions include:

- Dry mill plant constructed in 2007
- 100 million gallon annual ethanol production capacity
- Plant construction costs of \$2.11 per gallon of ethanol production capacity
- 40% debt and 60% equity financing
- 8.25% interest on 10-year loan for debt financing, with the loan fully repaid in 2017
- A total of \$0.21 fixed costs per gallon of ethanol produced through 2017 and \$0.15 per gallon in 2018-2024 (the decline is due to the loan payoff)

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- Non-corn, non-natural gas variable costs (including denaturant) of \$0.21-\$0.26 per gallon in 2007-2011
- Non-corn, non-natural gas variable costs (excluding denaturant) of \$0.17 - \$0.22 per gallon after 2011
- Variable denaturant costs after 2011 computed as 2 percent of the wholesale CBOB price
- 82.5 cubic feet of natural gas per bushel of corn processed
- Netback (marketing) costs of \$0.05 - \$0.08 per gallon of ethanol and \$4-\$6 per ton of DDGS
- Extraction and marketing costs of \$0.05 - \$0.07 per pound of corn oil

Operating efficiency assumptions represent a key component of the model. These have been revised substantially over time as new data has become available. The latest assumptions are based on analysis of the operating efficiency of the U.S. ethanol industry in a recent *farmdoc daily* article ([February 26, 2025](#)). Specifically, the assumptions for physical conversion rates are as follows:

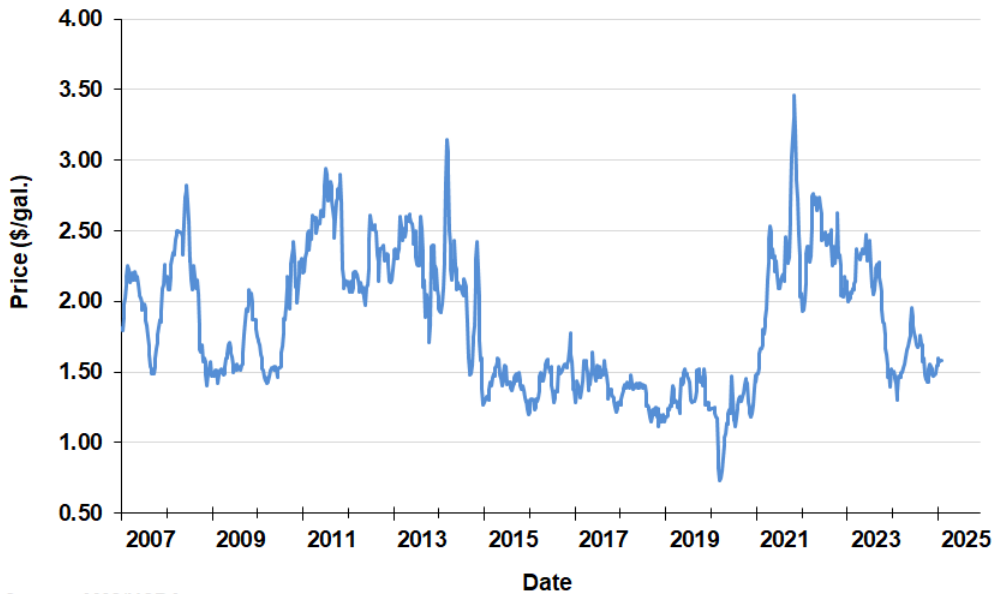
- 2.75 gallons of ethanol (including denaturant) produced per bushel of corn processed over 2007-2011; 2.80 gallons of ethanol per bushel of corn over 2012-2014; 2.85 gallons of ethanol per bushel of corn over 2015-2018; 2.90 gallons of ethanol per bushel of corn over 2019-2022; and 2.95 of ethanol per bushel of corn in 2023-2024
- 17.75 pounds of DDGS produced per bushel of corn processed over 2007-2011; 17.00 pounds of DDGS per bushel of corn for 2012-2016; 16.50 pounds of DDGS per bushel of corn over 2017-2018; 16.00 pounds of DDGS per bushel of corn in 2019; 15.75 pounds of DDGS per bushel in 2020-2021; 16.00 pounds of DDGS per bushel in 2022; 15.50 pounds per bushel in 2023; and 15.25 pounds per bushel in 2024.
- 0.55 pounds of corn oil per bushel of corn processed over 2012-2014 (start extracting January 2012); 0.60 pounds of corn oil per bushel of corn processed in 2015; 0.70 pounds of corn oil per bushel of corn processed in 2016; 0.75 pounds of corn oil per bushel of corn processed in 2017-2019; 0.80 pounds of corn oil per bushel of corn processed in 2020; 0.85 pounds of corn oil per bushel of corn processed in 2021; and 0.90 pounds of corn oil per bushel of corn processed in 2022-2024.

To track plant profitability over time, weekly [corn](#), [ethanol](#), and [DDGS](#) prices at Iowa ethanol plants are collected from the USDA Agricultural Marketing Service starting in late January 2007. Crude corn oil prices for the Midwest are available from OPIS. Natural gas costs over 2007 through March 2014 are based on monthly industrial prices for Iowa available from the EIA. Due to a change in the behavior of the industrial price series, starting in April 2014 natural gas costs are based on monthly electric power consumer prices for Iowa, also from the EIA.

## Analysis

Figures 1, 2, and 3 present the three components of ethanol production revenue on a weekly basis from January 26, 2007 through February 21, 2025. Figure 1 shows the weekly price of ethanol at Iowa plants. The figure reveals that prices began 2024 below \$1.50 per gallon but recovered during the first half of the year to a peak near \$2.00 at the end of June. The second half of the year saw ethanol prices sink back to the \$1.50 level. In comparison, Figure 2 shows that weekly DDGS prices started the year above \$200 per ton, a relatively high level historically, and then declined for most of the year, reaching a low of around \$125 in August. Prices recovered back to the \$150 per ton level towards the end of the year. Figure 3 shows that that weekly corn oil prices during 2024 generally fell, starting around \$0.60 per pound and then falling to less than \$0.45. Overall, the pattern of output prices for ethanol producers in 2024 was decidedly mixed. Ethanol prices had a significant upward price spike, while DDGS and corn oil prices generally trended downward.

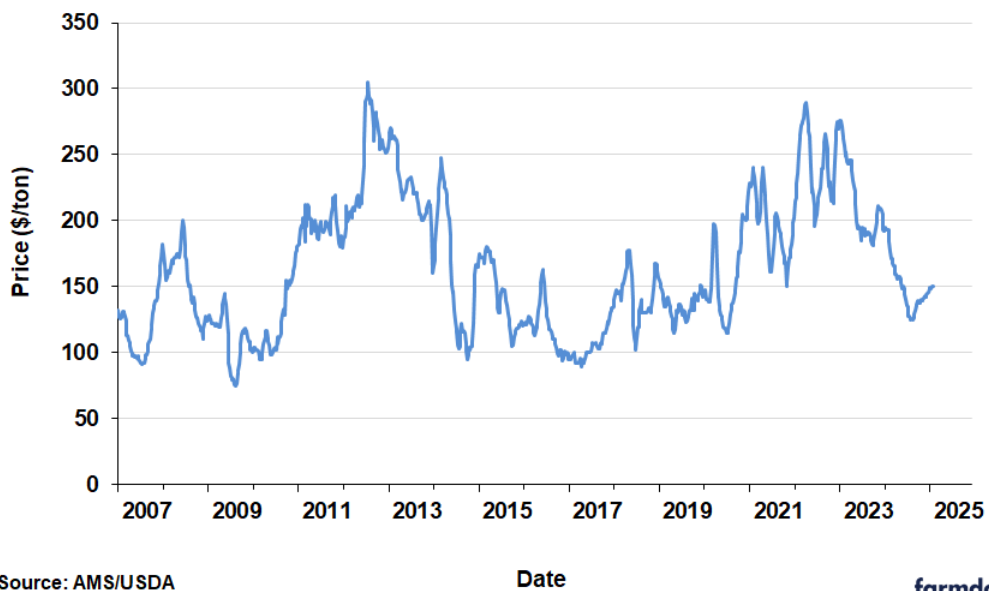
**Figure 1. Weekly (Friday) Ethanol Price at Iowa Plants, 01/26/2007 - 02/21/2025**



Source: AMS/USDA

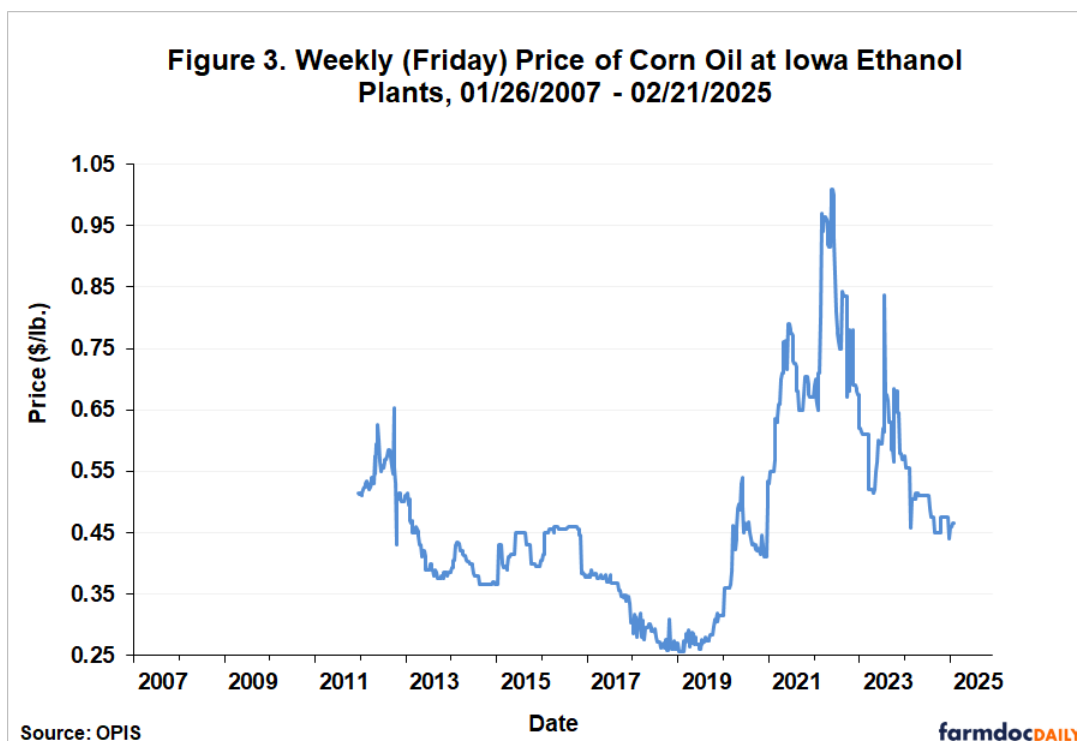
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**Figure 2. Weekly (Friday) Price of DDGS at Iowa Ethanol Plants, 01/26/2007 - 02/21/2025**



Source: AMS/USDA

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The main input cost of producing ethanol is corn (about 80 percent). Figure 4 shows that the price of corn mainly fell throughout 2024, reaching a low of \$3.86 in October. Since then, prices have rallied over a dollar a bushel.

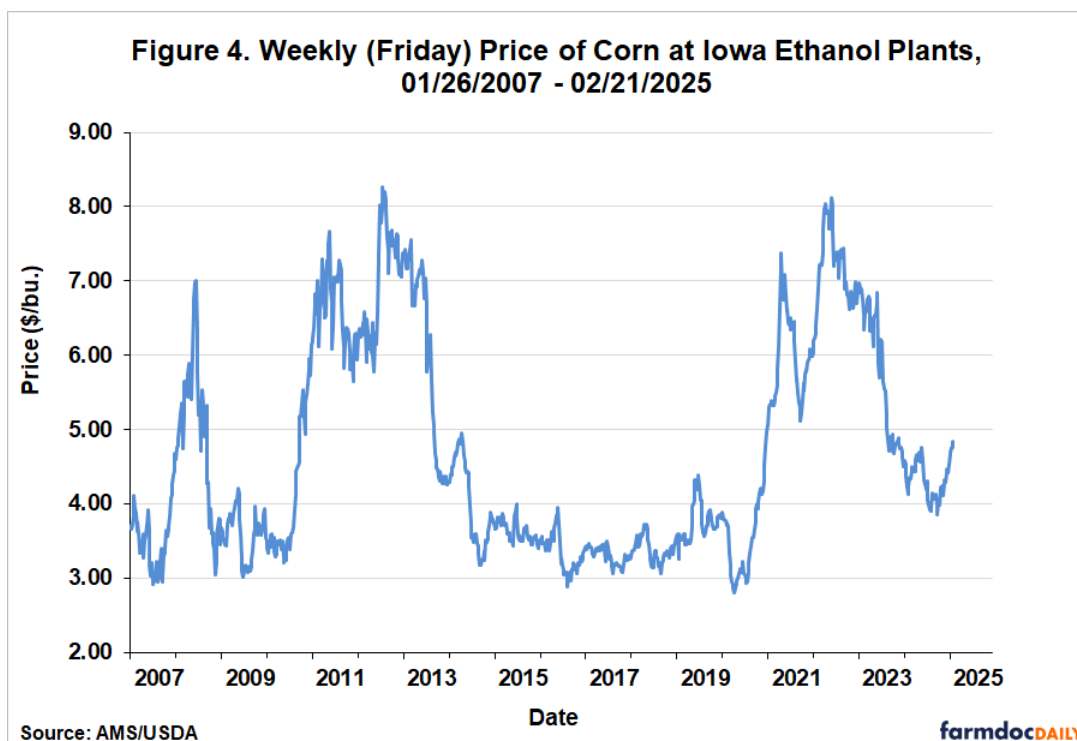
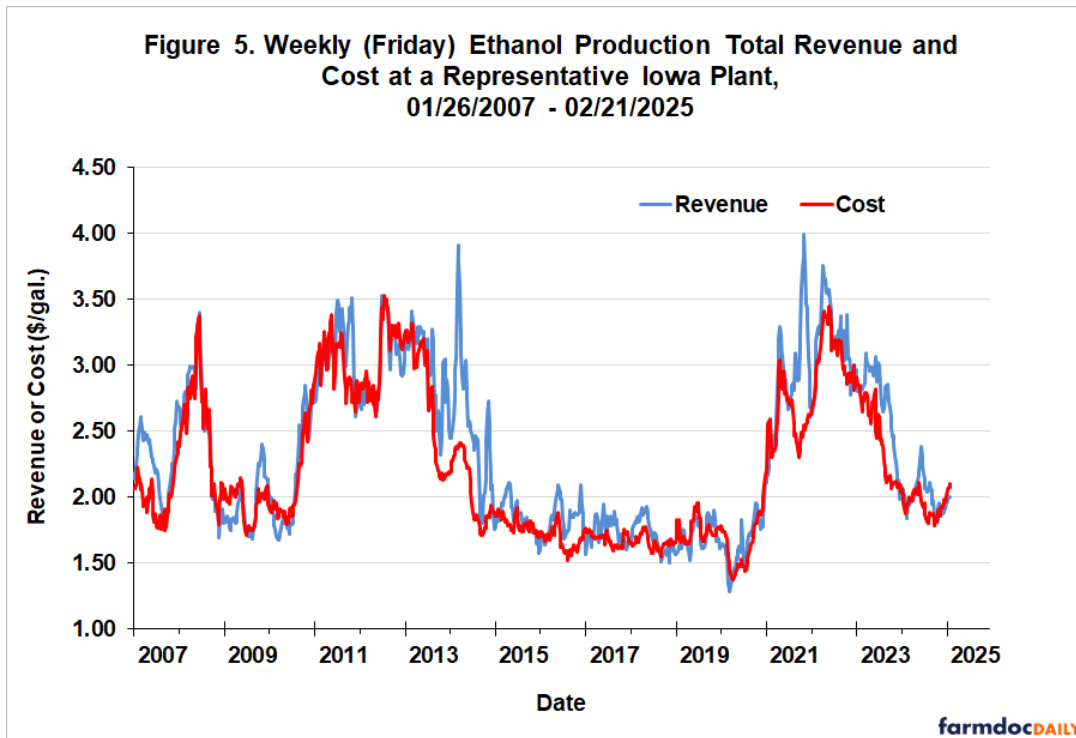
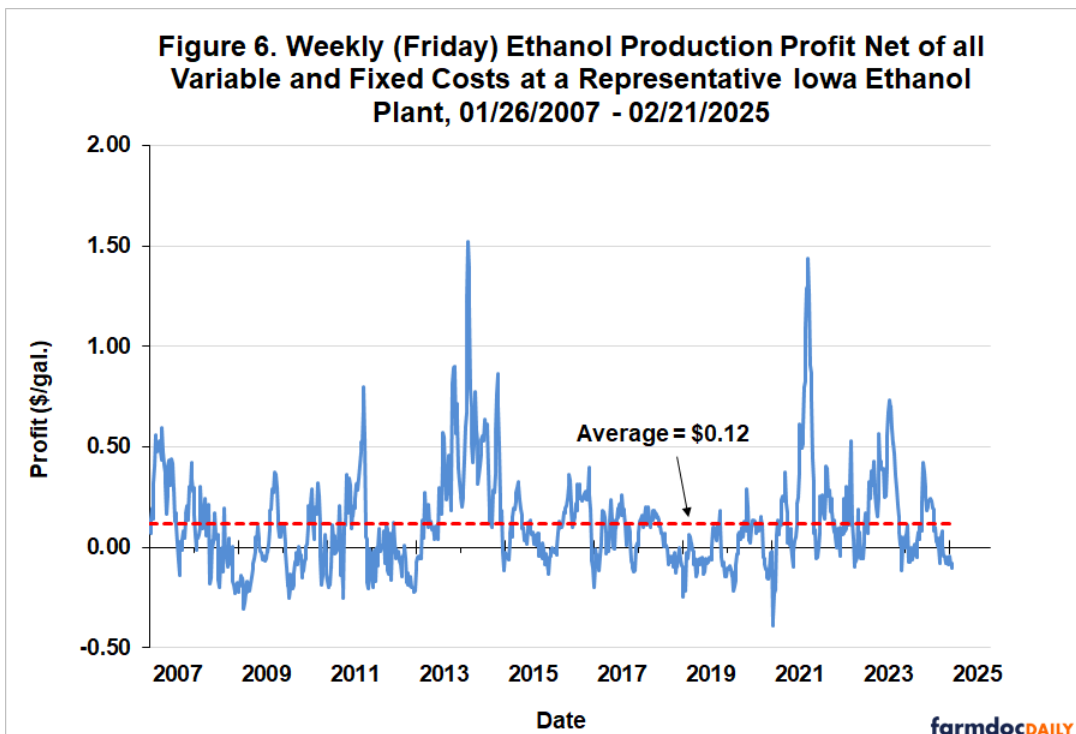


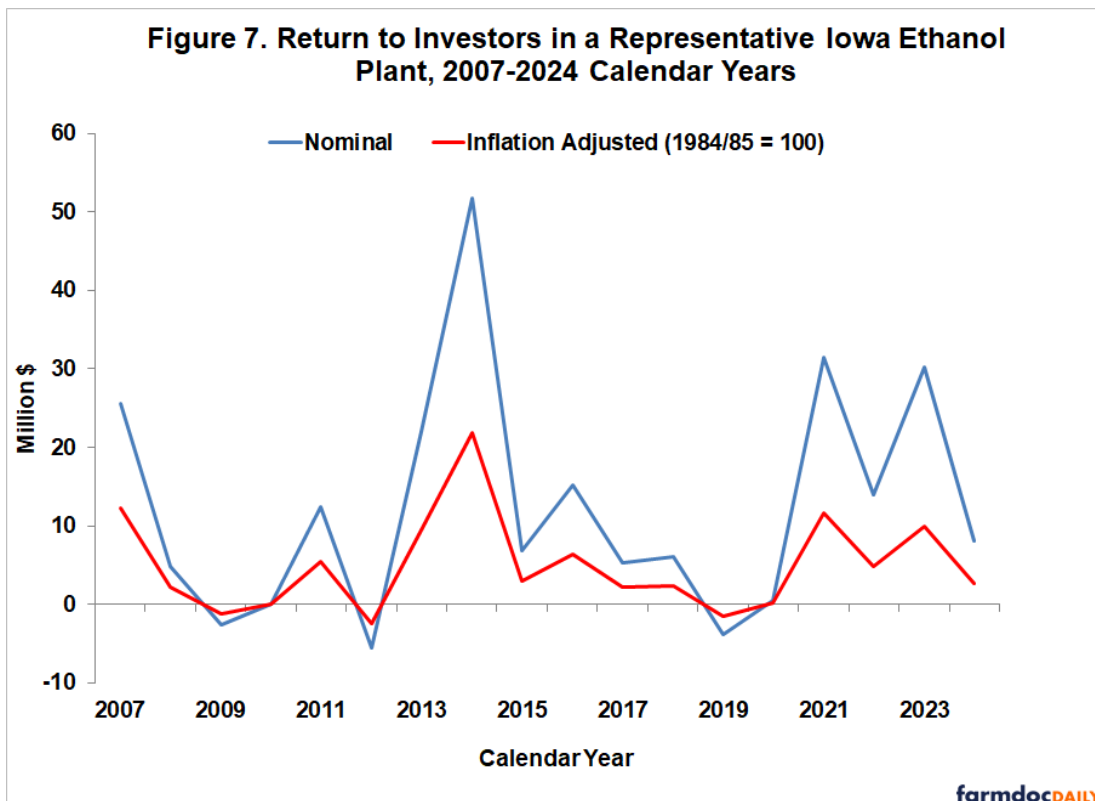
Figure 5 presents combined weekly total revenue for ethanol, DDGS, and corn oil and weekly total variable and fixed costs for the representative Iowa plant. Revenue and costs both began 2024 near \$2.00 per gallon, but led by increasing ethanol prices, revenue into the summer outstripped costs by almost \$0.50 per gallon. By the end of 2024, revenue and costs both declined back to about the same level as at the beginning of the year, \$2.00 per gallon.



Weekly ethanol production profit net of all variable and fixed costs is shown in Figure 6. This is simply the difference between revenue and cost presented in Figure 5. Net profits ranged widely in 2024, from a low of  $-\$0.11$  to a high of  $\$0.42$  per gallon, which is not surprising given the volatility of both output (ethanol, DDGs, corn oil) and input (corn) prices. After reaching the high for the year in late June, net profits declined rapidly and ended up the year with a small loss. Despite the swoon in the second half of the year, net profits for 2024 averaged  $\$0.08$  per gallon, slightly below the historical average of  $\$0.12$  since 2007. In sum, ethanol profits in 2024 regressed towards the mean compared to the historically very high profits over 2021 through 2023.



It is also useful to consider ethanol production profitability aggregated over an annual horizon for 2007 through 2024, as shown in Figure 7. Annual profits are presented in both nominal and inflation adjusted (real) terms. The nominal net profit of \$8.1 million in 2024 was the fifth straight year of positive profits. There has only been one year with negative returns since 2013, which was 2019. However, the 2024 profit of \$8.1 million is well-below the \$25.2 million average profit over the most recent three-year period, 2021-2023. The burst of inflation the last several years pushed the real level of profits in 2024 into the bottom-half of years since 2007.



Finally, we can use the average net profit for the representative plant to make a rough estimate of profit for the entire U.S. ethanol industry in 2024. Assuming all operating plants in the industry earned the average net profit for the representative plant of \$0.08 per gallon and that total ethanol production for the U.S. was 16.2 billion gallons in 2024, total (pre-tax) profit for operating ethanol plants in aggregate can be estimated at \$1.3 billion.

### Implications

Net profits for a representative Iowa ethanol plant ranged widely in 2024, from a low of -\$0.11 to a high of \$0.42 per gallon, which is not surprising given the volatility of both output (ethanol, DDGs, corn oil) and input (corn) prices. After reaching a high for the year in late June, net profits declined rapidly and ended up the year with a small loss. Despite the swoon in the second half of the year, net profits for 2024 averaged \$0.08 per gallon, slightly below the historical average of \$0.12 since 2007. In sum, ethanol profits in 2024 regressed towards the mean compared to the historically very high profits over 2021 through 2023. The outlook for the ethanol industry in 2025 is very murky given potential trade and biofuels policy changes that may be in the offing under the new Trump Administration.

### References

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