



# Predicting Fertilizer Prices

Gregg Ibendahl

2019 Risk and Profit

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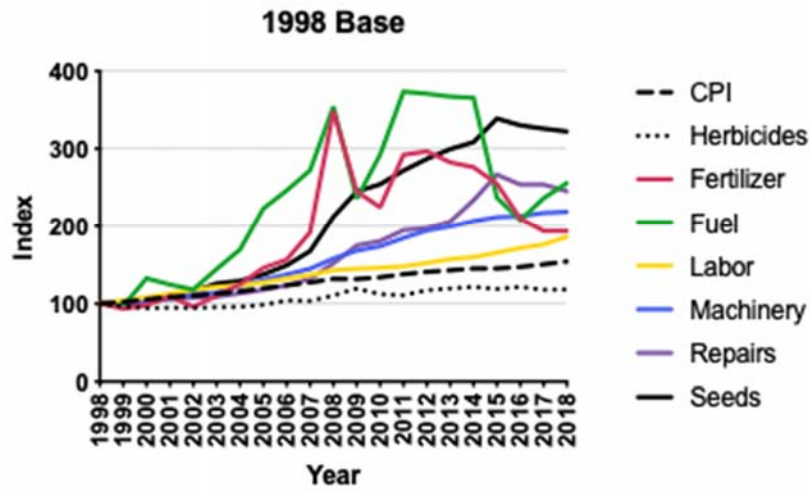
## Background

- Fertilizer is a major expense item for crop producers
- Prices can vary greatly throughout the year

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# USDA Price Indexes

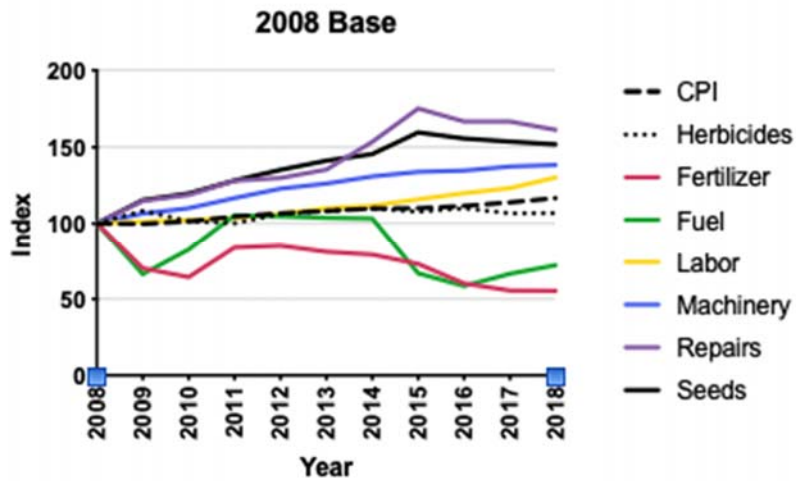


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# USDA Price Indexes



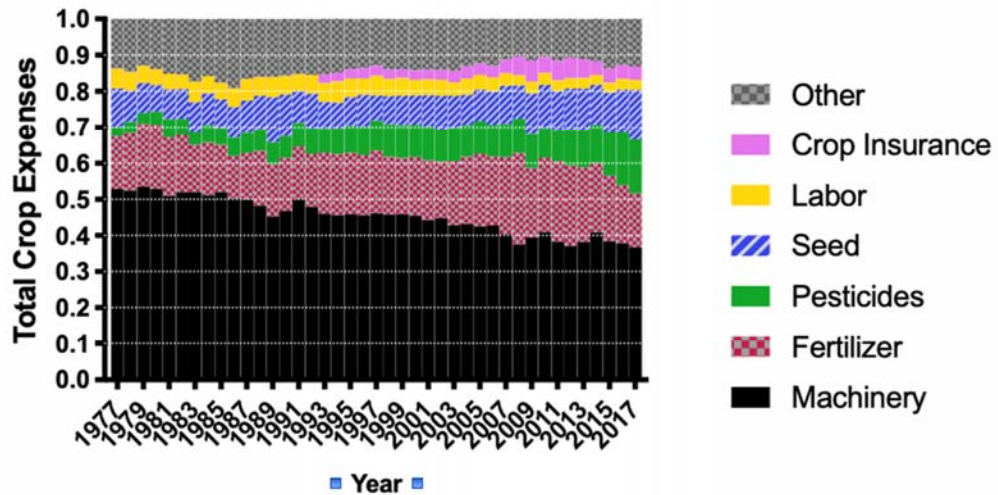
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# Fertilizer as a Percentage of All Costs

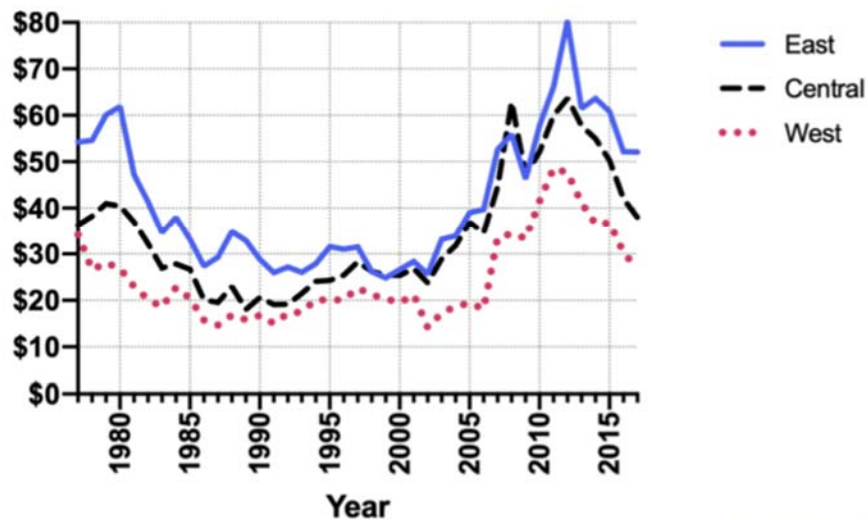
Central KS - % Crop Expenses



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# Fertilizer Cost per Acre by Region in Kansas (KFMA data)

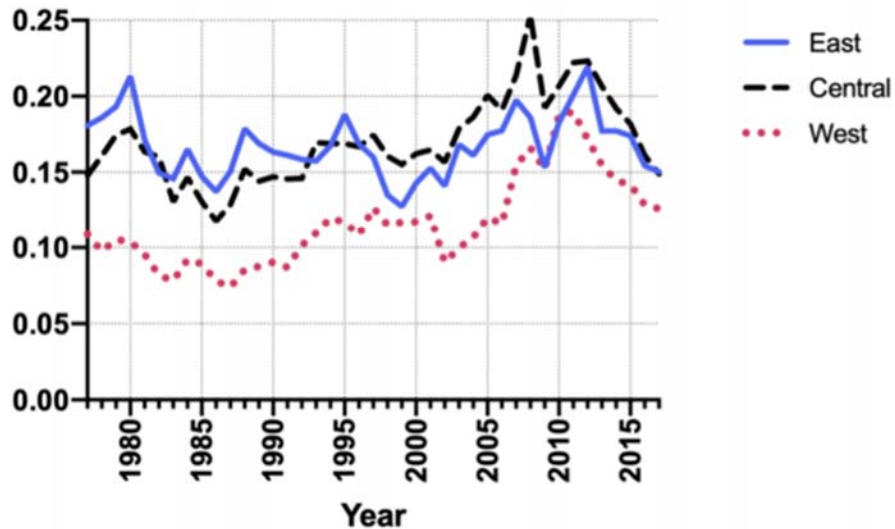
Fertilizer Cost per Acre (Real \$)



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# % of Costs by KFMA Region

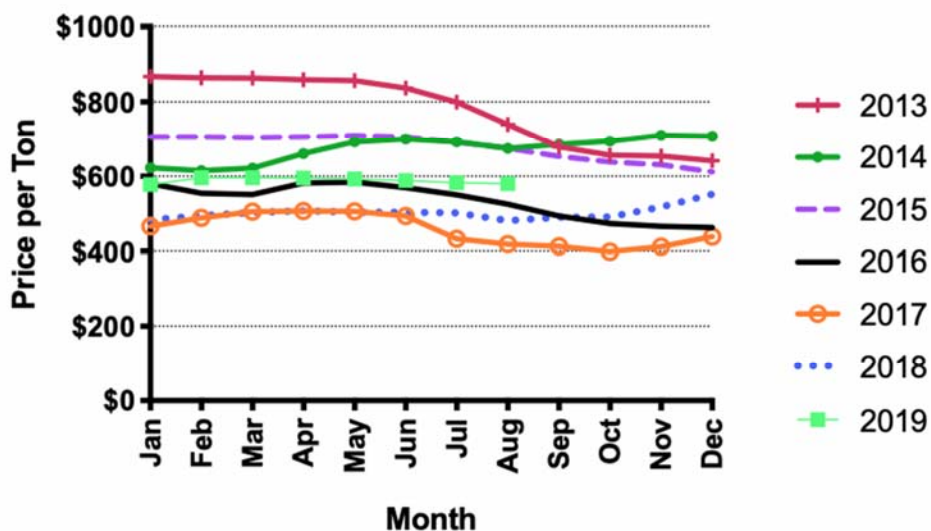
Fertilizer Cost as a Percent of Total Costs



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# Historical Anhydrous Ammonia Prices

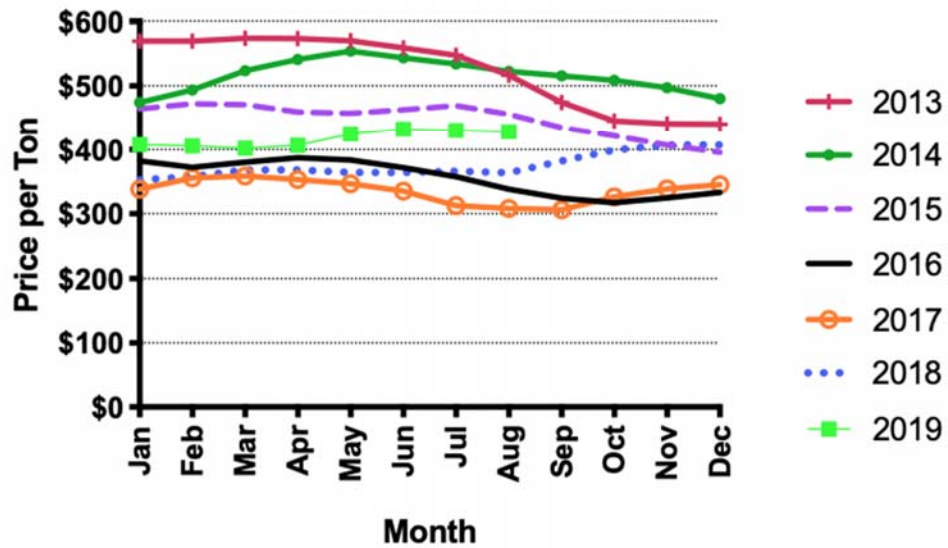
Fertilizer by year - AA



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# Historical Urea Prices

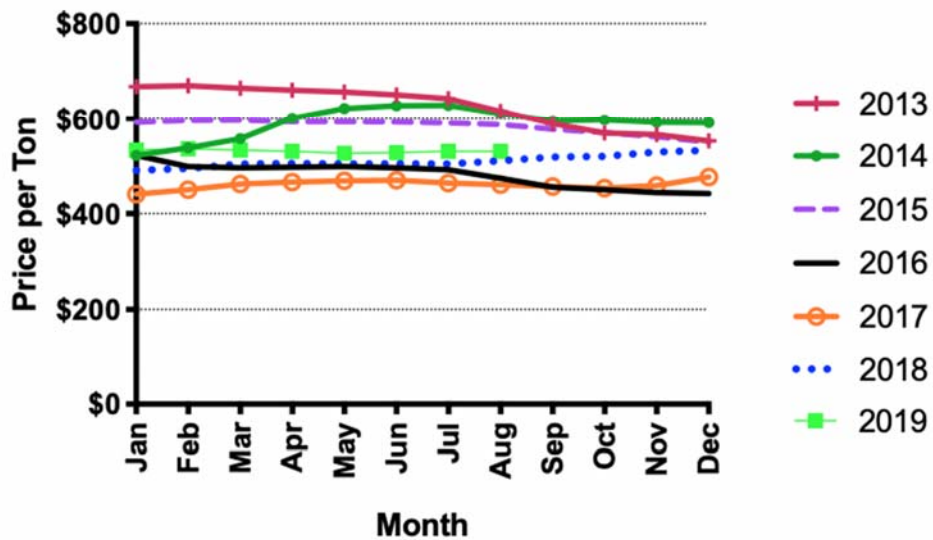
Fertilizer by year - Urea



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# Historical MAP Prices

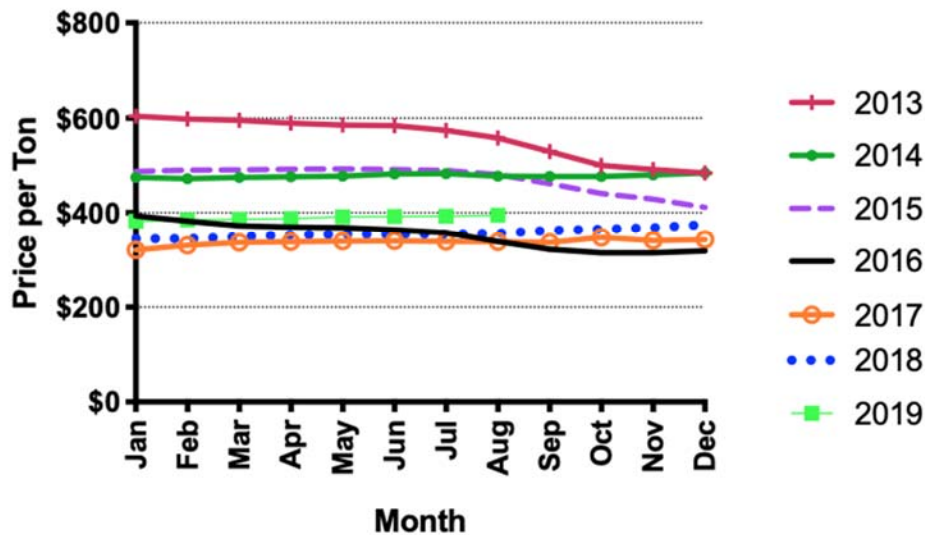
Fertilizer by year - MAP



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# Historical Potash Prices

Fertilizer by year - Potash



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## Problem

- Lower profitability from grain farming means farmers need to watch expenses closely in order to remain profitable
  - The ability to predict fertilizer costs in advance would help farmers time purchases
  - Also, could help with the crop mix allocation
- Many fertilizer models are based on natural gas and which does not do a good job of predicting fertilizer prices

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# Objective

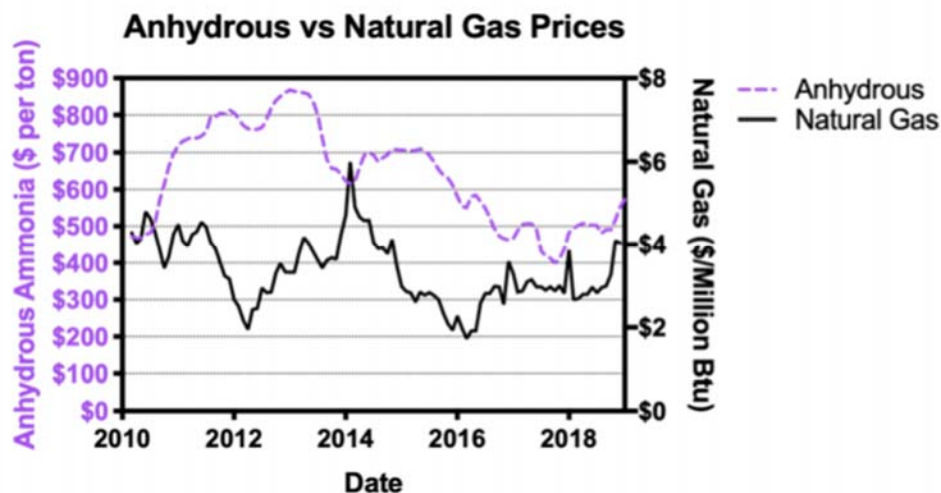
- This paper builds a fertilizer price prediction model that is based on both the corn future prices and the price of oil in order to come up with a more accurate prediction model that can help farmers lower their fertilizer cost.
  - A model with both corn and oil price helps to represent both the supply and demand for fertilizer.

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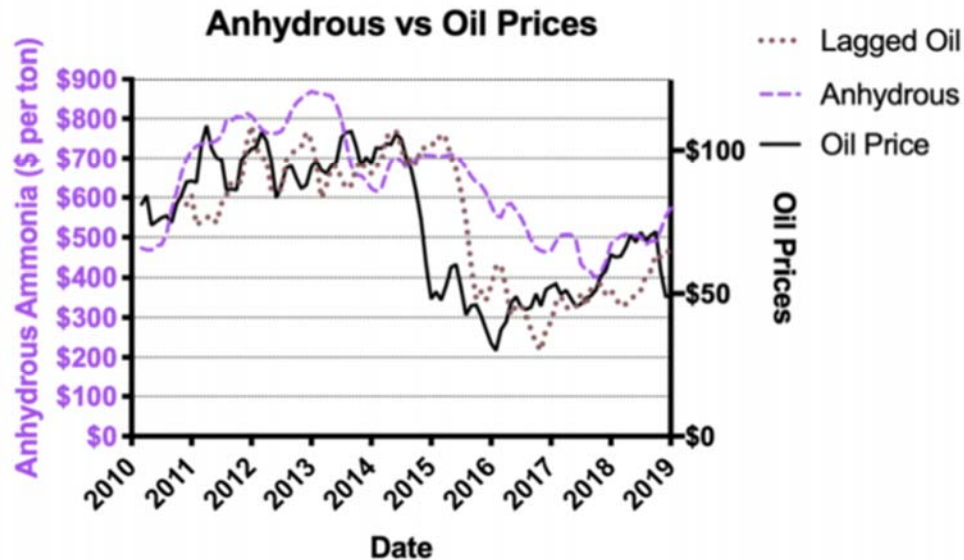
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# Why Isn't Natural Gas a Good Predictor



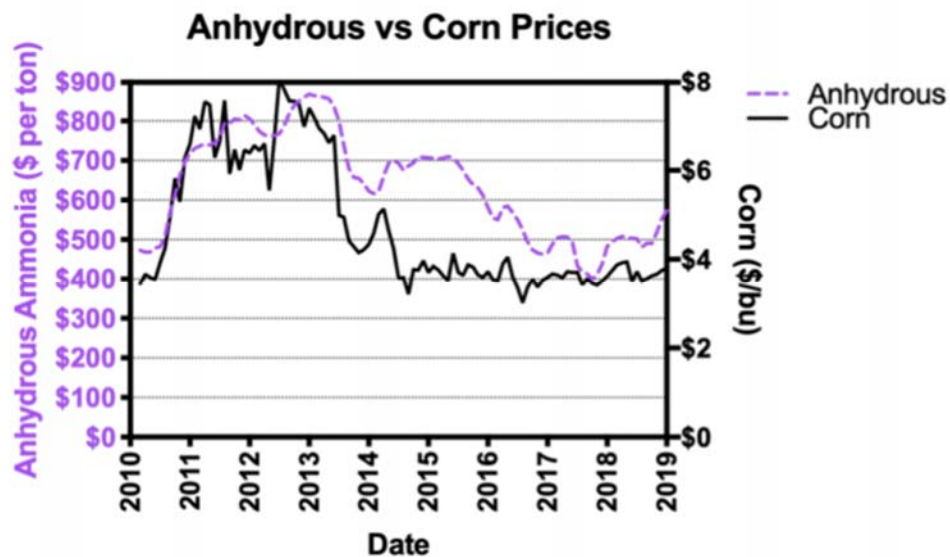
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# Oil Price works much better



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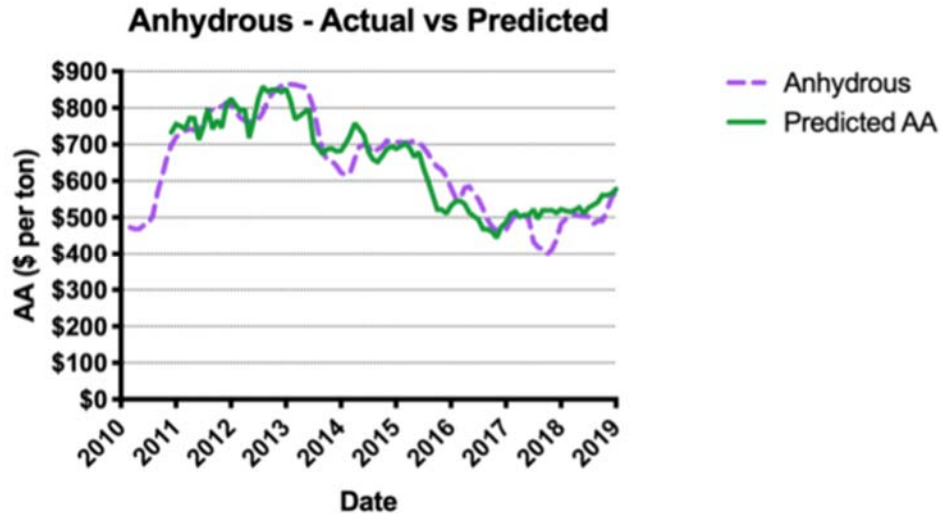
# Corn price is also a good predictor



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$$\text{Anhydrous ammonia (\$/ton)} = 202 + 43.4 * \text{corn (\$/bu)} + 3.18 * \text{oil\_9 mo lag (\$/ barrel)}$$



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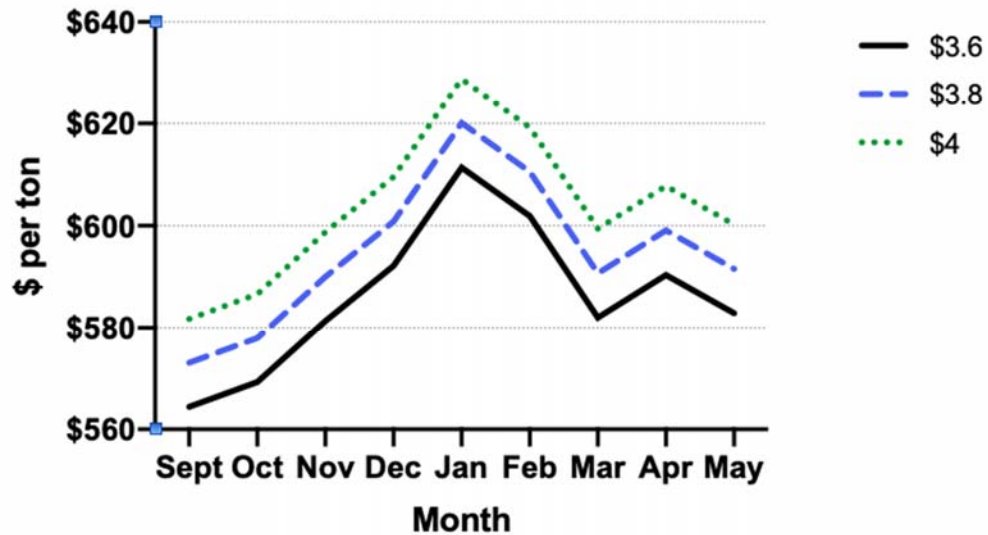
## Correlation with other fertilizers

|           | Anhydrous | MAP  | Urea | DAP  | Potash | UAN28 | UAN32 | 10-34-0 |
|-----------|-----------|------|------|------|--------|-------|-------|---------|
| Anhydrous | 1         |      |      |      |        |       |       |         |
| MAP       | 0.92      | 1    |      |      |        |       |       |         |
| Urea      | 0.89      | 0.88 | 1    |      |        |       |       |         |
| DAP       | 0.89      | 0.99 | 0.85 | 1    |        |       |       |         |
| Potash    | 0.89      | 0.94 | 0.91 | 0.92 | 1      |       |       |         |
| UAN28     | 0.96      | 0.95 | 0.95 | 0.92 | 0.95   | 1     |       |         |
| UAN32     | 0.95      | 0.94 | 0.95 | 0.90 | 0.93   | 0.99  | 1     |         |
| 10-34-0   | 0.82      | 0.86 | 0.79 | 0.82 | 0.81   | 0.85  | 0.87  | 1       |

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# Predictions

## Predicted AA Price



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# Thank you!

- Gregg Ibendahl
  - email: [ibendahl@ksu.edu](mailto:ibendahl@ksu.edu)
  - twitter: @Ibendahl

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