Photo from Wikimedia Commons

Change in Cost of Eggs Analysis and Correlation to Bird Flu

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Scope

Overview

The cost of eggs has been a frequent news headline in the last six years. This analysis seeks to identify repeated trends as outlined below:

Key Questions

- How has the cost of eggs fluctuated in the last six years?
- Are spikes in the cost of eggs localized to a specific region?
- How does the cost of organic eggs compare to conventionally raised eggs?
- Does the cost change seasonally?
- Have there been spikes in Bird Flu that correspond with the spikes in the cost of eggs?

Exclusions

This analysis does not explore the impact of global supply chain disruptions, labor shortages, or other external factors.

Question 1: How has the cost of eggs changed over a six year period?

Photo by Oakdell Egg Farm

6 Year Cost of Eggs Analysis

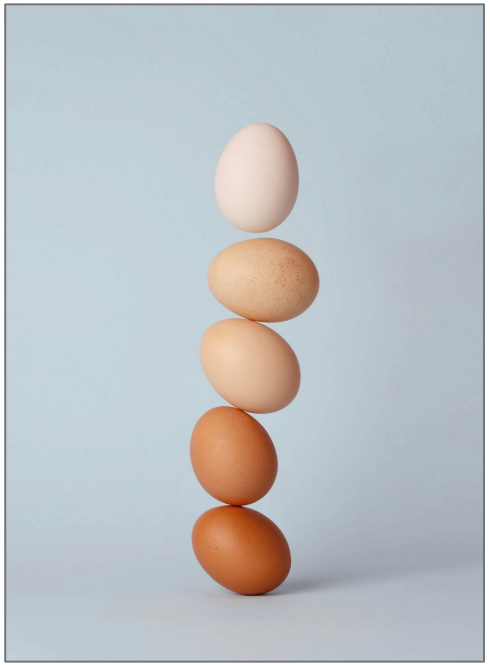


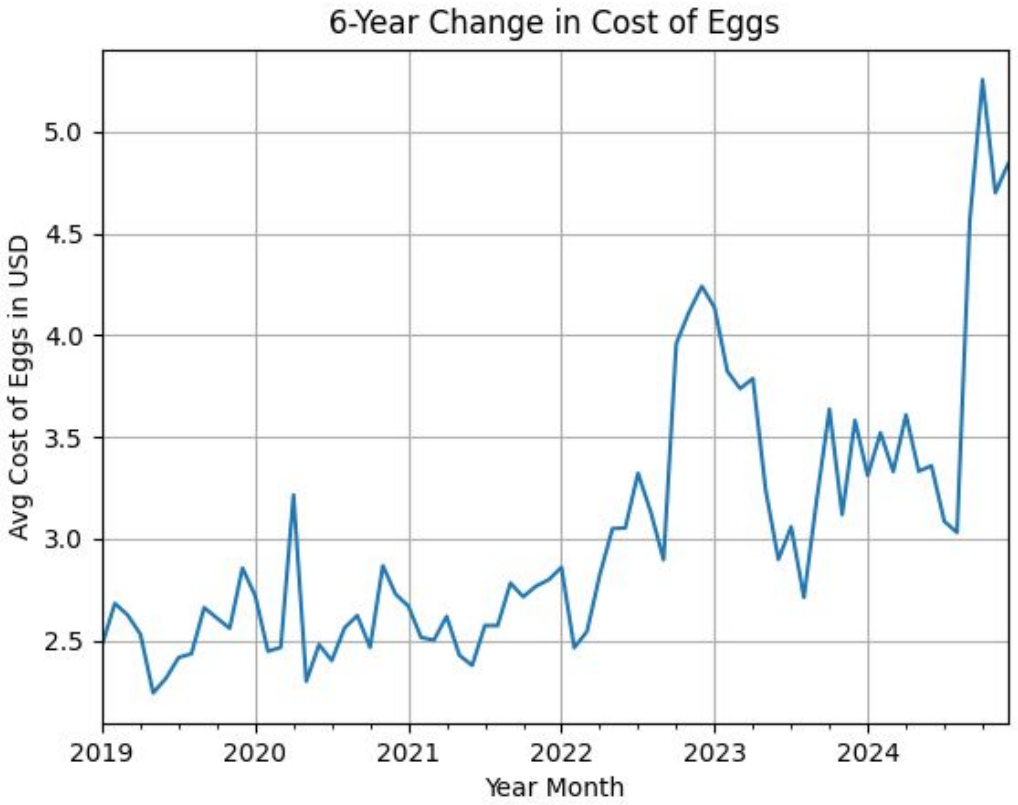
Photo by 青 晨 on Unsplash

Overview

- Filtered out lines where zero stores reported prices
- Limited to eggs in shell, not egg products such as egg nog
- The 6-year analysis includes organic and conventionally raised flocks, white and brown eggs
- Calculated based on the data collected in the United States from January 1st 2019 to December 31st 2024
- Calculated the weighted averages of eggs sold per year and month according to USDA reporting

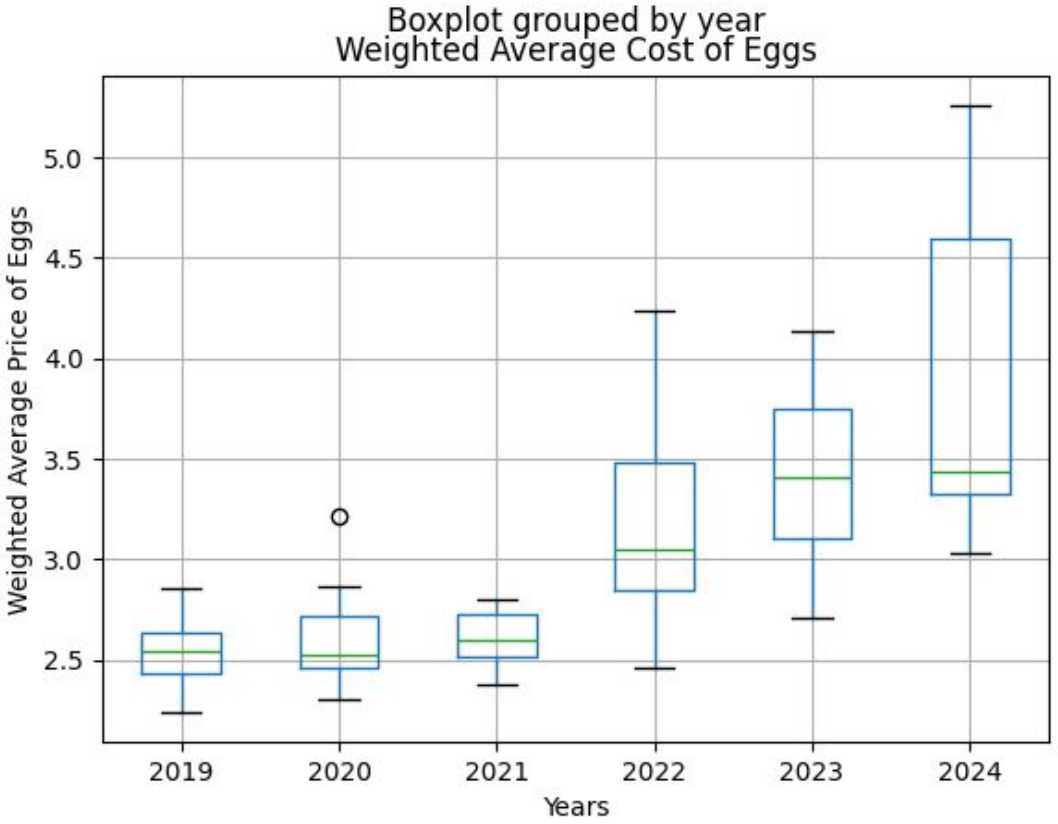
Observations

- Costs remained fairly stable from 2019 to mid-2022
- A sharp increase is present starting Q3 of 2022 and again in Q4 of 2024
- Not consistent with inflation



Observations

- Outlier in 2020 likely due to disruptions caused by COVID
- Prices returned to normal in 2021
- The sharp increase in 2023 & 2024 likely caused by another pressure.



6-Year Analysis Conclusions

Photo by Kate Remmer on Unsplash

- The average cost of eggs has increased 52% between 2019 and 2024
- This cost outpaces inflation which peaked at 7% in 2023
- The cost increase happened after prices returned to normal after the disruptions to the market due to COVID
- Another factor must be causing the continued upward trend in the cost of eggs

Question 2: Are spikes in the cost of eggs localized to a specific region?

Photo by Oakdell Egg Farm

Regional Analysis

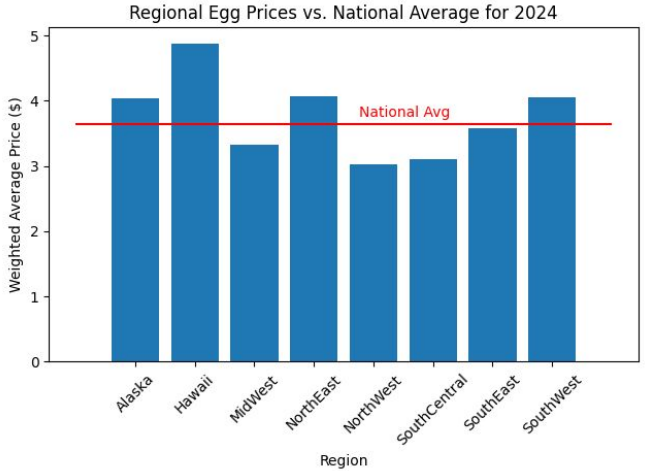
Photo by Janine Whiteson

Overview

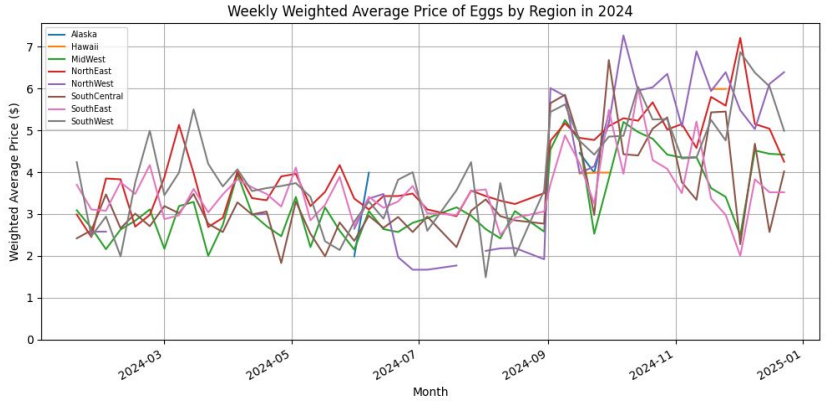
- Leveraged data collected weekly by the USDA from stores across the country
- Analysis limited to eggs in shell, not egg products such as egg nog
- The 2024 regional analysis includes organic and conventionally raised flocks, white and brown eggs
- Weighted average prices were calculated and grouped by Region and time period (Year, Week and Month) and were then compared to national averages

Observations

- Annual average prices show how costs generally compare across regions, but provide no insight into spikes.

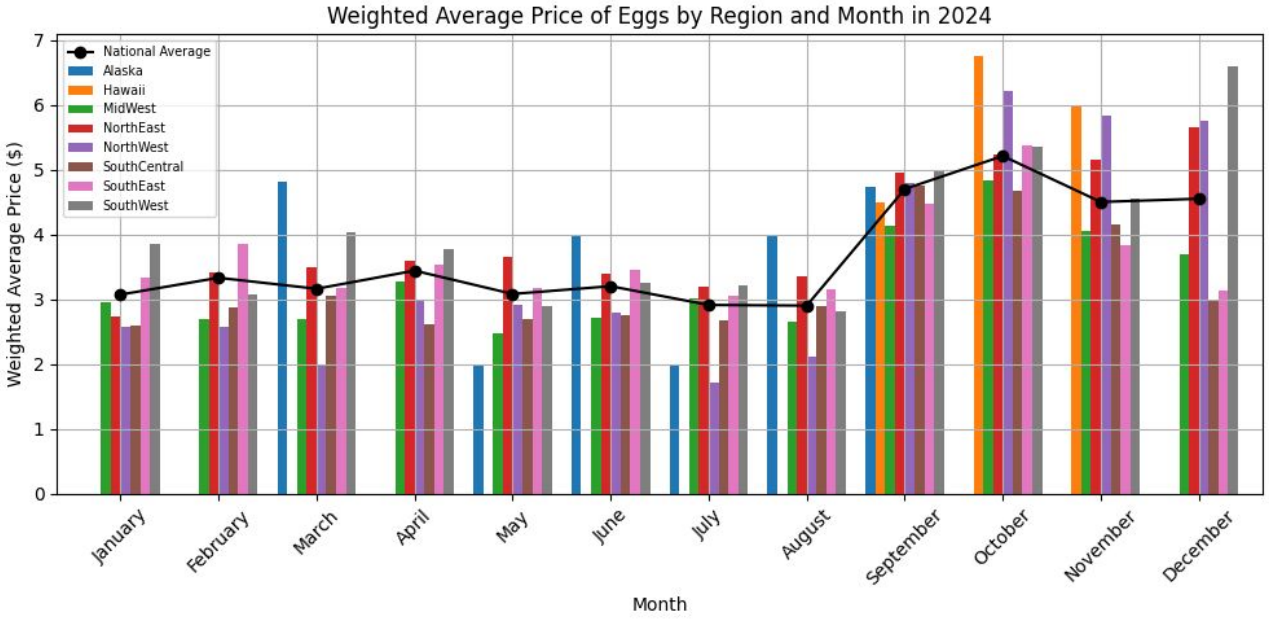


- Weekly data shows too many spikes (both up and down), many of which are due to inconsistent reporting.
- Hawaii, Alaska and NorthWest regions did not report prices regularly and experienced significant variability in what was reported.



Observations

- Omitted prices are easier to see on this graph because columns are missing (Alaska, Hawaii). NorthWest is now represented across all time points.
- A surge in prices during August-October was felt by the entire country.
- Impacts from that spike were greatest in Hawaii, NorthWest, NorthEast and SouthWest regions.
- SouthEast, SouthCentral and MidWest recovered, however NorthEast and SouthWest prices continue to trend upward. Perhaps this is due to a new spike?



Regional Analysis Conclusions

- Due to a variability in the frequency of reporting across regions, analyzing data at the weekly level is not very useful.
- Inconsistent/missing submissions from stores in the NorthWest during the first half of the year caused their annual average price to appear lower than the National average.
- MidWest, SouthEast and SouthCentral regions consistently experienced the lowest prices, most likely due to proximity to egg sources.
- Due to distance from egg sources, it makes sense that prices in Alaska and Hawaii would be higher than average, but missing data makes analysis of this information less reliable.
- It appears that the NorthEast, NorthWest and SouthWest regions have more difficulty recovering from price spikes.
- The upward trend in some regions in December could indicate a new spike.

Question 3: How does the cost of organic eggs compare to conventionally raised eggs?

Photo by Oakdell Egg Farm

Conventional vs. Organic Analysis

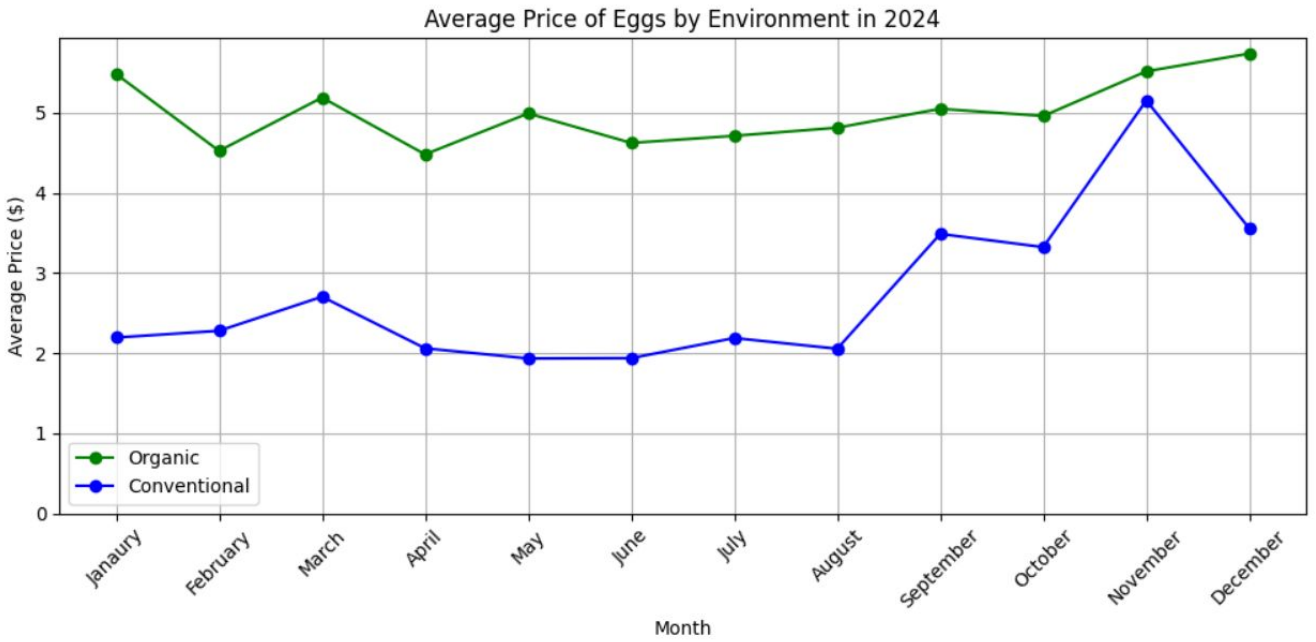
Overview

- Organic eggs traditionally more expensive
- Leveraged sample data collected by the USDA from stores across the USA
- Comparing specifically “Conventional” and “USDA Organic” eggs
    - Does not include “Cage-Free” or “Nutritionally Enhanced (Omega-3)”

Photo by iStockPhoto

Observations

- Large spike in conventional egg price in November
  - Immediate drop in December
- Highest organic price in December
- Lowest organic price in April
- Highest conventional price in November
- Lowest conventional price in June



Organic vs. Conventional Conclusions

Photo by Getty Images; Jenny Chang-Rodriguez

- Organic typically 2x as expensive
- Organic egg prices stayed relatively consistent
- Conventional egg prices climbed starting September and spiked in November
    - Likely due to introduction of new factor in conventional eggs
- New question: What happened in November 2024?

Question 4: Does the cost change seasonally?

Photo by Oakdell Egg Farm

Seasonal Change Analysis

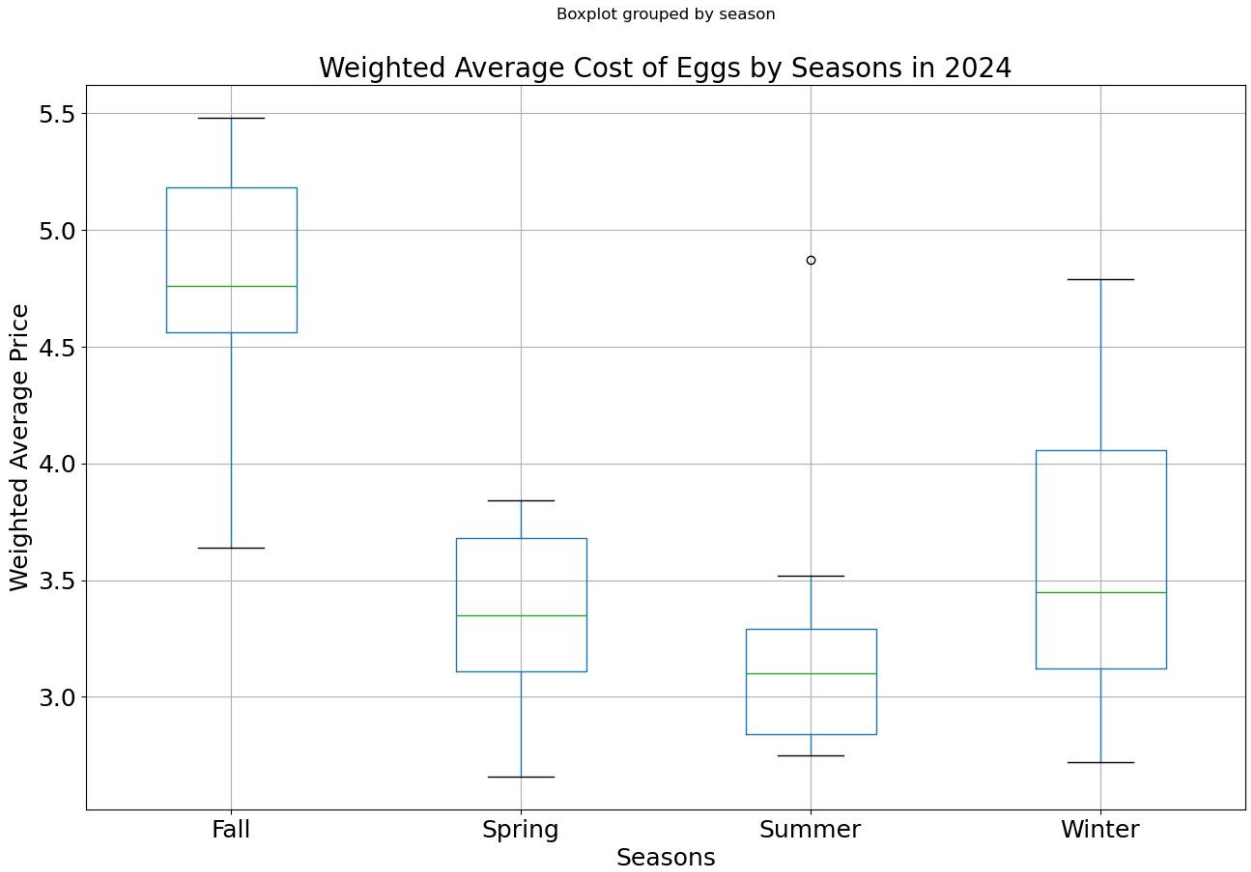
Photo by Backyard Chicken Coop

Overview

- Used USDA National Weekly Sell Egg Inventory data for 2024
- Analysis limited to eggs in shell, not egg products such as liquid egg white
- Weighted average price were calculated and grouped by season and report_begin_date

Observations

- Outlier is last week in summer
- In 2024, Fall had the highest average weighted price of eggs
- The variation in winter could be correlated to Holiday's



Seasonal Analysis Conclusions

- ANOVA Analysis:
  - Alternative Hypothesis - Is there a significant difference in weighted price between seasons?
  - Null Hypothesis- Is the difference we observe just due to chance?
- ANOVA Results:
  - Data is not normally distributed (p=3.24e-09)
  - Reject the null hypothesis

- Fall mean average weighted price is 1.23 above winter
- Factors influencing Fall and Winter:
  - Uptick in baking
  - Holidays
  - Cost of raising chicken

Question 5: Have there been spikes in Bird Flu that correspond with the spikes in the cost of eggs?

Bird Flu Analysis

Overview

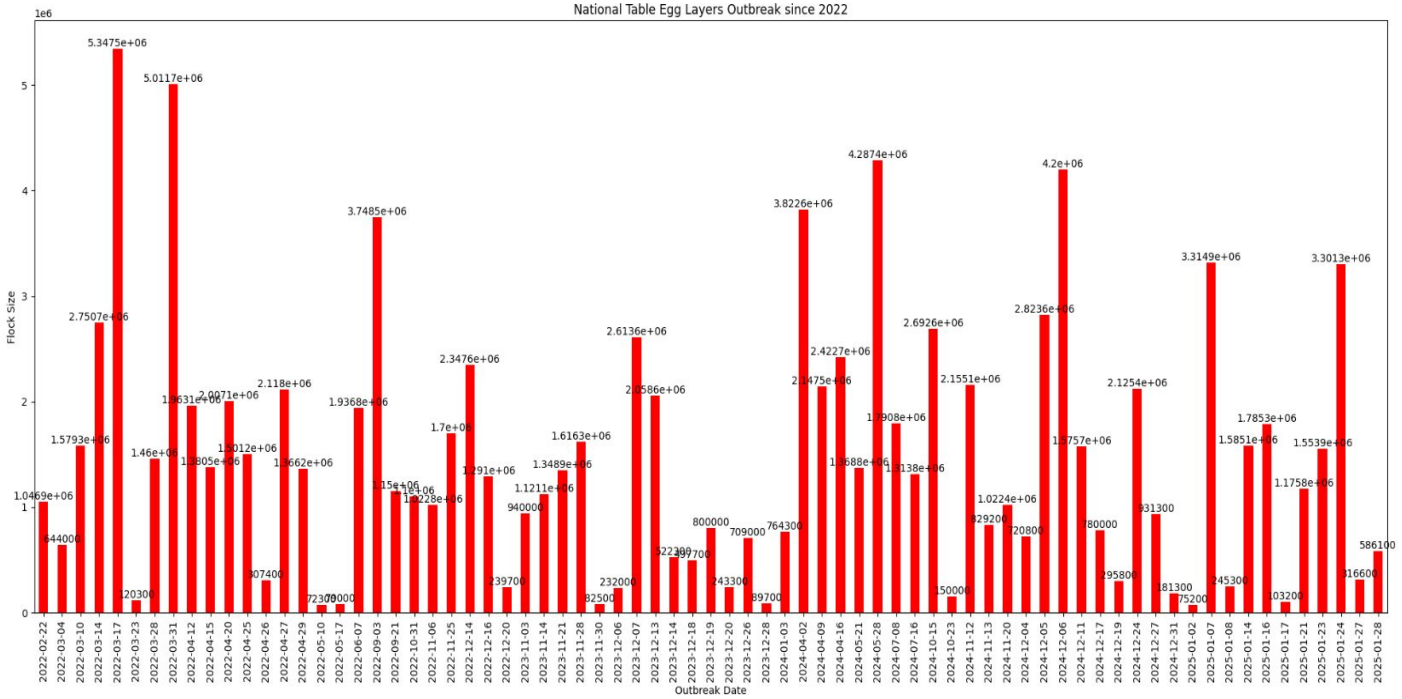
- Data provided by CDC
- Organized data by national and regional Table Egg Layers
- Plot data on map to highlight clusters of infected areas

Photo by Charles Hutchinson Flickr

National Outbreak Graph

Observations

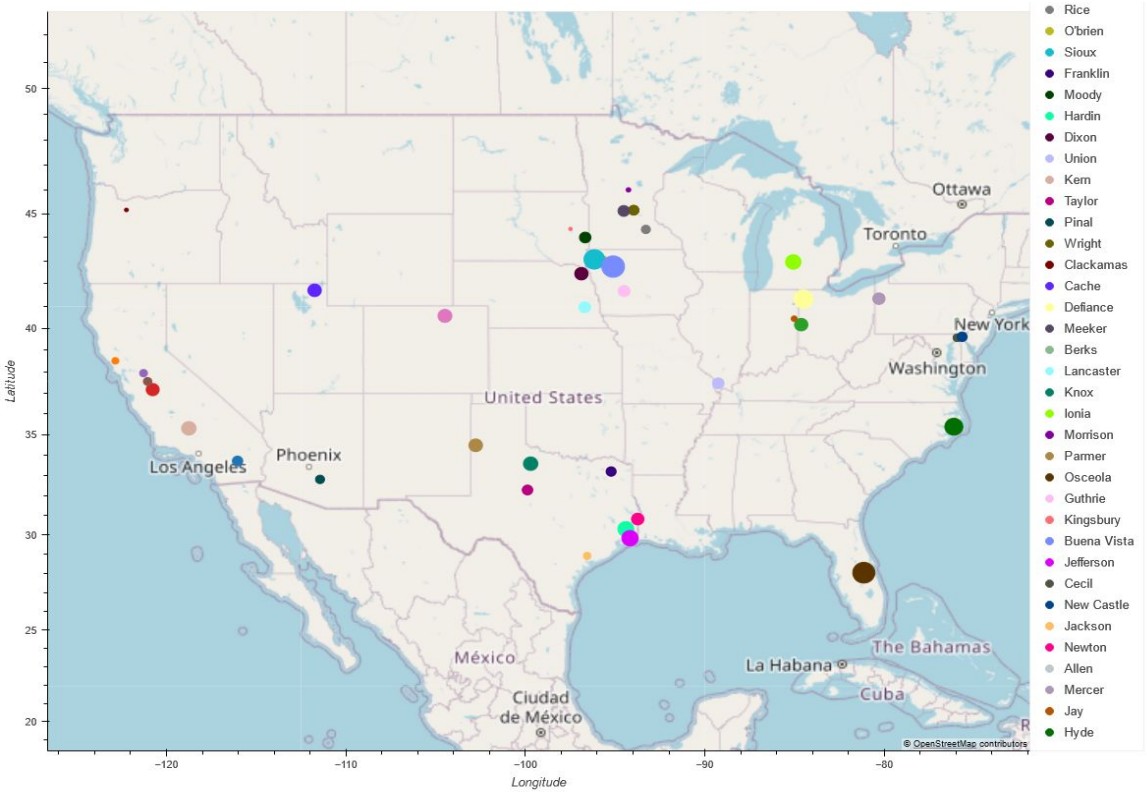
- The Midwest has had the most (67,922,900), the SW had the least (3,039,900)
- The largest spikes were in March of 2022, with 5+million reported in 1 day.
- 2023 did not have as many reported outbreaks as the other years



National Outbreak Map

Observations

- The largest outbreaks are in the Midwest and Florida.
- Texas and California account for the majority of outbreaks in their region.



Bird Flu Analysis Conclusions

- The Bird Flu has impacted the Midwest the most, seeing as Iowa, Ohio and Indiana are the top 3 states producing eggs.
- The West is the second region to be heavily impacted by the Bird Flu- specifically California.
- Thus far, 2025 has already reported over 14 million birds being affected by the bird flu

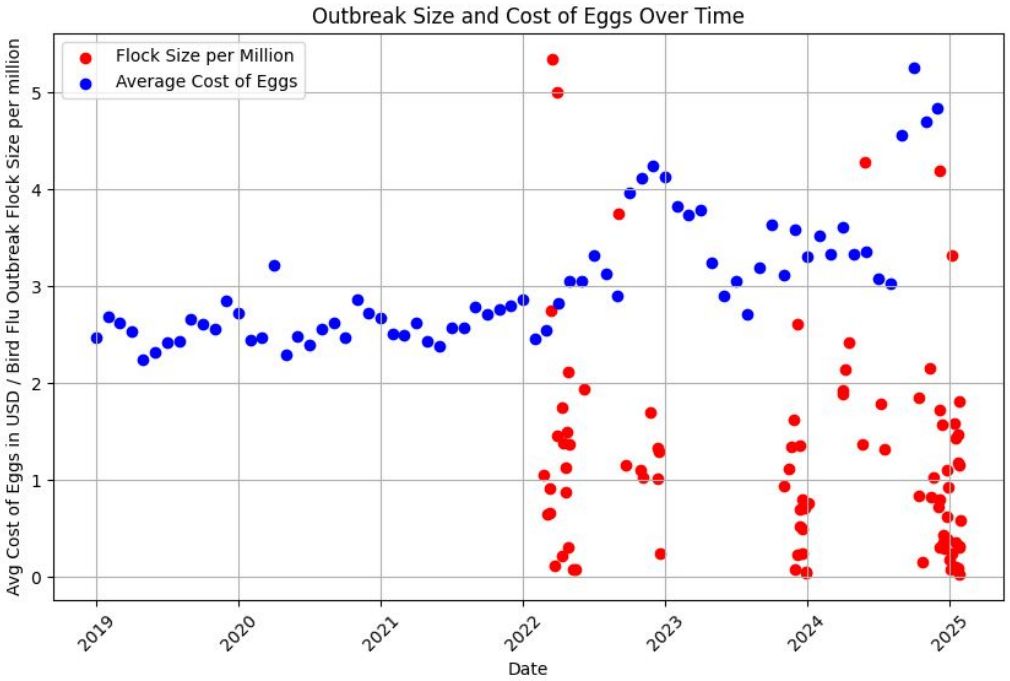
year	Midwest	Southeast	Northeast	Southwest	West	Total
2022	28,590,600	2,354,300	3,846,300	0	8,500,400	43,291,600
2023	9,662,200	0	0	0	3,212,800	12,875,000
2024	19,641,900	0	0	2,723,300	16,035,900	38,401,100
2025	10,028,200	3,314,900	0	316,600	383,000	14,042,700

Correlation?

Bird Flu/Egg Price Graph

Observations

- The blue dots represent average cost of eggs per US Dollar. The red dots represent bird flu outbreaks per million.
- There appears to be a correlation with the bird flu outbreaks and the increase in egg prices



Next steps

Further Analysis

Continued observation of the bird flu outbreaks and the cost of eggs can help strengthen the hypothesis.

Organic v. Conventional

Continuing to analyze data over time, investigating number of organic farms/flock sizes versus conventional, determining cost of raising a chicken organically vs. conventionally, research into possible causes of conventional egg spike in November 2024

Bird Flu

Predicting and prevention of further outbreaks by genetics, vaccinations and/or proper hygiene and sanitizing methods