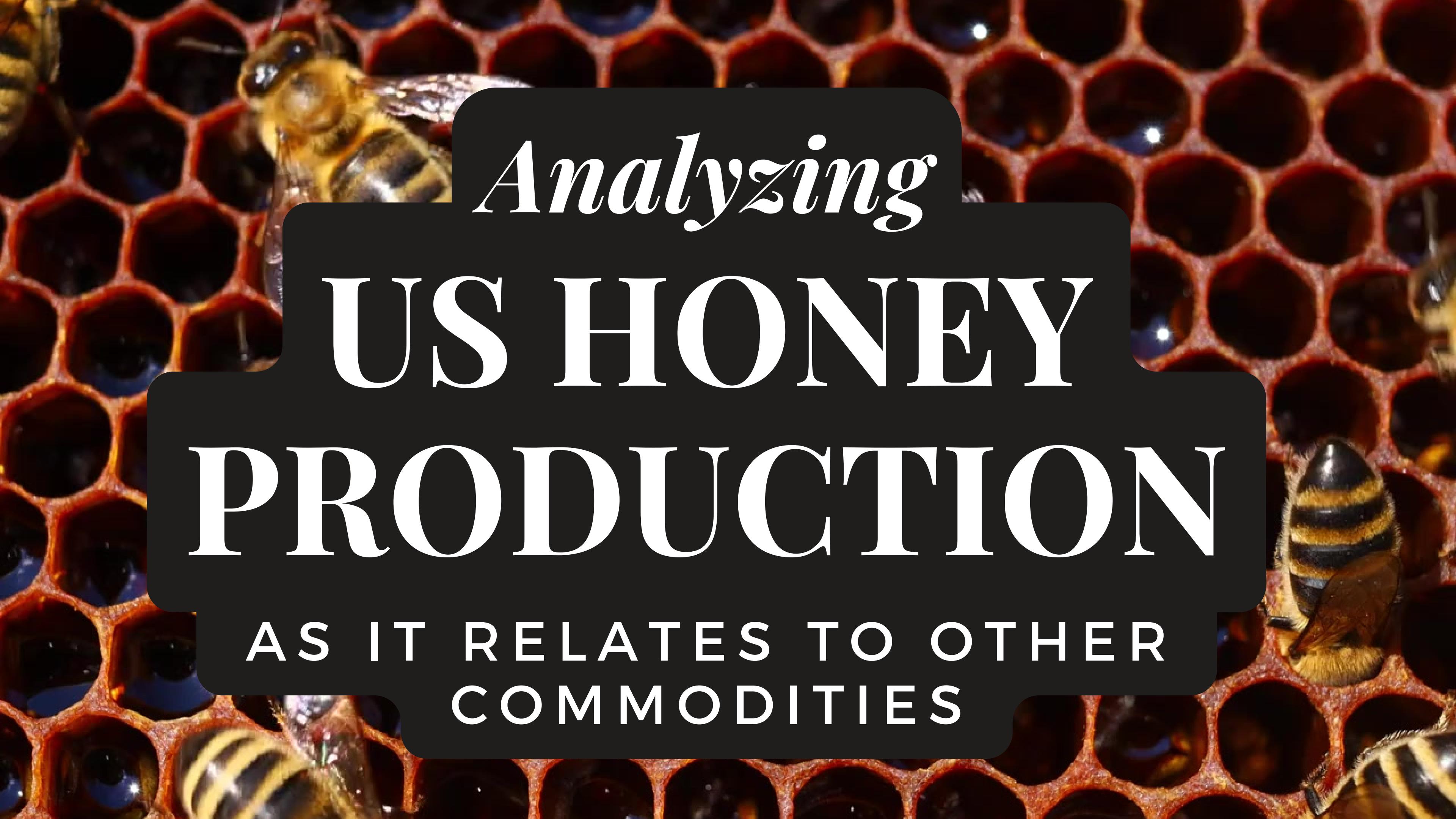




The QUEEN BEES

PRESENT



Analyzing US HONEY PRODUCTION

AS IT RELATES TO OTHER
COMMODITIES



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About Me - Sindy Saintclair

Graduate from the University of South Florida, Class of 2019

Experience in Chemistry - Biochemistry Emphasis as well as anthropological studies and public health

Experienced in medicine & healthcare, particularly in nursing and medical scribing



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About Me - Sara Slocum

Santa Monica College

Miami Dade College

Licenses & Certificates:

S6, S65, Life & Health, etc.

Currently Self-Employed

Investment Advisor

Retail Store Manager

Great with Finance,
Analytics, Team Leadership,
Performance



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About Me - Sonya Johnson

BA Psychology & Sociology
MSEd Instructional Technology
MA Theology & Church History
Entity Academy Data Science

Currently working as a Go-to-Market Advisor for
tech sales pipeline development

Program Management
Needs Analysis
Contract Management



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About Me - Nic Acosta

- Bachelors & Masters - I/O Psychologist & Data Science
- Soon by Entity Academy & AWS!
- Researcher & Healthcare Solutions Generalist with VaxCare Vaccine Solutions
- Social & Natural sciences.
- Statistical analysis of the workplace.



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About Me - Neha Gupta

Masters in Computer Science and Applications

Looking forward to joining a team with data analyst role where I can contribute my skills of problem solving and data analysis to use.

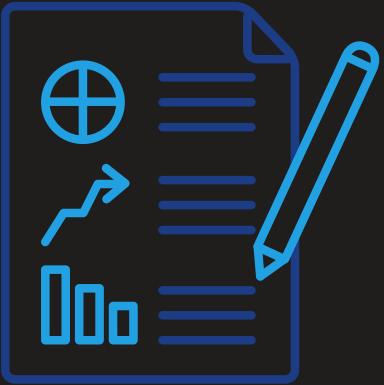
Past experience includes working in IT firms to deliver solutions to end clients.

Quick learner and hard worker with expertise in Coding and Analysis.



Datasets

- USDA Supply & Production



<https://www.kaggle.com/datasets/jeffersongranado/usdapsd>

<https://apps.fas.usda.gov/psdonline/app/index.html#/app/downloads>

- US Honey Production

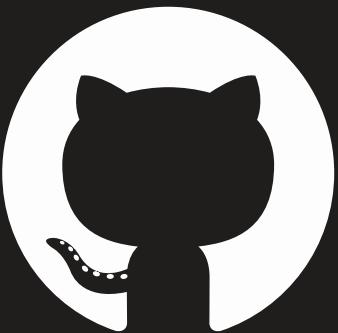
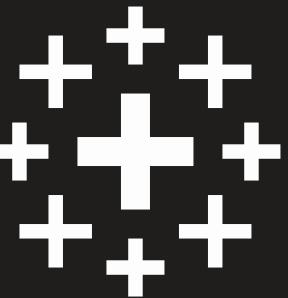
<https://www.kaggle.com/code/jcraggy/honey-production-usa/data>



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Tools

- Python
- Google Suite
- Trello
- Tableau
- Slack
- Jupyter Lab
- Zoom
- GitHub
- Canva
- R (R studio)
- Excel



Evaluation Questions

- How would honey production affect some other goods that were produced over time?
- Which commodities are correlated with honey production and how does honey production influence them?
- What predictive analyses can we make based on these correlations?



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ALL ABOUT HONEY

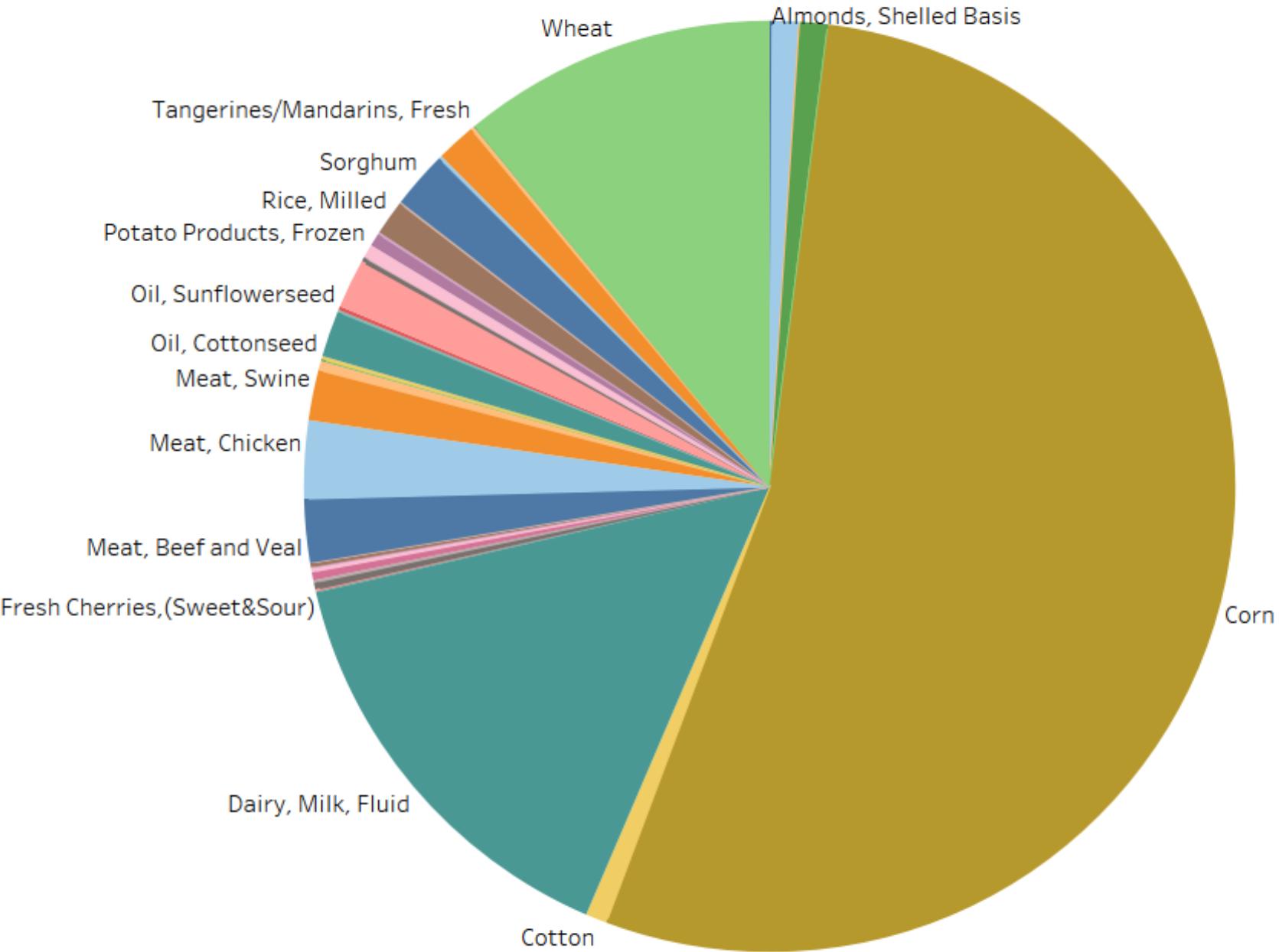
- *\$700 million industry in the United States*
- *\$18 billion in added revenue from honeybee pollination*
- *Number of colonies has dropped by almost 60% since 1947*
- *70% of agriculture products rely on pollination*
- *Colony collapse on the rise*

US AGRICULTURE STATS

Average Yearly
Production
1998-2012

Commodity ..	
Corn	291,469,867 53.70%
Dairy, Milk, Fluid	81,053,067 14.93%
Wheat	59,130,267 10.89%
Meat, Chicken	15,660,786 2.69%
Meat, Beef and Veal	11,985,533 2.21%
Sorghum	10,917,933 2.01%
Meat, Swine	9,549,133 1.76%
Oranges, Fresh	9,281,600 1.71%
Other	1,627,481 10.07%
Honey	78,920 0.01%

Total Production Values 1998-2012



= 13,154 Elephants!!

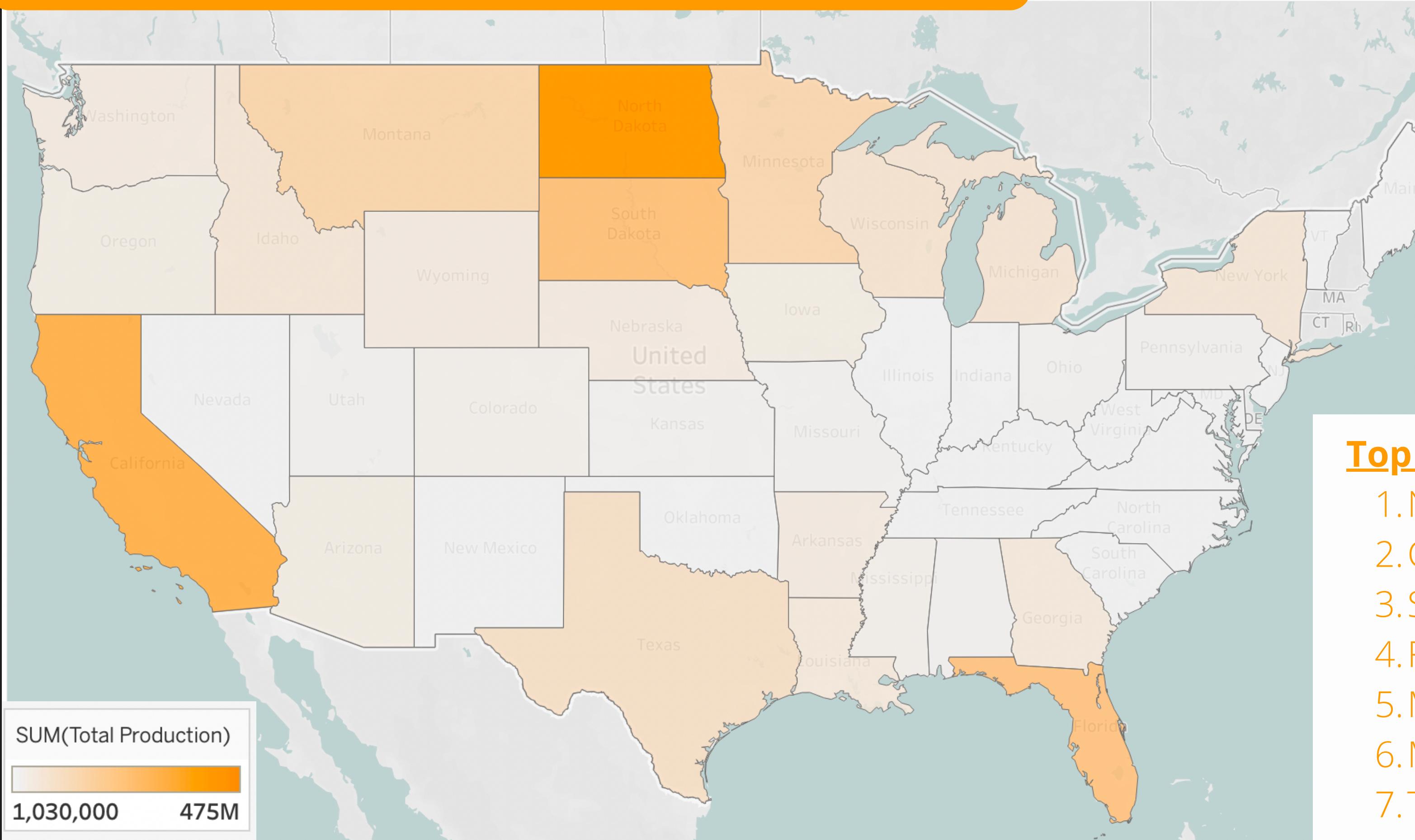


Domestic
Consumption
consistent with
production ratio



HONEY PRODUCTION BY STATE

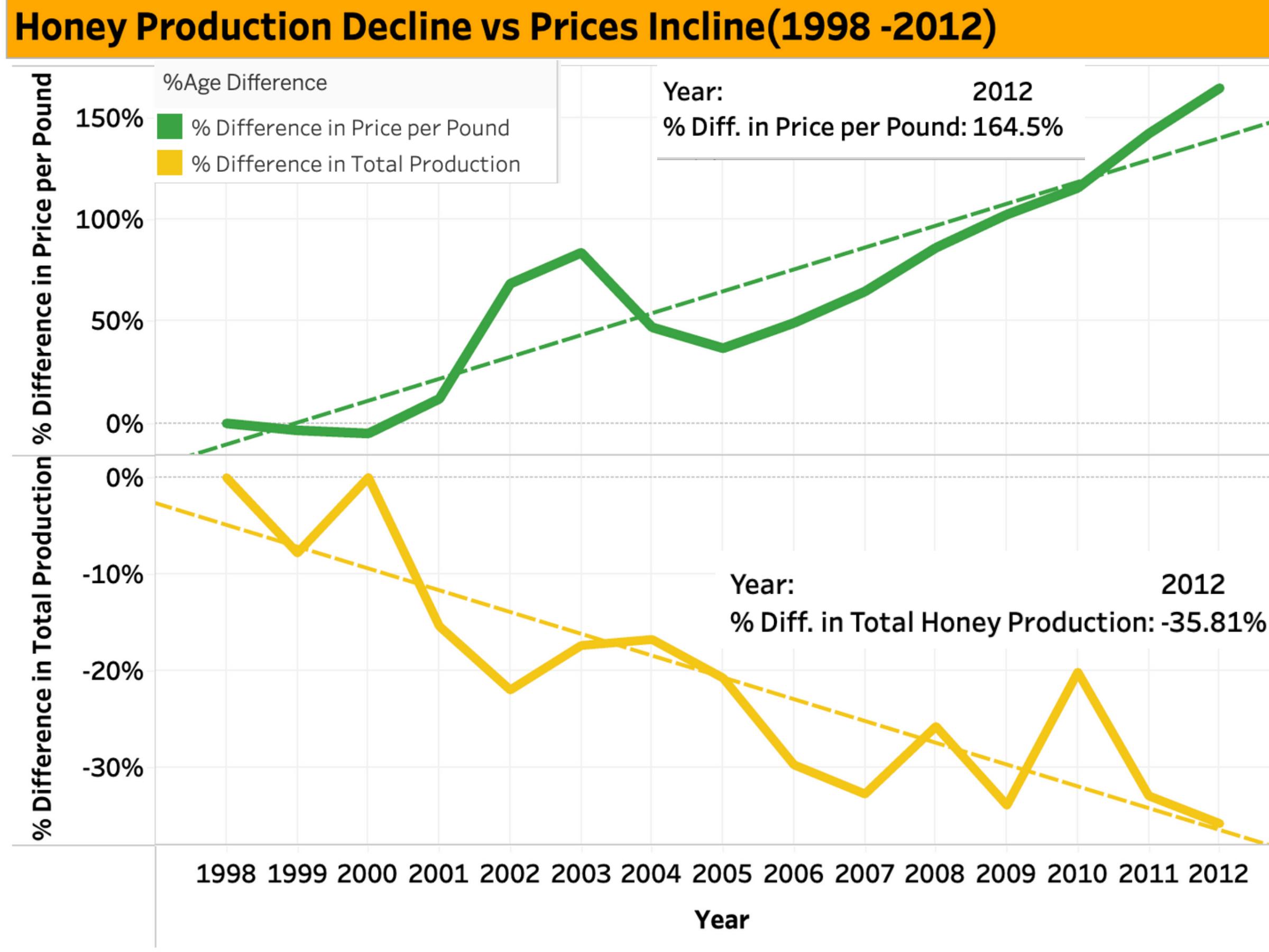
1998 - 2012



Top Producers

1. North Dakota
2. California
3. South Dakota
4. Florida
5. Montana
6. Minnesota
7. Texas

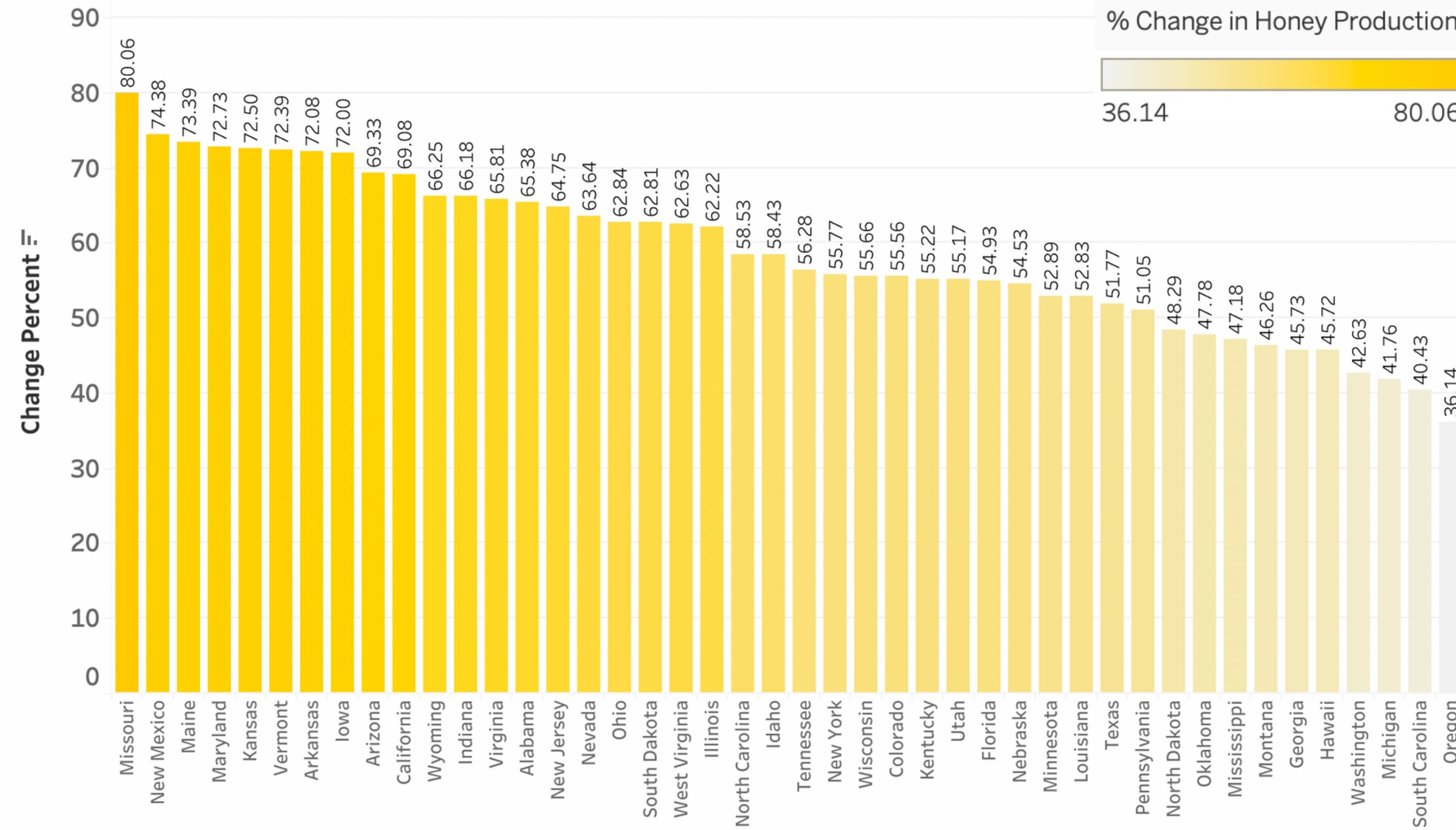
HOW HAS HONEY PRODUCTION CHANGED & IT'S EFFECT ON US AGRICULTURE



- 1/3 of our food relies on bee pollination.
- 90+ US crops rely on honey bee for pollination.
- No bees, no availability of fresh produce, and human nutrition would likely suffer.
- Beekeepers across the country lost 45.5% of their managed honey bee colonies from April 2020 to April 2021

HONEY PRODUCTION DECLINE BY STATE

% Decline in Honey Production State wise (1998 - 2012)



- Maximum Decline
 - Missouri - 80%
 - New Mexico - 74%
- Minimum Decline
 - Oregon - 36%
 - South Carolina - 40%
- Reasons for Decline
 - intensive agricultural practices
 - changes in land use
 - use of pesticides
 - pest and disease outbreaks by extreme weather

OUR ANALYSES



THE PROCESS



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1

Correlations

2

High Correlators

3

Linear Regression

4

Equations

5

ARIMAs

6

K-Means



COMMODITY GROUPS



Meat & Dairy



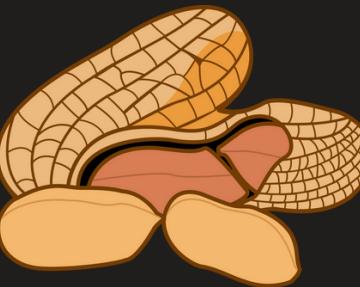
Fruits & Vegetables



Grains & Oats



Nuts & Oils



Miscellaneous



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MEAT & DAIRY

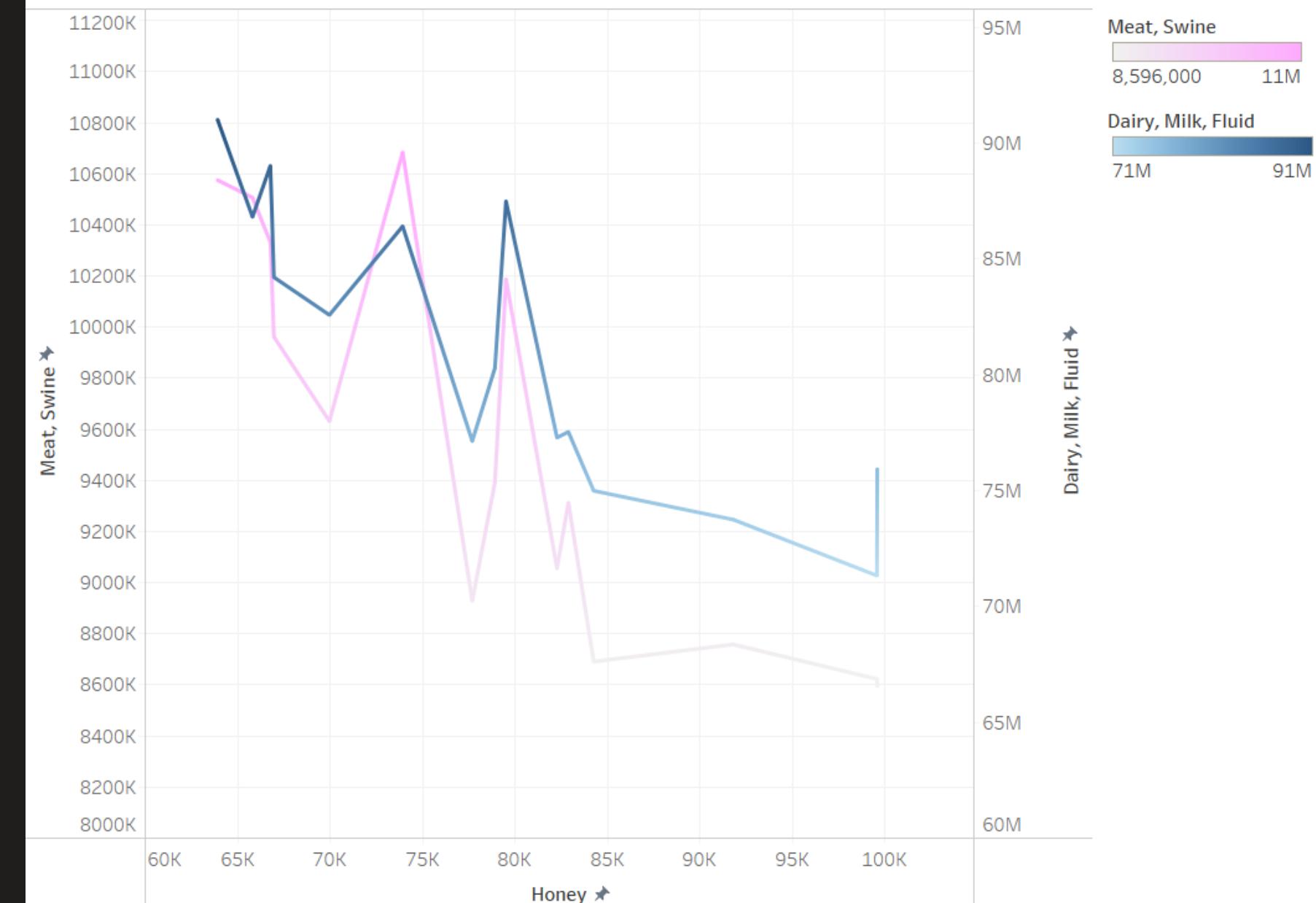
Honey ↑

These Commodities ↓

Year	Honey
Dairy , Milk, Fluid	-0.853603
Meat, Swine	-0.834067
Meat, Chicken	-0.82738
Poultry, Meat, Turkey	-0.808096
Meat, Beef & Veal	-0.070536

Correlations: 0 - 1

Linear Relationship of Swine and Milk Production with Honey
1998-2012



Linear Regressions

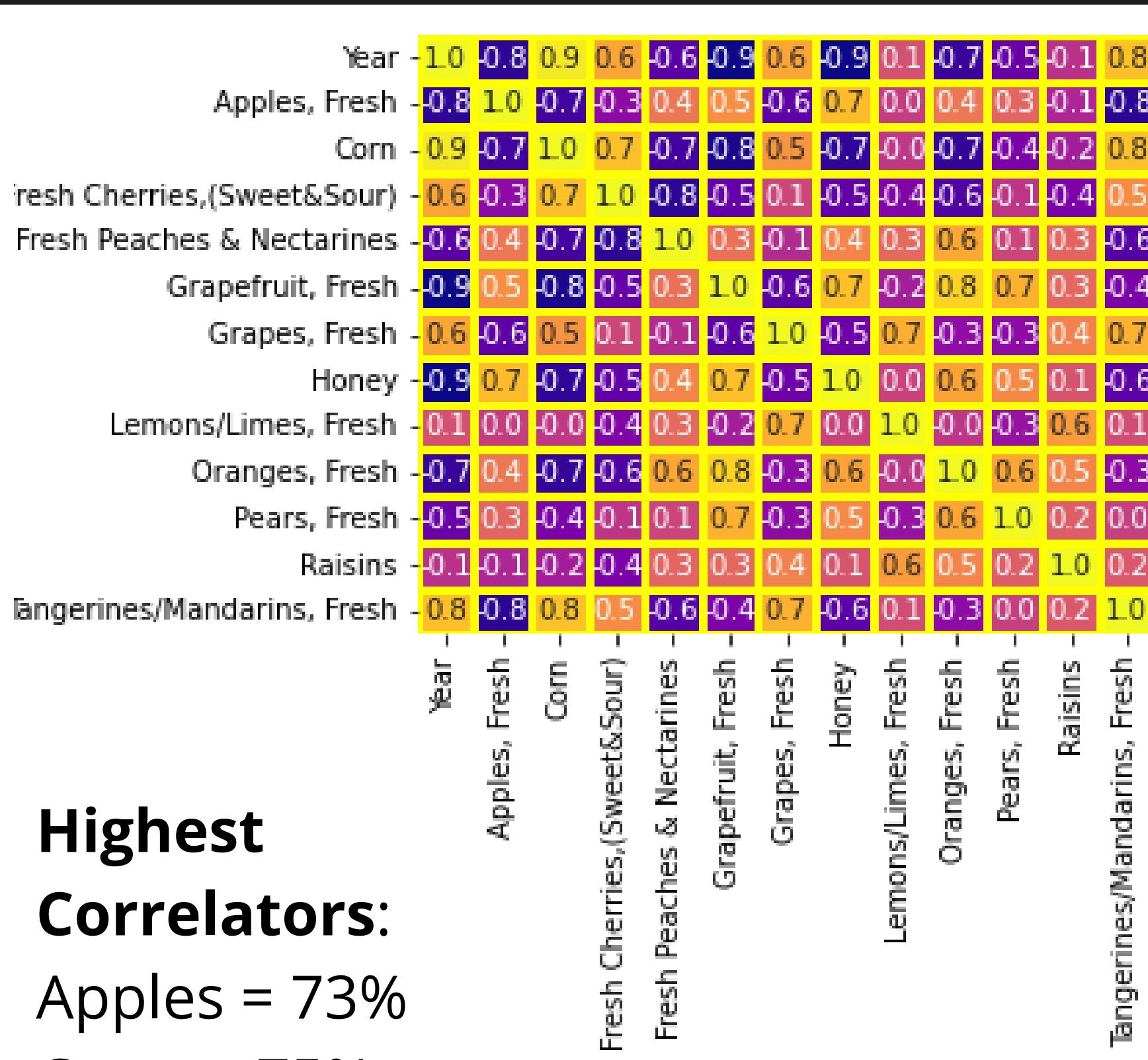
$$\text{Meat} = -55.5376(\text{Honey}) + 13930000.0$$

$$\text{Dairy} = -455.0467(\text{Honey}) + 117000000.0$$

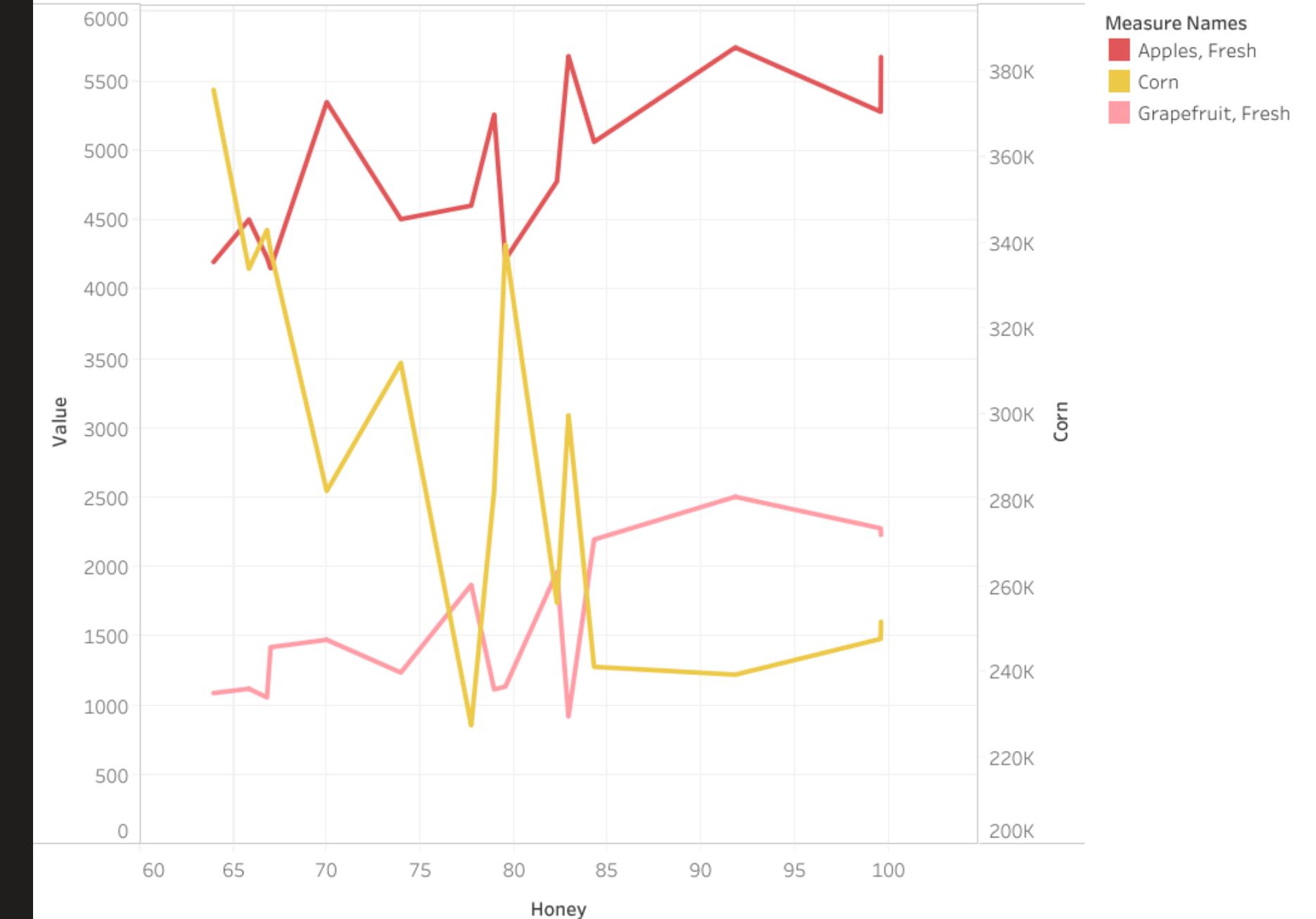
70% variance



FRUITS & VEG



Highly Correlated Commodities Against Honey Production

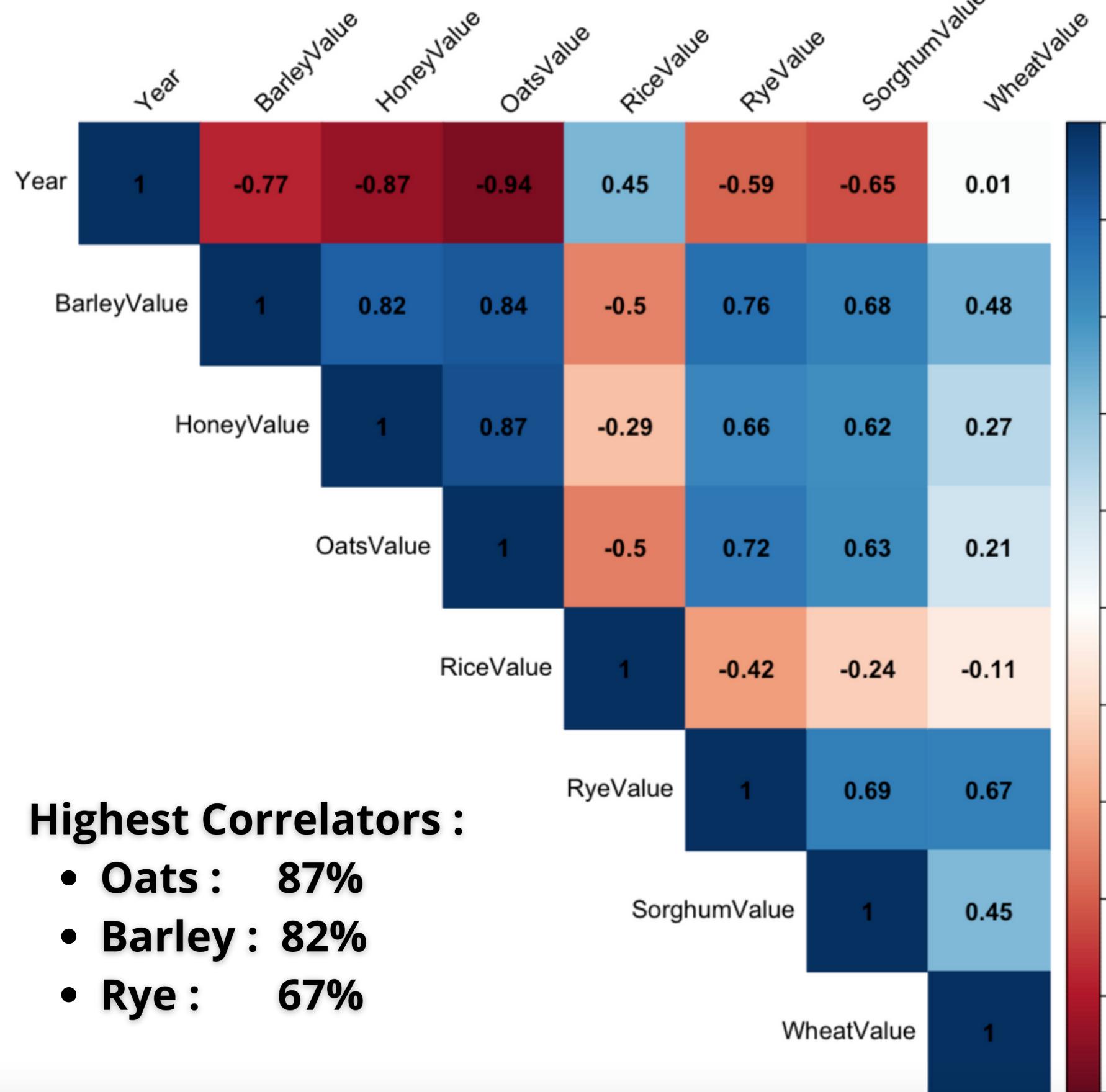


Linear Regressions

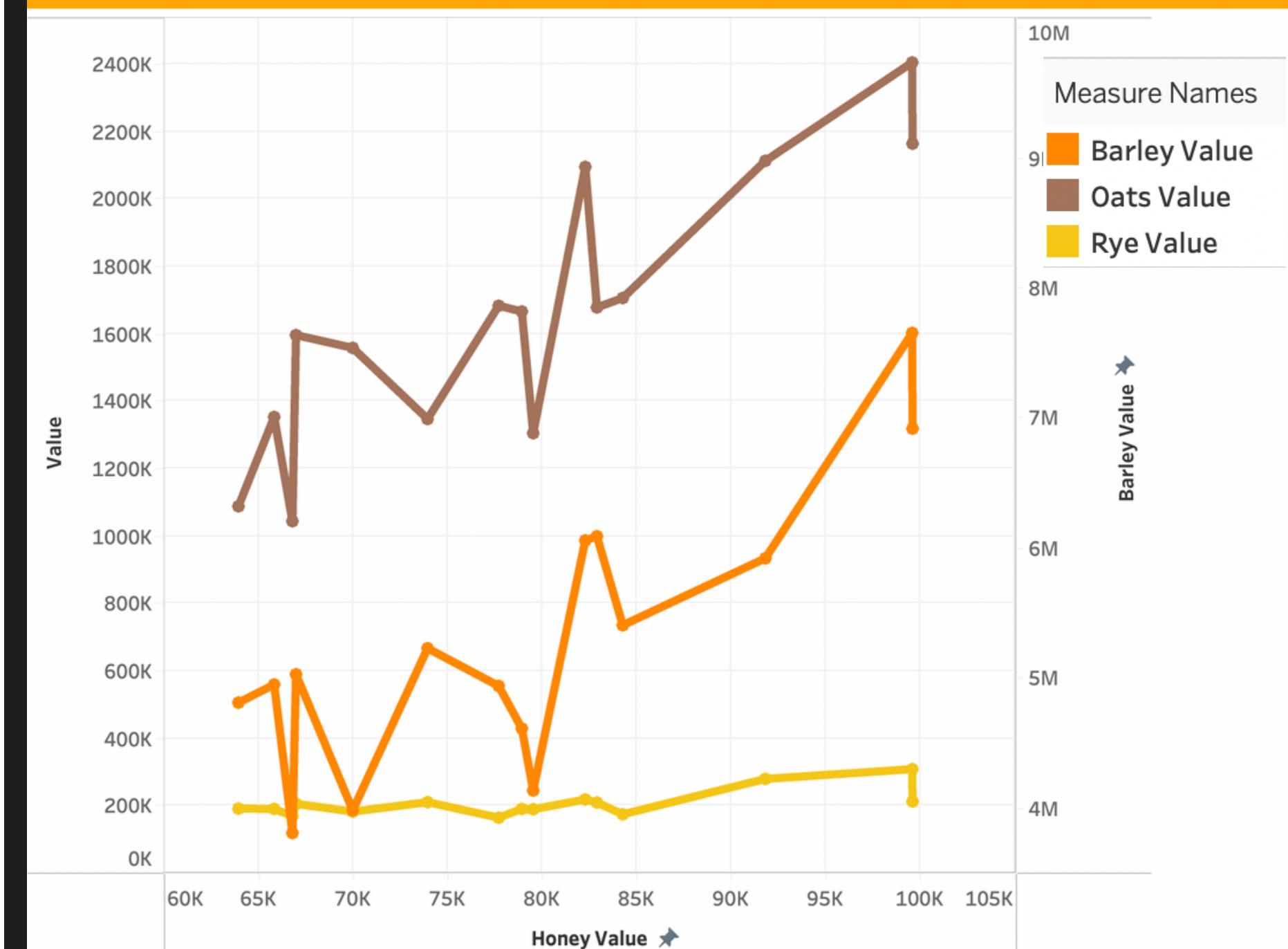
- Apples** = $36.9082(\text{Honey}) + 1971.9569$
- Corn** = $-3027.7330(\text{Honey}) + 530400$
- Grapefruit** = $34.9695(\text{Honey}) - 1183.0582$



GRAINS & OATS



Correlations Among Barley, Oats, Rye with Honey

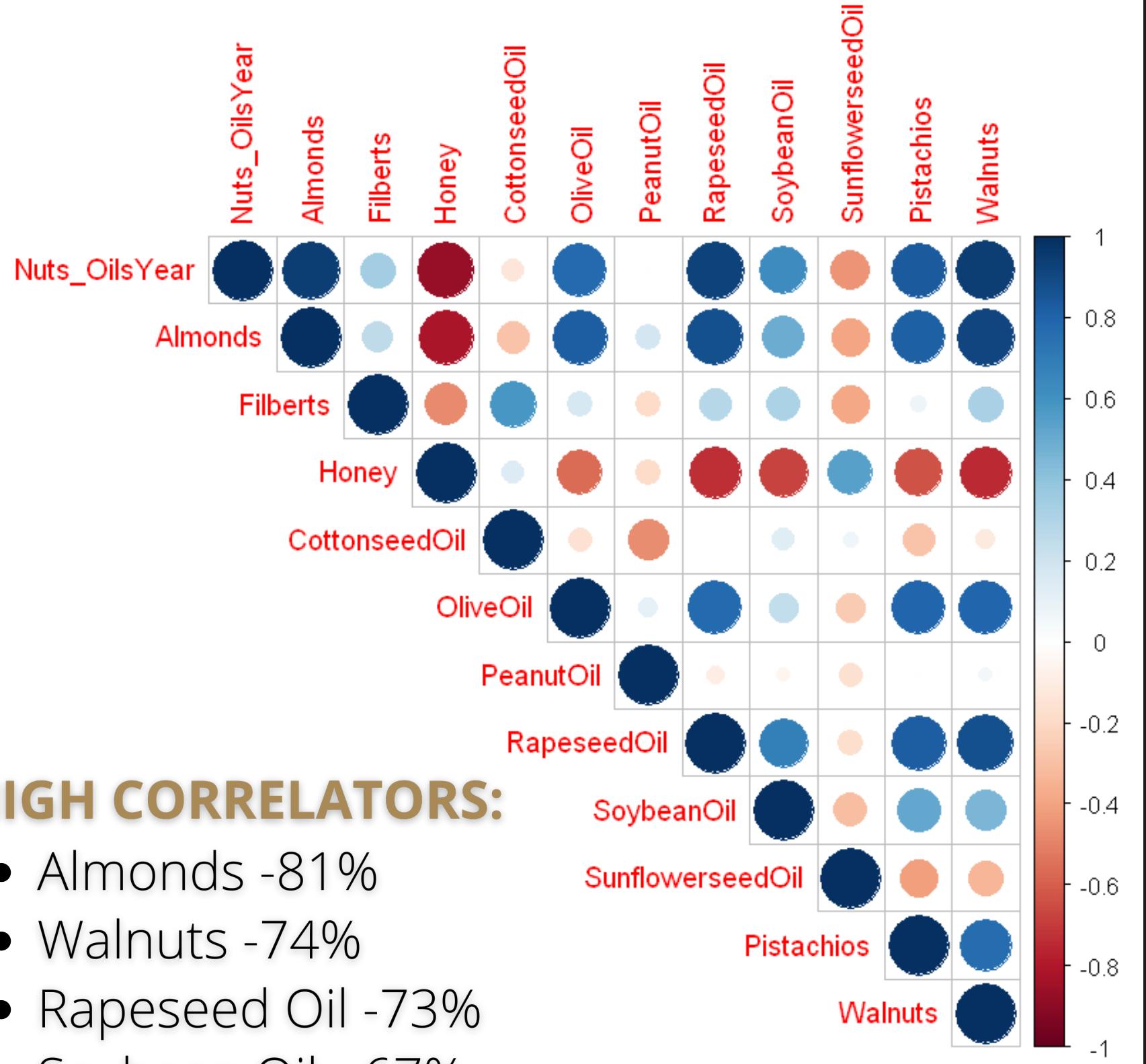


Linear Regressions :

- **Oats :** $10165500 = 30.22(\text{Honey}) - 730466.5$
- **Barley :** $315817600 = 76(\text{Honey}) - 667323$
- **Rye :** $2365160 = 2.238(\text{Honey}) + 30357.011$

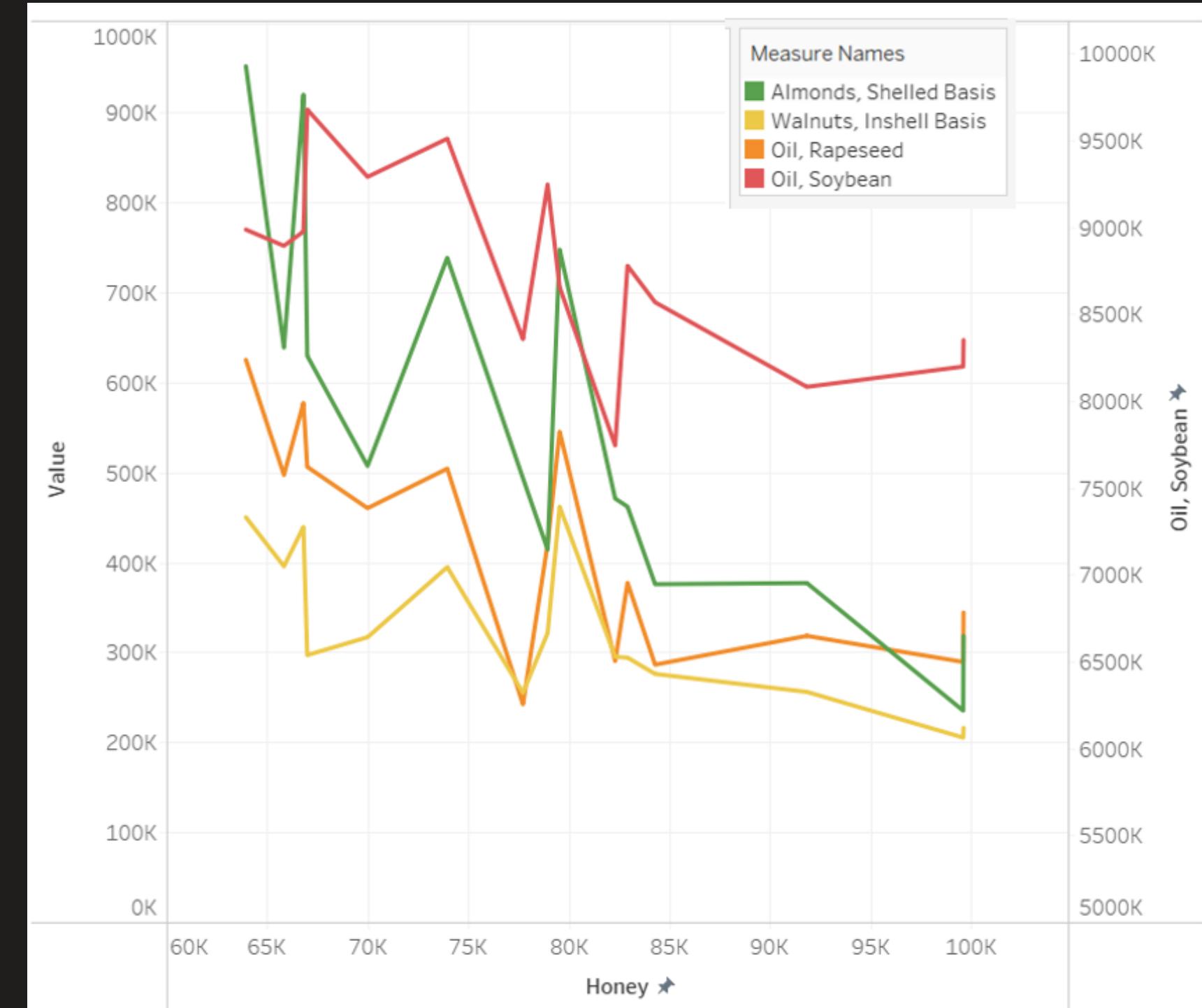


NUTS & OILS



HIGH CORRELATORS:

- Almonds -81%
- Walnuts -74%
- Rapeseed Oil -73%
- Soybean Oil - 67%



Linear Regressions

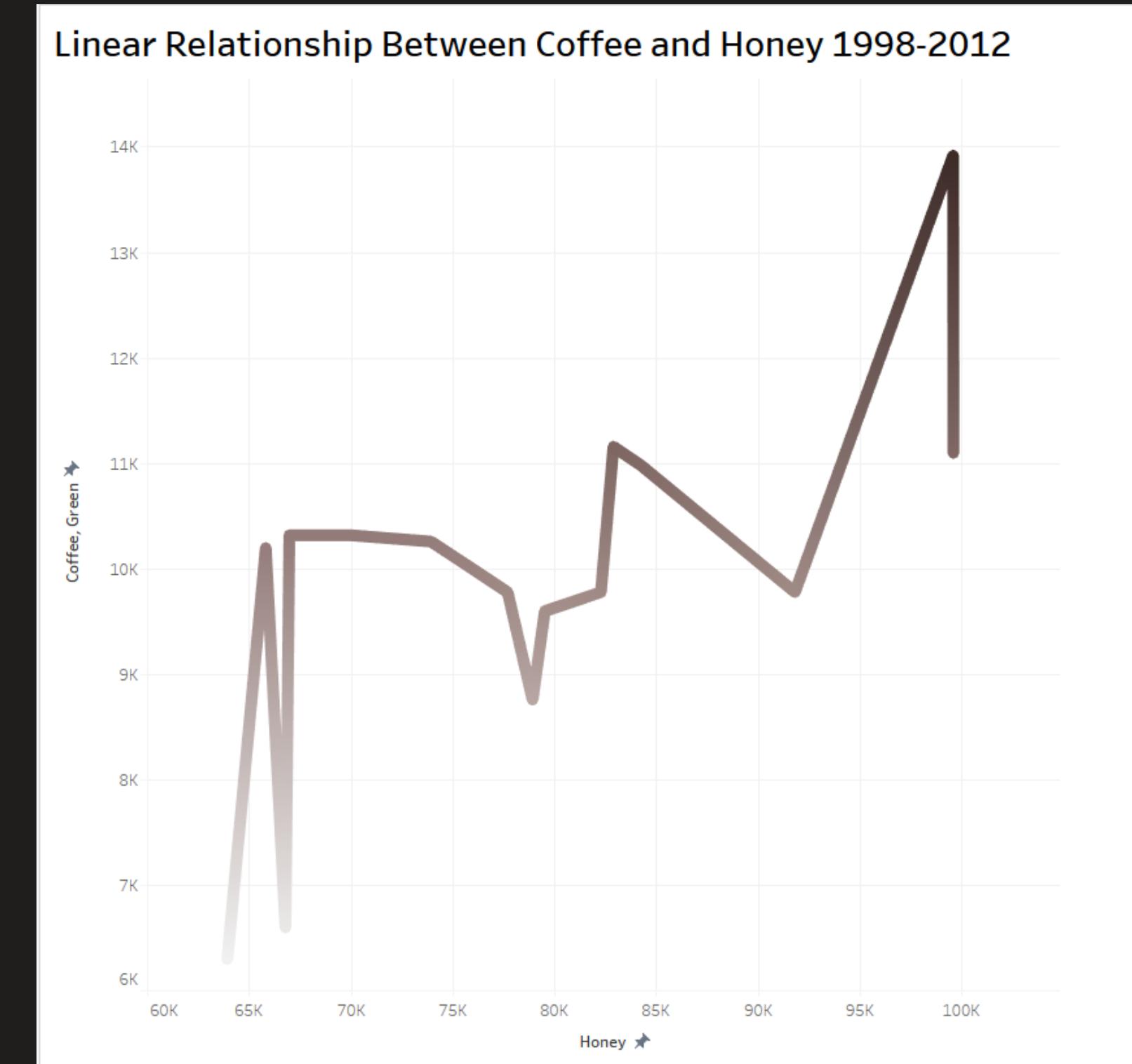
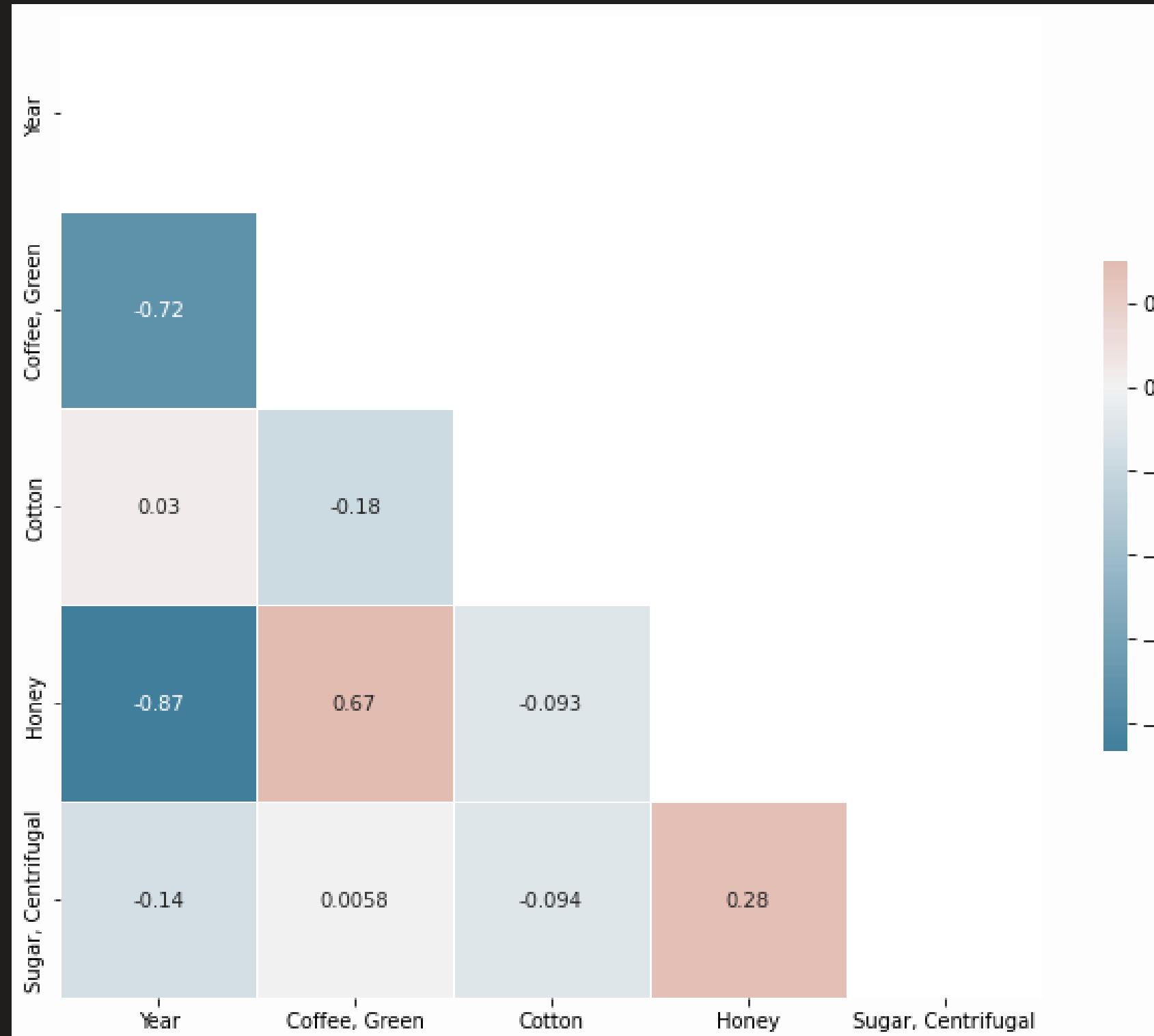
- Almonds = $-15.02(\text{Honey}) + 1737890.72$
- Walnuts = $-5.381(\text{Honey}) + 750350.122$
- Rapeseed Oil = $-7.709(\text{Honey}) + 1,028,000$
- Soybean Oil = $-32.06(\text{Honey}) + 11,290,000$



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MISCELLANEOUS



Coffee only highly correlated commodity



$\text{Coffee} = .1051(\text{honey}) + 16600.9553$



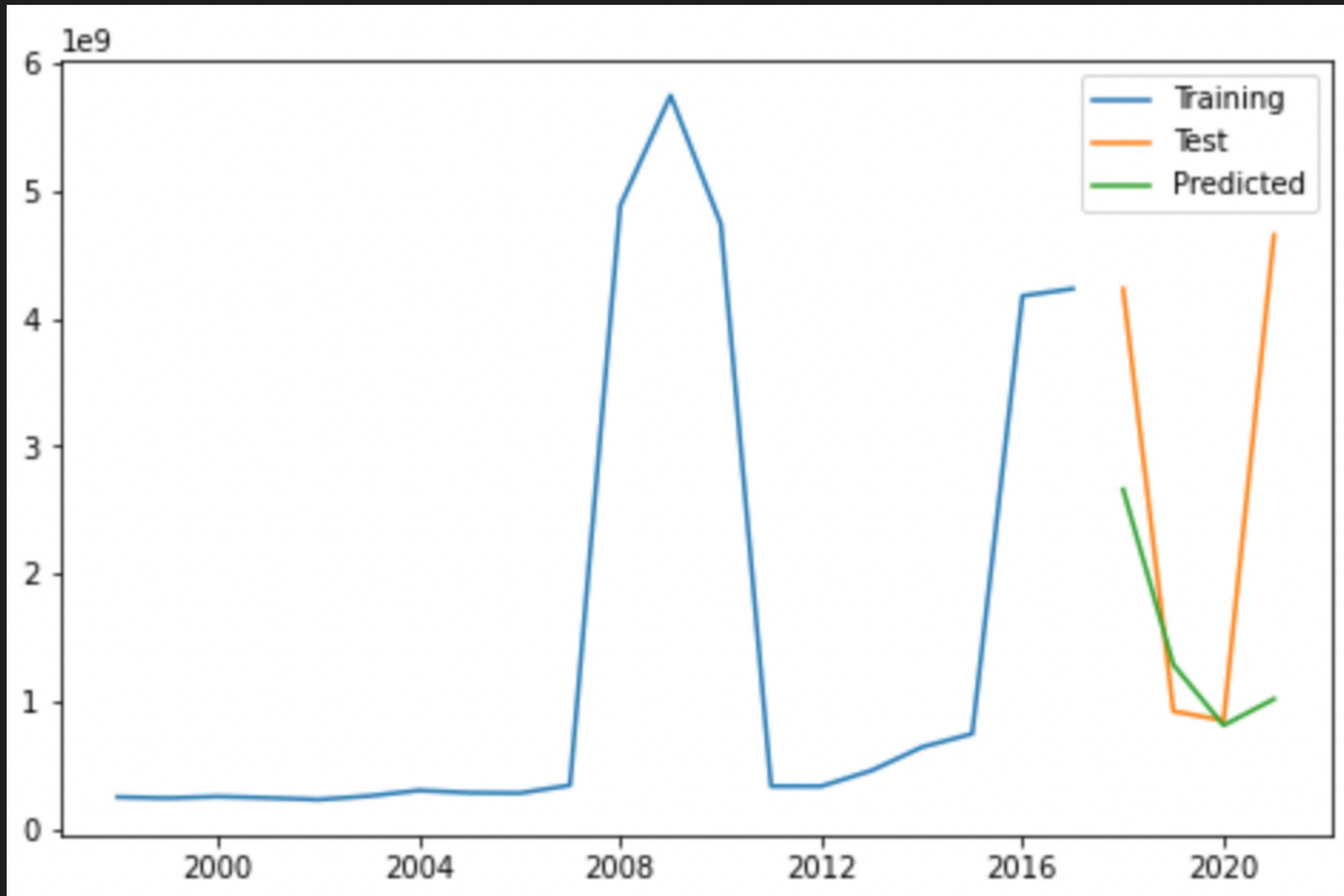
Which begs the question...

**WHAT DOES THIS MEAN
FOR THE FUTURE OF
HONEY?**

Future Forecasting of Honey Production using ARIMA

OATS PREDICTION(2022 - 2025)

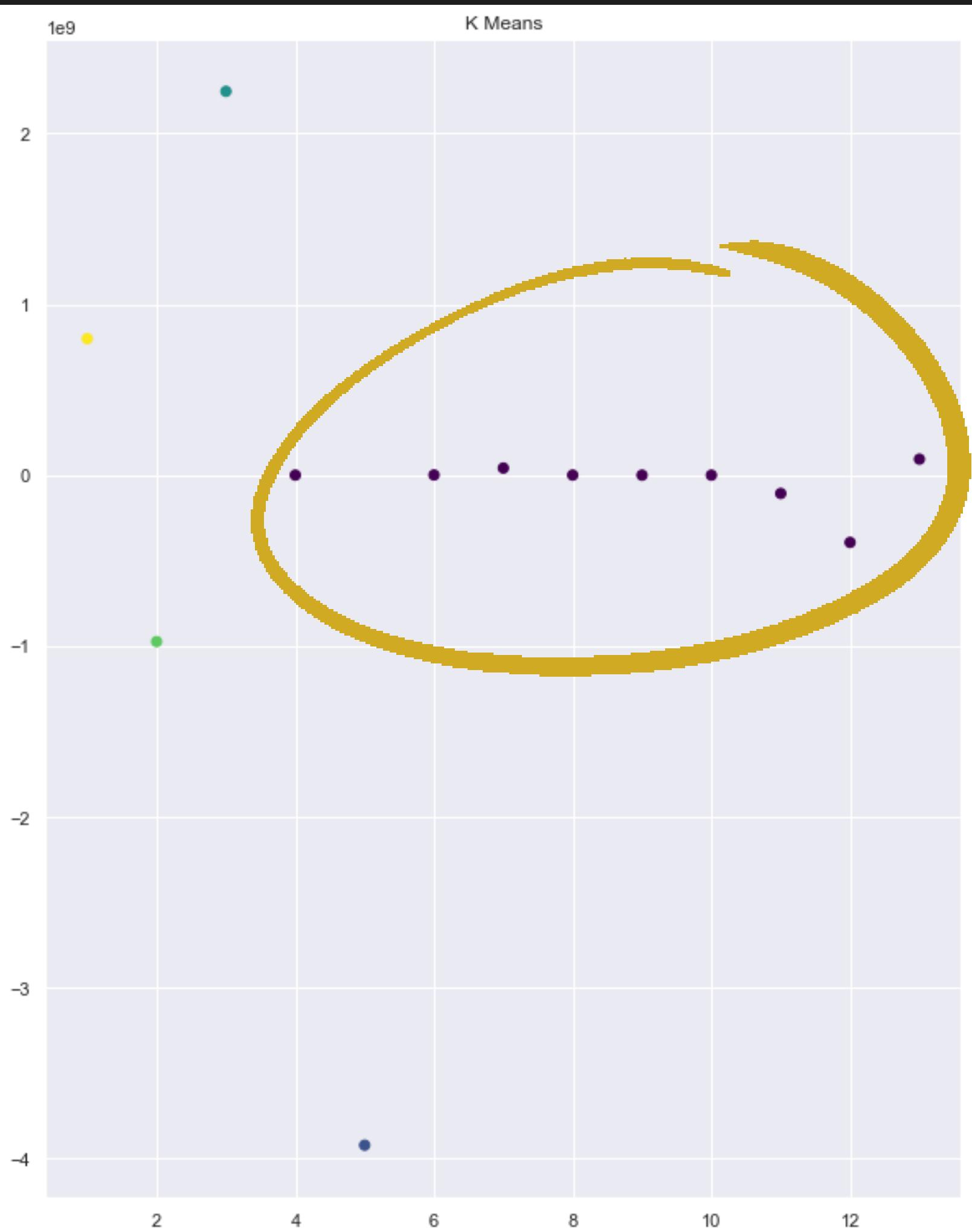
STEPS



Linear Regression Equation:
Oats: $10165500 = 30.22(\text{Honey}) - 730466.5$.

- Prediction for all highly correlated commodities.
- Pick the prediction value for each commodity for year 2023
- Feed them into the Linear Equations.
- Calculate the prediction for Honey for 2023
- Honey prediction based on Oats came to be 360,554.8 Metric Tons for 2023.

K-MEANS CLUSTER



	Commodity	Honey Prediction in Metric Tons
0	Apples	7.988601e+08
1	Corn	-9.744340e+08
2	Grapefruit	2.246869e+09
3	Dairy	2.564876e+05
4	Swine	-3.922429e+09
5	Rye	1.042323e+06
6	Barley	4.146428e+07
7	Oats	3.605548e+05
8	Almonds	-2.047279e+04
9	Walnuts	-6.776261e+04
10	Soybean Oil	-1.072080e+08
11	Rapeseed Oil	-3.937622e+08
12	Coffee	9.372079e+07

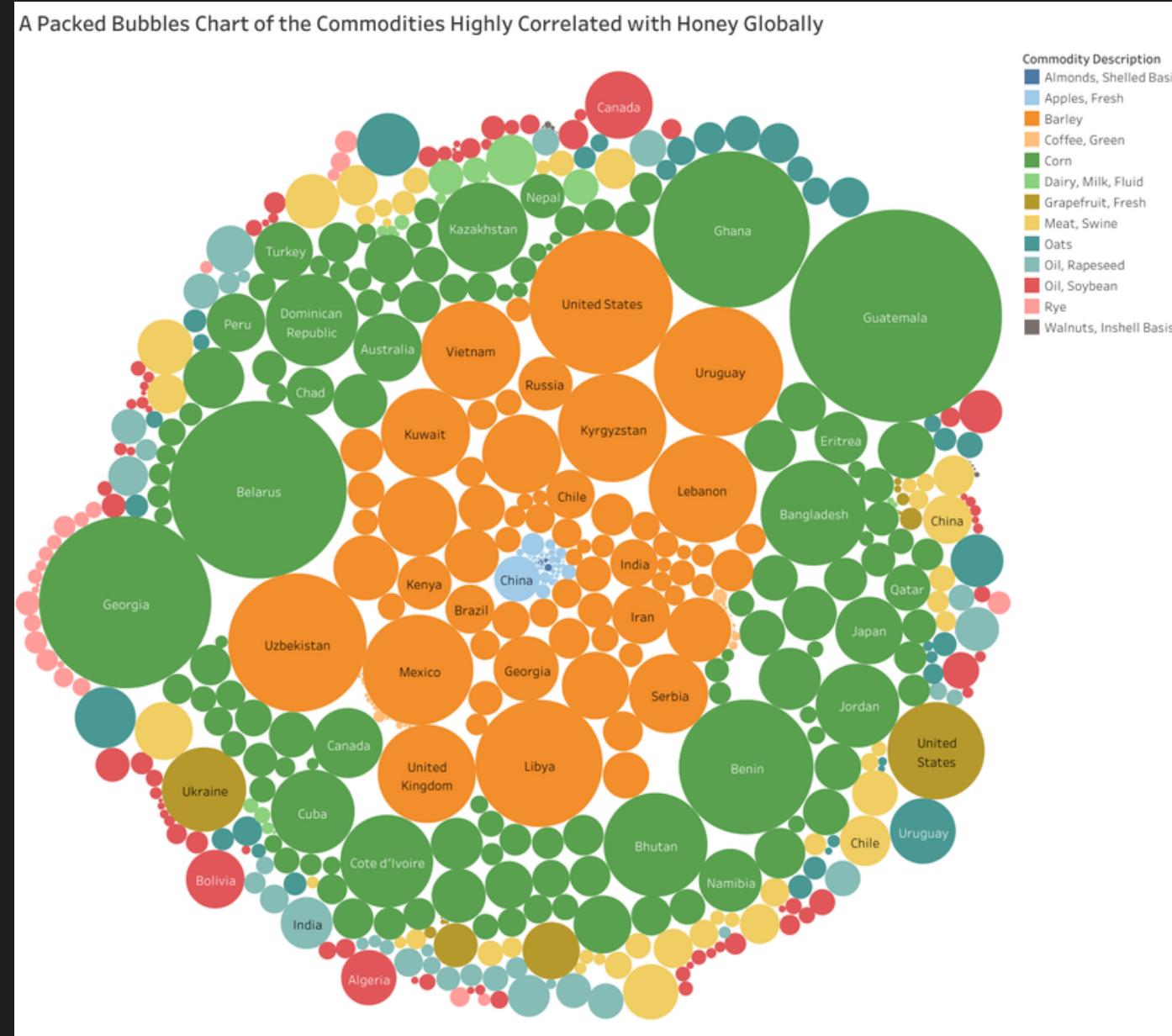
- Predicted values highly disparate
- 6/13 resulted in negative predictions
- Group 0 average of -4 million (MT)



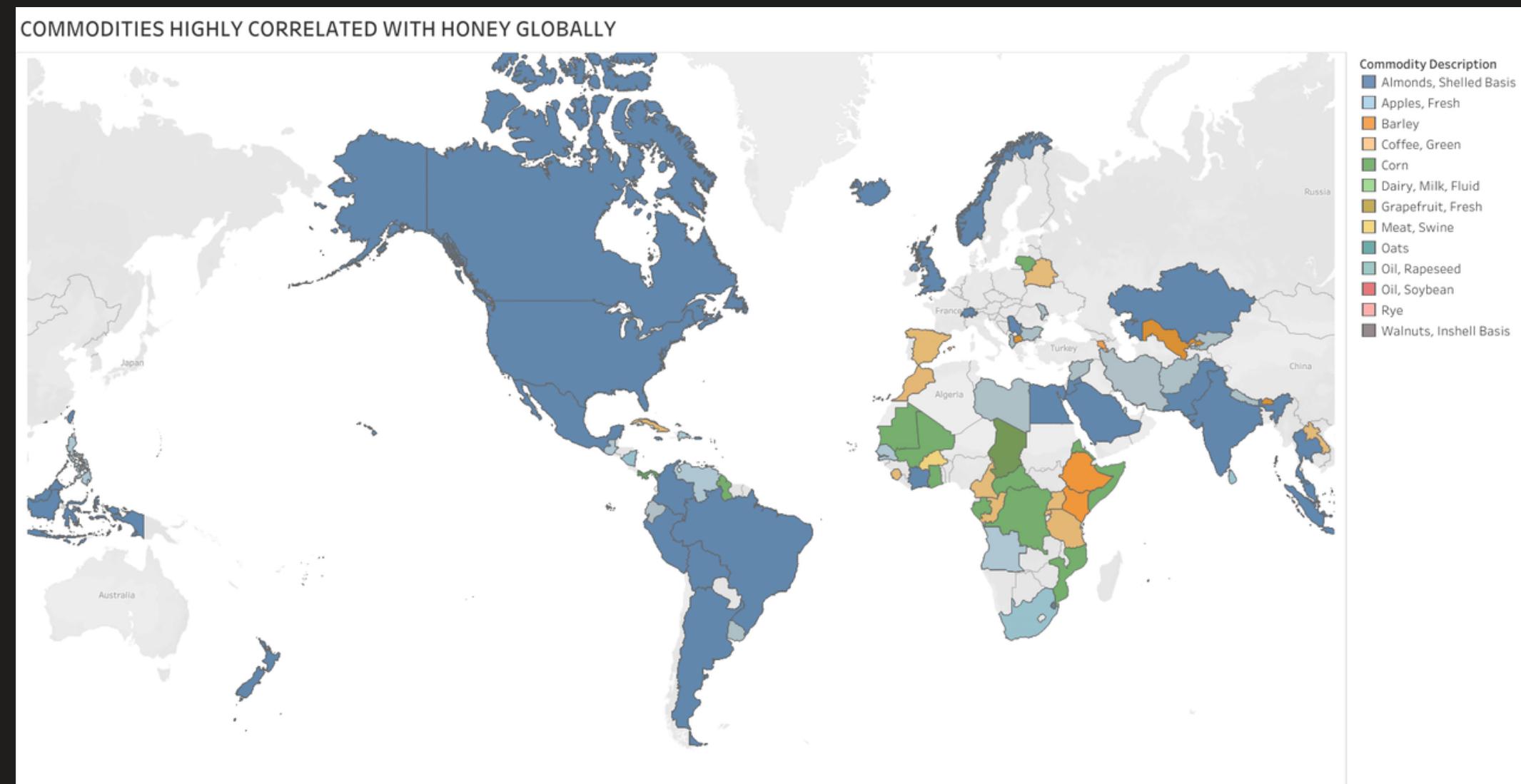
GLOBAL PERSPECTIVE



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- Top 5 Countries with highest production values
- Corn being the commodity with the highest production value



SUMMARY

Highly Correlated Goods				+ Grapefruit
+ Barley	+ Coffee	+ Rye	+ Oats	
+ Apples	- Rapeseed Oil	- Almonds	- Soybean Oil	
- Filberts	- Milk	- Swine	- Corn	

- Inconclusive
- Vital to production
- Similarities
- Third+ variables
 - Weather
 - Climate Change..



FINAL COMMENTS

- LIMITATIONS

- Time
- Accuracy of Data
- Knowledge

- NEXT STEPS

- Find other Data Sources
- Fix Assumption Issues
- Master the ARIMA
- Incorporate Other Factors
- Explore Global Trade Data



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How could this impact...

COMMODITY PRICING?



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*Thank
You*