

Small Holder Farmers Seasonality Analysis

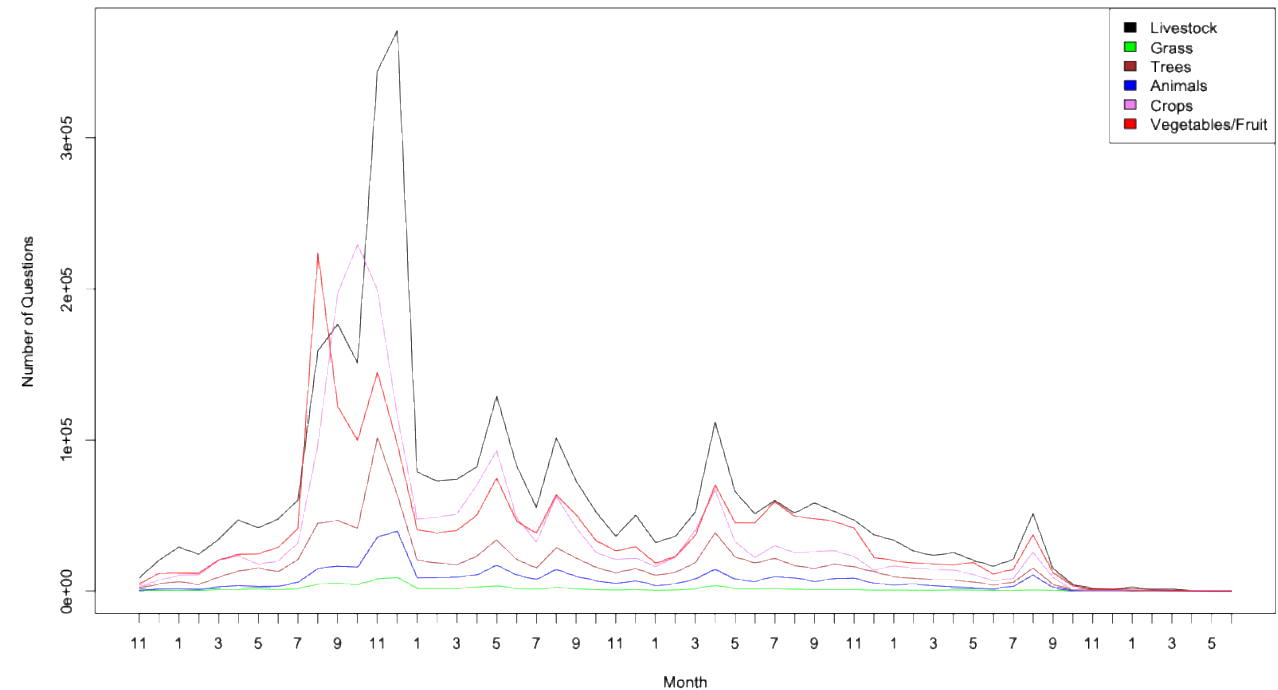
Holmes Finch

Examples of question categories

- Animals – “Animal”, “Dog”, “Ostrich”, “Bee”, “Bird”
- Livestock – “Livestock”, “Pig”, “Sheep”, “Turkey”, “Poultry”, “Pigeon”, “Cattle”, “Chicken”, “Goat”, “Guinea-pig”, “Guinea-fowl”, “Fish”, “Tilapia”
- Crops – “Maize”, “Millet”, “Rice”, “Wheat”, “Sugar-cane”, “Tobacco”, “Amaranth”, “Barley”, “Bamboo”, “Finger-Millet”, “Rapeseed”, “Sunflower”, “Safflower”, “Cotton”, “Flax”, “Oats”
- Vegetables – “Nightshade”, “Beans”, “Beetroot”, “Butternut-Squash”, “Cabbage”
- Grass – “Sudan-grass”, “Clover”, “Setaria”, “Sisal”
- Trees – “Coffee”, “Olive”, “Avocado”, “Coconut”, “Pear”, “Apple”, “Peach”, “Tea”, “Orange”, “Pineapple”

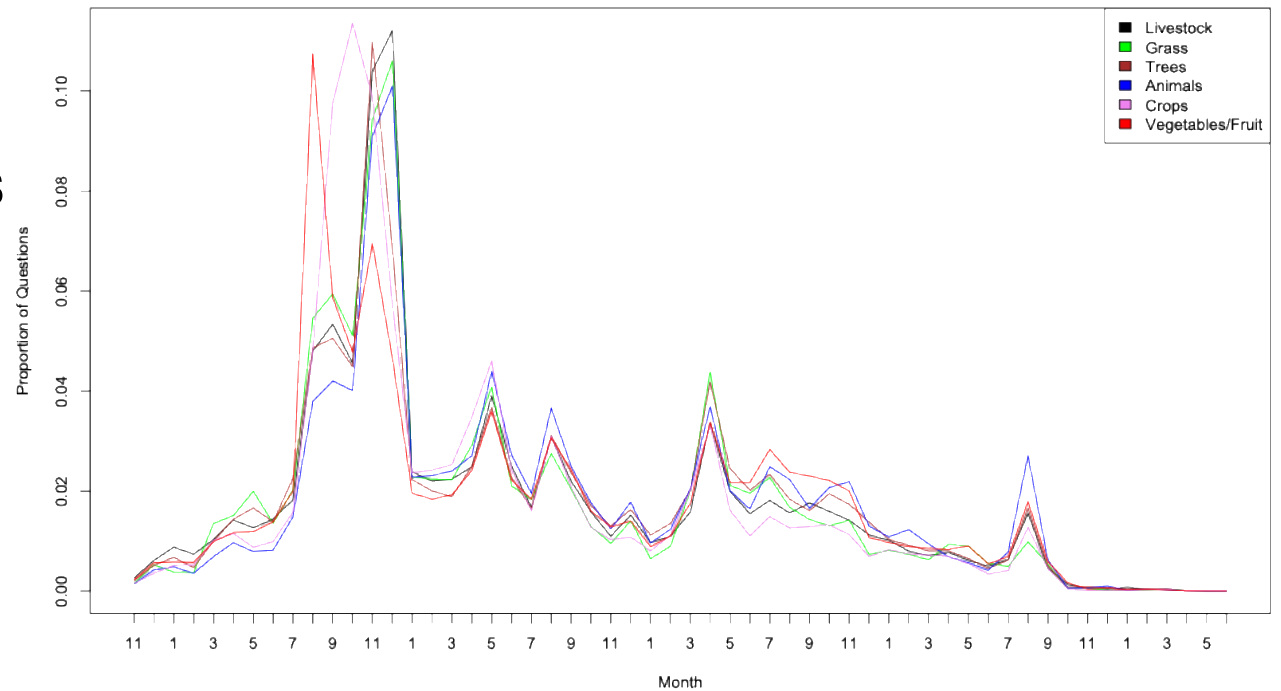
Number of question topics over time

- There was a peak in posts of all types in October and November of 2018.
- There were smaller peaks in the number of posts in June and August, 2018 and May, 2019.
- The highest number of posts across time was about livestock, followed by crops, and vegetables/fruits.



Percent of question topics over time

- The percent of all questions for each topic type appear in this figure.
- The pattern in these percentages over time is very similar to the total number of posts.
- These results suggest that for all topics most questions were asked early in the time period under consideration.



Tests for seasonality of question frequency

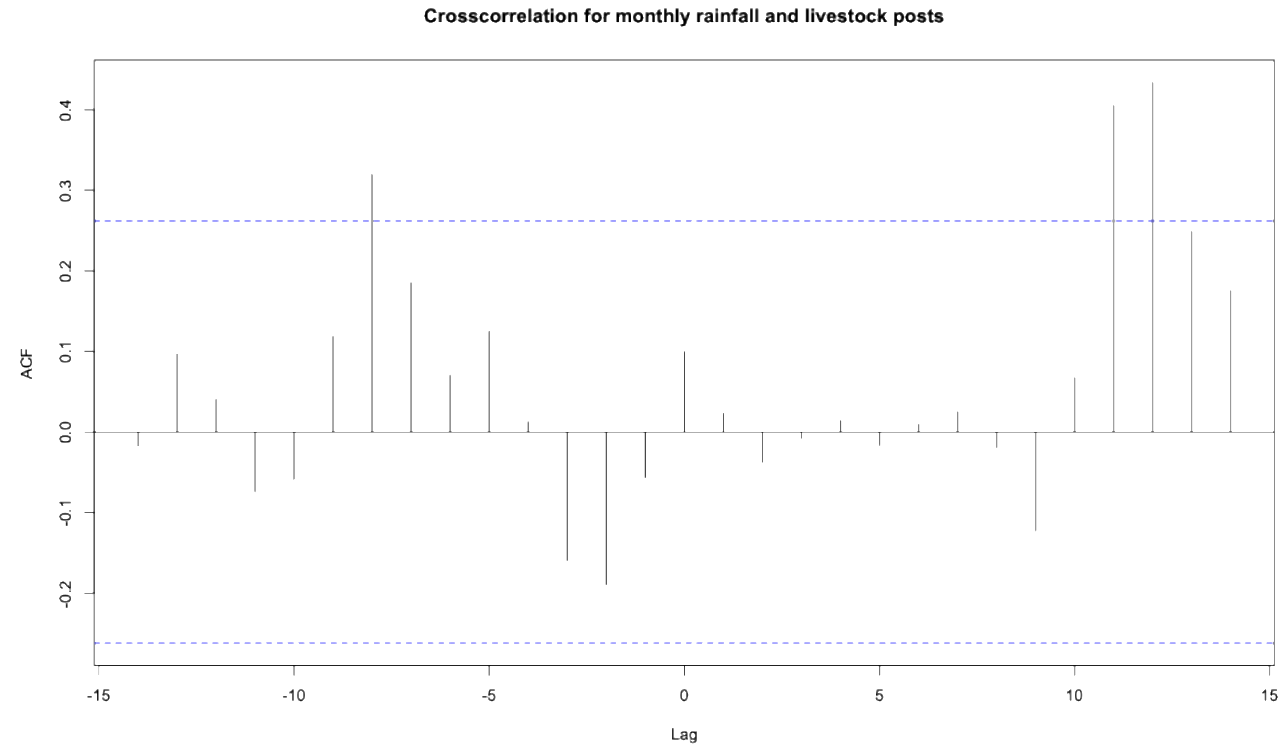
- A statistical test was used to ascertain whether there was evidence of seasonality in the number of posted questions.
- Seasonality was assessed using an approach described by Webel and Ollech (2019).
 - A nonseasonal time series model (ARIMA) was fit to the data.
 - The QS and Friedman's tests were applied to the residuals from this model.
 - If either test was statistically significant, seasonality was detected.
- No seasonality was detected for any of the question types included in the Farmers' posts.

Relationship between question frequency, monthly rainfall, and monthly rainfall anomalies

- In order to investigate the relationship between monthly rainfall, monthly rainfall anomalies, and question type, a cross-correlation function (CCF) was used.
- CCF estimates the correlation between the number of questions in each month and the monthly rainfall or monthly rainfall anomalies at different times.
- Correlations are estimated for the current month and for previous (lagged) months, which allows for examination of the impact of rain events in prior months and the current number of questions.

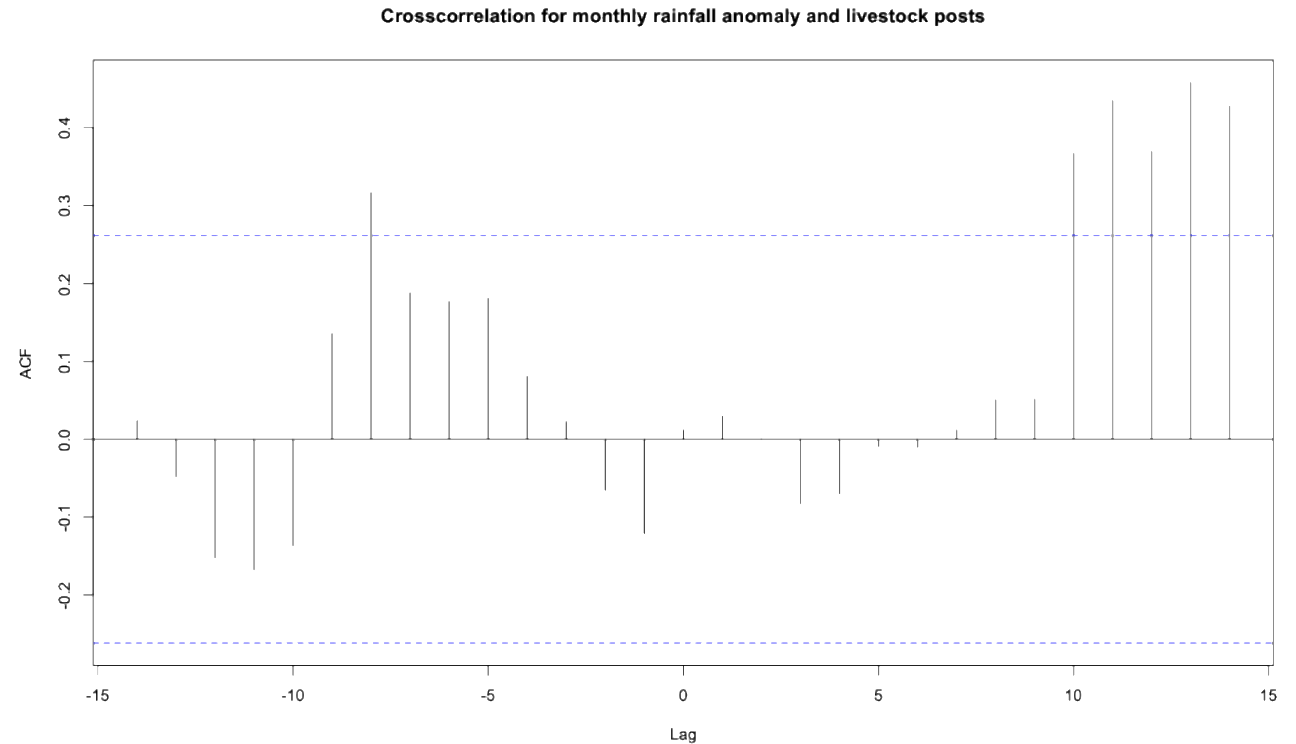
Relationship between question frequency and monthly rainfall: Livestock

- There were positive correlations between the current number of questions about livestock and rainfall one year earlier.
- These relationships are moderate in size.



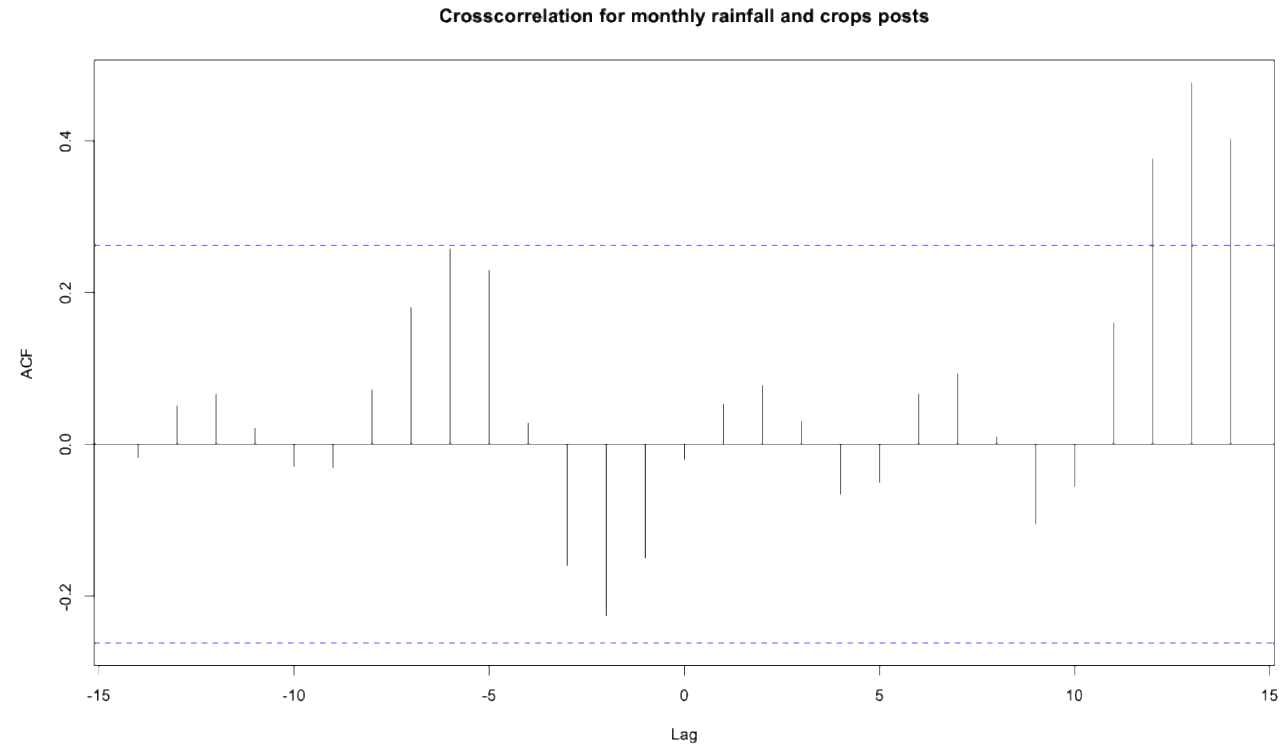
Relationship between question frequency and monthly rainfall anomaly: Livestock

- There were positive correlations between the current number of questions about livestock and rainfall anomalies 10 through 14 months earlier.
- These relationships are moderate in size.



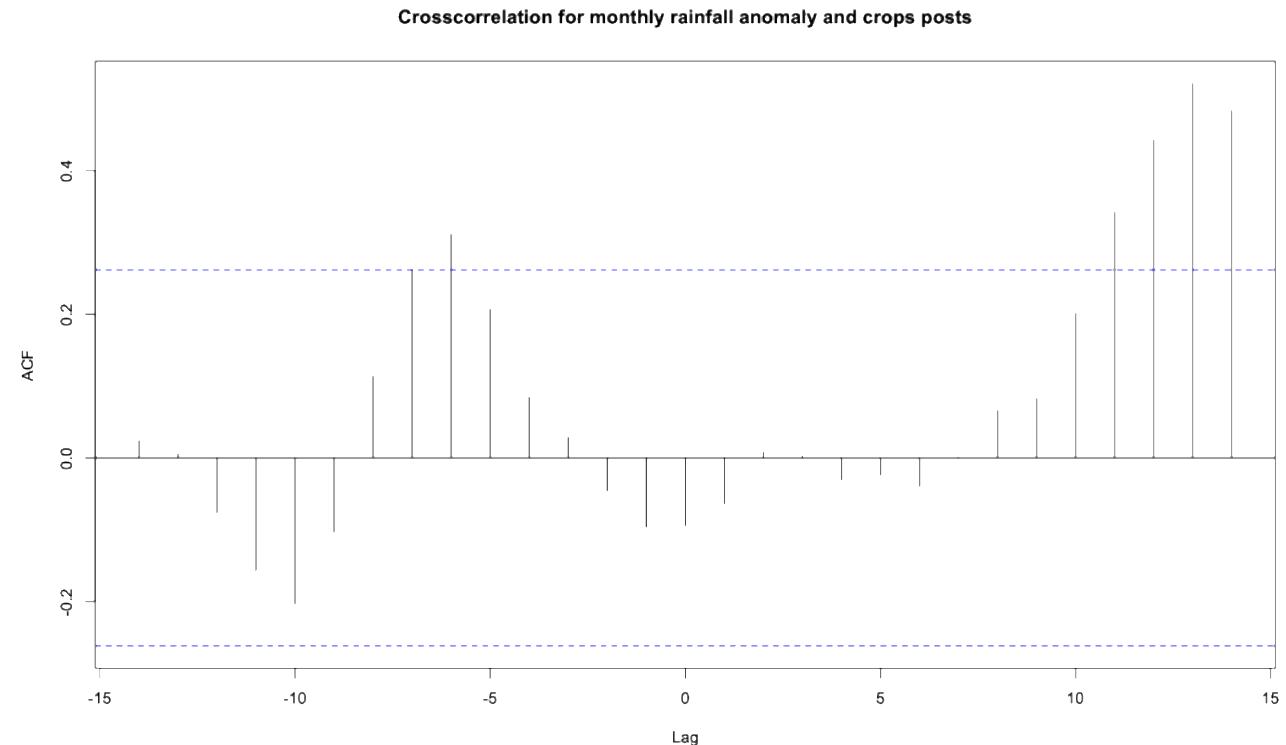
Relationship between question frequency and monthly rainfall: Crops

- There were positive correlations between the current number of questions about crops and rainfall one year earlier.
- These relationships are moderate in size.



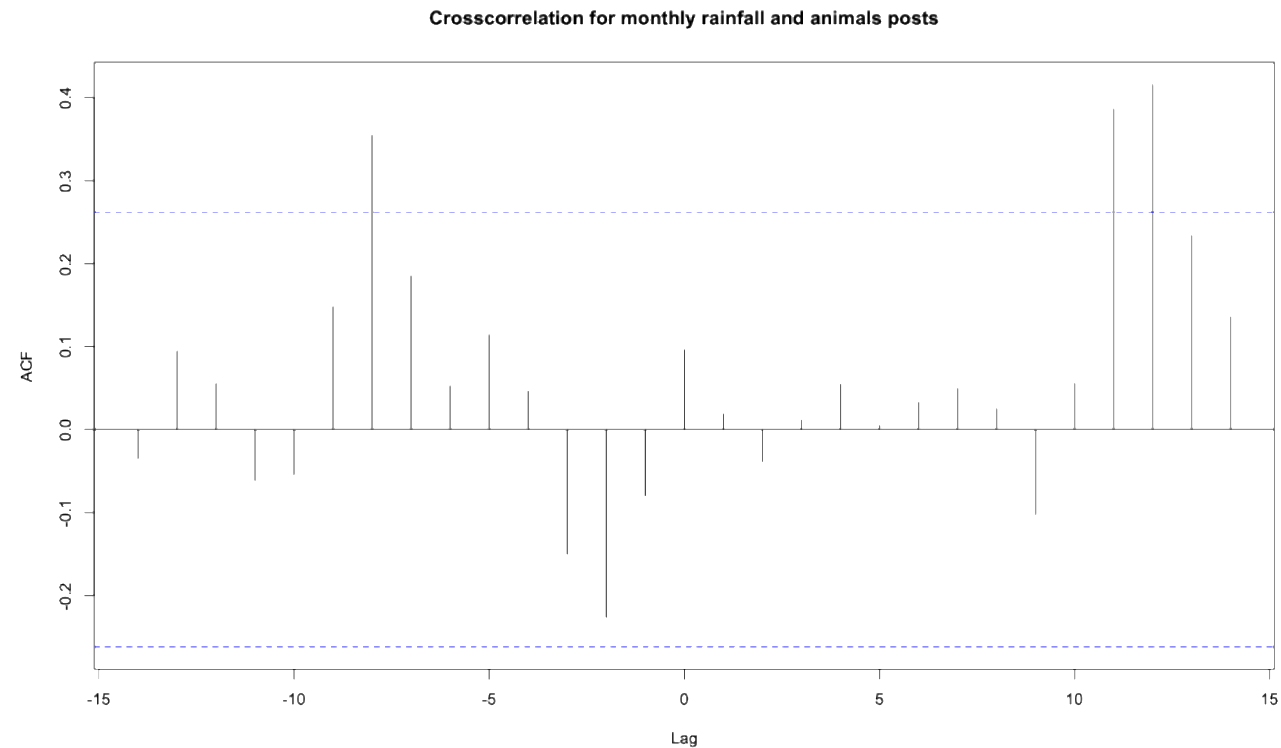
Relationship between question frequency and monthly rainfall anomaly: Crops

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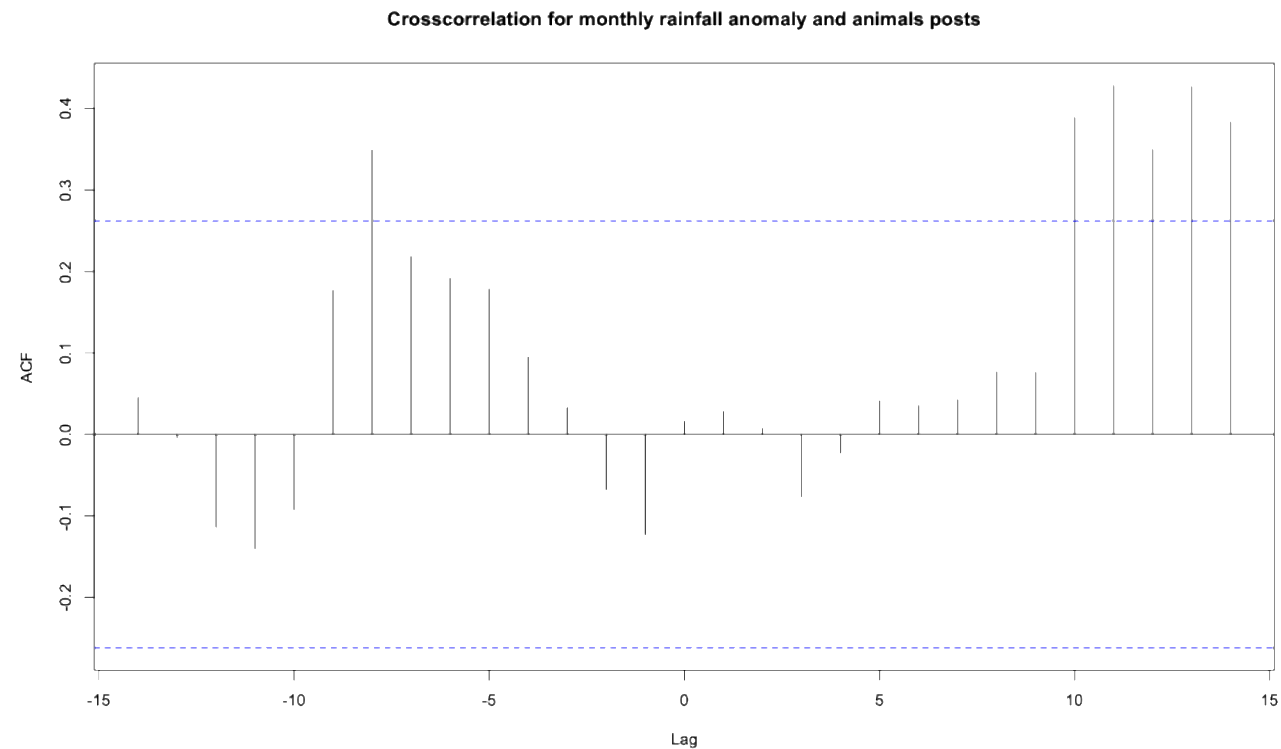
Relationship between question frequency and monthly rainfall: Non-livestock animals

- There were positive correlations between the current number of questions about crops and rainfall one year earlier.
- These relationships are moderate in size.



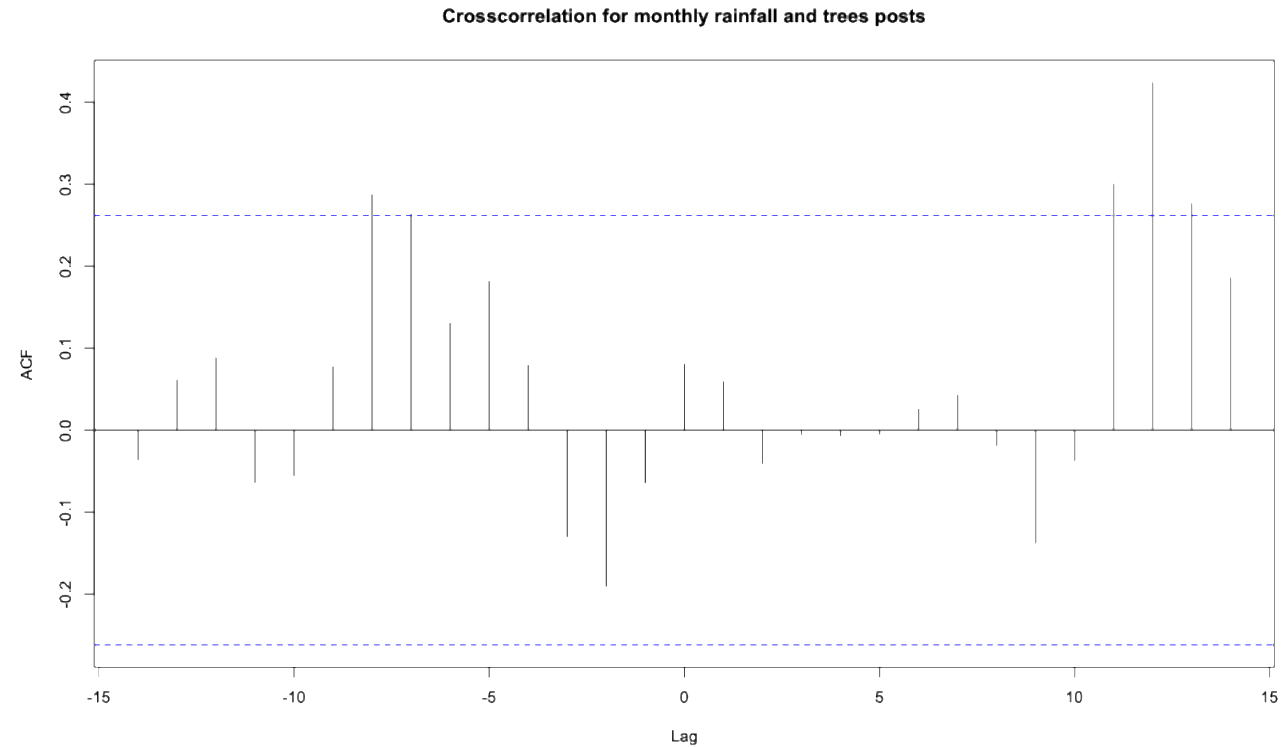
Relationship between question frequency and monthly rainfall anomaly: Non-livestock animals

- There were positive correlations between the current number of questions about non-livestock animals and rainfall anomalies 10 through 14 months earlier.
- These relationships are moderate in size.



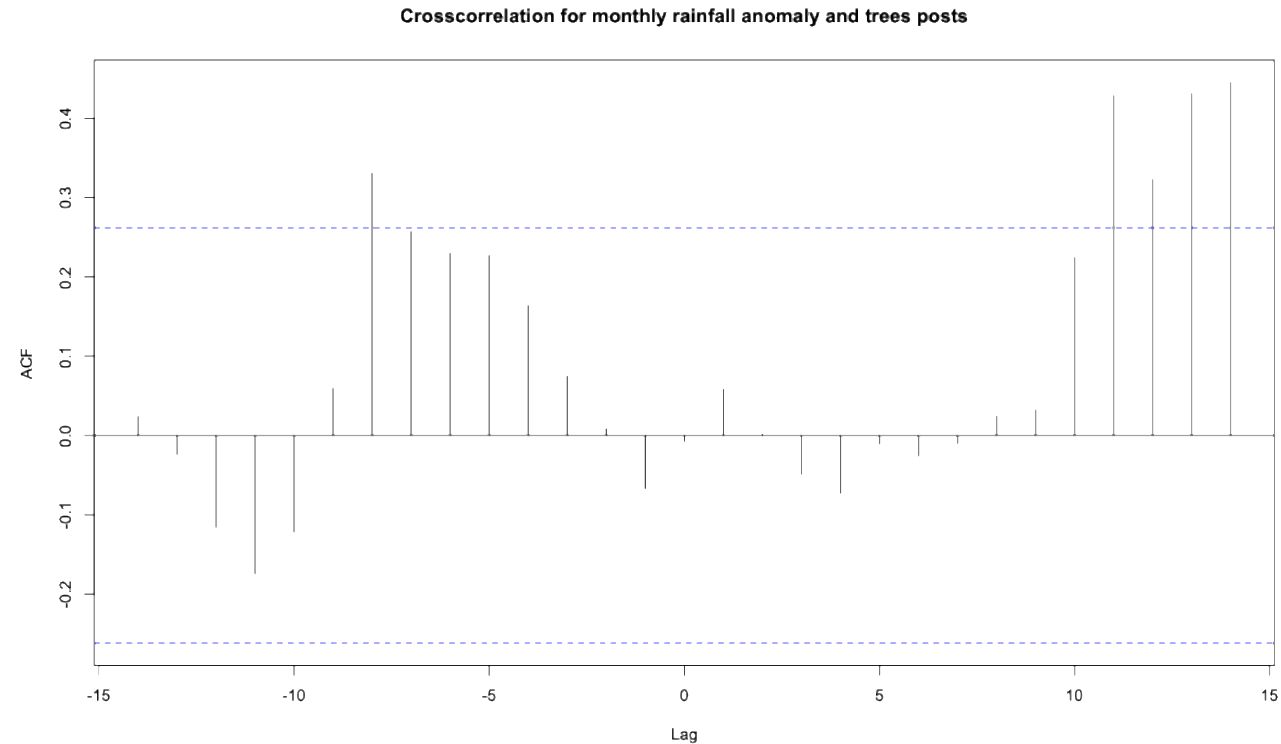
Relationship between question frequency and monthly rainfall: Trees

- There were positive correlations between the current number of questions about trees and rainfall one year earlier.
- These relationships are moderate in size.



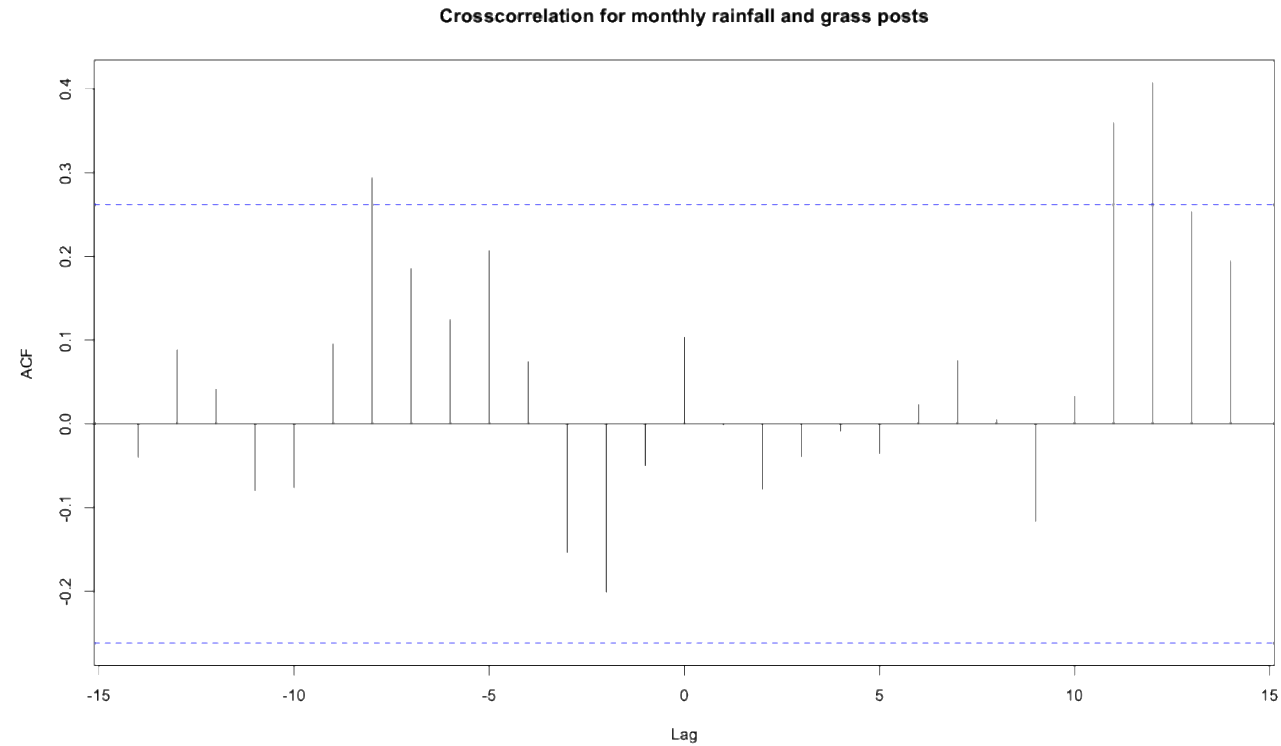
Relationship between question frequency and monthly rainfall anomaly: Trees

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- These relationships are moderate in size.



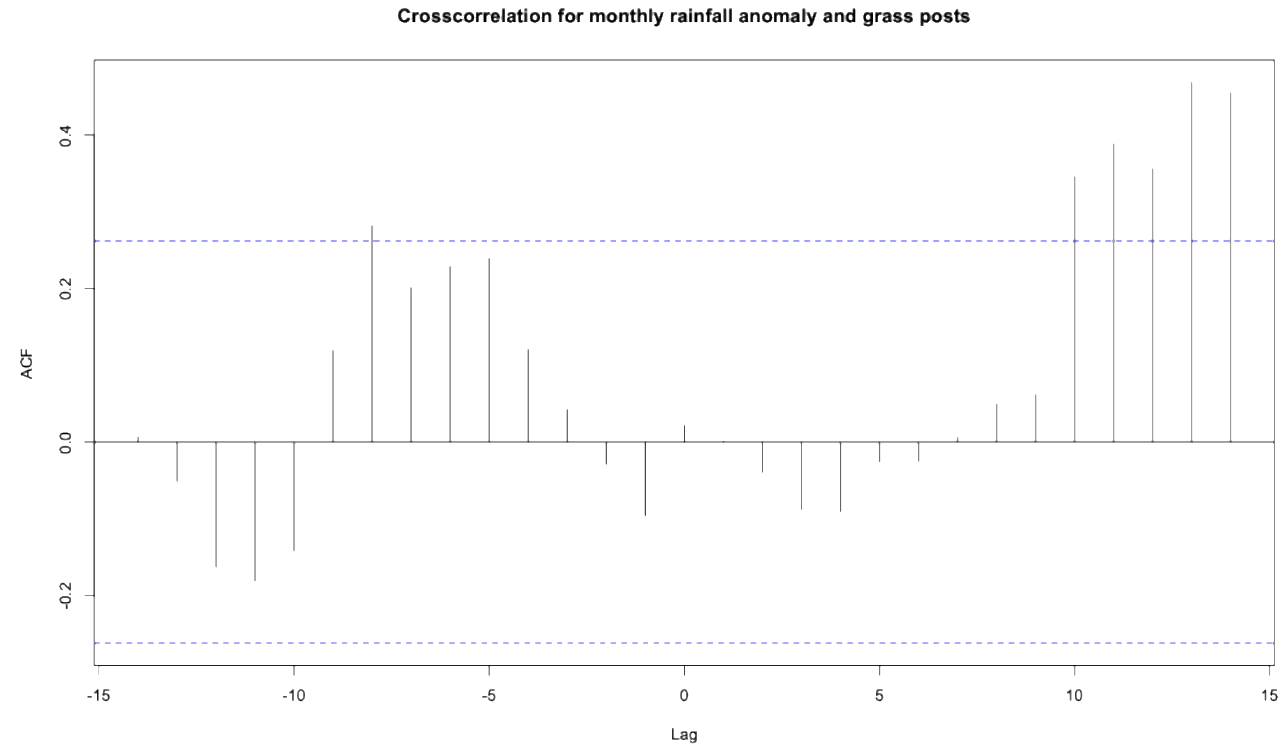
Relationship between question frequency and monthly rainfall: Grass

- There were positive correlations between the current number of questions about grass and rainfall one year earlier.
- These relationships are moderate in size.



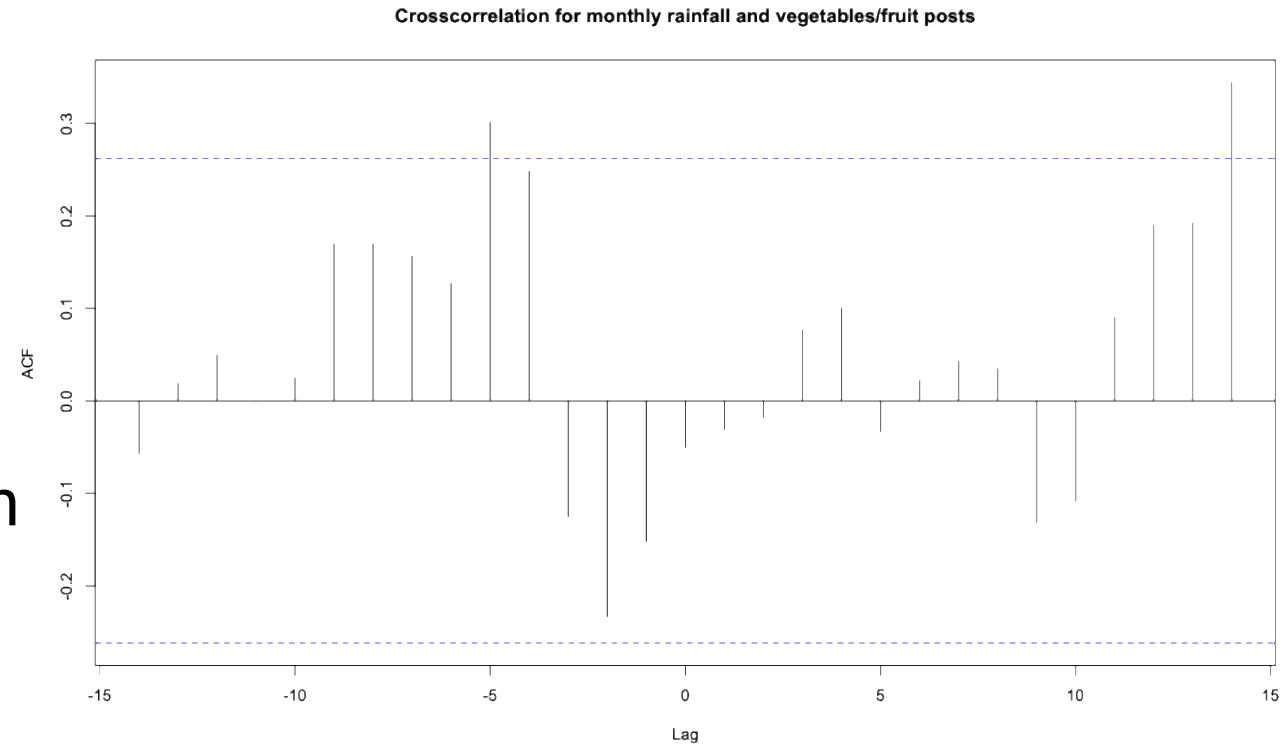
Relationship between question frequency and monthly rainfall anomaly: Grasses

- There were positive correlations between the current number of questions about grasses and rainfall anomalies 10 through 14 months earlier.
- These relationships are moderate in size.



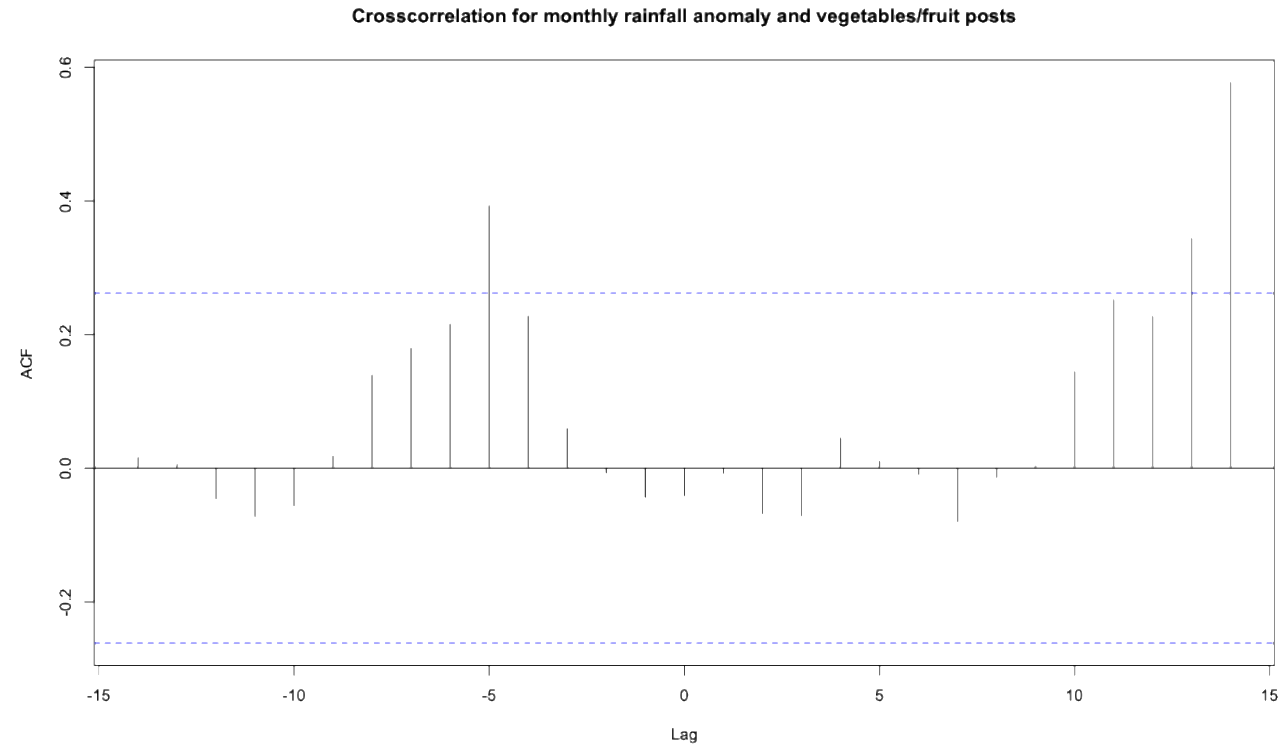
Relationship between question frequency and monthly rainfall: Vegetables/Fruits

- There was a positive correlation between the current number of questions about vegetables/fruits and rainfall 14 months earlier.
- This relationship is moderate in size.



Relationship between question frequency and monthly rainfall anomaly: Vegetables/Fruits

- There was a positive correlation between the current number of questions about vegetables/fruits and rainfall 14 months earlier.
- This relationship is moderate in size.



Summary

- Most of the questions were posted early in the time period under consideration.
- There were no clear seasonal patterns in the number of questions, regardless of topic.
- The most frequent questions were about livestock, crops, and vegetables/fruits.
- Questions at a specific date were moderately correlated with the amount of rain and rain anomalies that occurred a year earlier.