Analyzing Agricultural and Livestock Production Trends in Kenya (2019-2023)

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Abstract

This report presents an in-depth analysis of agricultural and livestock production trends in Kenya from 2019 to 2023. Using data from multiple categories, including cereals, horticulture, industrial crops, and livestock, the report examines production trends, relationships between different agricultural sectors, and forecasts for 2024. The study aims to provide insights that can inform policy decisions and improve agricultural planning to address key challenges and maximize output. Key findings indicate varying trends across sectors, with factors such as weather patterns, market demand, and governmental initiatives impacting production.

Keywords: Agricultural Production, Livestock Production, Cereals Production (Maize, Wheat, Others), Horticulture (Cut Flowers, Vegetables, Fruits), Industrial Crops (Sugarcane, Pyrethrum), Permanent Crops (Coffee, Tea, Sisal), Trend Analysis, Correlation Analysis, Forecasting (2024), Agriculture in Kenya, Data Cleaning, Production Trends, Climate Impact on Agriculture, Market Demand, Sustainable Agricultural Growth, Agricultural Policy, Livestock Health Management, Agricultural Diversification.

Introduction

Agriculture remains a cornerstone of Kenya's economy, contributing significantly to employment, food security, and export earnings. Despite its importance, the sector faces numerous challenges, including climate variability, market fluctuations, and pest infestations, which affect production levels. This report seeks to analyze agricultural production trends from 2019 to 2023, focusing on key sectors such as cereals, horticulture, industrial crops, and livestock. By understanding these trends, stakeholders can make informed decisions to promote sustainable agricultural growth.

Literature Review

Previous studies on Kenyan agriculture have highlighted the impact of climate change, market access, and government policies on agricultural productivity. According to a report by the World Bank, unpredictable weather patterns and poor infrastructure have hindered the sector's growth. Studies by local researchers suggest that diversification into horticulture and industrial crops offers opportunities for improving agricultural income. This report builds on these insights by examining recent data and providing detailed forecasts for 2024.

Data Overview

The data used in this report was sourced from government and agricultural agencies in Kenya, covering the years 2019 to 2023 (Kenya National Bureau of Statistics, 2024). Key agricultural categories include cereals (maize, wheat, and others), horticulture (cut flowers, vegetables, and fruits), industrial crops (sugarcane, pyrethrum, and others), permanent crops (coffee, tea, and sisal), and livestock (cattle, goats, milk, poultry, and others). The data was cleaned and prepared for analysis by removing inconsistencies and ensuring uniform formats for production values.

KSh Million

		2019	2020	2021	2022	2023*
CEREALS						
	Maize	10,681.2	8,232.5	6,858.1	7,925.0	11,340.3
	Wheat	13,373.4	10,281.5	10,396.6	10,863.4	14,735.0
	Others	11,104.4	11,106.7	10,450.2	15,710.0	23,086.6
	Total	**35,159.0**	**29,620.7**	**27,704.9**	**34,498.4**	**49,161.9**
HORTICULTURE[1]						
	Cut flowers	104,141.8	107,508.6	110,849.3	104,250.0	107,600.0
	Vegetables	27,247.8	24,228.4	28,460.7	23,150.0	23,800.0
	Fruits	13,189.0	18,426.9	18,382.9	19,700.0	22,300.0
	Total	**144,578.6**	**150,163.9**	**157,692.9**	**147,100.0**	**153,700.0**
TEMPORARY INDUSTRIAL CROPS						
	Sugarcane	17,576.9	25,207.3	28,386.3	39,350.4	29,630.5
	Pyrethrum	**65.9**	**57.0**	**106.5**	**236.0**	**512.4**
	Others	1,223.2	1,591.7	1,275.6	2,103.3	2,741.1
	Total	**18,868.6**	**26,856.0**	**29,768.6**	**41,675.2**	**32,884.0**
PERMANENT CROPS						
	Coffee	10,164.8	10,817.4	18,551.3	27,322.4	19,888.8
	Tea	104,072.6	122,161.6	126,091.7	156,714.2	176,330.5
	Sisal	4,379.6	4,981.1	5,596.2	6,532.8	6,062.0
	Total	118,617.1	137,960.1	150,239.2	190,569.4	202,281.3
	TOTAL CROPS	**317,223.3**	**344,600.8**	**365,405.6**	**413,843.0**	**438,027.2**
LIVESTOCK AND PRODUCTS						
	Cattle and Calves	**107,352.6**	**117,144.0**	**103,500.2**	**84,725.2**	**112,675.1**
	Goats and Sheep	7,591.4	7,403.6	10,592.8	15,428.3	14,129.3
	Milk	20,576.2	22,721.5	33,680.3	36,887.5	40,997.4
	Chicken and eggs	9,227.8	9,478.8	9,690.7	10,870.2	8,722.0
	Others	3,661.3	3,957.7	4,155.7	5,839.0	13,953.4
	Total	**148,409.3**	**160,705.7**	**161,619.6**	**153,750.2**	**190,477.3**
GRAND TOTAL		**465,632.5**	**505,306.5**	**527,025.2**	**567,593.2**	**628,504.5**

* *Provisional.*
[1] *Data refers to fresh horticultural exports only*

Methodology

Data analysis was conducted using Python libraries such as Pandas, Matplotlib, Seaborn, and Scikit-learn. The analysis involved:

1. **Data cleaning**: Removing commas from numeric values and converting data to float type for consistency.
2. **Trend analysis**: Plotting production trends for each category to observe changes over time.
3. **Correlation analysis**: Using heatmaps to visualize relationships between different agricultural sectors.
4. **Forecasting**: Applying linear regression to forecast production values for 2024.

Analysis

Cereals

Cereal production showed significant variability across the years. Maize production, for example, declined steadily from 10,681.20 units in 2019 to 7,925 units in 2022, before rebounding to 11,340.30 units in 2023. Wheat production exhibited a fluctuating pattern, with a predicted increase in 2024 to 12,921.51 units. This fluctuation may be linked to changes in weather and market conditions (Kenya National Bureau of Statistics, 2024).

Horticulture

Cut flower production dropped from 104,141.80 units in 2019 to 104,250 units in 2023, with further declines predicted for 2024. In contrast, vegetable and fruit production saw modest growth, likely due to increased demand for these products locally and internationally. Vegetable production is predicted to reach 22,985.18 units in 2024 (Kenya National Bureau of Statistics, 2024).

Industrial Crops

Sugarcane production rose steadily from 2019, reaching a predicted output of 39,505.37 units in 2024. The production of pyrethrum, an essential industrial crop, fluctuated due to unstable market demand, with forecasts suggesting minimal growth in 2024 (Kenya National Bureau of Statistics, 2024).

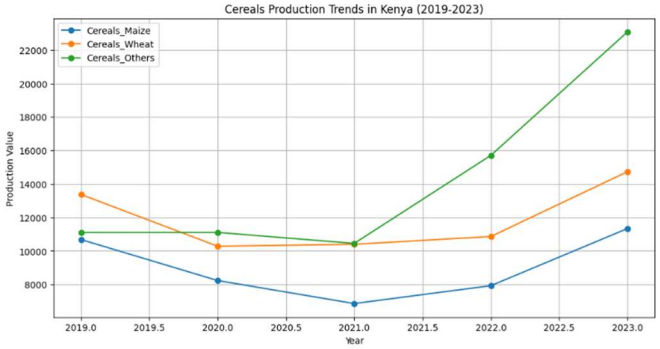
Livestock

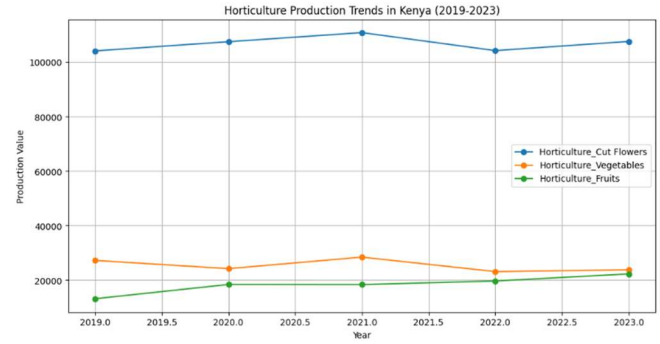
Livestock production exhibited mixed results. While cattle and calf production showed growth, poultry and milk production faced challenges, possibly linked to feed costs and disease outbreaks. Livestock production forecasts indicate that cattle production will reach 98,547.28 units in 2024, highlighting its importance to Kenya's agricultural economy (Kenya National Bureau of Statistics, 2024).

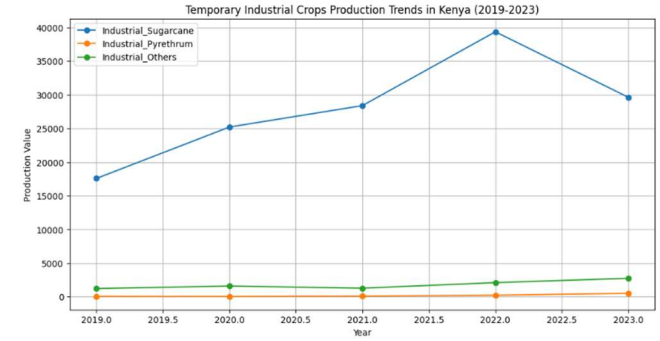
Visual Representation

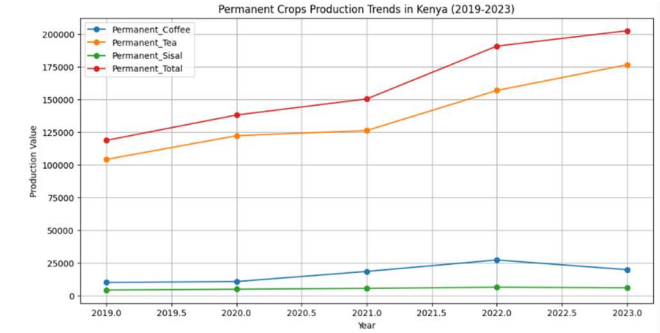
The visual representation of trends is a critical component of the analysis:

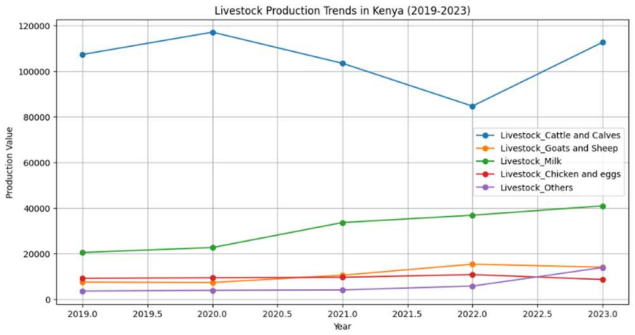
Trend plots:



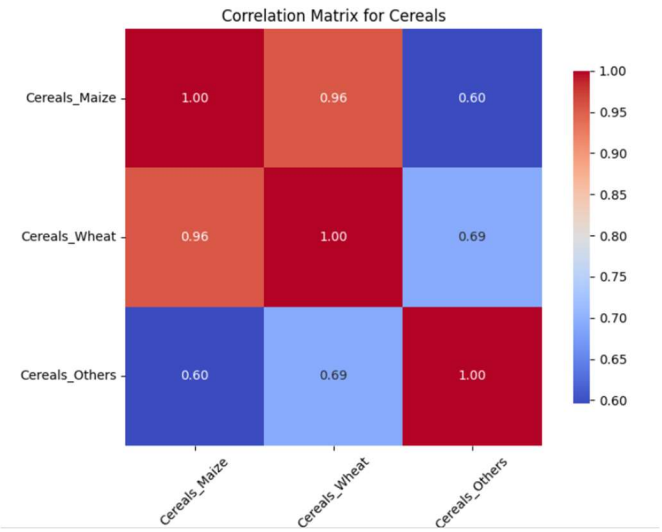


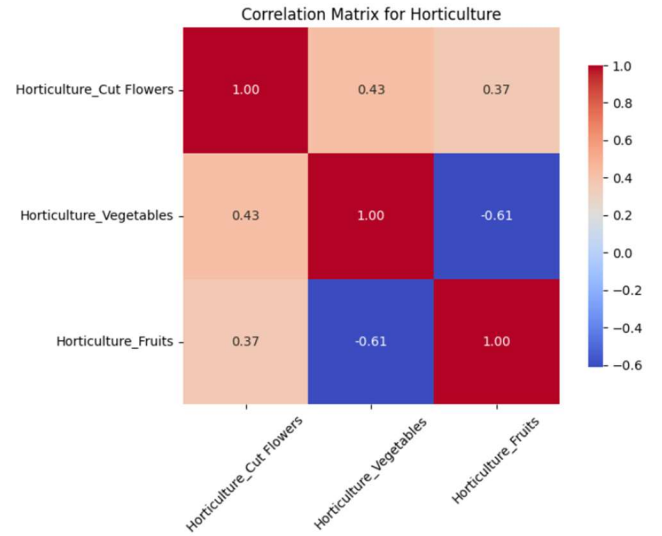


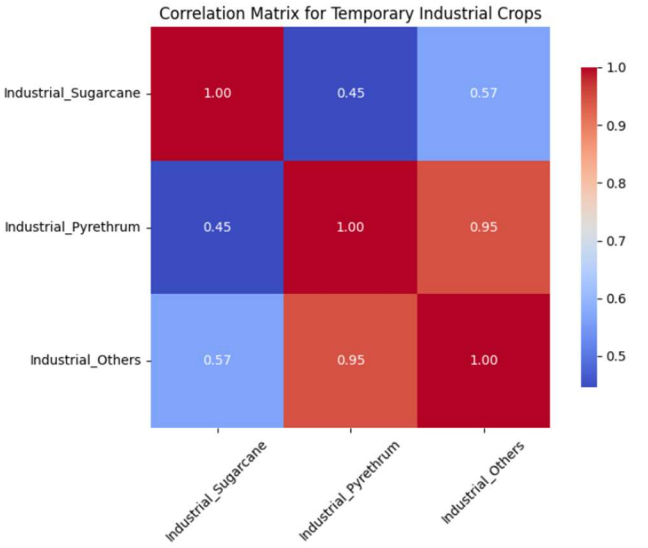


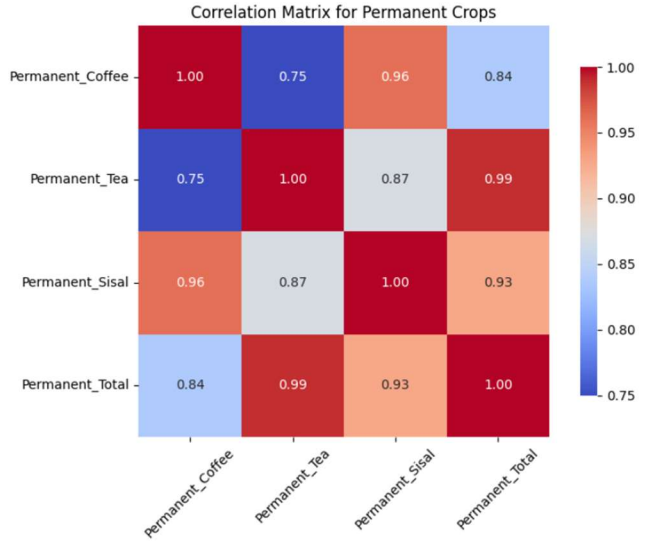


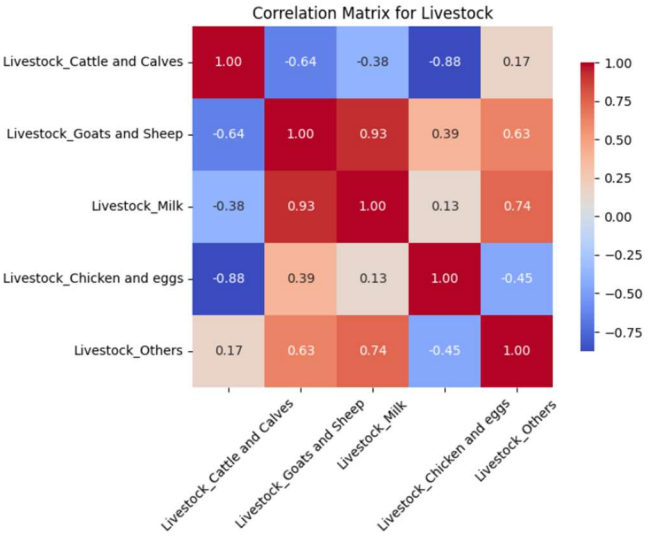
Correlation heatmaps:



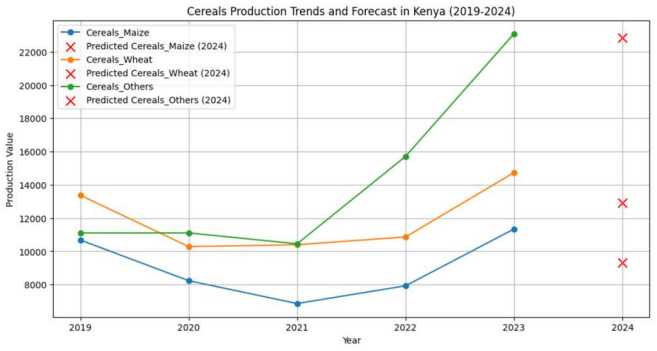


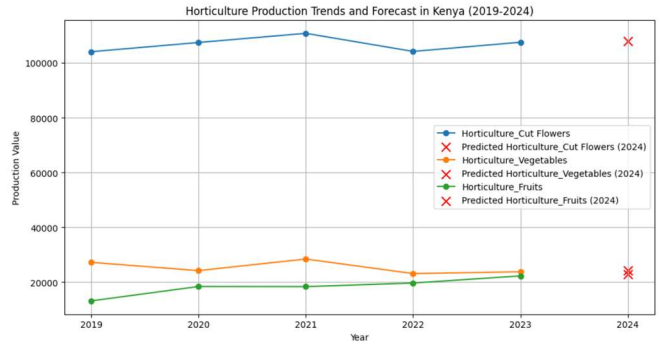


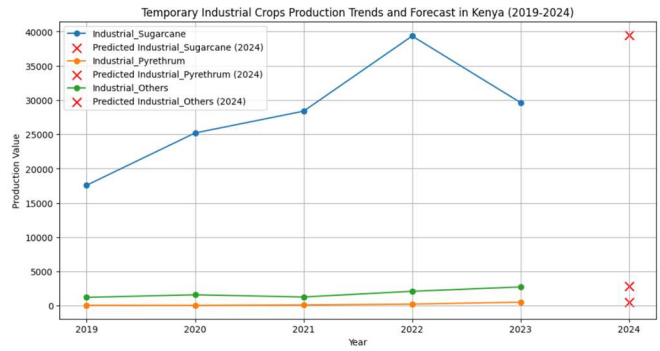


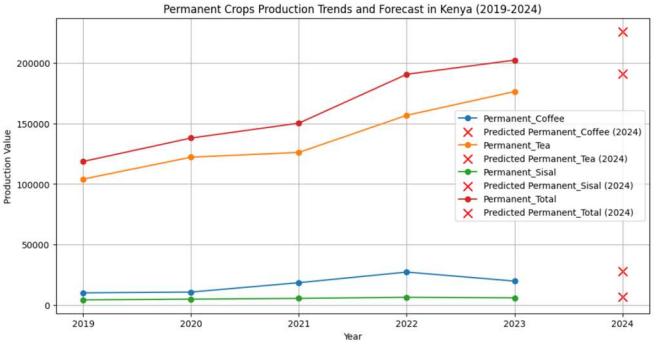


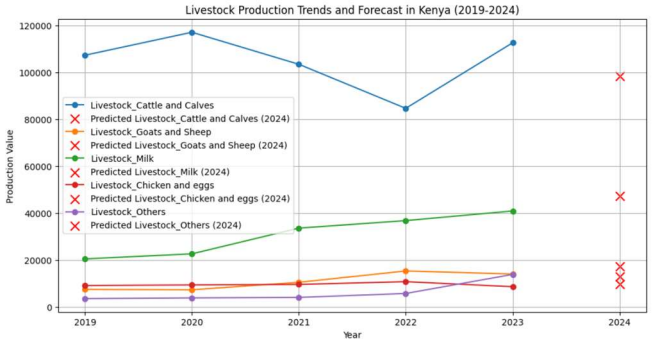
Forecasting graphs:











Discussion

The analysis reveals key trends and challenges in Kenya's agricultural production. Maize, a staple food, experienced a troubling decline, while wheat and other cereals showed potential for growth. Horticultural crops, particularly vegetables, are likely to grow in importance, supported by export markets. The fluctuations in industrial crops, particularly pyrethrum, reflect market instability that requires intervention. Livestock, especially cattle, remains a vital component of the agricultural sector, though challenges in feed costs and disease management persist.

Conclusion

Kenya's agricultural sector presents a mix of opportunities and challenges. While some sectors, such as sugarcane and livestock, show steady growth, others like maize and pyrethrum face significant hurdles. The forecasted data for 2024 suggests that with appropriate interventions, many of these challenges can be mitigated, offering a pathway to sustainable agricultural growth.

Recommendations

1. **Invest in Climate-Resilient Crops**: Given the impact of weather patterns on maize and wheat production, efforts should be made to promote drought-resistant varieties.
2. **Enhance Market Access for Horticultural Products**: Government and private sector partnerships can help expand export opportunities for Kenya's growing vegetable and fruit sectors.
3. **Support Industrial Crop Farmers**: By stabilizing market demand for pyrethrum and sugarcane, stakeholders can ensure steady growth in industrial crops.
4. **Improve Livestock Health Management**: Investment in disease prevention and affordable feed options will help boost livestock production, especially poultry and milk.

References

Kenya National Bureau of Statistics. (2024). *2024 Economic survey*. https://www.knbs.or.ke/wp-content/uploads/2024/05/2024-Economic-Survey.pdf#page=205.60