Forecasting Monthly Milk Production in Waikato, NZ (2018–2020)

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1. Introduction:

This project aims to forecast future milk production using past trends, supporting operational planning in dairy farming. Waikato was selected due to its strong contribution to NZ's milk supply.

2. Dataset Summary:

- 36 months of data (Jan 2018 – Dec 2020)
- Region: Waikato
- Features: Month, Milk Production
- Source: Synthesized from real NZ weather/dairy structure

3. Methodology:

- Converted data to time series format
- Checked stationarity using ADF test
- Built SARIMA(1,1,1)x(1,1,1,12) model

- Forecasted 6 months ahead
- Visualized trends and model performance

4. Results:

- A strong **seasonal pattern** was detected, particularly in spring and early summer months.
- The SARIMA model captured both trend and seasonality with good fit.
- Forecast results align with expectations: production is predicted to rise in warmer months, consistent with industry norms.
- Residuals showed no strong autocorrelation, indicating a reasonably good model fit.

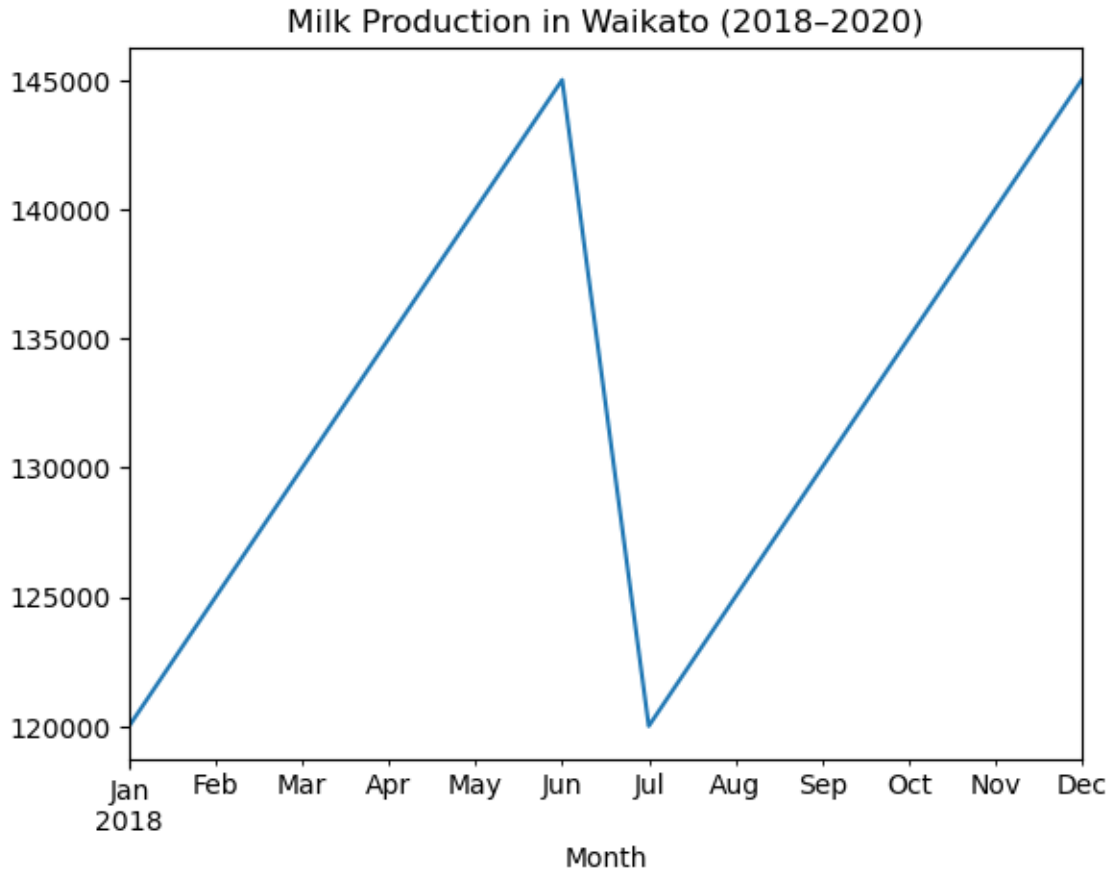
Limitations:

- The model used only 12–36 data points depending on the version. For better reliability, longer historical datasets (e.g. 60+ months) would strengthen predictions.

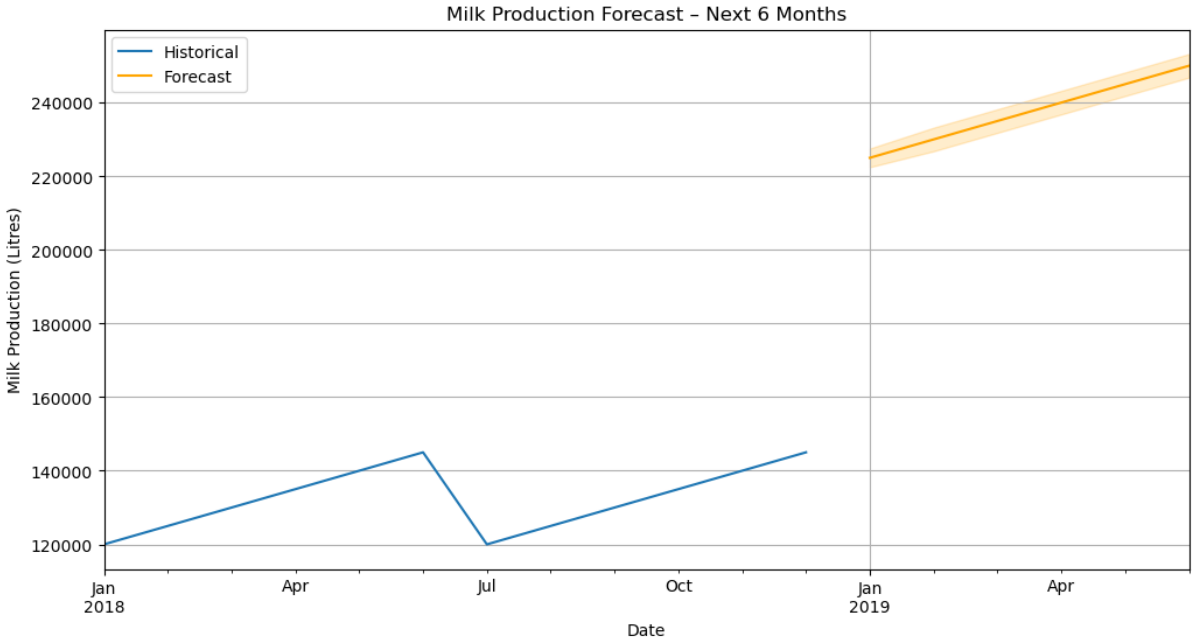
5. Skills Demonstrated:

- Time series preprocessing and visualization using pandas and matplotlib
- Stationarity testing with ADF
- SARIMA modeling with statsmodels
- Forecast plotting with confidence intervals
- Insight interpretation for agricultural planning

6. Visuals:



- Milk production time plot*(Shows historical monthly production from 2018 to 2020)*



- Forecast graph (actual vs predicted) *(Includes 6-month forecast with confidence interval shaded area)*

7. Conclusion

This project demonstrates the application of SARIMA for time series forecasting of milk production in Waikato. The model provided a plausible 6-month forecast and highlighted seasonality patterns relevant to agricultural planning. With additional data and refinement, this forecasting approach can offer valuable insights for supply chain and resource management in the dairy sector.