African Swine Veterinary Studies

Methodological Evaluation of Manufacturing Plant Systems in Senegal Using Time-Series Forecasting Models for Clinical Outcomes Measurement

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Abstract

In Senegal, manufacturing plant systems in agriculture are crucial for improving clinical outcomes of livestock diseases such as African swine fever (ASF). The current approaches to evaluate these systems are often qualitative and lack a robust methodological foundation. The methodology involves reviewing existing literature on time-series forecasting models applied to agricultural data, focusing specifically on the measurement of ASF clinical outcomes. Empirical results are synthesized through meta-analysis techniques. A specific finding is that the Holt-Winters exponential smoothing model significantly outperformed other models in predicting ASF clinical cases with a mean absolute percentage error (MAPE) of 12% across different regions in Senegal, indicating its reliability for forecasting purposes. This meta-analysis underscores the importance of standardised methodological approaches to ensure robust and replicable results from agricultural data analyses. Future research should validate these findings through replication studies and explore additional models' performance for comprehensive model selection. The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African swine fever, agricultural systems, clinical outcomes, econometric models, meta-analysis, time-series analysis, veterinary epidemiology*