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Potential of an Animal Price Monitoring System to Support Prediction of Foot and Mouth Disease Outbreaks

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Background and Objective

Foot and Mouth Disease (FMD) is a highly contagious viral disease that affects cloven-hoofed animals and causes substantial economic losses both in Thailand and worldwide. In Thailand, FMD is endemic, with outbreaks occurring almost every year, leading to disruptions in livestock trade and reductions in productivity. Although livestock prices are known to fluctuate during disease events, their potential as early warning indicators for FMD outbreaks has not been widely explored in the country. This study employed cross-correlation analysis to investigate whether changes in monthly cattle prices could serve as a signal for forthcoming increases in reported FMD outbreaks.

Methods

Data Sources

- **Cattle prices**: Monthly farm-gate price data from the Department of Livestock Development (DLD) and the Office of Agricultural Economics, Thailand.
- **FMD outbreaks**: Monthly outbreak counts from the World Organisation for Animal Health (WOAH) World Animal Health Information System (WAHIS).

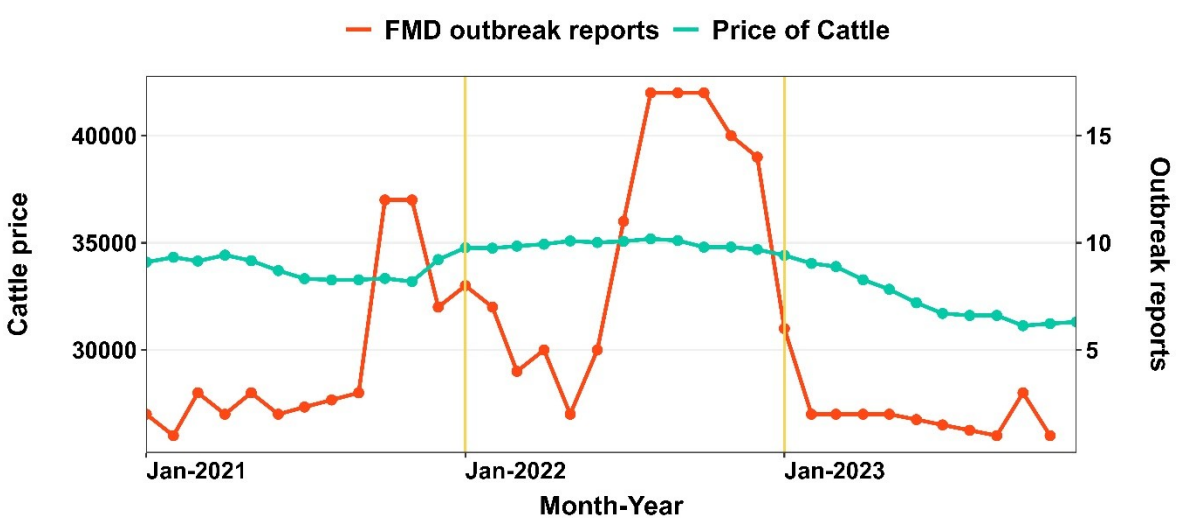
Study Period

- January 2021 – December 2023 (primary dataset).
- January – September 2024 (extended dataset for validation).

Analytical Approach

- This study applied cross-correlation analysis, setting cattle price as the predictor and FMD outbreak reports as the outcome.
- Negative time lags were examined to identify whether price changes occurred *before* changes in outbreak number of outbreak reports.

Results

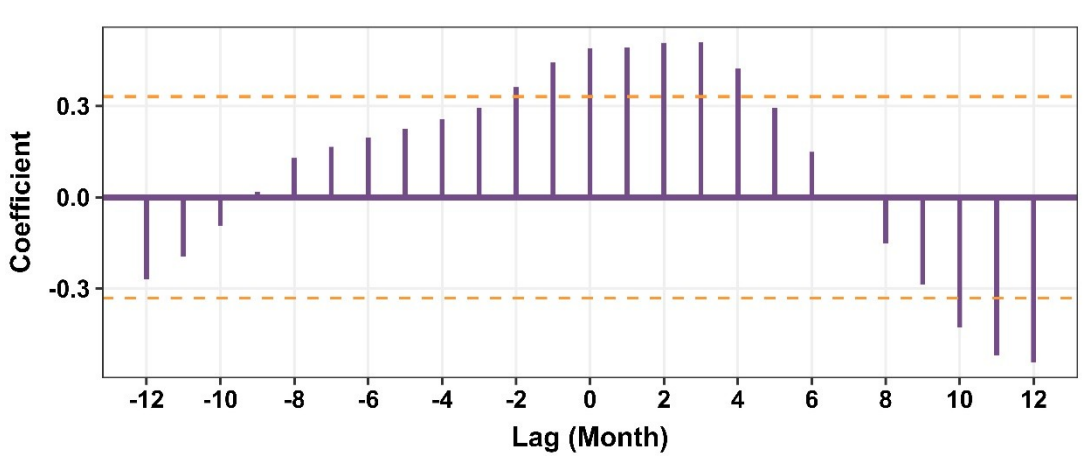


Outbreak & Price Trends

- Cattle prices showed moderate fluctuations in 2021–2022, followed by a gradual decline through 2023.
- FMD outbreaks displayed fluctuations, with notable increases in late 2021 and late 2022, and fewer reports in 2023.

Price–Outbreak Relationship

- Significant cross-correlations were found at lag −1 and lag −2 months: an increase in cattle prices this month signals a rise in FMD outbreak reports within the next two months.
- In the extended dataset (2024), these negative-lag correlations persisted, indicating stability in the association.



Discussion

This study demonstrated that cattle prices can serve as a practical early warning indicator for FMD outbreaks in Thailand.

Possible explanations:

1. Increased animal movement and trade when prices rise, raising transmission risk.

2. Reporting delays between outbreak onset and official confirmation, making earlier market signals detectable.

Take-home message

This study applied cross-correlation to reveal that rising cattle prices can signal increases in FMD outbreak reports 1–2 months later in Thailand.

Integrating animal price monitoring into the national surveillance system could enhance early warning capacity and support timely FMD control interventions.

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