DETECTION OF PORCINE DNA IN SOY SAUCE USING REAL-TIME POLYMERASE CHAIN REACTION (qPCR)

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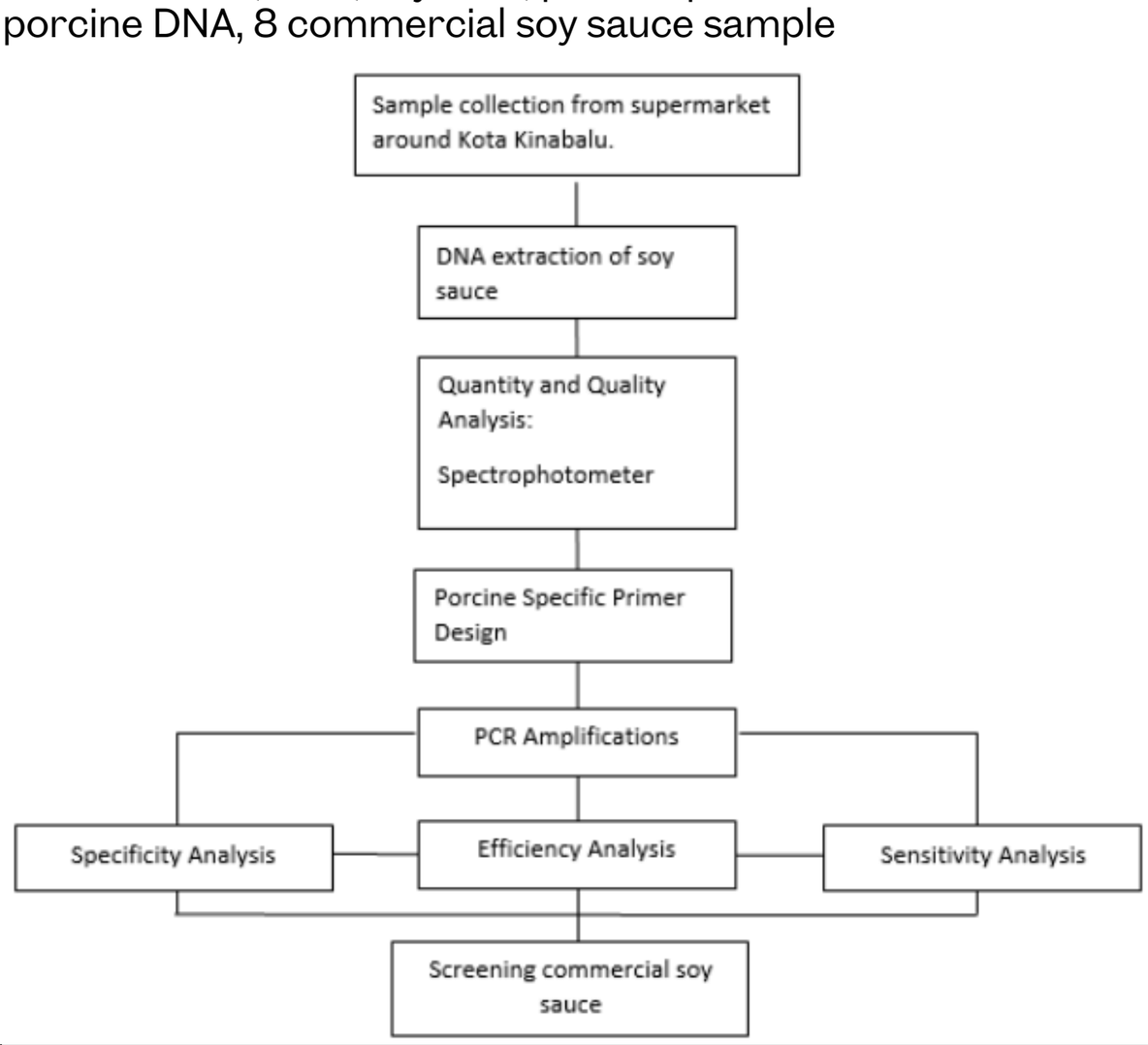
INTRODUCTION

- Soy sauce is widely consumed in Asia and is at risk of food adulteration, including undeclared porcine-derived ingredients.
- Protein and lipid detection methods perform poorly in processed/fermented foods like soy sauce due to degradation.
- Real-Time PCR (qPCR) provides a fast, sensitive, and specific method to detect trace DNA in processed foods.
- This study validates a SYBR Green Real-Time PCR assay for detecting porcine DNA in soy sauce.

METHODOLOGY

Raw Materials
Chicken meat, beef, soybean, pork as positive control for porcine DNA, 8 commercial soy sauce sample



CONCLUSION

SYBR Green Real-Time PCR **successfully detects porcine DNA** with high sensitivity and specificity. **No porcine** DNA was detected in the eight halal-labelled commercial soy sauce samples. This method is suitable for **halal verification**, food authenticity testing, and regulatory enforcement."

LIMITATIONS & RECOMMENDATIONS

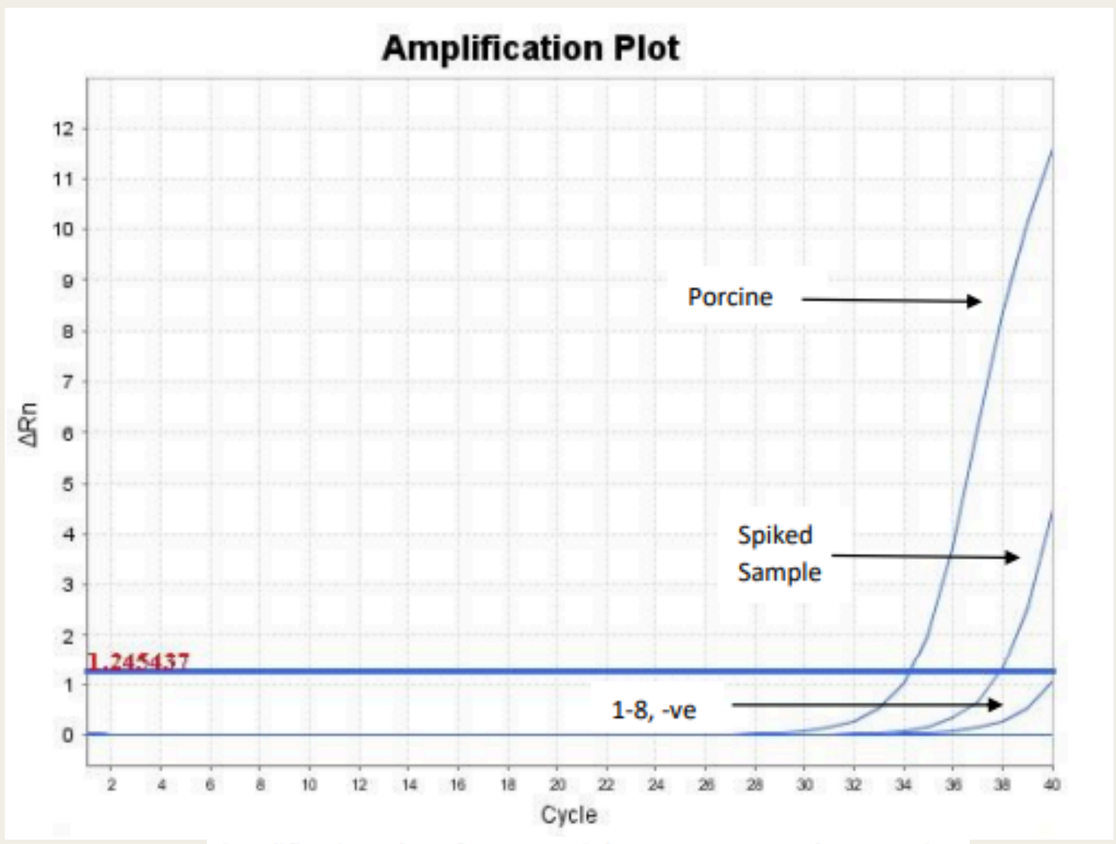
Soy sauce's fermented matrix reduces DNA purity and may inhibit Real-Time PCR amplification.
Future work should optimise DNA extraction for fermented foods and expand screening to more commercial samples.

OBJECTIVES

1. To evaluate quality and quantity of DNA extracted from soy sauce.
2. To determine specificity, sensitivity, and efficiency of PCR assay for porcine DNA detection in soy sauce.
3. To screen porcine DNA amplification in commercial soy sauce in the market in Kota Kinabalu.

RESULTS AND CONCLUSIONS

1. DNA Extraction
   - Raw materials produced **high-quality DNA** (A260/280 = 1.78–1.98).
   - Soy sauce samples gave **lower DNA concentration** (9–20 ng/µL) due to fermentation matrix inhibitors.
2. Primer Specificity
   - Only **porcine DNA amplified** (Ct ~19.78).
   - No amplification for chicken, beef, soybean, or NFW. → Primers are **100% species-specific**.
3. Sensitivity (LOD)
   - Detection limit: **0.001 ng/µL** porcine DNA.
   - Ct increases as concentration decreases. →Indicates high assay sensitivity suitable for trace detection.
4. PCR Efficiency
   - **R^2 = 0.9986**
   - **Efficiency = 79.8%** (acceptable for food samples)



Amplification plot of commercial soy sauce sample screening

5. Screening of Commercial Soy Sauce
   - All 8 samples: **No porcine DNA detected** (Ct undetermined).
   - Spiked soy sauce control amplified at Ct **33.19**, confirming assay validity.