Detection of Porcine DNA in Processed Foods by Real-Time PCR for Halal Authentication

Application

Qualitative screening of porcine DNA in processed foods for halal authentication. The published reference study demonstrated detection across diverse processed-food matrices and subsequently applied the method to commercial food products

Instrument

LIGHTGene 9600 Real-Time PCR System. In the LIGHTGene software, use the Absolute experiment type for amplification/Ct analysis. The intended analytical output for this application is qualitative: Porcine DNA Detected / Not Detected / Invalid, rather than absolute copy-number reporting.

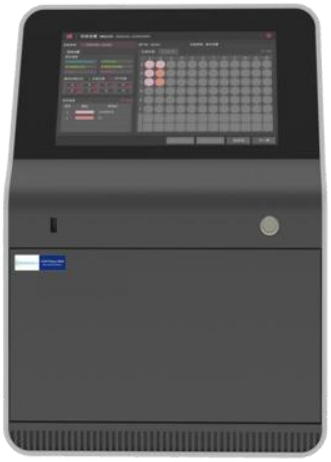
Proposed Workflow

Processed food → Homogenization → Food DNA extraction → Porcine-specific real-time PCR → Amplification/Ct analysis → Detected / Not Detected / Invalid

Foods

Homogenization
&
DNA extraction

Porcine-specific
real-time PCR



LIGHTGene 9600
Real-time PCR system

PCR Cycling Condition

Step	Temperature	Time	Cycles	Reading
Activation	50°C	2 min	1	No
Initial activation	95°C	10 min	1	No
Denaturation	95°C	15 sec	35	No
Anneal/extension	60°C	1 min		FAM+JOE

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Recommended Controls

Control	Purpose
Porcine positive control	Confirms porcine target amplification
NTC / negative control	Checks reagent contamination and background amplification
Internal control (JOE)	Monitors reaction validity and supports interpretation of negative results

Published positive criterion: FAM Ct <35 at threshold 0.3, with valid positive and negative controls.
Published LOD: 0.005 ng porcine DNA within 35 cycles.

Experiment Setup

Parameter	Recommended setup
Instrument	LIGHTGene 9600 Real-Time PCR System
Experiment type	Absolute
Analysis	Qualitative Ct / amplification analysis
Porcine target	FAM
Internal control	JOE
Result	Porcine DNA Detected / Not Detected / Invalid

Published Commercial Food Screening Results

1. Detection Across Processed-Food Matrices
   In the applicability study, DNA from 12 processed-food matrices was spiked with porcine DNA. Porcine DNA was detected in all 12 matrices, indicating that the method could detect the target across diverse food matrices without observed PCR inhibition

   Table 1 Ct Values of 12 Processed-Food Matrices

Matrix	Published mean Ct	Result
Instant noodle	34.011	Porcine DNA detected
Noodle	33.980	Porcine DNA detected
Dumpling	16.428	Porcine DNA detected
Produce	34.006	Porcine DNA detected
Chocolate	33.782	Porcine DNA detected
Snack	33.291	Porcine DNA detected
Pie	33.547	Porcine DNA detected
Gochujang	33.985	Porcine DNA detected
Fermented soybean pastes	34.405	Porcine DNA detected
Sauce	33.909	Porcine DNA detected
Kimchi	34.136	Porcine DNA detected
Tea	33.997	Porcine DNA detected

Note: The applicability test used food-matrix DNA spiked with porcine DNA; these are not naturally positive commercial samples.

2. Commercial Food Screening

The validated real-time PCR method was applied to 131 commercial processed-food samples across eight food groups. Porcine DNA was not detected in 129 samples, while two samples tested positive. The positive samples were one instant-noodle product (Ct 33.96) and one dumpling product (Ct 33.02), as shown in Table 2.

Table 2 Detection of porcine DNA in Korean processed foods

Matrix	Number of samples		
	Total number of samples	Porcine positive	Porcine negative
Sauce	39	-	39
Instant noodle	34	1	33
Confectionery	22	-	22
Tea	15	-	15
Dumpling	6	1	5
Noodle	6	-	6
Kimchi	5	-	5
Gochujang	4	-	4
Total	131	2	129

Conclusion

The published study demonstrates the applicability of real-time PCR for qualitative detection of porcine DNA in processed foods. With Ct and amplification curve analysis, the LIGHTGene 9600 provides an effective platform for porcine DNA screening, supporting halal authentication and food integrity testing.

Reference

Kim Y, Lee HS, Lee KG. Detection of porcine DNA in Korean processed foods by real-time PCR. Food Science and Biotechnology. 2023;32(1):21–26. doi:10.1007/s10068-022-01169-x.