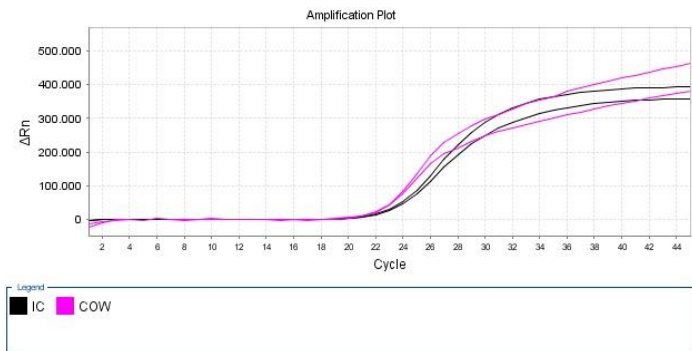
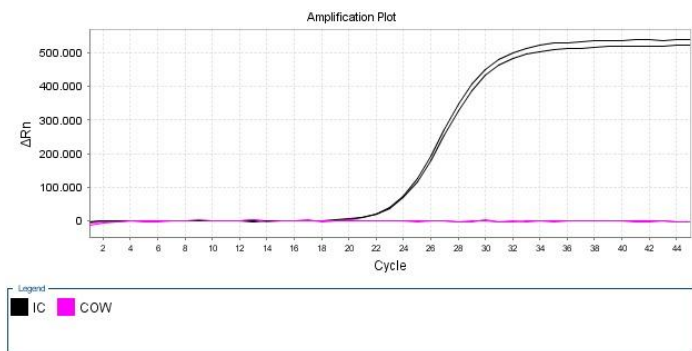


Positive Control –



Negative Control –



12. SPECIFICITY/INCLUSIVITY

- 100 % Exclusivity, determined using DNA from 12 animal species suitable to occur in the same food products (Table 1).
- 100 % Inclusivity, determined in 6 food samples obtained from different commercial sources and from External Quality Control (Table 1).

13. SENSITIVITY

The limit of detection (LoD) for SUPREME REAL TIME DETECTION KIT Cow is 10 pg of target DNA.

The method's detection limit can detect 0.02% of bovine (*Bos taurus*) DNA in 50 ng of total DNA.

No false negatives were obtained, either in the defined PCR conditions or in the deviations used for robustness, increasing the stringency.

BIOPREMIER

SUPREME REAL TIME DETECTION KIT COW

Ref: BIOPSFS-0006

1. BACKGROUND INFORMATION

According to the European Commission Directive 2002/86/EC, food ingredients have to be declared. Species authenticity is highly relevant to consumers for economic, medical, cultural, and religious reasons. Examples like fraudulent substitution of expensive species with cheaper meats, inclusion of meat in vegetarian products, and allergens in food products highlight the importance of this issue. Additionally, meat species must be disclosed on the label with both commercial and scientific denominations to verify the meat's origin and traceability and to analyze the quality control of handling and cleaning processes of production lines. Methods for species detection based on the identification of proteins are not reliable for application in highly processed and heated products due to protein deterioration. DNA is more stable than proteins during processing. Traditional protein-based detection methods are unreliable for highly processed and heated products, unlike DNA-based methods. DNA is more stable, and modern PCR techniques enable the identification of fragmented DNA from the species present in a sample, ensuring accurate and highly sensitive detection with a lower detection limit detection. Real time PCR techniques are suitable for amplifying small fragments of DNA high sensitivity and specificity.

2. INTENDED USE

The SUPREME REAL TIME DETECTION KIT Cow enables a qualitative detection of bovine (*Bos taurus*) DNA in food samples by Real Time PCR, after a sample processing step. This DNA is present in the mitochondrial genome and it may be found in processed food and food industry.

The kit includes an Internal Control (IC). The IC is used to evaluate PCR inhibitors in the sample or to evaluate problems that occurred during PCR preparation/amplification. The kit includes a Master mix for the target and IC, primers and TaqMan® probes, labelled with non-fluorescent quenchers. The kit contains Uracil-DNA Glycosylase (UDG), preventing DNA contamination with PCR products. The kit includes a positive control, which allows an evaluation of the primers and probes used to detect the targets, and a negative control (nuclease-free water) to confirm the integrity of the kit reagents.

The kit was validated in the instruments ABI PRISM® 7500 Fast. The kit is compatible with all thermocyclers working in **FAM** and **ROX** channels. The detection kit must not be used for diagnostic procedures. For Food use only.

The procedure includes the following main steps:



3. TRADEMARKS AND DISCLAIMER

Registered names, trademarks, etc. used in this document, even when not specifically marked as such, are not to be considered unprotected by law. BPMR kit handbooks and user manuals can be requested from BPMR or your local distributor.

4. LIMITED LICENSE AGREEMENT

Use of this product signifies the agreement of the following terms: The kit must be used solely in accordance with the respective Instructions for Use. BPMR grants no license under any of its intellectual property to use or incorporate the enclosed components of this Kit with any components not included within this kit except as described in the Instructions for Use. This kit and its components are licensed for one-time use and may not be reused, refurbished, or resold.



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BPMR is certified ISO 9001:2015

5. QUALITY CONTROL

In accordance with BPMR's ISO 9001, each lot of the kit is tested against predetermined specifications to ensure consistent product quality.

6. WARNINGS AND PRECAUTIONS

Molecular Biology procedures, such as RNA extractions and PCR amplification, require qualified staff to prevent the risk of erroneous results, especially due to sample contamination or degradation of the nucleic acids contained in the samples. It is strongly recommended to have dedicated areas, materials and equipment for the RNA extraction, preparation of the PCR and post-PCR procedures. Workflow in the laboratory must proceed in a unidirectional manner, beginning in the Extraction Area and moving to the Amplification and Detection Area.

- The user should always pay attention to the following:
- Read all the instructions provided before running the assay.
- Do not mix reagents from different batches.
- Wear proper PPE, including disposable gloves and laboratory coats.
- Store and extract positive material separately from all other reagents.

7. CONTENTS AND STORAGE CONDITIONS

The kit should be stored between -20°C and 5°C and protected from exposure to light. Repeated thawing and freezing (>5) should be avoided, as this may reduce the sensitivity. Considerate to freeze in aliquots to maintain the performance of the assay.

The kit contains reagents for 100 reactions.

| CONTENTS | UNITS | COMPOSITION |
|------------------------------|----------------------|--|
| Master Mix (blue cap) | ● 2 tube (2 x 683µl) | Buffer, dNTPs, Primers and Probes |
| Enzymes (white cap) | ○ 1 tube (1 x 220µl) | DNA polymerase, UDG and storage buffer |
| Negative Control (clear cap) | ○ 1 tube (1 x 130µl) | Nuclease-free water |
| Positive Control (red cap) | ● 1 tube (1 x 130µl) | Target DNA |

8. MATERIAL REQUIRED AND NOT SUPPLIED

- Microcentrifuge
- Laminar Air Flow Cabinets/PCR Cabinets
- Disposable powder-free gloves
- Micropipettes and nuclease-free filter tips
- Real time PCR instrument
- Tubes/Strips/Multiwell plates and accessories specific for each Instrument
- DNA extraction kit (example: BIOPEXT-0609)

9. PROCEDURE

9.1 Sample preparation

Depending on the specific characteristics of the sample, procedures like homogenization and grinding may be necessary before DNA extraction.

9.2 DNA extraction

Use a kit or protocol suitable for DNA extraction from food products, such as BIOPREMIER DNA Extraction Kit from Food (ref: BIOPEXT-0609) or similar. Follow the manufacturer's or authors instructions.

9.3 PCR preparation

A – PCR mix

Always wear gloves for all PCR procedures.

1. Thaw the kit solutions. Mix thoroughly (do not vortex the tube Enzymes) and centrifuge briefly
2. Prepare the reactions, as described below:

| CONTENTS | N° OF SAMPLES | |
|---------------------|---------------|---------------|
| | 1 | 10 (10 + 1) |
| qPCR reaction | | |
| Master Mix | ● 13 µl | 143 µl |
| Enzymes | ○ 2 µl | 22 µl |
| Total Volume | 15 µl | 165 µl |

Note: Prepare the PCR reaction for each sample, or in alternative, prepare a Master Mix for the total number of reactions plus 10% (e.g. for 10 samples, prepare a volume for 11). In this case, prepare the Mix in a 1,5mL sterile, nuclease-free tube. Include 2 PCR reactions for the Positive and Negative controls.

3. Mix the prepared Mix by inverting the tube and centrifuge briefly
4. Dispense 15 µL aliquots of prepared Mix into the plate wells or PCR tube
5. For the negative control, pipette 5 µL of Negative Control tube (Clear Cap); Pipette 5 µL of DNA sample per well; and for the positive control, pipette 5 µL of Positive Control tube (Red Cap). Each PCR tube / well should have a final PCR volume of 20 µL
6. Centrifuge briefly the plate wells or PCR tubes
7. Place the reactions into the Real Time PCR instrument.

B – Program set up

Prepare the Real-Time PCR instrument according to the following temperature/time program:

| PHASE | TEMPERATURE | CYCLES | TIME | ACQUISITION |
|-------------------|-------------|--------|--------|--------------|
| Incubation | 37 °C | 1 | 15 min | No |
| UDG Inactivation | 95 °C | 1 | 5 min | No |
| DNA Amplification | 94 °C | 45 | 15 s | No |
| | 60 °C | | 30 s | Collect Data |
| | 72 °C | | 15 s | No |

Sample Volume: 20 µl

Detection format: Hydrolysis Probe

Passive reference dye: None

| TARGET | CHANNELS |
|------------------------------------|--|
| Detection of Cow | FAM Excitation at 465 nm, Emission at 510 nm |
| Detection of Internal Control (IC) | ROX Excitation at 533 nm, Emission at 610 nm |

14. DATA ANALYSIS

For analysis of PCR results, select fluorescence display options. Samples with positive Ct-values are considered positive.

Important: Please, also check amplification curves, not only Ct values. Samples should be inspected both in logarithmic and linear scale view and compared with the negative control. Adjust the Threshold, if necessary. Sample results should be assessed after the positive and negative controls have been examined and determined to be valid. If the results of controls are not valid, the sample results cannot be interpreted. Interpretation of PCR-data:

a) Controls

To validate the assay, the controls must have the following results:

| | Cow DETECTION FAM | IC DETECTION ROX |
|------------------|-------------------|------------------|
| Negative Control | Negative | Positive |
| Positive Control | Positive | Positive |

Note that if the controls do not match these results, the experiment must be repeated.

b) Samples

Interpretation of sample results is summarized in the following table:

| Cow DETECTION FAM | IC DETECTION ROX | INTERPRETATION |
|-------------------|---------------------|--|
| Positive | Positive/Negative** | DNA detected, sample Positive for Cow |
| Negative | Positive | No DNA detected, sample Negative for Cow |
| Negative | Negative | Invalid Result* |

*When both Cow and IC detection are Negative, means the presence of PCR inhibitors in the sample. Dilute the sample or perform another DNA extraction.

** High DNA concentration of the target in the sample can lead to a reduced or absent fluorescence signal of the IC.

Table 1: Exclusivity and Inclusivity of the SUPREME REAL TIME DETECTION KIT Cow

| Species | SUPREME Kit Result | Result comparison |
|--------------------------|--------------------|-------------------|
| Vegetarian meatballs C66 | NEG | Matched |
| Foie gras C31 | NEG | Matched |
| Soy C30 | NEG | Matched |
| Ham C19 | NEG | Matched |
| Chicken burger C28 | NEG | Matched |
| Pork sausage C25 | NEG | Matched |
| Chicken meat C17 | NEG | Matched |
| Rabbit meat C29 | NEG | Matched |
| Duck meat C9 | NEG | Matched |
| Potato C20 | NEG | Matched |
| Turkey meat C15 | NEG | Matched |
| Boar meat C65 | NEG | Matched |
| Cow milk C63 | POS | Matched |
| Cow meat C27 | POS | Matched |
| Cow burger C57 | POS | Matched |
| Butter C59 | POS | Matched |
| Meat sausage C4 | POS | Matched |
| Cow cheese C60 | POS | Matched |