



VERYfinder

Food Frauds Investigation Real-Time PCR kits

Pap In Feed
Cow In Buffalo Milk

What is a food fraud?

Food fraud is a collective term used to encompass the deliberate and intentional substitution, addition, tampering, or misrepresentation of food or food ingredients, for economic gain.

Adulteration

Refers to the addition of one or more undeclared ingredient(s), to improve the appearance of the product or to increase its weight fictitiously. For example, adding cow to goat milk for cheese production.

Substitution

Involves replacement of one ingredient by a similar or cheaper one. For example, using pollack in place of cod.

Misdescription

Refers to the method of production, the geographical origin of the food or the amounts of key ingredients used. For example, including animal derived ingredients in vegetarian meals.

There is a clear link
and

How can DNA help?

Nowadays, the analysis of DNA is widely used in the determination of food authenticity and Real-Time PCR is the most sensitive method for the detection and quantification of DNA sequences of different contaminating species. The method, combined with an appropriate nucleic acid extraction system, allows the analysis of raw materials, semi-finished and finished products as well.

DNA testing allows an efficient and sensitive identification of plant and animal derivatives, easily detecting accidental contaminations or potential frauds.

between **food fraud**
food safety.

What challenges?

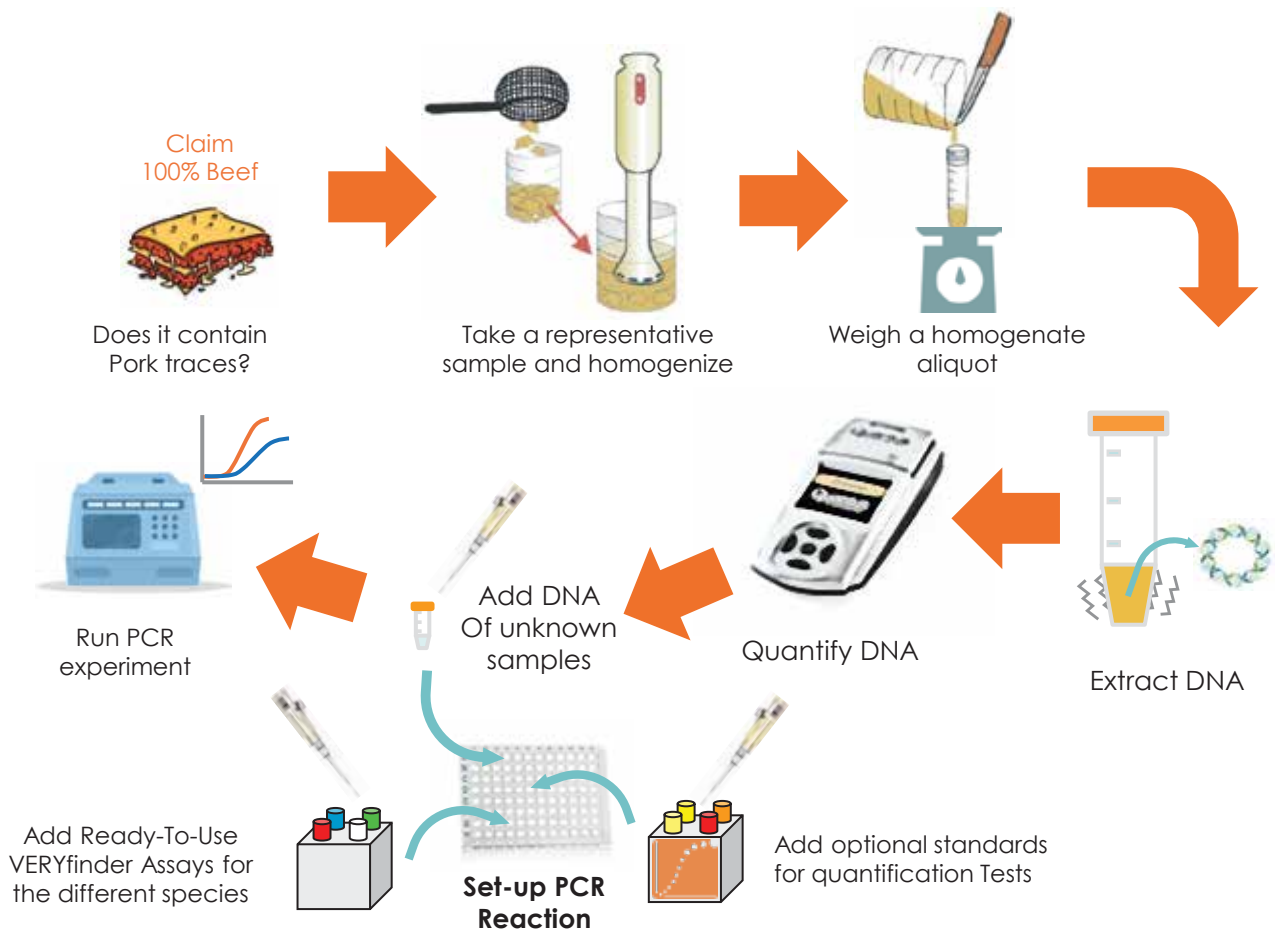
*Real-Time is powerful
but it is paramount to
understand the
applicability of the
technology*

- I. Understanding the **fitness** of Real-Time PCR for answering the relevant analytical question
- II. Ensuring the marker has the **specificity** required to avoid false positives
- III. **Compatibility** with a variety of matrices
- IV. **Conformity** to standards, guidance or legal requirements
- V. Requirement for analytical **standards**

*DNA measurements
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several reasons*

While detection of undeclared meat is straightforward quantification is not. There is a tendency to focus on meat content expressed as weight/weight (w/w). DNA measurements used in quantification of species are however hardly correlated to meat content (w/w) for several reasons: differences in species genome size, tissue cell size (i.e., cell number per gram meat) and mitochondrial distribution, DNA extractability, DNA degradation, water content. Hence, the results obtained using PCR shall be intended as percentages of DNA copies and not percentages in meat weight, unless an appropriate standard is set.

How does it work?



ISO 20813:2019 - Molecular biomarker analysis
— Methods of analysis for the detection and identification of animal species in foods and food products (nucleic acid-based methods)
— General requirements and definitions

ISO/TS 20224-(1/7):2020 - Molecular biomarker analysis — Detection of animal-derived materials in foodstuffs and feedstuffs by real-time PCR — Part 1: Bovine DNA detection method

Relevant ISO norms for the detection and identification of animal DNA in food were recently defined.

Rules for PAP in feed

EU reference laboratory for animal proteins in feed validated three qPCR diagnostic methods detecting any ruminant, pork and poultry material in feed.

In the 1990s, due to BSE risks control, the use of animal meal (PAPs) in zootechnical nutrition was strictly prohibited. This measure was very effective and BSE in cattle was eradicated. Hence, in 2013 the European Commission decided to allow again the use of PAPs, with the exclusion of those obtained from ruminants (cattle and sheep), in the preparation of feed. In June 2021 amendment, the regulation on the use of PAPs allowed new uses but banned "intraspecies recycling". To enforce these rules the EU reference laboratory for animal proteins in feed (EURL-AP) validated three qPCR diagnostic protocols detecting any ruminant, pork and poultry material in feed.

Cow in buffalo milk

Cases of food adulteration Continue to occur and not just in the EU. Economically motivated adulteration (EMA) Occurs when a food is mixed with a cheaper ingredient to reduce production costs and increase profits. Buffalo milk adulterated with cow's milk is on the list of the most famous food frauds. This Real-Time PCR kit (2-plex with internal amplification control) detects traces of less than 1% cow's milk (*Bos taurus* - less expensive) in Buffalo milk (*Bubalus bubalis* - more expensive). Unique feature of the kit is the possibility of direct loading in reaction of the milk without a previous DNA extraction.



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