SureFood® ANIMAL ID test kits

Qualitative identification and quantification

- Manual & semi-automated DNA preparation for raw meat and processed products
- IAAC (Internal Amplification and Animal Control)
- 4plex Screening

More information:

https://r-b.io/anmlid

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Animal Identification

Species specification is of great interest: meat products can be falsified due to incorrect declaration – see horsemeat scandal for example. Inferior meat products are falsely declared and thus, a consumer is misled. This may be partly a criminal intent, but the corresponding financial damage as well as the loss of reputation can be highly immense for the distributor.

The required transparency of species identification can be of great interest, both qualitatively and quantitatively in a second step. Quantitative analyses, may detect any falsified declaration of minced meat quantities like "50 per cent pork/beef in minced meat". Moreover, a second application is the guarantee of religious rules (Halal, Kosher). In this case, no technical threshold of any duty of declaration is tolerated, but especially for the detection of pork in food, a zero tolerance is needed. Consequently, analytical test systems should have a maximum sensitivity.

Due to the high DNA concentration in animal cells and the availability of genomic DNA in the nucleus (single copy) and highly conserved DNA in mitochondria (multi-copy DNA), the highly specific analysis of genetic information by real-time PCR is the method of choice.

Based on a high stability of DNA, it can be prepared and detected from raw meat as well as heated, processed meat products provided that DNA is present.

In highly purified products such as gelatin, the amount of present DNA has been more or less removed that a reliable measurement might be difficult or no longer be possible.

Extraction control and meat/ plant detection kit

To proof the successful extraction of DNA from samples, the SureFast® Animal+Plant Control 3plex kit can be used. It detects separately a general plant marker as well as a general marker for land-living vertebrates (including humans).

Vegetarian food

This assay may be also used to analyze food samples for the presence of meat. A negative result for meat however does not guarantee per se vegetarian food: The limit of detection is > 0. Moreover, in highly processed samples of meat origin, the DNA might be degraded.

DNA preparation

Manual – Spin filter based
SureFood® PREP Basic

Semi-automated – Magnetic beads based
TANBead/SureFast® Mag PREP Food

qPCR

Identification – SureFood® ANIMAL ID

Duplex – including an internal amplification and animal control (IAAC).

4plex screening – three parameter and IAAC. In the absence of the tested target species, it can be observed, whether another species is included in the sample or not by the help of the IAAC.

Relative quantification – SureFood® ANIMAL QUANT
The kits contain two PCR systems, one for detection of the specific gene of interest and one for the detection of an animal gene (reference gene). Thus, the relative DNA amount of the animal of interest can be calculated by using a serial dilution series.

Included qPCR controls

IAC
The internal amplification control of the Pork SENS PLUS kit (S6117) ensures that a negative signal obtained for pork is a guaranteed real negative sample and no false negative due to possible inhibition. This is important for e.g. religiously motivated analysis ensuring the absence of pork.

IAAC
The internal animal amplification control serves as IAC. Furthermore, it enables the detection of vertebrate DNA. Hence, the resulting IAAC curve is the product of the IAC and the possible presence of vertebrate DNA. Thus, it is possible to state whether animal DNA is present or not.

Result analysis

Fig. 1: Amplification Plot FAM Channel – Beef specific detection

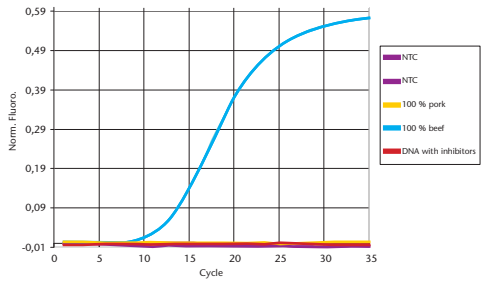
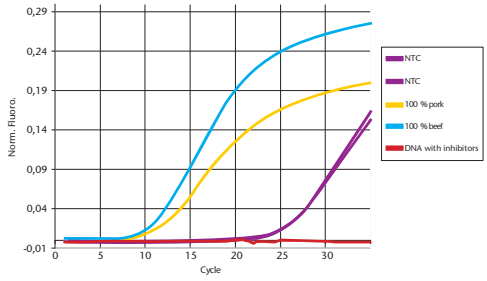


Fig. 2: Amplification Plot VIC Channel – Animal DNA detection (example: IAAC run)



First, check if sample(s) in FAM channel show(s) positive results [Fig. 1]. Here, in the beef detection assay, the beef sample (blue line) shows a signal, while the known pork sample (yellow line) shows no curve. To clarify whether the sample of usually unknown content is a real negative (below LOD), switch to the VIC/HEX channel and check the control for inhibition (IAC) and extraction (IAAC) [Fig. 2]. The pork sample (yellow line) shows an IAAC signal: no inhibition. The signal is much stronger as the NTC signal. **Conclusion:** the unknown sample is negative for beef, no inhibition occurred but animal DNA was extracted, therefore it is a real negative sample for beef (below LOD).

SureFood® ANIMAL ID products

Product	Description	No.of Tests	Art.No.
SureFood® PREP			
Basic	DNA preparation of food and feed	100 preparations	S1052
SureFood® PREP Add-On	DNA preparation kit for 2 g sample weight in conjunction with SureFood® PREP Basic	15 extractions	S1055
SureFast® Mag PREP Food	For DNA extraction from food and feed. For the use in combination with the TANBead Maelstrom™ Autostage (Art.No. ZMAL8) or Maelstrom™ 4800 (Art.No. ZMAL48)	96 preparations	F1060
DNA-Extraction control			
SureFast® Animal+Plant control 3plex	Extraction control for plant or animal matrix including internal control DNA (ICD)	100 reactions	F4053
SureFood® ANIMAL ID – qualitative real-time PCR			
4plex Beef/Sheep/Goat + IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6121
4plex Pork/Chicken/Turkey + IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6123
4plex Beef/Horse/Pork + IAAC	Detection limit: Pork 0.5 %, Beef, Horse 0.1 % depending on matrix and DNA preparation	100 reactions	S6126
4plex Camel/Horse/Donkey + IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6131
3plex Rat/Mouse + IAC	Detection limit: ≤ 500 DNA copies depending on mantrix and DNA preparation	100 reactions	S6127
Beef IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6113
Horse IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6118
Horse/Donkey IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6119
Pork SENS PLUS	Detection limit: ≤ 0.0001 % depending on matrix and DNA preparation	100 reactions	S6017
Pork IAAC	Detection limit: 0.5 % depending on matrix and DNA preparation	100 reactions	S6114
Chicken IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6115
Turkey IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6116
Cat/Dog IAAC	Detection limit: 0.5 % depending on matrix and DNA preparation	100 reactions	S6112
Water Buffalo/Beef + IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6130
Poultry IAAC	Detection limit: 0.1 % depending on matrix and DNA preparation	100 reactions	S6125
SureFood® ANIMAL QUANT – quantitative real-time PCR			
Beef	Detection limit: ≤ 5 DNA copies; limit of quantification: 0.04 % depending on matrix and DNA preparation	2 x 50 reactions	S1010
Pork	Detection limit: ≤ 5 DNA copies; limit of quantification: 0.04 % depending on matrix and DNA preparation	2 x 50 reactions	S1011
Chicken	Detection limit: ≤ 5 DNA copies; limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions	S1014
Turkey	Detection limit: ≤ 5 DNA copies; limit of quantification: 0.1 % depending on matrix and DNA preparation	2 x 50 reactions	S1015

SureFood® PREP Basic

Multiplex real-time PCR Kit

* **References:**

1. *Pelin Ulca a, Handan Balta a, İlknur Çağın a, Hamide Z. Senyuva* (2013)
   Meat species identification and Halal authentication using PCR analysis of raw and cooked traditional Turkish foods, Meat Science 94, 280-284
2. *Yasemin Demirhan a, Pelin Ulca a, Hamide Z. Senyuva*
   Detection of porcine DNA in gelatine and gelatine-containing processed food products — Halal/Kosher authentication, Meat Science 90, 686-689