

# Nadgradnja sistema varne hrane z metodologijo za odkrivanje potvorb

Ornela Čebulec,  
Veliki jesenski živilski seminar,  
29.11.2018

**18** — distribucijskih centrov

**16** — proizvojenj v 6 državah

**40** — prisotnost izdelkov na več kot 40 trgih

**5492** — zaposlenih na 12 trgih



OWN BRANDS



PRINCIPALS



# Vsebina

1. Splošno o potvorbah
2. AG metodologija za odkrivanje potvorb
3. Uporaba laboratorijskih analiz pri odkrivanju potvorb v Atlantic Grupi

# 1. Splošno o potvorbah

# Approach to Food Fraud Prevention





**DAILY Mirror** Wednesday January 16, 2013  
REAL NEWS... REAL ENTERTAINMENT 50p

**The shark**  
More amazing pictures  
PAGES 16&17

**Sail to France from £1**  
WITH P&O Ferries  
SEE PAGE 18

**GIANT THRILLER**  
Bolton knock out Premier League Sunderland on replay night  
**PLUS**  
All the FA Cup action in 8-page pullout

**whisperer!**




# HORSE MEAT IS FOUND IN TESCO BURGERS



**By DAMIEN FLETCHER**  
TESCO staff were last night clearing beef burgers from stores nationwide after horse meat was found in its own brand range. Experts discovered some sold at shops in Ireland had been contaminated but withdrew all stock from the UK as a precaution. One sample tested contained 20% horse meat.  
Tesco said: "We apologise for any distress." Bosses insisted there was no risk and blamed foreign suppliers. Lidl, Aldi and Iceland beef was also hit.  
**FULL STORY: PAGE 6**

► Supermarkets clear shelves ► Inquiry at supply plants







Ekstra deviško oljčno olje zamenjano z drugim cenejšim oljem.



Barvanje sadja in zelenjave za prikrivanje napak.



Redčenje medu s sladkornimi sirupi.



Napačne izjave, datum minimalne trajnosti, itd.

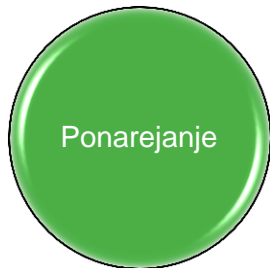


Misrepresentation of nutritional value

Kopiranje blagovne znamke.



Formulation of an fraudulent product



Dodatek prepovedanih barvil k začimbam.



Artificial enhancement



Counterfeits, theft overruns gray markets

Prodaja neprijavljenega izdelka.



Ribe in  
ribji  
izdelki



Mleko in  
mlečni  
izdelki



Kava in  
čaj



Med in  
javorjev  
sirup



Sadni  
sokovi



Žitarice



Začimbe



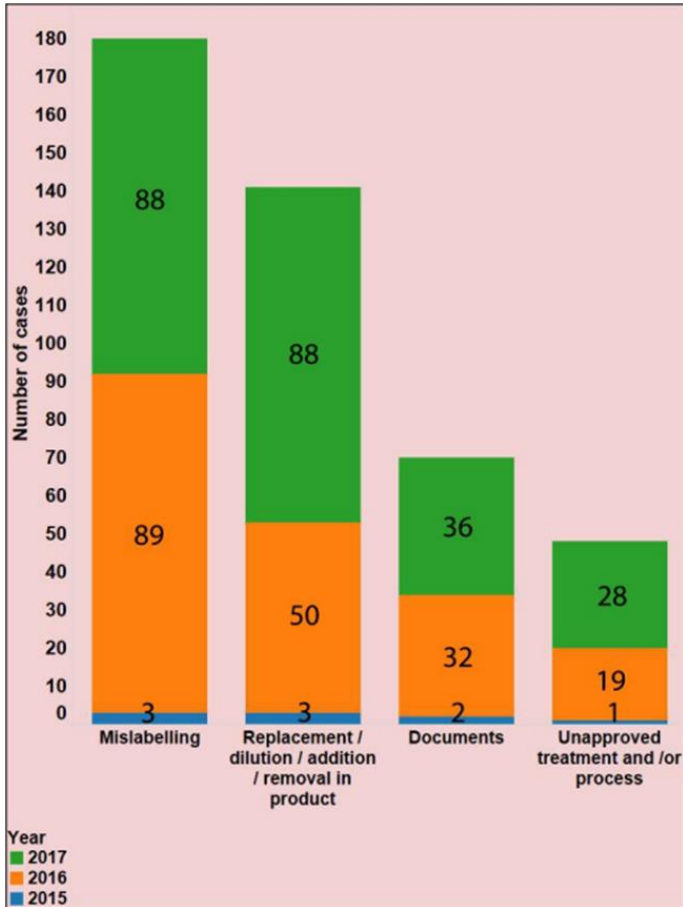
Ekstra  
deviško  
oljčno  
olje



Ekološki  
izdelki



Vino



Potvorbe hrane postajajo vedno večji problem v globalnih prehranskih verigah.

V preteklosti zavržena hrana v vrednosti 200 milijonov € - ta številka se vsako leto večja.


2017: 9800 ton - 230 milijonov €.

## Enotne EU definicije za potvorb hrane ni!


### 4 operativni kriteriji:

- Kršenje zakonodaje (nedeklarirani arašidi)
- Namerno dejanje (ni naključno)
- Ekonomski dobiček
- Zavajanje kupcev (arašidi so alergeni, kupci kupujejo arašide za ceno lešnikov)


**SUBSTITUTION  
HAZELNUTS by PEANUTS**



3.345€/Ton



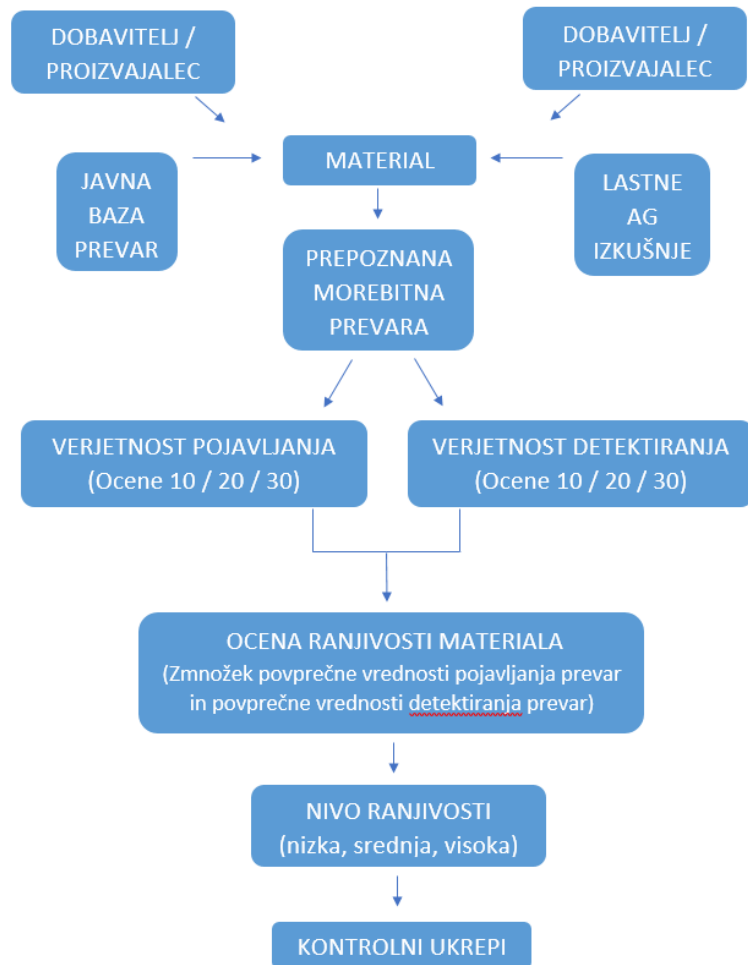
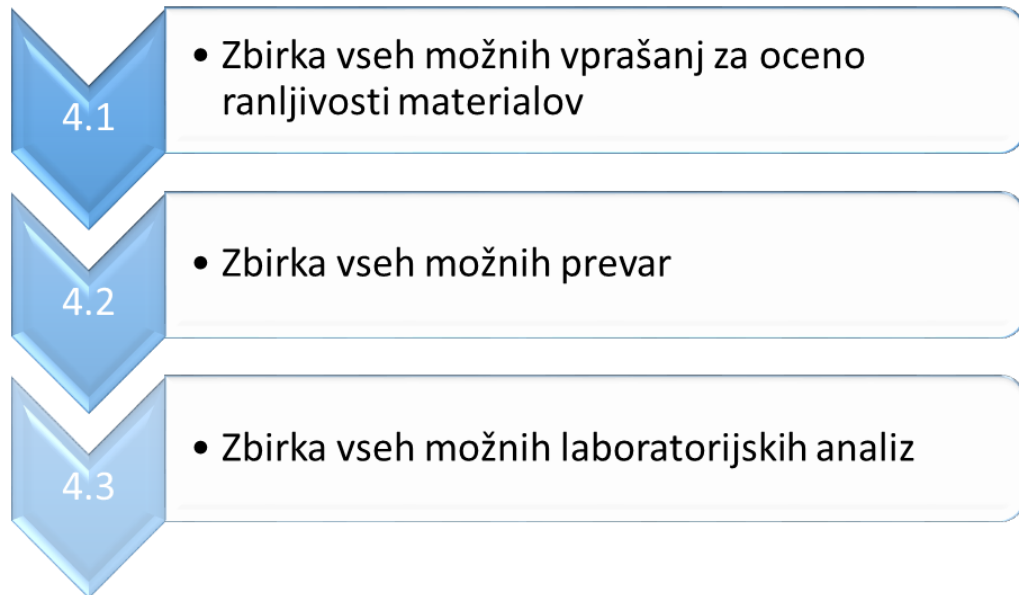
1.486€/Ton



Health and  
Food Safety

## 2. AG metodologija za odkrivanje potvorb

## KORAKI PRED POSTAVITVIJO METODOLOGIJE:



## AG QWP 27 – Prevare hrane

Priloga 1 AG QWP 27: Potential adulteration and analysis

Priloga 2 AG QWP 27: Ocena ranljivosti

Priloga 3 AG QWP 27: Pomoč pri oceni ranljivosti

Priloga 4 AG QWP 27: Seznam materialov z nizko ranljivostjo in kontrolni ukrepi

Priloga 5 AG QWP 27: Seznam materialov s srednjo ranljivostjo in kontrolni ukrepi

**Priloga 6 AG QWP 27: Seznam materialov z visoko ranljivostjo in kontrolni ukrepi**

Priloga 7 AG QWP 27: Ocena ranljivosti za izdelke

Purchase category	Purchase subcategory	Fraud cases	Analytical approach	Source
Dairy raw materials	Whole milk powder	1.) Addition of Nitrogen rich adulterants (extended with melamine, urea); 2.) The milk fat and/or milk protein components can be replaced with non-milk components, such as soy, starch or vegetable replacers; adulteration of milk powder with vegetable fats and oils (RASFF) 3.) Unauthorised transit, attempt to illegally import, unauthorised operator and improper health certificate(s) (RASFF)	1.) LC/MS-MS Liquid chromatography tandem-mass spectrometry (& Gas chromatography/isotope dilution mass spectrometry (GC/IDMS) ), Elisa 2.) UHPLC-UV (Ultra-high performance liquid chromatographic with UV detector)	
	Skimmed milk powder			
	Goat milk powder	Addition of cow's milk	Elisa test	
	Ca-caseinate	Feed grade caseinates used as food grade caseinates (RASFF)		
	Na-caseinate			
	Whey proteins	1.) Addition of Nitrogen rich adulterants (extended with melamine, urea); 2.) Fraudulent/improper health certificate(s) (RASFF)	1.) LC/MS-MS (& Gas chromatography/isotope dilution mass spectrometry (GC/IDMS) )	
	Milk protein			
	Other dairy raw materials - dairy spread, cheese Kačkavalj, cheese powder, cream powder, milk powder for cappuccino, milk cream, yogurt powder	RASFF: - Expiry dates changed of and incorrect labelling on sheep's cheese; - Expiry dates of long life whipping cream changed; - Illegal import of white cheese; - Unauthorised transit of milk powder.		
Sugar	Sugar	Adulterants: Chalk/talc powder GMO, sugarcane or sugar beet	1.) Chalk/talc powder: Add sugar in the glass of water - pure sugar sinks to the bottom, sugar with adulterants remain on the top. When mixing chalk will settle down at the bottom.	<a href="https://bohatala.com/adulteration-in-different-flours-suji-and-sugar/">https://bohatala.com/adulteration-in-different-flours-suji-and-sugar/</a>
Fish	Tuna	1.) Frauds in fish species Subjection to tuna frauds in relation to % of global catch: - SKIPJACK TUNA ( <i>Katsuwonus pelamis</i> ): Least concern - YELLOWFIN TUNA ( <i>Thunnus albacares</i> ): Near threatened - BIGEYE TUNA ( <i>Thunnus obesus</i> ): Vulnerable - ALBACORE TUNA ( <i>Thunnus alalunga</i> ): Near threatened - BLUEFIN TUNA ( <i>Thunnus thynnus</i> ): Endangered 2.) Fish freshness vs frozen-thawed; 3.) Wild vs farmed (salmon); 4.) Quality  RASFF: - Improper/fraudulent health certificate(s) and CoA; - spoilage (incomplete health certificate, non approved establishment, best before date exceeded; issued on 31/12/2009 for product that expires on 9/2009); - illegal import (traces of old removed labels of other establishments than mentioned on the certificates); - mentioned seal was missing; - incorrect labelling; - expiry dates changed; - suspicion of fraudulent use of health mark;	1.) Species identification: Quantitative and qualitative analysis Microarray, PCR, DNA Barcoding and metabarcoding 2.) Fish freshness: volatile nitrogen, histamine, biogenic amines, carbon monoxide succinic dehydrogenase SDH Techniques: Titrimetric, GC-FID-methanator Elisa test HPLC-UV, HPLC-fluorimeter 3.) 13C NMR spectroscopy  Checking the documents on the scientific name of the fish, the catch method and the fishing area.	<a href="http://www.fao.org/docrep/V7180E/V7180e09.htm">http://www.fao.org/docrep/V7180E/V7180e09.htm</a> <a href="http://oceana.org/sites/default/files/euo/OCEANA_fish_label_english.pdf">http://oceana.org/sites/default/files/euo/OCEANA_fish_label_english.pdf</a>
	Salmon			
	Mackerel			
	Sardines			
	Sea bass			



Goat milk powder

Addition of cow's milk

Elisa test

September 2018



# Monthly Summary of Articles on Food Fraud and Adulteration

Retrieved mainly from the JRC tool Medisys (<http://medisys.newsbrief.eu>)



## Food Fraud Cases

In Australia, a leading honey distributor and some supermarket chains have been accused of selling fake honey based on nuclear magnetic resonance (NMR) analyses for screening and sugar testing. One of the retailers withdrew the suspicious samples from the Australian market.  
[ABC News](#); 2 September 2018

Three tons of tomato sauces (6000 jars) were seized by Italian authorities for lack of traceability documentation.  
[Salerno Today](#); 3 September 2018

More than a fifth of meat product samples tested by the UK Food Standards Agency in England, Wales and Northern Ireland in 2017 were found to be partly or totally made up of unspecified meat not mentioned on the label. Lamb was the meat most frequently affected, so was minced meat.  
[BBC](#); 5 September 2018

Italian authorities discovered rice of Asian origin falsely labelled as Italian during a series of controls carried out to enforce the implementation of the obligation to indicate the geographical origin of rice.  
[Il Giornale di Sicilia](#); 6 September 2018

Italian authorities found 300 kilogrammes of expired meat in a restaurant and more than 80 kilogrammes of meat and fish not fit for human consumption were seized in a camping village.  
[Cronache Maceratesi](#) & [Corriere Romagna](#); 9 September 2018

Indian Food Safety officers seized 40 hectolitres of expired cooking oil filled in barrels, which were previously used for storing pesticides in Kashmir during raids that coincided with the wedding season. Officials also seized expired milk and Muzumma food specialty from Kashmiri restaurants.

- Honey
- Substitution/Artificial enhancement
- Tomato
- Mislabelling
- Meat
- Substitution/Mislabelling
- Rice
- Mislabelling
- Meat and fish
- Not fit for consumption
- Cooking oil, milk, special food

The screenshot shows a Trello board with a green background. The board title is "Food Fraud Risk Information". It contains several cards. The first card is a "Welcome" card with a green background and a "Welcome" message. The second card is a "Recent food fraud incidents - October 2018" card with a grey background, listing incidents such as honey adulteration, homemade black market alcoholic drinks, meat products in Scotland, and alleged spray painting of table grapes. The third card is a "Recent food fraud incidents - September 2018" card with a grey background, listing incidents such as honey adulteration in Australia, fish vendor mislabeling in Kuwait, Malaysia's halal logos, and counterfeiting of premium milk brands. The fourth card is an "Alcoholic Beverages" card with a grey background, listing spirit drinks, wine, and beer. A fifth card is a "FOOD FRAUD TRAINING" card with a black background and white text, advertising a training course for SQF, BRC, FSSC 22000, and FSMA. A modal window is open over the board, showing a card titled "Beef" with a red background. The card is in the "Meat, Poultry, Eggs" list. It has a "Description" section with the text: "Beef is at high risk of food fraud in most parts of the world. Risks: Misrepresentation of meat species - occurs commonly. Illegal slaughtering and poaching (some countries). Misrepresentation of origin, variety (wagyu), organic status, halal status or animal-raising ('grass-fed'). Poaching. Smuggling, illegal imports, tax avoidance. Tampering with expiry dates (frozen beef). Undeclared or illegal veterinary drugs. Treatment with bleach to improve appearance (offal is most at risk). Treatment with formalin to extend shelf life (common in areas without refrigeration). Addition of water and other 'fillers' to increase the weight and/or volume of product. Buffalo meat is expected to remain a common adulterant or replacement for beef in South East Asia, while donkey meat is an emerging concern in the Middle East and horse meat remains a potential adulterant in Europe. Organic beef is significantly more expensive than conventional beef and is at risk of food fraud. Conventional beef can be misrepresented as organic beef. Other types of fraud include misrepresentation of grass-fed/Practise rased/Protein, beef". The card also has "Copy" and "Watch" buttons in the "ACTIONS" section.

<https://trello.com/>

# Priloga 2 AG QWP 27: Ocena ranljivosti

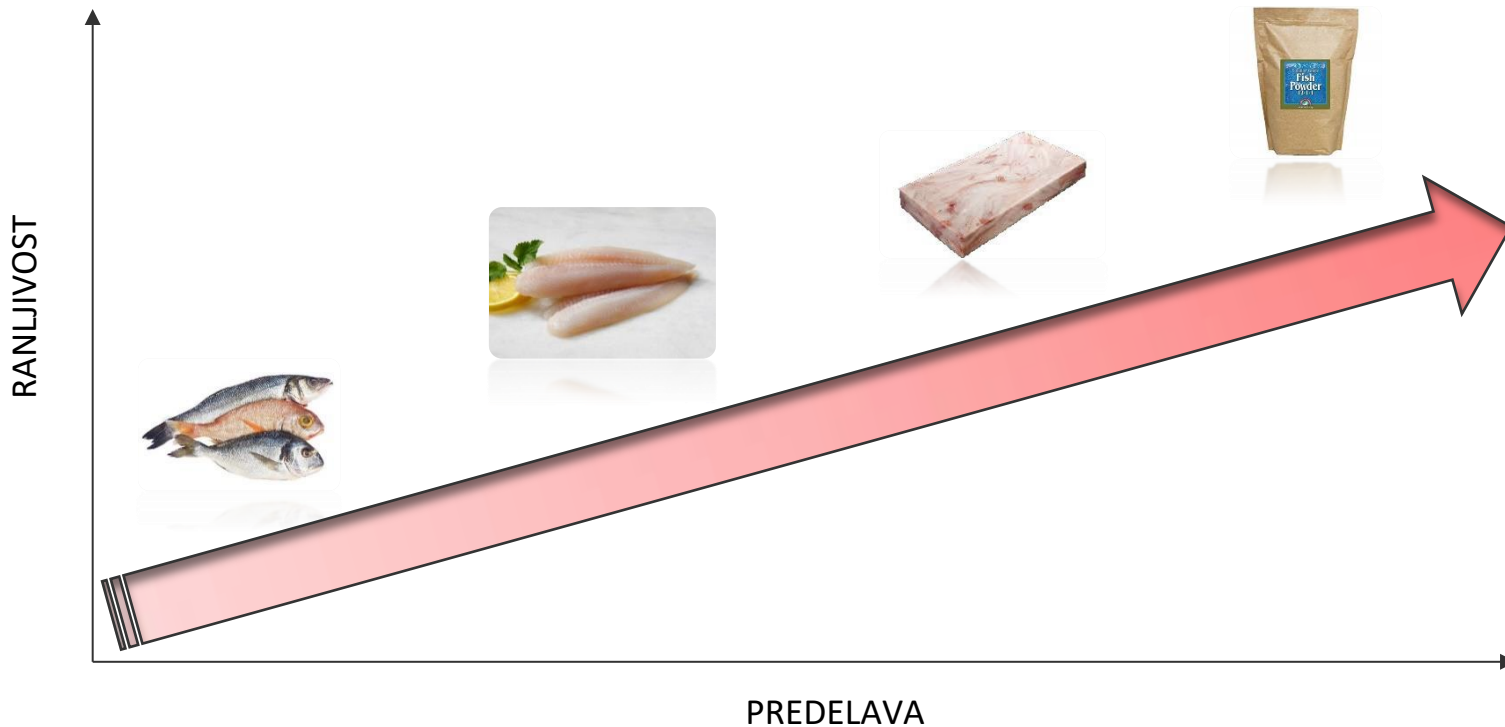


## Ocena ranljivosti za materiale

Material	Dobavitelj / proizvajalec	Pričakovana vrsta prevare	Verjetnost pojavljanja							Verjetnost detektiranja					OCENA RANLJIVOSTI MATERIALA	RANLJIVOST MATERIALA	
			Zgodovina prevar in podatki iz literature	Ekonomski dejavniki / nihanje cen / velikost trga in tržna vrednost	Geografsko poreklo	Dolžina in kompleksnost dobavne verige	Dostopnost do surovine	Kompleksnost prevare	Povprečna vrednost pojavljanja prevar	Odnos z dobaviteljem	Fizična oblika materiala	Presoje dobavitelja	Fizična dostopnost do materiala med transportom	GFSI certifikati			Povprečna vrednost detektiranja prevar
Tuna zmrznj.kosi(14220) - Thunnus albacares		Zamenjava z drugo vrsto tune	10	10	20	20	20	20	17	20	10	20	10	30	18	300	srednja ranljivost za prevare
Tuna zmrznj.kosi(14220)		Slabša kakovost surovine (histamin, ...)	30	10	20	20	20	20	20	20	10	20	10	30	18	360	visoka ranljivost za prevare
Tuna zmrznj.kosi(14220)		Ledena glazura (max 5 %)	20	10	20	20	20	20	18	20	10	20	10	30	18	330	visoka ranljivost za prevare
Tuna zmrznj.kosi(14220)		Tretiranje z ogljikovim monoksidom in nitriti	30	10	20	20	20	20	20	20	10	20	10	30	18	360	visoka ranljivost za prevare

Verjetnost pojavljanja	Verjetnost odkritja	MIN	MAX	
10 - Zelo malo verjetno	10 - Zelo verjetno	100	160	nizka ranljivost za prevare
20 - Verjetno	20 - Verjetno	161	324	srednja ranljivost za prevare
30 - Zelo verjetno	30 - Zelo malo verjetno	325	900	visoka ranljivost za prevare

# Materiali: Bolj predelano, bolj ranljivo!



# Kontrolni ukrepi

(priloge 4, 5 in 6)

## Nizka ranljivost:

Običajna vhodna kontrola  
(vpišite točno metodo vhodne  
kontrolne, npr. senzorika, vonj, ...)

## Srednja ranljivost

a.) Vhodna kontrola po parametrih v  
povezavi z identificirano prevaro

b.) Detajlen pregled vhodnih  
dokumentov dobavitelja (CoA) s  
pošiljko, veterinarsko spričevalo ali  
podpisana specifikacija materiala

c.) Monitoring na identificirani rizik s  
specifično analizo metodo

**a.) ali b.) + c.)**

## Visoka ranljivost:

a.) Vhodna kontrola po parametrih v  
povezavi s prevaro (točno definiraj vrsto  
kontrolne, npr. presejanje, primerjava  
barve, ...) in detajlen pregled vhodnih  
dokumentov dobavitelja s pošiljko  
(izjava, CoA na prepoznano prevaro,  
vezan na LOT vsake pošiljke),  
veterinarsko spričevalo ali podpisana  
specifikacija materiala

b.) Monitoring na identificirani rizik  
(Dinamično vzorčenje v odvisnosti od  
števila pošiljk - npr. svaka 5, ...)

### 3. Uporaba laboratorijskih analiz pri odkrivanju potvorb v Atlantic Grupi

- Analize v zunanjih laboratorijih
- Razvoj hitrih metod v internih laboratorijih
- Nove analitske možnosti

**ANALYTICAL RESULTS**

**ON SAMPLE AS IT IS**

Value/Uncertain	Unit of measure	LoQ	LoD	Start/end date of analysis	Op. units	Row
<b>ILLEGAL DYES SUDAN</b>						
Met.: 004 MPP Res912 Rev.9 2016						
Sudan 1	< LoQ	mg/kg	0.0050	05/10/2018-06/10/2018	11	2
Sudan 2	< LoQ	mg/kg	0.0050			3
Sudan 3	< LoQ	mg/kg	0.0050			4
Sudan 4	< LoQ	mg/kg	0.0050			5
Sudan orange	< LoQ	mg/kg	0.0050			6
Sudan red 7B	< LoQ	mg/kg	0.0050			7
Sudan red B	< LoQ	mg/kg	0.0050			8
Sudan red G	< LoQ	mg/kg	0.0050			9
Para red	< LoQ	mg/kg	0.0050			10
butter yellow	< LoQ	mg/kg	0.0050			11
Metanil yellow	< LoQ	mg/kg	0.0050			12
Toluidine red	< LoQ	mg/kg	0.0050			13
<b>ILLEGAL DYES ORANGE II - RODHAMINE B</b>						
Met.: 004 MPP Res912 Rev.9 2016						
Orange II	< LoQ	mg/kg	0.0050	05/10/2018-06/10/2018	11	15
Rhodamine B	< LoQ	mg/kg	0.0050			16
	< LoQ	mg/kg	0.0050			17

	IZVJEŠTAJ O ISPITIVANJU		ul. Zrinske odbrane 99 71000 Sarajevo Tel: +387 (0)33 543 584 www.vfs.ba	
VETERINARSKI FAKULTET - VETERINARSKI INSTITUT		Laboratorij za ispitivanje hemijskih i bioloških rezidua i kvaliteta živačnih namirnica		
Broj dokumenta: 6918/18		ID broj uzorka: 6481-HBR-18	Sarajevo, 12.07.2018	
<b>PODACI O NARUČIOCU ISPITIVANJA</b>				
Naziv i adresa naručioca ispitivanja		J.U. VETERINARSKI ZAVOD BIHAĆ		
Po završetku / zaplanku / ugovoru		01-778-1/18 od 09.07.2018		
Naziv i adresa vlasnika uzorka (ako je različito)		-		
<b>PODACI O UZORKU</b>				
Identifikacioni broj uzorka: 6481-HBR-18		Datum prijema uzorka: 10.07.2018		
Naziv i količina uzorka: Sirovo meso				
Proizvođač: Datum proizvodnje: Rok upotrebe: Oznaka: Br. Protokola 1199-1/16				
Stanje uzorka kod prijema: zadovoljavajuće				
Uzorkovanje izvršio:		Datum uzorkovanja:		
Datum početka ispitivanja: 12.07.2018		Datum završetka ispitivanja: 12.07.2018		
<b>ISPITNE METODE I REZULTATI ISPITIVANJA</b>				
Prisustvo konjskog proteina	NJE DETEKTOVANO	Referentna vrijednost	Jedinica mjere	Metoda ispitivanja
* Prema uputstvu proizvođača				
<b>OCJENA REZULTATA ISPITIVANJA</b>				
Na osnovu rezultata ispitivanja, u dostavljenom uzorku ID br. 6481-HBR-18 nije utvrđeno prisustvo konjskog proteina.				

**ANALYTICAL RESULTS**

**ON SAMPLE AS IT IS**

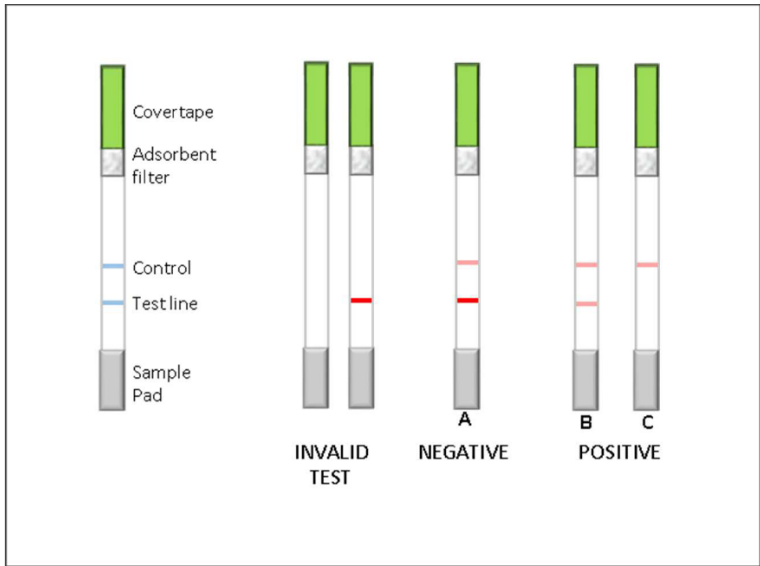
Value/Uncertain	Unit of measure	LoQ	LoD	Start/end date of analysis	Op. units	Row
<b>ACIDIC COMPOSITION</b>						
Met.: UNI EN 12968-2+UNI EN 12965-1+UNI EN 12966-4						
Acidic composition						
Butyric acid (C 4:0)	n.d.	%	0.050	25/09/2018-25/09/2018	01	2
Capronic acid (C 6:0)	n.d.	%	0.050			3
Enanthic acid (C 7:0)	n.d.	%	0.050			4
Caprylic acid (C 8:0)	n.d.	%	0.050			5
Capric acid (C 10:0)	n.d.	%	0.050			6
Caproic acid (C 10:1)	n.d.	%	0.050			7
Lauric acid (C 12:0)	n.d.	%	0.050			8
Lauroic acid (C 12:1)	n.d.	%	0.050			9
Tridecanoic acid (C 13:0)	n.d.	%	0.050			10
Tridecenoic acid (C 13:1)	n.d.	%	0.050			11
Myristic acid (C 14:0)	0,074±0,03	%	0.050			12
Myristoleic acid (C 14:1)	n.d.	%	0.050			13
Pentadecanoic acid (C 15:0)	traces	%	0.050			14
Pentadecenoic acid (C 15:1)	n.d.	%	0.050			15
Palmitic acid (C 16:0)	4,654±0,34	%	0.050			16
Palmitoleic acid (C 16:1)	0,283±0,04	%	0.050			17
Heptadecanoic acid (C 17:0)	0,104±0,04	%	0.050			18
Heptadecenoic acid (C 17:1)	0,174±0,04	%	0.050			19
Stearic acid (C 18:0)	1,644±0,12	%	0.050			20
Oleic acid (C 18:1)	54,434±1,71	%	0.050			21
Linoleic acid (C 18:2)	20,284±0,83	%	0.050			22
Linolenic acid (C 18:3)	6,454±0,46	%	0.050			23
Arachic acid (C 20:0)	0,484±0,05	%	0.050			24
Eicosenoic acid (C 20:1)	0,994±0,08	%	0.050			25
Behenic acid (C 22:0)	0,264±0,04	%	0.050			26
Erucic acid (C 22:1)	0,064±0,04	%	0.050			27
Lignoceric acid (C 24:0)	0,094±0,04	%	0.050			28
Polynaturated fatty acids > C 20	n.d.	%	0.050			29
Saturated fatty acids	7,324±0,37	%	0.050			30
Monounsaturated fatty acids	65,534±1,71	%	0.050			31
Polynaturated fatty acids	26,734±0,95	%	0.050			32

Sample Condition on Receipt: Temperature < = -15 °C

ANALYSIS DESCRIPTION	RESULT	U	REC. N.	UNIT OF MEASURE	LO	LD	METHOD	ANALYSER	ENDING DATE
<b>GENETIC IDENTIFICATION</b>									
Genetic identification of fish species	Thunnus albacares						IQS1502 Rev.5.2016 - Sequenziatore		26/04/2016

**END TEST REPORT**

The original document is a PDF file with Digital Signature: 18D02806-In-0-DigitalSignature.pdf



18.9.2018 MELAMIN Y MLEKU (ALPSKEM)

<p>MLEKO ALPSKO</p> <p>1 ppm</p>	<p>MLEKO + 0,1 ug/100ml MELAMINA</p> <p>1 ppm</p>	<p>0,01 ug/100ml MELAMINA</p> <p>100 ppb</p>	<p>0,001 ug/100ml MELAMINA</p> <p>50 ppb</p>	<p>10 ppb</p>
<p>1</p> <p>2</p> <p>+ 0,001M</p> <p>+ 0,005M</p> <p>+ 0,01M</p>	<p>+ 0,001M</p> <p>+ 0,005M</p> <p>+ 0,01M</p>	<p>+ 0,001M</p> <p>+ 0,005M</p> <p>+ 0,01M</p>	<p>+ 0,001M</p> <p>+ 0,005M</p> <p>+ 0,01M</p>	<p>+ 0,001M</p> <p>+ 0,005M</p> <p>+ 0,01M</p>
<p>SIROTKA V PRAHU</p> <p>MATERIAL: 15630</p> <p>SARZA: 26477</p>	<p>POSNETO MLEKO V PRAHU</p> <p>MATERIAL: 506390</p> <p>SARZA: MD 9543</p>	<p>POSNETO MLEKO V PRAHU ZA KAVO</p>		



# NGS – Next generation sequences

- Laboratorij SGS
- Detektiranje vseh različnih DNA v vzorcu
- Več kot 1000 vrst v podatkovni bazi
  - Kakšne vrste mesa/rib vsebuje vzorec?
  - Kakšne začimbe vsebuje mešanica začimb?
  - Kakšno vrsto kave vsebuje vzorec?
  - ...



All Species ID NGS kit



Thermo Fisher Scientific  
Ion Chef™ System



Thermo Fisher Scientific  
Ion S5™ System  
Next Generation Sequencer



Torrent Suite™  
Software

Hvala za vašo pozornost!

**HOW TO BE A  
DETECTIVE**

