





The challenge to trace
the source of contamination
in the international
food and feed supply chain

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Disclaimer

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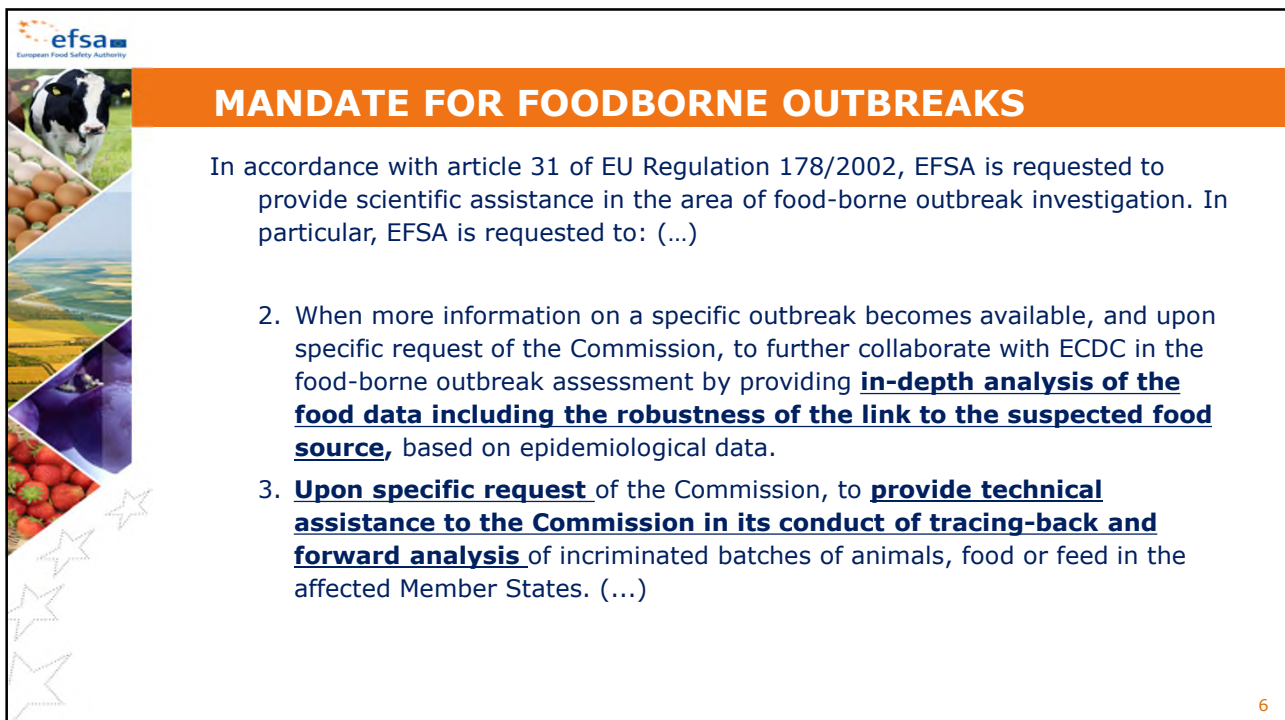
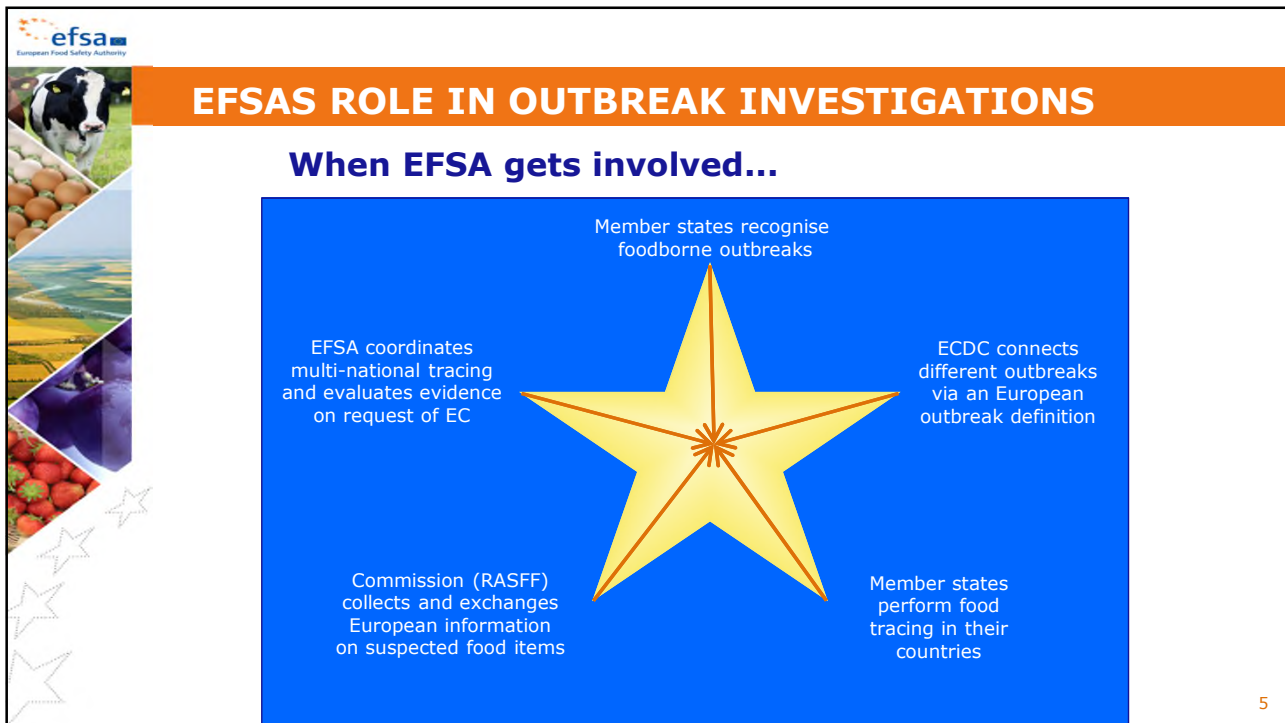
- EFSA's role in tracing outbreaks
- DEMOS project: Complexity of Tracing
 - 1st step: Processing
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 - 3rd step: Information flow
- The revised data model

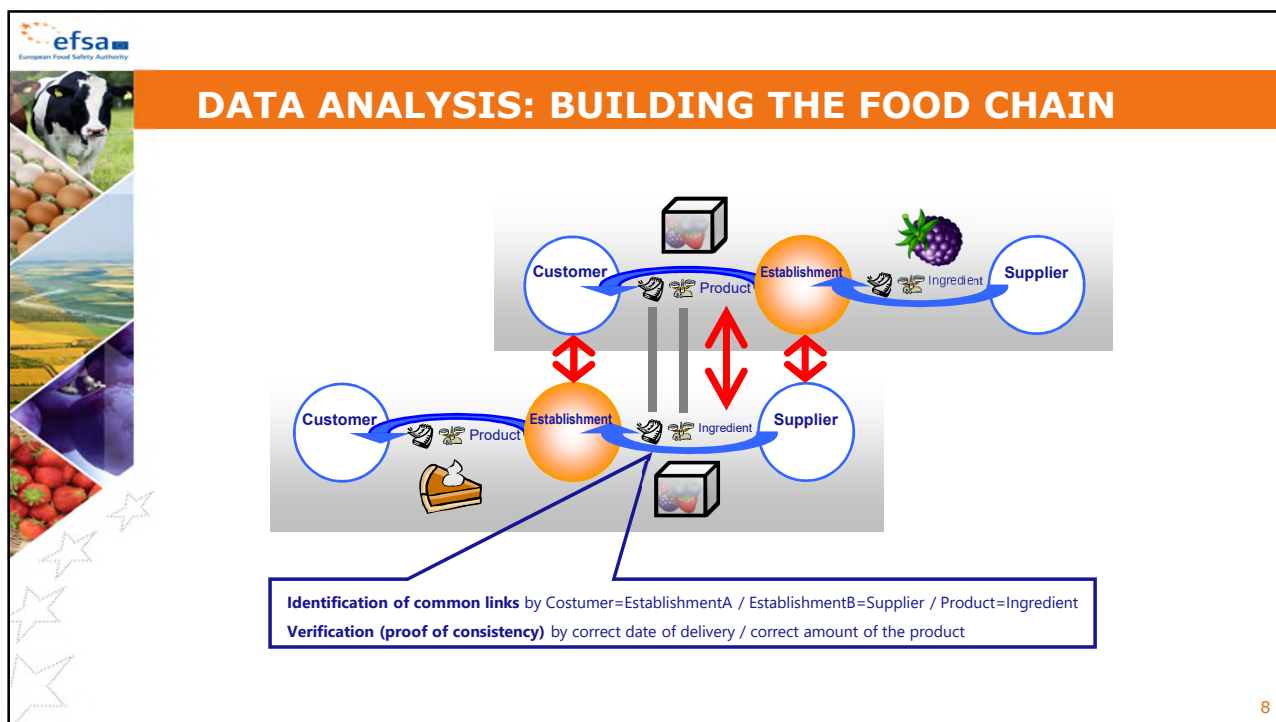
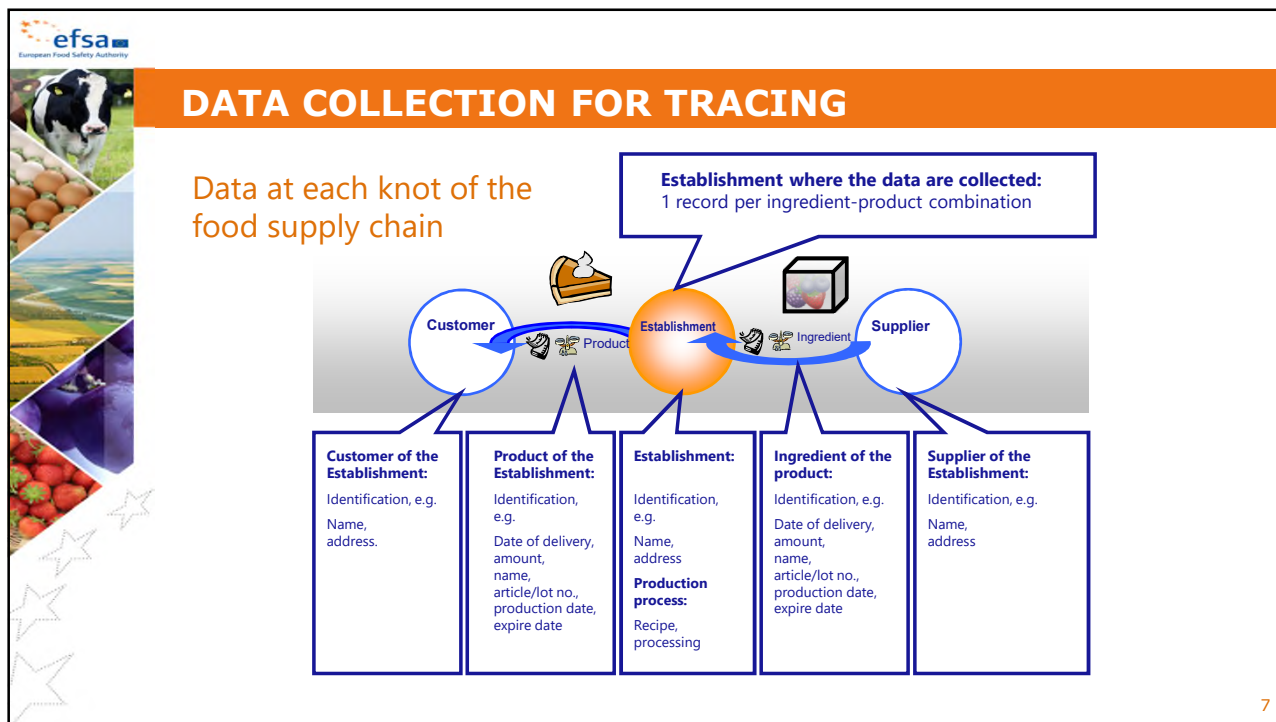
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EFSA's Mandate

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RESULTS: FOOD SUPPLY CHAIN

Results per analysis:

- Already established parts of the food supply chain
- Open knots (establishments) with missing data
- Missing amount of material (lost in tracing)

The diagram illustrates the food supply chain flow. It starts with a 'Supplier' (blue circle) on the right, connected to an 'Establishment' (orange circle) by a blue arrow labeled 'Product'. This 'Establishment' is connected to another 'Establishment' (orange circle) by a blue arrow labeled 'Product'. Finally, this second 'Establishment' is connected to a 'Customer' (blue circle) on the left by a blue arrow labeled 'Product'. Above the flow, a red arrow points left, labeled 'Farm to Fork (forward)'. Below the flow, a red arrow points right, labeled 'Fork back to Farm (backward)'.

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TOOL: FOOD-CHAIN-LAB

The screenshot shows the Food-Chain-Lab software interface. On the left, there is a table with columns: ID, Address, CompanyID, Type of business, UK Number, Code, and Sector. The table lists three entries: 1. 'United Kingdom Ltd', 2. 'United Kingdom Ltd', and 3. 'United Kingdom Ltd'. On the right, there is a network visualization showing a map of Europe with nodes and connecting lines, representing the food supply chain network.

Primary production
Processing
Distribution
Final preparation


Contamination

Specialized software:

- collects data in the right structure / performs data validation
- filters and visualizes food supply networks
- performs data analysis: Scoring, cross-contamination, regional analysis


BfROpenLab: <http://silebat.github.io/BfROpenLab/>
 Support / contact: Christian Thoens, christian.thoens@bfr.bund.de
 Authors: C Thoens, A Weiser, M Filter, A Falenski, A Kaesbohrer, B Appel
 German Federal Institute for Risk Assessment (BfR), Berlin

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The Complexity

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THE DEMOS PROJECT

Review of tracing methodologies

- WP1: General data structure to collect tracing data
 - Extensive literature search on existing guidance
 - Expert hearings for several food areas:
fresh meat, fish, ready-to-eat food of animal and non-animal origin, and the retail sector
 - Draft report for public consultation
- WP2: Guidance on data collection / including regional data
- WP3: Guidance on data analysis / review of the methodology

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EFSA WORKING GROUP




EFSA working group on
"Tracing food and feed products for outbreak investigations"
(DEMOS WP 1)

revising the data structure.

- Judith Leblanc
- Beate Pinior
- Jim McLauchlin
- Armin Weiser

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SEVERAL DEFINITIONS OF TRACEABILITY


There exist no common definition of traceability, but several approaches¹

Working definition of (product) traceability

Traceability is defined as the ability to retrospectively follow the movement of food, feed, food-producing animal or substance intended to be, or expected to be incorporated into or in contact with food or feed, through all stages of production, processing and distribution by means of recorded data.

¹ Olsen & Borit (2012): How to define traceability

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SEVERAL DEFINITIONS OF TRACEABILITY

But one important distinction¹:


"Tracking" is the informative process by which a product is followed along the supply chain keeping records at each stage, (...)." (Prospective data collection)

"Tracing" is defined as the ability of reconstructing the history of a product, identifying its origin (...)." (Retrospective data collection)

Forward Tracing	Recall	Tracking
Backward Tracing	Tracing	
	Retrospective	Prospective

¹ Pizzuti & Mirabelli (2015): The global track&trace system for food

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SEVERAL DEFINITIONS OF TRACEABILITY

- **Product traceability** is the reconstruction of the physical product flow, the location of a product at any stage of the food supply chain.
- **Process traceability** is the reconstruction of all transformations of the product, including interactions with physical/mechanical, chemical, and environmental factors.
- **Genetic traceability** is the reconstruction of the genetic constitution of ingredients of the product. This is used to identify ingredients, their origin, or if they are genetically modified.
- **Inputs traceability** is the reconstruction of types, source and supplier of all ingredients used during production and processing.
- **Disease and pest traceability** reconstructs the epidemiology of pests and biotic hazards that may contaminate food or feed.
- **Measurement traceability** is the reconstruction of data and quality of measurements.

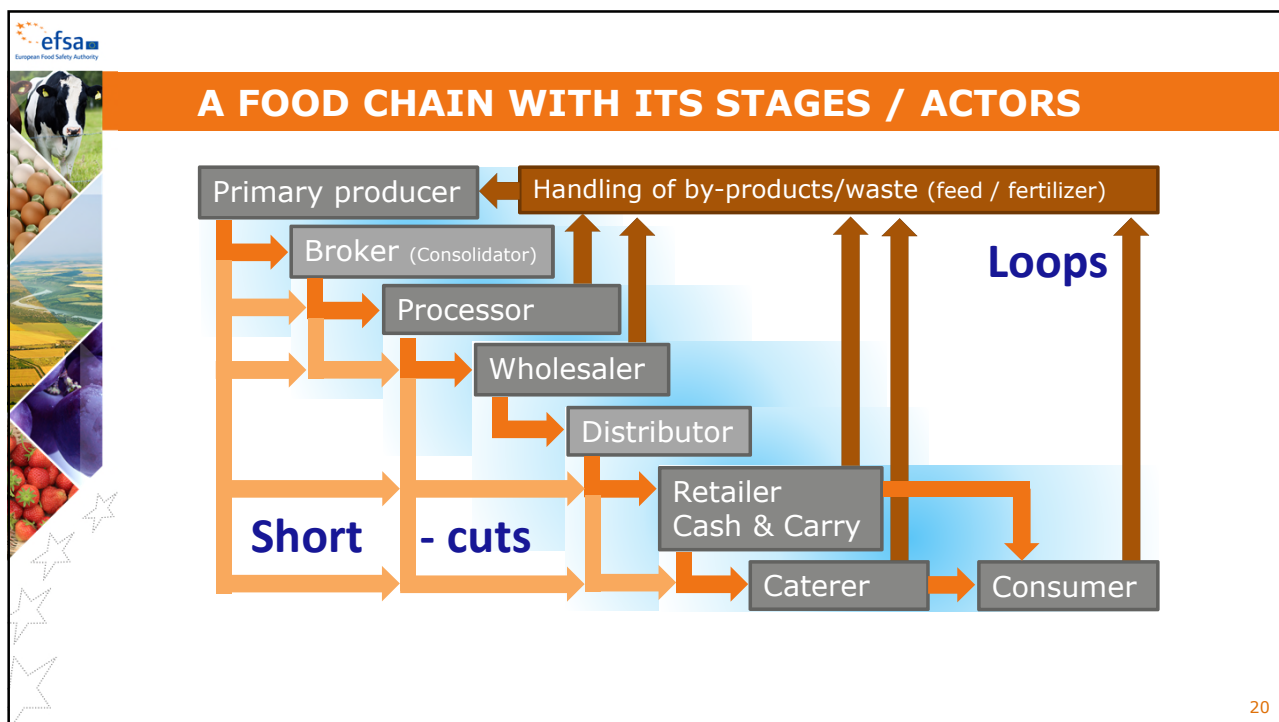
Reference: Opara (2003)

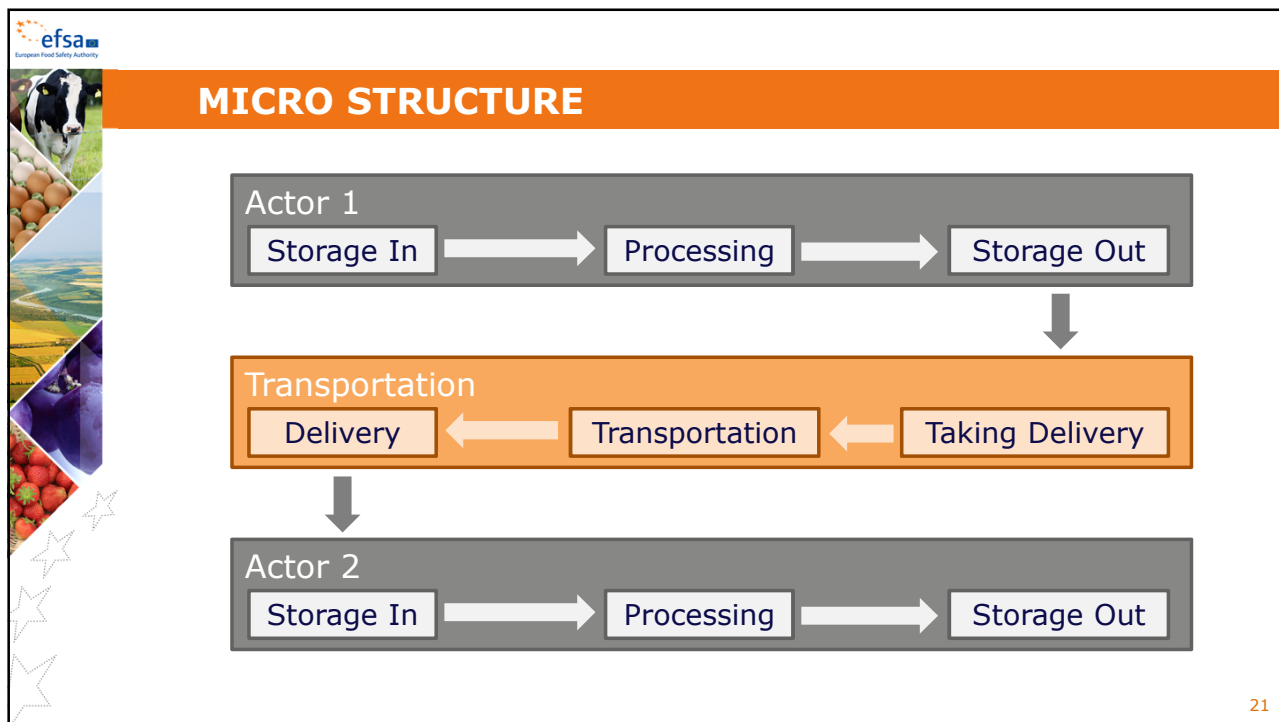
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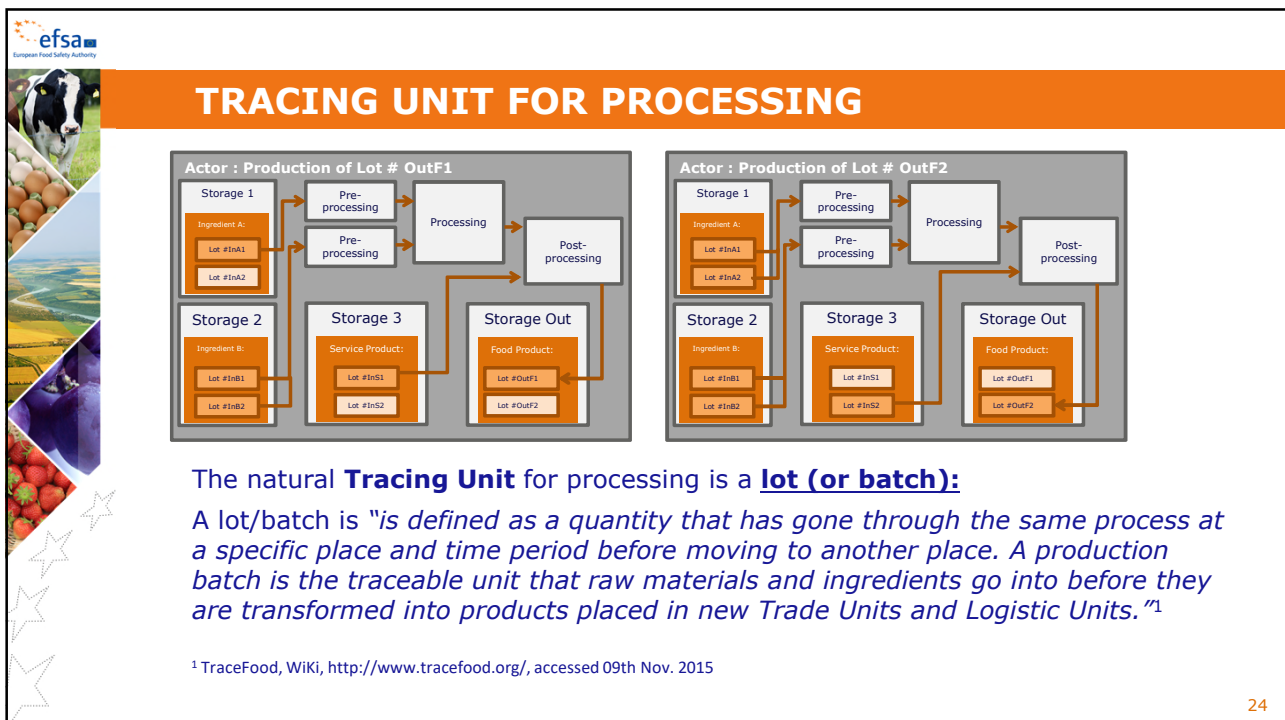
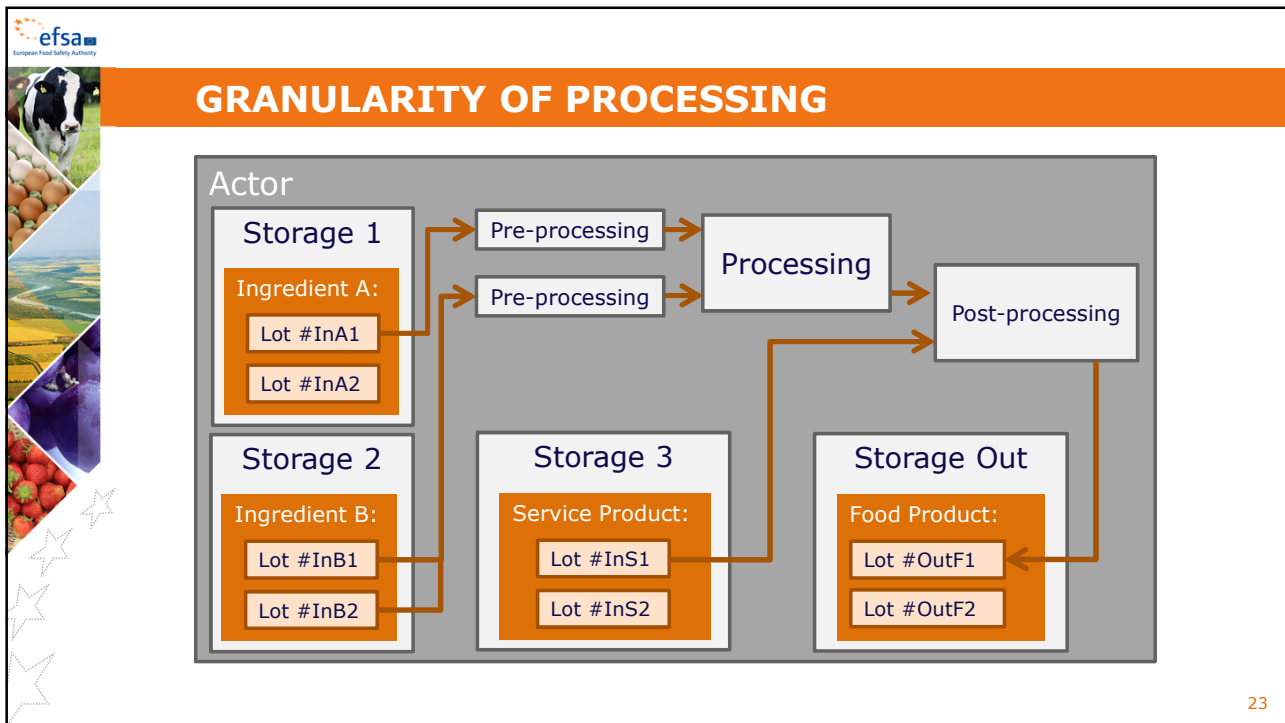



Which data do we need to reconstruct the history of a food item
(suspected to be the cause of a disease) ?

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DEFINITIONS


'Product category' identifies the general type of a food item. Food items of the same product category have usually same food safety characteristics.

'Product' identifies the kind of the food item in the usual terminology in the food chain (e.g. product type, brand, package size etc.). Food items with the same product name are usually exchangeable in the food chain.

'Lot / batch' identifies the production process in which the food item was produced. This includes the producer, the location and the date of production. Food items with the same product name and lot number were produced under equal conditions, e.g. equal ingredients, equal production line, equal time slot of production.

'Consignment / trade unit' identifies the single unit of a product which is not divided during transportation. Food items of the same product and consignment had the same provider and recipient in the food chain.

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PROCESSING

Processing is any change of the product:

Name	Change
Preparation	New product / new lot (time)
Storage	New product characteristics / time

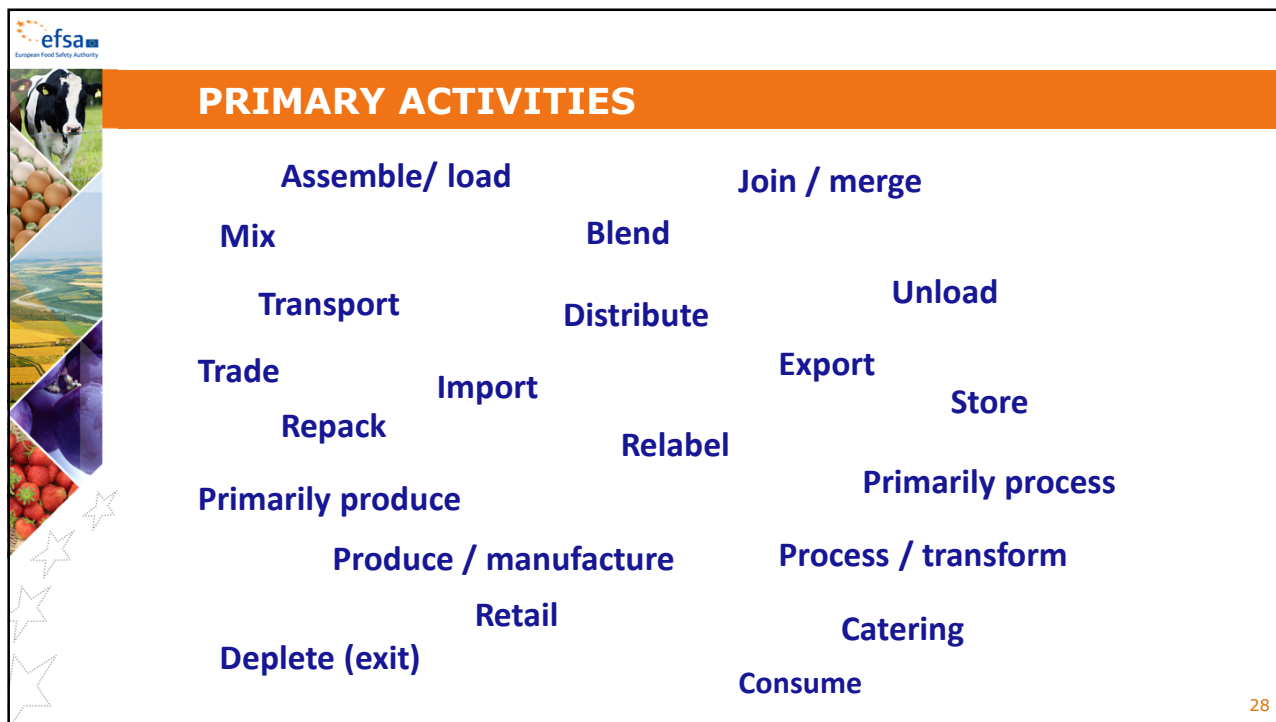
Processing at distribution:

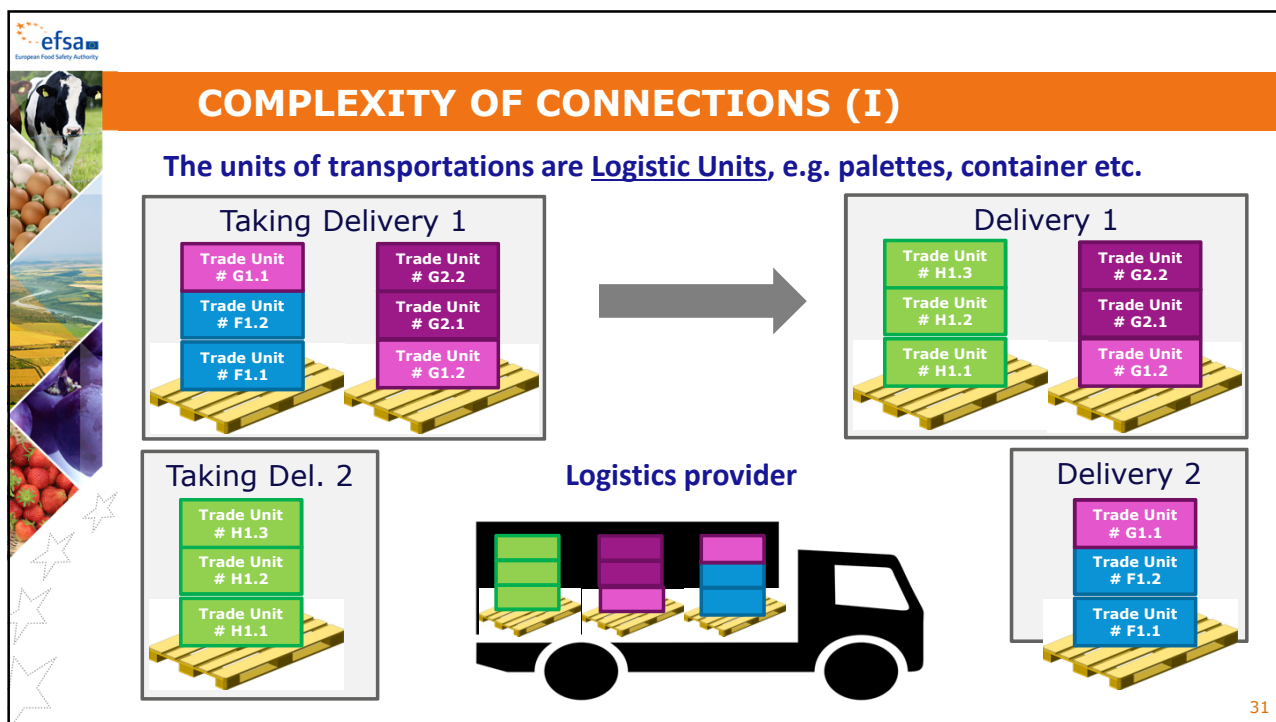
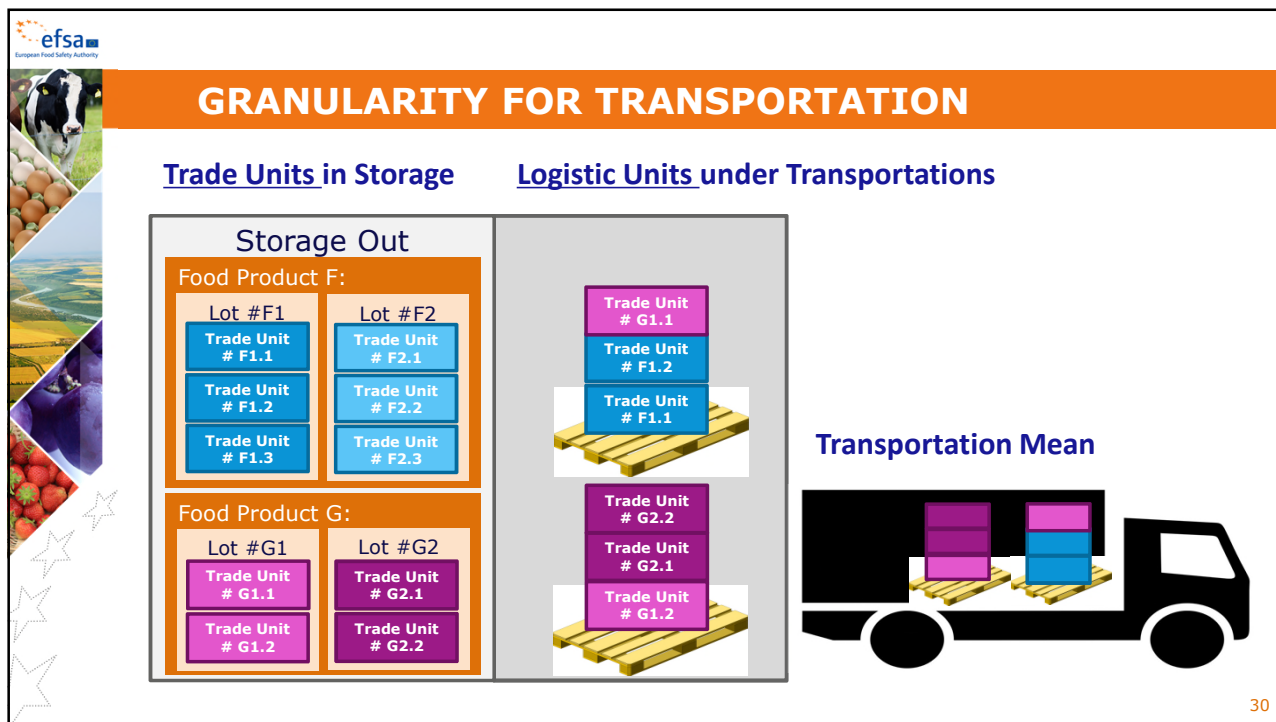
Trade	New contact (information owner)
Blending, repacking	Merged lots / new consignments
Dividing, splitting	Splitted locations / multiple consignments


Transport as processing:

Transport	New location (time)
-----------	---------------------

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DEFINITIONS


'Consignment / trade unit' identifies the single unit of a product which is not divided during transportation. Food items of the same product and consignment have the same provider and recipient in the food chain.

'Logistic unit' is defined as an item of any composition established for transport and/or storage that needs to be identified and managed for logistics.

'Lot transaction' identifies the single transportation unit of a lot which is not divided during transportation. Food items of the same product, lot and consignment had the same provider and recipient in the food chain.

'Package unit' identifies the minimal trade unit, which could not be divided into smaller trade units.

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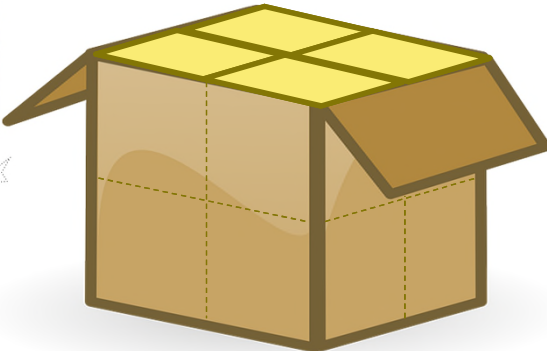


DIVISION OF PRODUCTS DURING DISTRIBUTION


The trade units can change in the food chain, ...

... but they are usually defined in the **Product Information Sheet**


Trade Unit of production,
e.g. = 8 boxes = 64 cans



Trade Unit for distribution,
e.g. 1 box = 8 cans




Trade Unit for the Consumers,
e.g. 1 can



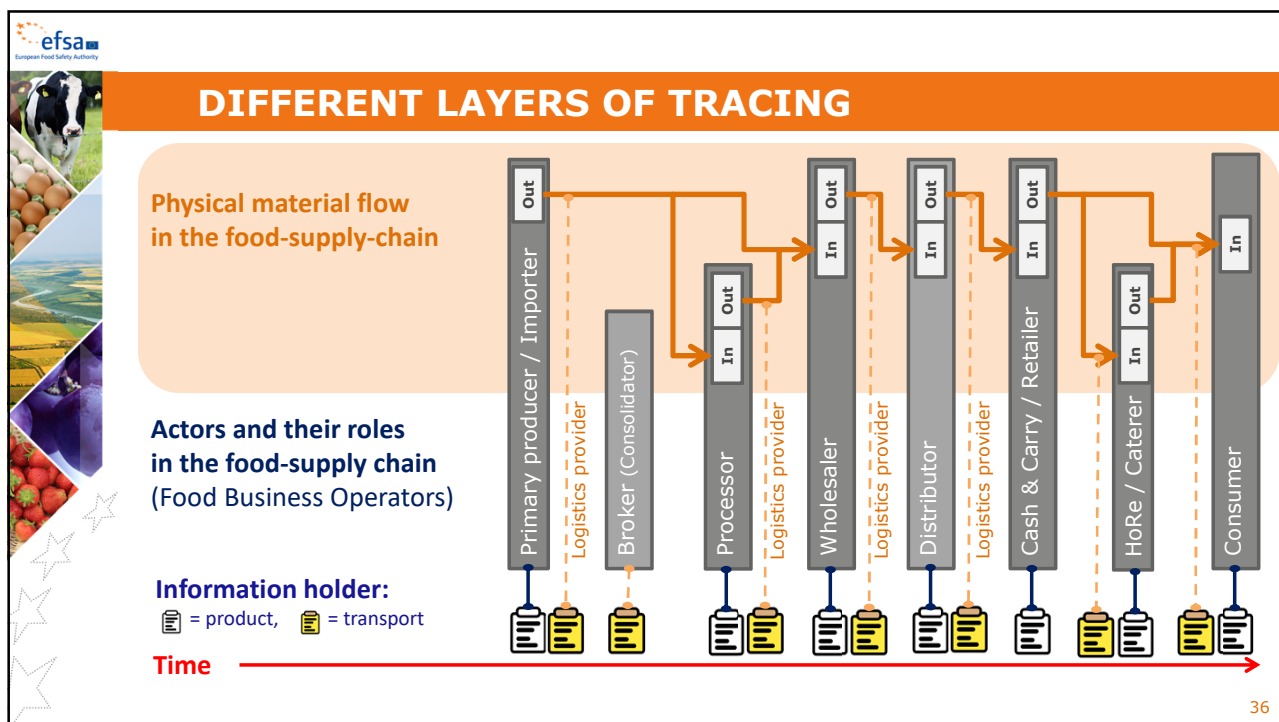
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3rd step: Information flow

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DEFINITIONS


'Information owner' is a person or an entity, who generates or collates an information on a food item. This person is able to change or correct the information (and decides on confidentiality).

'Information holder' is a person or an entity, who has access to an information on a food item. This person is able to regularly retrieve the information.

'Contact person' is a person in a food business, who is contacted by food safety administrations in case of requests.

'Food business operator' means the natural or legal persons responsible for ensuring that the requirements of food law are met within the food business under their control (EC 178/2002).

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DOCUMENTATION FOR TRACING

Source	Content	Owner
Product information sheet (specification)	Processor, product, EAN, description, ingredients, package (consumer, retail, trade), transport conditions, storage / use conditions, food safety characteristics, etc.	Processor
Invoice	Supplier, receiver, product, lot, amount, price, logistic provider, date of shipment	Supplier
Consignment note	Sender, place of taking, place of delivery, date of delivery, inspection results	Logistic provider
Receipt	Date of delivery, content, product, lot, amount	Receiver
Label	Product, EAN, lot, expiry date, etc.	Product holder


...but how is the flow of information managed?

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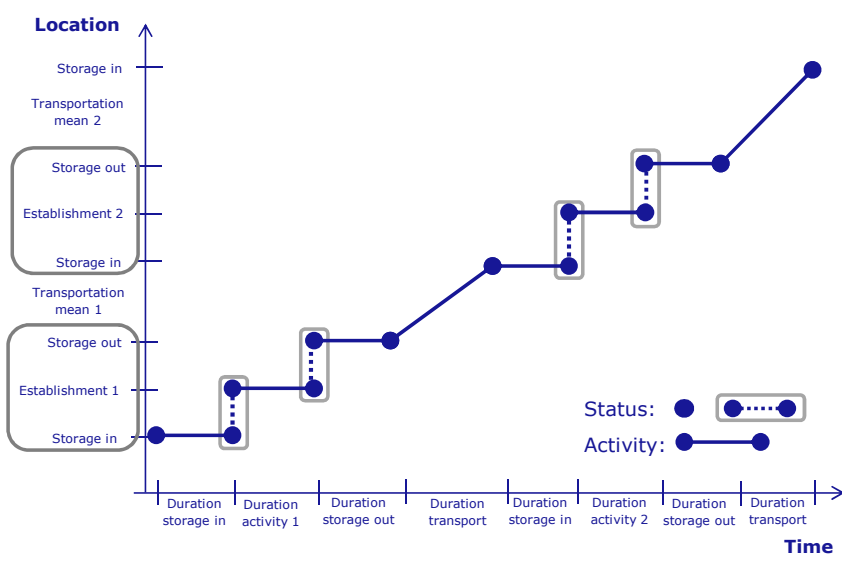


Granularity of tracing information

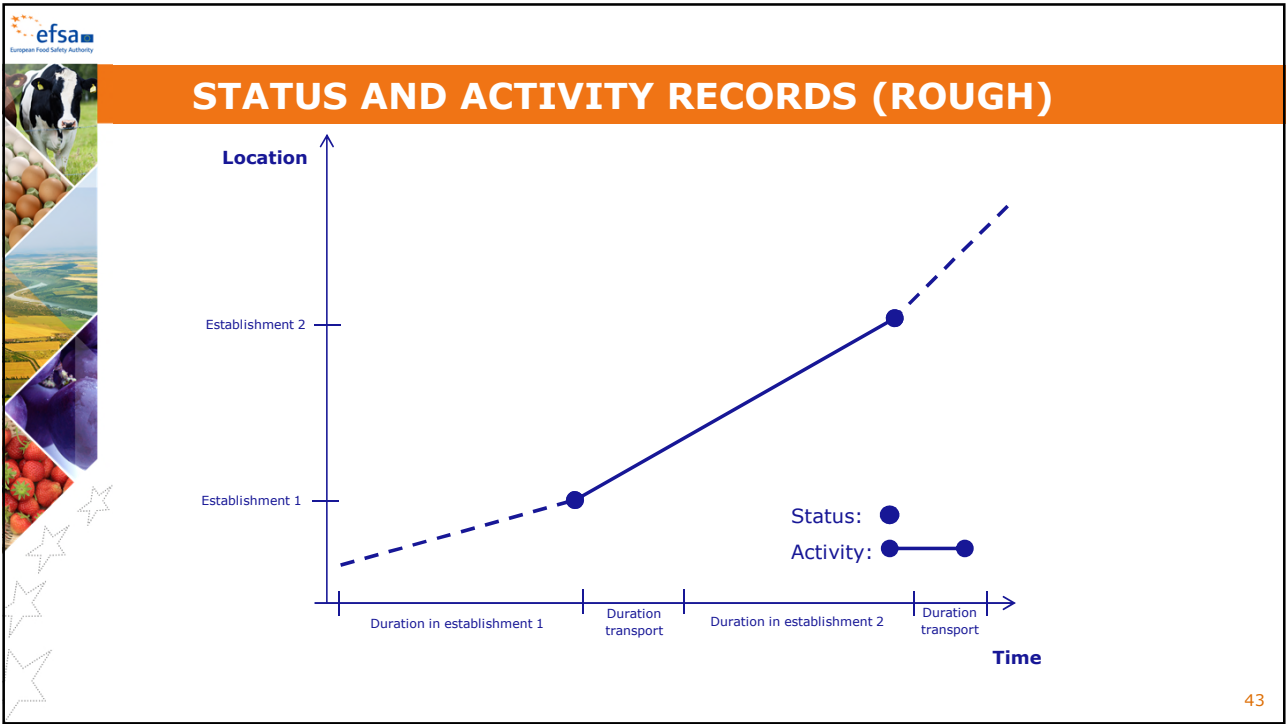
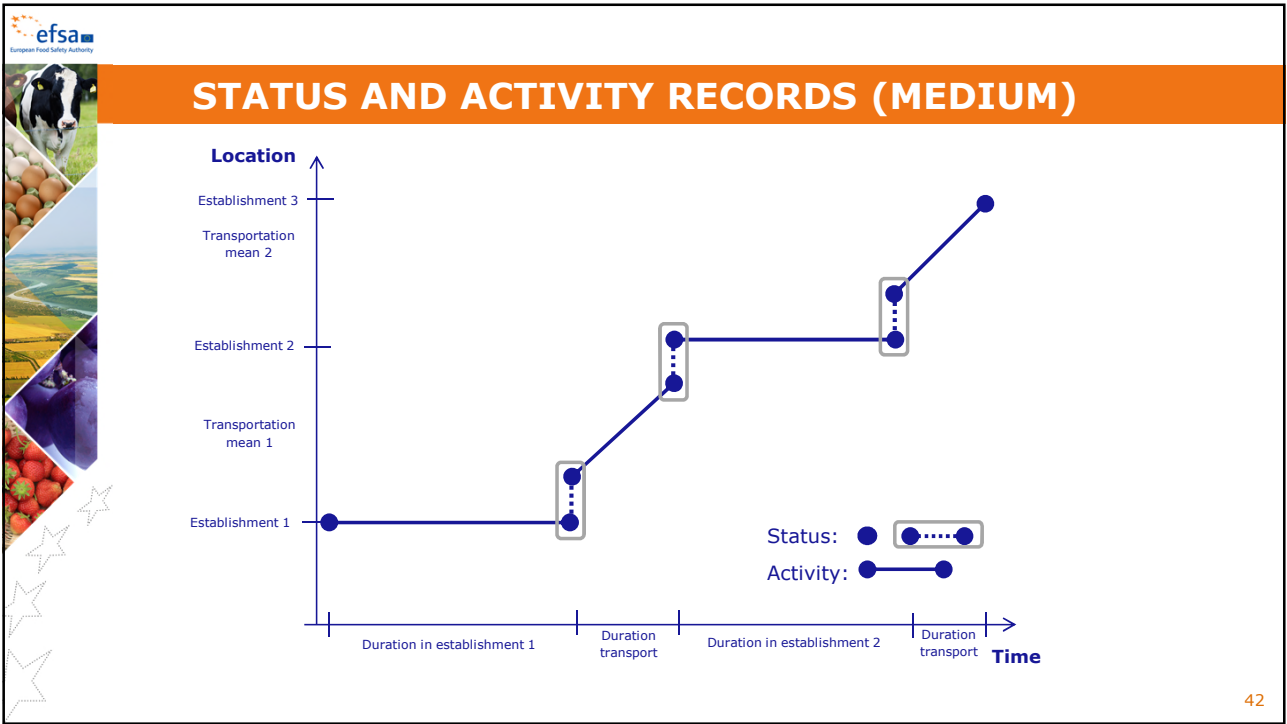
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STATUS AND ACTIVITY RECORDS (DETAILED)



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QUALITY OF TRACEABILITY SYSTEMS

- **The precision** is mainly described by the granularity of the differentiation of the traceable resource units and activities.
- **The completeness** is mainly described by the percentage of necessary information, which it is possible to retrieve retrospectively.
- **The reliability** is mainly described by the accuracy of the stored information.

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MOTIVATION OF TRACEABILITY SYSTEMS

- **Production optimisation / competitive advantages**
- **Quality assurance / certification**
- **Sustainability / animal welfare**
- **Chain communication / trade globalisation**
- **Food safety / legislation**
- **Bioterrorist threats**


Reference: Karlsen et al. (2013)

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The revised data model

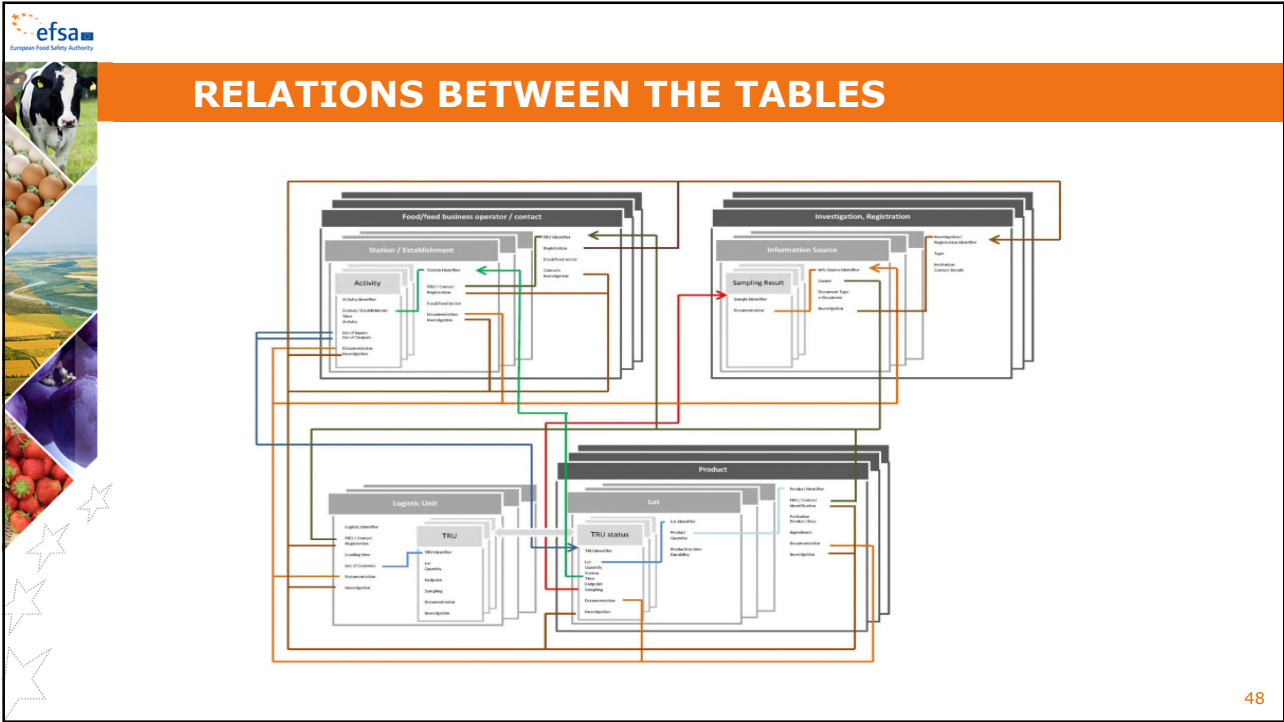
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REVISED DATA STRUCTURE: 9 TABLES

Food Business Operator	Product	Investigation
Establishment	Lot / batch (Logistic unit)	Information source
Activity	Traceable Resource Unit	Measurement
Transformation	Status	Information

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INFORMATION IN RASFF (1)


Investigation / Registration

Investigation /
Registration
Identifier

Type

Institution

Contact



Notification number: 3252

Reference: 200221

Notification type: food

Notification basis: company's own check

Notification classification: alert notification


Notifying country:

Notifying Country region:

CP Reference:

Date of notification: 20/02/20

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INFORMATION IN RASFF (2): FOLLOW-UP

Information Source

Info Source Identifier

Owner

Document type
e-Document

Investigation ID

fup14 #3305 - ec validated - [REDACTED]

CP Reference: [REDACTED]

Organisation / ministry: [REDACTED] Food Authority [REDACTED] Regional Directorate [REDACTED]


Contact person: Mr [REDACTED] Tel: [REDACTED] Fax: [REDACTED] E-mail: [REDACTED]

Additional information:

Follow-up type: additional information

Reference: 20[REDACTED]0221

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INFORMATION IN RASFF (2): ATTACHMENTS

Information Source

Info Source Identifier

Owner

Document type
e-Document

Investigation ID

General documents:

notid	Type	File name
3252[REDACTED]	analytical report	[REDACTED].pdf

Products Operators information documents:



notid	Type	File name
3261[REDACTED]	bill(s)/delivery document(s)	BILL_OF_LADING [REDACTED].pdf

Reference: 20[REDACTED]0221

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Berlin, 08th November 2017, 23

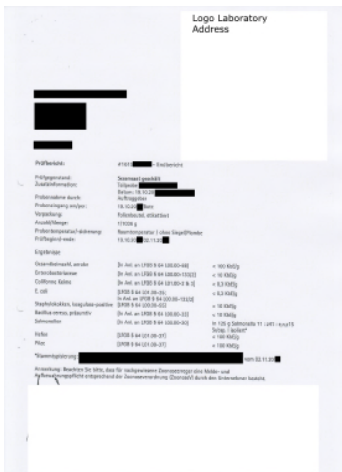
INFORMATION IN RASFF (3)

Sampling Result



Sample Identifier

Sampling result

Info Source ID



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STATUS IN RASFF (1)

Product

Product Identifier

FBO / Contact ID

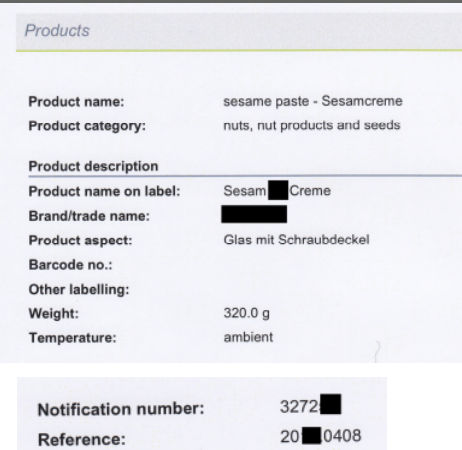
Packaging


Product class

Ingredients

Info Source ID

Investigation ID






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Berlin, 08th November 2017, 24



STATUS IN RASFF (2)

Lot

Lot Identifier

Product ID


Quantity

Production time

Durability

Consignment	
Consignment / lot number:	L60318
Origin:	Greece
Public health certificate number:	
Public health certificate date:	
CVED number:	
Other document:	
Number:	
Durability date:	best before 01/02/2018
Description of the lot no. of units:	12.099
Description of the lot total net weight:	3.871,68 kg

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STATUS IN RASFF (3)

Traceable Resource Unit (TRU) Status

TRU Identifier

Lot ID

Quantity

Station

Time

Endpoint

Sampling

Info Source ID


Investigation ID

fup6 #3276 - ec validated -	
CP Reference:	
Organisation / ministry:	
Contact person:	
Additional information:	<p>Investigations at the establishment [redacted] have confirmed the receipt of "Sesam Crème".</p> <p>The supplier had informed the [redacted] FBO about the non-compliance. The [redacted] enterprise started immediately to withdraw the product from the market (350 glasses). All products were destroyed in one authorized enterprise. The evidence documents were shown to [redacted] inspectors.</p>

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Berlin, 08th November 2017, 25

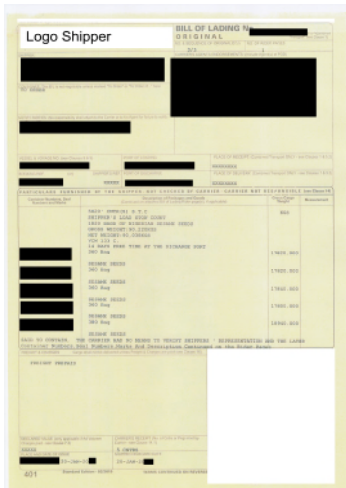


STATUS IN RASFF (2)


Logistic Unit

- Logistic Identifier
- FBO / Contact ID
- Loading time
- List of Contents
- Info Source ID
- Investigation ID

<https://www.msc.com/track-a-shipment>




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STATUS IN RASFF (3)

Traceable Resource Unit (TRU) Status

- TRU Identifier
- Lot ID
- Quantity
- Endpoint
- Sampling ID
- Documentation ID
- Investigation ID



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TRANSFORMATION IN RASFF (1)

Food / feed business operator / Contact

FBO Identifier

Registration ID

Food/feed sector


Contacts

Investigation ID

Operator	
Operator type:	produced for
Name:	██████████
ApprovalNumber:	██████████
Address:	██████████
Location:	██████████
Postal code:	██████
Country:	Germany
Distribution to:	France, Luxembourg, Portugal

Operator type:	manufacturer
Name:	██████████
ApprovalNumber:	██████████
Address:	██████████
Location:	██████████
Postal code:	██████
Country:	Greece
Distribution to:	Austria, Belgium, Estonia, France, Germany, Switzerland

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TRANSFORMATION IN RASFF (2)

Station / Establishment

Station Identifier

FBO Contact ID

Registration ID

Food/feed sector


Info Source ID

Investigation ID

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Berlin, 08th November 2017, 27



INFORMATION IN RASFF (3)

Activity

Activity Identifier

Station ID

Time

Activity

List of Inputs

List of Outputs

Info Source ID

Investigation ID

fup15 #3280 - ec validated - Greece

CP Reference: [REDACTED]


Organisation / ministry: [REDACTED] Food Authority [REDACTED] Regional Directorate [REDACTED]

Contact person: [REDACTED]

Additional information:

- According to the audit findings there is no evidence indicating possible underperformance of the decontamination process steps. The heat treatment steps were adequately validated and appropriately verified/documentated for the 18.03.2016 production run of tahini used for the [REDACTED] sesame paste.
- The [REDACTED] sesame paste was produced on the 21.03.2016 and was packaged in glass jars on the 21.03.2016, 22.03.2016 & 23.03.2016.
- The process steps until the production of tahini were described in details in alert notification [REDACTED] tip 6. For this specific batch of [REDACTED] sesame paste the process procedure following tahini production could be briefly described as follows:
 - o On 18.03.2016 23250kg of sesame seeds from the 95000kg of the [REDACTED] batch used for the production of 16900kg tahini.
 - o 1500kg of the above quantity was placed in two plastic pallet tanks in order to be used for [REDACTED] sesame paste production.
 - o The remaining quantity of tahini used as follows: a) 5100kg were packaged in plastic containers of 0.9kg (L60318), b) 12000kg used for the production of sesame oil (L60322).
 - o On 21.03.2016 3871kg of [REDACTED] sesame paste was produced. The main step of the process was the mixing of the tahini produced on 18.03.2016 with the other ingredients (sugar, cottonseed oil & soya lecithin). The mixed product (through a close pipeline system) was then placed in a stainless steel holding tank remaining there until packaging at approximately 45°C.
 - o The final product packaging took place on 21.03.2016 (1647kg), 22.03.2016 (1167kg) & 23.03.2016 (1037kg). The glass jars used for the product packaging had undergone UV treatment but their caps did not.
- In general the whole production line is a closed one. However, in this specific batch the production chain had been interrupted by an intermediate step of tahini storage in plastic pallet tanks. There was no verification for the adequate sanitation and the appropriate storage conditions of these plastic tanks before their use.

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DRAFT REPORT FOR PUBLIC CONSULTATION

SCIENTIFIC REPORT

APPROVED: 29 March 2016

PUBLISHED: dd mmmm 2016

doi:10.2903/j.efsa.2016.4040

Data structures for tracing back and forward of products in multinational food and feed safety incidents

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Olaf Mosbach-Schulz, EFSA-AMU

Berlin, 08th November 2017, 28



(Thanks to an unknown lady who permitted this photograph of her tattoo, 2016, photograph by Olaf Mosbach-Schulz)

THANKS FOR YOUR ATTENTION

European Food Safety Authority (EFSA)
Assessment and Methodological Support Unit (AMU)

Olaf Mosbach-Schulz olaf.mosbach-schulz@efsa.europa.eu

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