

Tracking and tracing in food supply chains

Prof.dr.ir. Jack G.A.J. van der Vorst
Chair Logistics and OR group
Wageningen UR, Netherlands
Jack.vanderVorst@wur.nl

AOAC Europe – Eurachem Symposium
Brussels
Marche 3, 2005

Menu

- What is traceability?
- Results international benchmark study T&T
- Actual situation and developments
- Design of a traceability system
- Concluding remarks

General Food Law (EU 178/2002/art. 18): **ambiguous demands**

- “Food and feed business operators shall be able to identify any person from whom they have been supplied with a food, a feed, a food-producing animal, or any substance intended to be, or expected to be, incorporated into a food or feed. To this end, such operators shall have in place systems and procedures that allow for this information to be made available to the competent authorities on demand.
- Food and feed business operators shall have in place **systems and procedures** to identify the other businesses to which their products have been supplied. This information shall be made available to the competent authorities on demand.
- Food or feed which is placed on the market or is likely to be placed on the market in the Community shall be adequately labelled or identified to facilitate its traceability, through relevant documentation or information in accordance with the relevant requirements of more specific provisions.”



Proposed demands of the Dutch Food Safety Authority 2004

A system for traceability that comprises the following elements:

- The (time of) goods received and their internal handling
- The processing
- The dispatch
- Analysis of the determining of lot sizes

Provide the following information on request *within 4 hours* in case of calamities:

- Determination of the **batch size** of the product involved
- Customers of a possibly affected lot
- Possible suppliers of any ingredients of an affected lot
- Amount and sort of the ingredients
- Production circumstances including rework and possible influence on other lots
- Possible cross contamination during transport

EU guidance document GFL (1)

- Traceability is a risk management tool
- Required is one step back and one step forward approach
- Food contact materials are captured in new regulation (EU 1935/2004)
- The chain covers the importer/grower up to the retailer outlet
- Recommended are:
 - Internal traceability (link incoming and outgoing products & batch splitting/combinations)
 - T&T at international trading partners
- Recall batch size = responsibility company (but they should be able to show traceability analysis)
- Direct informing of food safety authority in case of food incident

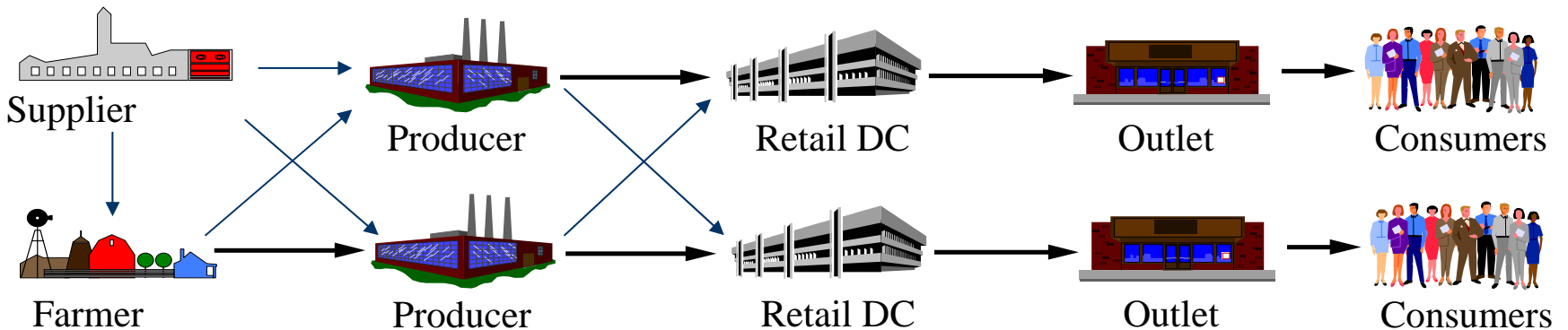
EU guidance document GFL (2)

- **Information to be provided immediately:**
 - Name, address of supplier, nature of products that are supplied
 - Name, address of customer, nature of products that is delivered
 - date of transaction / delivery
- **Highly recommended information (as soon as reasonably practicable):**
 - volume or quantity
 - batch number
 - more detailed description of the product (pre-packed, raw, bulk...)
- Information detail depends on type of business (risk assessment)
- Required is information on physical flows - not just commercial flows
- **Type of systems and procedures needed:** related to the time needed to deliver fast and accurate information.
- **Record keeping** = MIN(5 years, BBD + 6 months)

Traceability is ...

tracking (pro-active gathering of information)

forward tracing (reactive gathering of information)

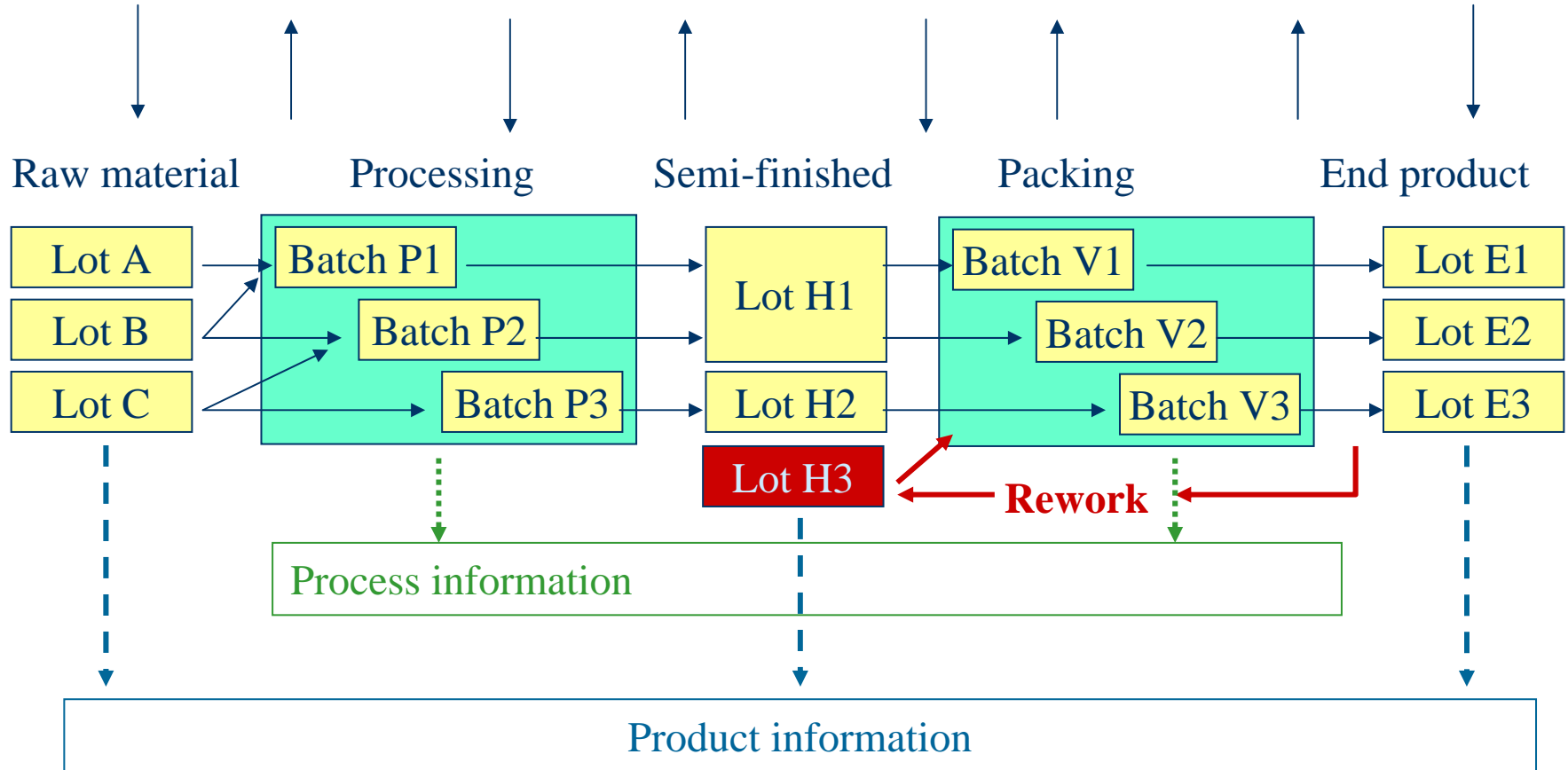


backward tracing (reactive gathering of information)

Traceability is all about ..

- ... deciding what **performance level to** strive for:
 - How fast can the tracing operation take place?
 - What is the tracing unit?
 - What is the maximum recall size that can be accepted?
 - ... knowing the wishes of your customers concerning food safety.
 - ... deciding on the **lot segregation** in your goods flow.
 - ... following lots through the process.
- Lot = a number of products (boxes, bags, pallets, ..) that have **unique and homogeneous characteristics** with a **common history** in process conditions.

Communication (EDI, XML)
Registration (LIS, ERP, MES, WMS)
Identification (barcodes, scanners, RFID)



Menu

- What is traceability?
- Results international benchmark study T&T
- Actual situation and developments
- Design of a traceability system
- Concluding remarks

Benchmark T&T



Benchmark results (1)

- Small differences between the countries; food supply chains have become global chains.
- The differences between supply chains are larger than between countries.
- Legislation important incentive for traceability .. but still indefinite wrt. required performance levels.
- Retailers are more demanding than government.
- Best practices are fully integrated or highly coordinated chains that go beyond legal requirements.

Benchmark results (2)

- There is still little chain collaboration and/or chain transparency.
- Large differences in chain performance regarding traceability. Complete chain traceability scarce.
- There are hardly any specific traceability systems.
- Most companies focus on prevention instead of traceability
- Traceability usually part of larger change project aimed at improving logistical efficiency, product and process quality assurance or the communication to buyers.

Findings T&T in types of supply chains

Meat



- integrated chains
- need evident, more branding
- bottleneck: identification
- international co-operation required
- technological developments
(DNA: animal identification)

Dairy



- integrated chains
- focus on prevention (QA)
- T&T from store to factory
- bottleneck: lot segregation
- Innovative products resulting
in increased complexity

Fruit & Vegetables



- spot market
- more chain co-operation
- focus on prevention (QA)
- low ICT-penetration level
- trend more pre-packed

Wheat/Bread



- grain spot market; after
coordinated chains
- bottleneck: bulk goods
- low ICT-level (islands)
- development of chain products

Bottlenecks for traceability



- Indefinite and differentiated performance levels concerning traceability
- Lack of chain organisation and chain transparency
- Lack of standardisation in identification and registration
- Little economical incentives for traceability
- High investments in infrastructures required for 100% traceability
- Traceability of products in QA schemes is restricted
- Divergence in businesses systems makes standardisation difficult

Menu

- What is traceability?
- Results international benchmark study T&T
- Actual situation and developments
- Design of a traceability system
- Concluding remarks

Chain strategies T&T

- **Compliance-oriented strategy:** comply to rules and regulations with the help of end-of-pipe techniques (process as black box) – *just costs*.
- **Process improvement-oriented strategy:** control within the own link by means of production integrated measures that achieve both compliance with governmental rules and regulations and a better return – *costs and local benefits*
- **Market-oriented (branding) strategy:** aim for full traceability within the supply chain to achieve competitive advantage (by creating added value in the market place) – *costs and chain benefits*

Actual situation 2005

- Many companies focus on compliance, some on process-improvement and a few on branding.
- Front-runners .. all develop their own system.
- More and more cooperation and alignment of systems.
- **Biggest issues:**
 - Smallest traceable unit
 - Optimal batch size determination
 - T&T at retailer and supplier (labelling)
 - Usefulness of small batch sizes
 - Paper versus electronic recording (LIMS)
 - Complete PDCA-cycle
 - Availability of traceability analysis and procedure
 - Management decision regarding maximum recall size
- Main development: barcode or RFID ?



Menu

- What is traceability?
- Results international benchmark study T&T
- Actual situation and developments
- Design of a traceability system
- Concluding remarks

Steps in the traceability analysis

Step 1

Determine the traceability strategy

Step 2

Demarcate the scope of the project

Step 3

Analyse the processes

Make process flow diagrams and describe inbound & outbound volumes in each process step including possible cross-contaminations and cut-off points for lot segregation (e.g. by cleaning).

Step 4

Determine improvement measures

Step 5

Implement improvement measures

Step 6

Adjust procedures and test the system

Risk
=
the chance of an incident occurrence
x
severity of the incident
x
volume of infected lot
X
reaction time

It's all about making choices ...

- Comply to legislation or branding
- Just QA or also high traceability
- Link focus or chain focus
- Generic or specific (QA)
- Existing chain or new supply chain
- Low risk or high risk
- National or international

Improvement options

- **Managed system**
 - Adjusted warehousing (silo's, check posts, etc.)
 - Adjusted machinery: less blending
- **Managing system**
 - More cleaning (with loss of line efficiency)
 - No use of remaining small lots
 - Less rework
 - Lot separation
- **Information system**
 - Introduction of barcodes / RFID
 - New control equipment (linked to ERP-system)
- **Organisation**
 - New ways of working to guarantee lot segregation
 - Working with scanners, etc.

Menu

- What is traceability?
- Results international benchmark study T&T
- Actual situation and developments
- Design of a traceability system
- Concluding remarks

General recommendations

- Formulate a **traceability policy** and performance objectives
- Extend the risk analysis with a **traceability analysis** with focus on lot sizes and maximum (allowed) recall volumes.
- Evaluate the current **lot segregation** of especially bulk goods
- Analyse the lot segregation at **suppliers** and establish an integrity monitoring program on supplied materials (contains the bag the materials that the label claims it contains?)
- Improve the **feedback** from the work floor
- Implement **standard barcodes/RFID** and coordinate with suppliers and customers
- Replace vulnerable paper QA/QC-files with an **electronic LIMS**
- **Store** all relevant process data for the appropriate period.