

Enabling Transparency in Meat Supply Chains: tracking & tracing for supply chain partners, consumers and authorities

Huub Scholten¹, Tim Bartram, Ayalew Kassahun¹, Sabine Kläser, Ralph Tröger, Rob J.M. Hartog¹, Angela Schillings-Schmitz, Sandra Meier, Robert Reiche

¹Wageningen University
Information Technology
Hollandseweg 1
6706 KN Wageningen
The Netherlands
huub.scholten@wur.nl

Abstract: This paper discusses a new system that enables meat supply chain stakeholders and regulators or authorities to track and trace and – at the same time – allows meat consumers to use their smartphone (or internet) to get immediate and direct access to all information on the specific meat item they see at the butcher or in the supermarket. This meat transparency system follows meat through the supply chain and stores its history. Apps help supply chain partners to upload the data they want or have to share and apps help them, authorities and consumers to get the stored history in a format that fits the intended user. As the system is based on the international EPCIS standard, roll-out of the meat transparency system to other supply chains (other types of meat, other types of food and other countries) is easy and straight forward.

1 Introduction

The horse meat scandal of 2013 was not the first major problem related to meat supply chains. Twenty years ago the meat sector was confronted with BSE (bovine spongiform encephalopathy), also known as mad cow disease. Despite huge efforts by authorities and the meat sector itself, such incidents can always occur. Moreover the responses of the authorities and the meat sector on such crises showed that adequate measures require enormous efforts with relative poor effects. As a consequence, consumers lose their trust and meat sales drop, at least for a period [Ka00], [Ka01].

In the context of the European research programme Future Internet Public-Private Partnership (FI-PPP) the EC funds research projects that accelerate the development and adoption of future Internet technologies in Europe. In the first phase of FI-PPP a use case for such innovations in the agrifood sector has been developed in the project SmartAgri-Food. In the project FISpace (FI-PPP phase 2) concepts and ideas of SmartAgriFood are tested in a series of early trials. The Meat Information on Provenance or MIP trial aims

at making the meat supply chain more transparent. Using existing technologies and standards it will develop an innovative transparency system for meat and test it in a beef supply chain. In FI-PPP phase 3 approximately 20 new projects will be funded to roll-out what is tested in the FI-PPP phase 2 projects such as FISpace.

This paper will outline briefly a new meat transparency system, which focuses on the business cases and opportunities for different stakeholders, including consumers.

2 Developed transparency system

The MIP trial distinguishes information handling at two levels. The first level concerns the flow of a product along a meat supply chain (starting from cows at the farm to meat industry to retailer to consumer). The second layer of information handling concerns information exchanges between two or more supply chain partners (e.g. notes of deliveries) and will not further be discussed here.

Information on the product oriented layer enables tracking and tracing in two directions: from farm to fork and from fork back to the farm. This information will be stored in one or more EPCIS repositories to make it available for tracking & tracing by apps. These apps will inform consumers (what is the history of the meat item I am considering to buy?), meat supply chain partners (where are the meat items that went through my company?) and – in case of food alerts – authorities (where can we find all meat items that belong to some suspected lot?).

EPCIS or Electronic Product Code Information Services is a standard to store and use information on products in many business situations, including perishable goods such as meat in supply chains [Ep03], [Ba02]. An overview of the overall system with the two information layers is given in Figure 1.

In addition to the backbone consisting of one or more EPCIS repositories, the system requires the following functions:

1. Populating EPCIS repositories with meat transparency data: capturing and uploading EPCIS events into an EPCIS repository, e.g. birth, breeding, fattening, slaughtering, cutting, packing/unpacking, sending/receiving and selling.
2. Accessing transparency data by businesses and government: GUI for standard EPCIS query operations for business locations, processes, products, time intervals.
3. Discovery of traceability data sources: who has information about a specific product, identified via Global Trade Item Number (GTIN) + lot or serial number in order to reconstruct the entire chain of custody.
4. Aggregation of traceability information: automated collection and aggregation of traceability information of a product; authorized requesters should get: place/ date of birth, date/ location of slaughtering of the processed animals, a list of all parties who had custody of a product and a list of distribution centres/ retail stores a product of concern has been shipped to.

5. Accessing transparency data by consumers (B2C): function similar to the previous one, but for consumers, not allowing tracking & tracing, but only presenting three types of information: (1) dynamic data (date of slaughtering, place of birth, etc.), (2) *master data* (location of the slaughterhouse, etc.) and (3) marketing information (pictures, certificates, videos, etc.).

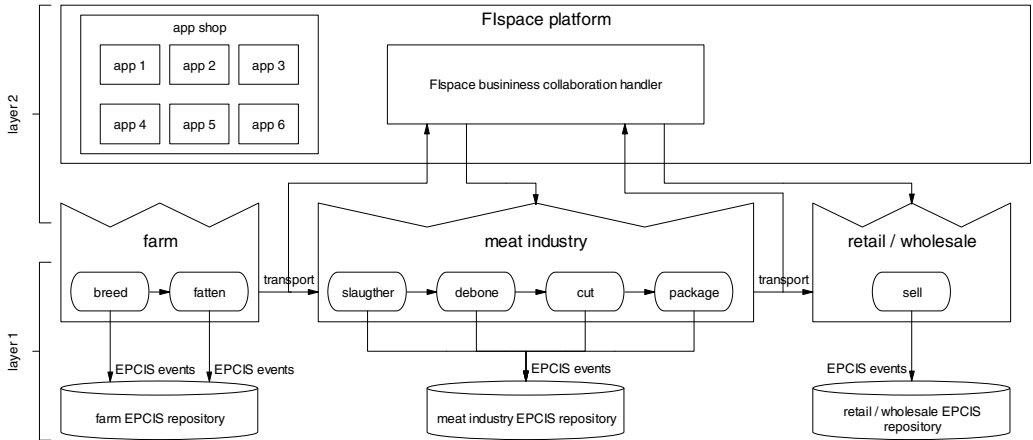


Figure 1. Overview of the new meat transparency system in a beef supply chain.

3 Business cases for different types of users

The new meat transparency system distinguishes three groups that can use it: (1) consumers, (2) meat supply chain partners and (3) authorities and regulators. In this section the benefits for each of these groups will be summarized.

Consumers can use their smartphone in the shop (or a PC at home) to be informed on: date of slaughtering, place of birth, obviously on the weight of the meat item, ingredients (if included), location of the slaughterhouse, and more marketing oriented information like pictures, certificates, videos, recipes, etc. Consumers can also make a profile that facilitates to filter the information, according to what they are interested in. These benefits for consumers have also an indirect positive effect on how consumers experience their retailer that provides a proven history of the meat item they buy. Finally, consumers will have the impression of a brand like name or an approval stamp, when they get access to this type of information.

Supply chain partners can also benefit from the meat transparency system. Farmers, for instance, get a direct link to consumers. This facilitates differentiation of products from those of other farms. Moreover, a farmer's investment, e.g. in sustainability or in animal friendliness, will be made visible for the meat consumer. In this way farmers communicate with the consumers of their products. Farmers, slaughterhouses and meat processors can base products better on the requirements of consumers and other meat supply chain

partners. In this way it will facilitate optimising every partner's business processes and improve investment decisions.

Authorities can easier control and enforce regulations in case of a meat alert such as the horse meat scandal. The new meat transparency system enables a fast, effective, surgical response of the authorities with less critique by the media and the general public, resulting in more confidence and trust in the responsible authorities. Moreover, the society as a whole will benefit too, as the transparency system will reward investing in socially attractive farming styles, such as sustainable production and animal welfare.

4 Conclusion and discussion

At present there are several systems that enable providing information to consumers on many aspects of meat they are considering to buy or just bought. In Germany a good example is fTRACE (<http://www.ftrace.com/de/de>) that enables consumers to get meat information back to the farm and is adopted in a series of German (and a few Dutch) supermarkets. There are also tracking & tracing systems for food, including meat. So far the authors do not know any system that serves all parties involved in the meat sector and enables to look in two directions, i.e. from farm to fork and vice versa. The meat transparency system, developed in FIspace's MIP trial aims at serving consumers, meat supply chain partners and authorities. Moreover, based on EPCIS, it is designed in a way that facilitates rolling it out in other meat supply chains, for other types of meat, for other types of food and even for other perishable goods, nationally and internationally.

Acknowledgements

This paper is based on research in the FIspace project, which is a FI-PPP phase 2 project, granted by the EC in FP7 under grant agreement n° 604123.

References

- [Ka00] Kassahun, A. et al.: Transparency in food supply chains: A design of an information systems for tracking, tracing and food awareness for the meat sector. 7th International European Forum (Igls-Forum) - (136th EAAE Seminar) on System Dynamics and Innovation in Food Networks, Innsbruck-Igls, 2013, Austria.
- [Ka01] Kassahun, A. et al.: to be submitted. Enabling chain-wide transparency in meat supply chains based on the EPCIS global standard and cloud-based services. Computers and Electronics in Agriculture.
- [Ba02] Bartram et al.: Efficient Transparency in Meat Supply Chains with IT-Standards: EPCIS based Tracking & Tracing for Business Partners, Consumers and Authorities. 34. GIL-Jahrestagung, 24-25 February 2014. GIL, Bonn, 2014.
- [Ep03] EPCGlobal: EPC Information Services (EPCIS) Version 1.0.1 Specification. http://www.gs1.org/gsmp/kc/epcglobal/epcis/epcis_1_0_1-standard-20070921.pdf, Lawrenceville, New Jersey, 2007, EPCglobal Inc, p. 146.