Assessment of current procedures for animal food production chains and critical control points regarding their safety and quality: preliminary results from the Organic HACCP-project

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Introduction

Within the 5th EU-framework project "Recommendations for improved procedures for securing consumer oriented food safety and quality of certified organic foods from plough to plate" (QLRT-2002-02245; "Organic HACCP"), a systematic analysis was carried out among selected certified organic food production chains, such as eggs and milk but also wheat bread, cabbage, tomatoes, apples and wine, to investigate current procedures of production management and quality assurance. For each of seven quality and safety criteria, such as microbial toxins and abiotic contaminants, potential pathogens, natural plant toxicants, freshness and taste, nutrient content and food additives, fraud as well as social and ethical aspects the information was analysed to identify Critical Control Points (CCPs) and to suggest ways how the control of quality and safety can be further improved. CCPs were defined as the steps in supply chains where the qualities of the final product can be controlled most efficiently.

The project had the following overall objectives:

i) to provide an overview of consumer concerns in terms of organic food in different European regions, and a conceptual framework for setting future research in perspective;
ii) to establish a database of existing procedures and relevant control points for selected organic food production chains, prepared for extension with additional commodity groups and updated procedures;
iii) to provide systematic analyses of each selected commodity chain using procedures developed for Hazard Analysis by Critical Control Points (HACCP), for each of seven aspects of safety and/or quality; and
iv) to produce and disseminate information material with recommendations for improvements of procedures and control, to the stakeholders involved, and to define the most important research needs on subjects where current knowledge does not yield a sufficiently firm basis for practical recommendations, and disseminate this information to researchers and research policy makers.

The new aspect within the Organic HACCP project was thus to improve how consumer concerns are addressed, through the use of the CCP concept for a wide range of criteria, not only safety.

Materials and methods

Database

A questionnaire was set up by experts in the areas of the following seven quality and safety criteria: microbial toxins and abiotic contaminants, nutrient content and food additives, pathogens, freshness and taste, natural plant toxicants, fraud, social and ethical aspects.

Questions were formulated with regard to the areas of consumer concerns. An internal (confidential) database was established to carry out the analysis of collected data, representing several regions typical for the selected commodity and to overview the management steps and their critical control points. The database contains information on i) the background of the CCPs, ii) the quantitative risk related to other chains in the analysis or, if relevant, compared with data from other studies, iii) how and why the step is controlled in the chain or suggestions of means for improved control and, and iv) discussions in relation to the differences between the chains. Possibilities which may alleviate the problem at a later stage, if relevant, were also included.

CCPs and analysis of the chains in the sense of Organic HACCP

Critical control points were identified using methods developed for Hazard Analysis and Critical Control Points (HACCP), a standard system which identifies, evaluates and controls hazards that are significant for food safety {Alimentarius, 1997 #1225;NACMCF, 1997 #357}. Organic farming and the HACCP approach, the two systems have important common aspects, while they also show important differences: For example, organic production must, by definition, cover the full chain from primary production until the food is sold to the consumer, while, at present, HACCP systems are most often set up within one enterprise/operation, such as a factory. A combination of the two types of principle could utilise their respective assets and compensate for the weakness of each system. Neither system has specific provisions for ensuring other aspects of quality than food safety. This is at present entirely up to the general skills of those involved at each step of the chain of production and distribution.

In the organic HACCP project, we used some of the concepts from HACCP for identifying CCP, as a tool for defining procedures that could be used to optimise quality assurance and quality in the entire chains of production and distribution. The Organic HACCP concept differs from the standard HACCP in at least three aspects: i) it covers the entire chain, not just one enterprise; ii) it is concerned with safeguarding each of a range of qualities, such as taste, trustworthiness and authenticity, not just safety in the sense of preventing a health hazard; and iii) concentration on the aspects of procedures for analysis of risks. The project concentrated on the aspects of procedures for analysis of risks, working with representative examples, in order to provide a systematic framework for the formulation of recommendations for improving existing procedures, rather than with a view to their commercial use or as a means of obtaining HACCP certification. The definition of a CCP is a step at which control can be applied and is essential to prevent or eliminate a risk (instead of a food safety hazard) or reduce it to an acceptable level.

Publicly accessible database

Based on the internal database, an external, publicly accessible database has also been established, which is accessible on the public homepage (www.organichaccp.org) under “results”. Log-in is not necessary.

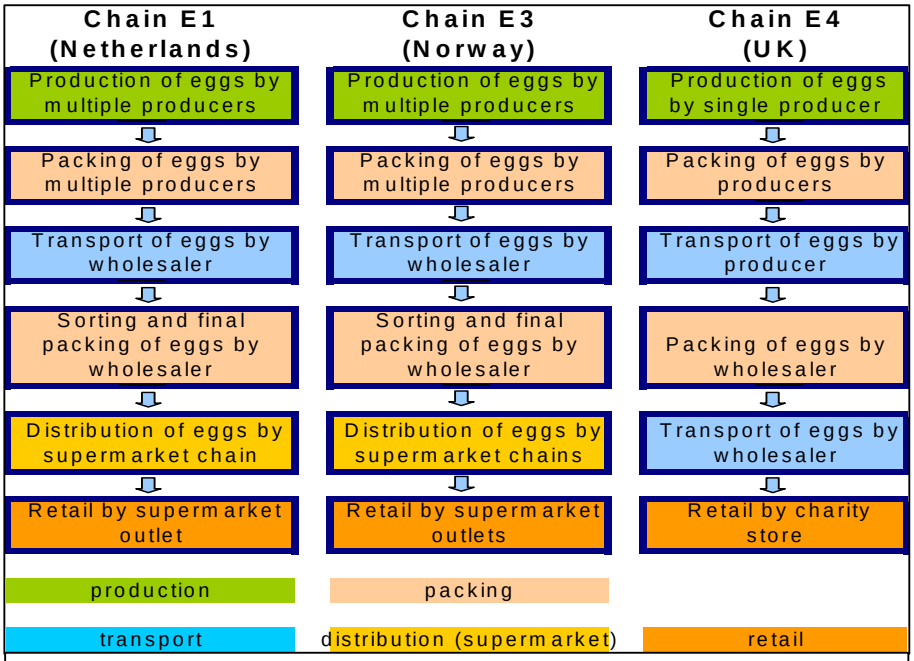

Figure 1 Typical supply chain structures for eggs from real chains in the Netherlands, Norway and UK.

Results and discussion

The internal (confidential) database has received 139 datasets from the actors (producers, processors, retailers etc.) of 3-6 supply chains for each of the seven commodities: eggs, tomatoes, cabbage, wine, milk, apples and wheat bread, each covering 3 to 4 regions. The publicly accessible database contains overviews of 29 examined chains of production and distribution for organic products.

The egg supply chain looked similar in the examined chains in the Netherlands, Norway and UK (Figure 1). Production and packaging was maintained by the producers. In all chains, a wholesaler was responsible for further sorting and packaging. Transport was mainly made by wholesalers.

In Table 1 and 2, CCPs are identified for all seven criteria regarding the three egg and the four milk chains, respectively. Generally, the organic production practices do not raise any concerns regarding the levels of natural toxicants in eggs or milk. Therefore, there was no indication to define a CCP for this criteria along the examined egg and milk chains. The listed CCPs must not appear in all of the chains investigated but can. However, at least in one of the cases per chain examined the listed CCPs must have been of a risk. The publicly accessable database (see www.organichaccp.org see “Results” Critical Control Points) gives further explanations on how small, variable or high the risk was for a particular management step in a certain chain.

Table 1 Critical Control Points (CCP) for the three examined egg chains from the Netherlands, Norway and UK and all four examined milk chains from Austria, Norway and Denmark (2). All 7 quality and safety criteria were considered with the relevant management steps.

Criteria	Management Step	CCP for eggs	CCP for milk
Microbial toxins/abiotic cont.	Production	Feed: Contamination with dioxins/pesticides	Feed: Contamination with dioxins/pesticide Fodder storage: conditions for mycotoxin formation in cereals and silage.
Nutrients/ additives	Production	Feed: Composition of diet	Feed: Composition of diet
Potential pathogens	Production	Farm situation: introduction from neighbouring land via run-off/contaminated drinking water Feed: through feed, fresh material contaminated by wild mammals/birds	Management, Labour, Equipment, Storage of milk: all faecal contamination Farm situation: introduction from neighbouring land Feed: through feed, fresh material contaminated by wild mammals/birds.
	Packaging	Storage: inappropriate conditions	
Freshness/taste	Production	Feed: type of feed (outdoor feeding)	Feed: type of feed (outdoor feeding) Storage: time frame.
	Processing		Management: information regarding homogenization.
	Packaging	Storage: storage time, condition	Storage: storage time, condition. Labelling: labelling information regarding type of processing.
	Distribution	Storage: storage time, condition	

Table 1 Continued

Criteria	Management Step	CCP for eggs	CCP for milk
	Retail	Storage: storage time, condition Display: storage time, condition	Storage: temperature regime Display: temperature regime Consumer contact: information transfer regarding type of processing.
	Delivery to private housholds	-	Storage: temperature regime.
Natural plant toxicants	-	-	-
Fraud	Production	Feed: use of not allowed additives/ higher amounts of non-organic (concentrate) feed Animal Health Care use of non-approved or higher allowed quantities, too short withholding periods	Feed: use of not allowed additives/ higher amounts of non-organic (concentrate) feed Animal Health Care use of non-approved or higher allowed quantities, too short withholding periods.
	Sorting/final packaging	Labelling: conv. eggs sold as organic	
Social/ethical aspects	Production	Management: diversification vs. specialist farms. Labour: family vs. non-family enterprise Animal Health Care: trust in animal welfare	Management: diversification vs. specialist farms. Labour: family vs. non-family enterprise Animal Health Care: trust in anaimal welfare.
	Delivery to private housholds	-	Labour: family vs. non-family enterprise Consumer contact: information transer
	Retail	Customer contact: information transfer	Labour: family vs. non-family enterprise Consumer contact: information transfer.

Based on the collected data and additional advice from the participants at the terminal workshop in Newcastle in January 2005, 14 leaflets have been prepared: 7 leaflets for producers (including eggs and milk), covering each of the 7 commodities, 3 addressing consumers, on the topics “Taste, freshness & nutrients”, “Authenticity & fraud” and “Safety

& contamination", 3 for retailers on the same topics, and 2 leaflets for processors (producers and processors of wine are covered by the same leaflet).
The leaflets have been translated into 6 languages (English, German, Italian, Spanish, Danish and Portuguese) and distributed to the subscribers of the QLIF newsletter, and they are available at the project homepage: http://www.organichaccp.org/OrganicHACCP.asp and on http://www.organic-europe.net/haccp/.

Literature:

Code Alimentarius 1997. Food Hygiene- Basic Texts - General Principles of Food Hygiene, HACCP Guidelines, and Guidelines for the Establishment of Microbiological Criteria for Foods.
NACMCF. 2003. *Hazard analysis and critical control point principles and application guidelines* [report]. U. S. Food and Drug Administration, U. S. Departement of Agriculture, 1997 [cited 20.1.2003 2003]. Available from http://www.cfsan.fda.gov/~comm/nacmcfp.html.