

Organic Food Processing – Principles, Concepts and Recommendations for the Future



Results of a European research project on the quality of low input foods

Edited by Alexander Beck, Ursula Kretzschmar and Otto Schmid



SIXTH FRAMEWORK PROGRAMME



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About Subproject 5 of the QLIF Project:

“Development of a framework for the design of “minimum” and “low input” processing strategies, which guarantee food quality and safety”

Organic processing standards prohibit the use of chemicals, many preservatives and other food additives, which are widely used in the processing of conventional foods. However, there are frequent discussions as to the underlying rationales and criteria used to allow some but not other processing methods and additives. There is also evidence that consumers of “low input” and organic foods have specific expectations with respect to quality characteristics of processed food. It is therefore essential to develop a framework/code of practice, which can be used to determine whether novel processing strategies are compatible with i. Organic processing standards and/or principles and ii. Consumer demands and expectations

Subproject 5 addresses these issues through three research areas:

- Workpackage 5.1 Development of a consolidated framework/Code of practice for the evaluation “minimum” and “added value” processing strategies in organic and “low input” food production and processing with respect to food quality and safety
- Workpackage 5.2 Case study 1: Assessment of chlorine replacement strategies for fresh cut vegetables
- Workpackage 5.3 Case study 2: Assessment of processing technologies that may improve the nutritional composition of dairy products

The following project reports are available at the QLIF homepage www.qlif.org and were published by the Research Institute of Organic Agriculture (FiBL) Frick, Switzerland:

- A literature survey on underlying principles in Organic and “Low-Input Food” processing. (2004). Edited by Otto Schmid, Alexander Beck and Ursula Kretzschmar.
- “Approaches Used in Organic and Low Input Food Processing – Impact on Food Quality and Safety (2006). Results of a Delphi survey from an expert consultation in 13 European countries. By Ursula Kretzschmar and Otto Schmid.
- Code of Practise for Organic Food Processing. (2006). By Alexander Beck with contributions of Ursula Kretzschmar, Angelika Ploeger and Otto Schmid.
- Concept papers outlining parameters for further development of Organic Food Processing in the EU regulation 2092/91 for organic agriculture. (2006). Edited by Alexander Beck, Ursula Kretzschmar and Otto Schmid.

For information on the Subproject 5 see <http://www.qlif.org/research/sub5/index.html>. All these publications can also be downloaded from the following Internet website: <http://org-prints.org/view/subjects/4processing.html>

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Alexander Beck, Ursula Kretschmar and Otto Schmid (Editors)

Organic Food Processing - Principles, Concepts and Recommendations for the Future. Results of a European research project on the quality of low input foods

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**With contributions from Angelika Ploeger, Marita Leskinen, Marjo Särkkä-Tirkkonen,
Monika Roeger, Thorkild Nielsen and Niels Heine Kristensen**

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Foreword

This report contains the final results of work done in a subproject on processing within a large, integrated EU-funded project within the 6th Framework Research Programme in Area 5 on food safety and quality. This integrated project, the QLIF Project (Quality of Low Input Food), aims to improve quality, ensuring safety and reducing costs along the European organic and 'low input' food supply chains through research, dissemination and training activities. Within this project a special work package dealt with the 'Development of a framework for the design of 'minimum' and 'low input' processing strategies, which guarantee food quality and safety'.

During the project it was possible to elaborate on the following papers, which were published by the Research institute of Organic Agriculture (FiBL) in Frick (Switzerland):

1. A literature survey of underlying principles in organic and 'low -input' food processing (Schmid, Beck, Kretzschmar, 2004).
2. Results of a Delphi survey, 'Approaches Used in Organic and Low Input Food Processing – Impact on Food Quality and Safety' (Kretzschmar, Schmid, 2006).
3. Code of Practice for Organic Food Processing (Beck, 2006).
4. Concept papers outlining parameters for further development of organic food processing in EU Regulation 2092/91 for organic agriculture (Beck, Kretzschmar, Schmid, 2006).

All these publications can be downloaded separately from the QLIF project website www.qlif.org. The concept papers are integrated with the full text in this report.

We very much appreciate the support of the Subproject 5 project team in contributing to this research work. We would also like to thank all the experts who participated in the Delphi survey, as well as the subcontractors who were facilitators and key informants in different countries, helping to find experts willing to participate in the survey.

We are also grateful for the support of Helga Willer and Daniel Gorba of FiBL for the formatting and illustrating of this report.

We acknowledge the Commission of the European Communities as well as the Swiss Staff Secretariat for Education and Research SER/ SBV (former Federal Office for Education and Science (BBW)) for their financial support.

The editors hope that this report helps to better outline the parameters for the further development of organic food processing.

Frick, Switzerland, June 2006

Alexander Beck, Ursula Kretzschmar and Otto Schmid, FiBL

Urs Niggli, Director of FiBL

Executive Summary

Literature survey on underlying principles of organic and ‘low-input’ food processing:

The literature survey, which was conducted as the first part of the subproject on food processing, focuses on the underlying principles of organic food processing, which are quite different depending on different types of products, different processing standards and marketing concepts. Some of the principles are basic (e.g. the use of certified organic ingredients, a certified production chain and minimal use of additives), others are shared broadly (e.g. more careful processing methods, naturalness) and some principles are in discussion mainly in the private sector (e.g. environmental management concepts, social requirements, regional focus).

The survey discusses current practices and challenges in general and with regard to different product groups (organic fruits and vegetables, cereals, dairy and meat products). Such challenges, imposed by the tendency towards longer shelf life and higher food safety, should not be achieved at the expense of, e.g. their freshness (e.g. milk). Clearly there is a lack of guiding principles and related criteria needed to make a decision about the various processing methods under discussion.

The report shows that EU Regulation 2092/91 covers a number of consumer perceptions such as certification system, traceability, minimal use of additives, labelling concepts and the use of organic raw materials. However, other consumer expectations such as careful processing, freshness, healthy nutrition and fair trade are not fulfilled. The future development of organic food processing should follow a more ‘farm-to-fork’ approach. Consumer expectations should be better taken into account. Innovative solutions/technologies are needed that involve using natural substances with more appropriate technologies and/or less critical additives and processing aids.

Delphi expert survey

Between October 2004 and May 2005 a two-step expert survey was conducted using the Delphi method. In the first round, 250 experts in 13 countries in Europe were involved, and were asked to respond to a standardised questionnaire in October and November 2004, and a second round from March to May 2005. The Delphi expert survey was designed in such a way that the most important and currently discussed aspects regarding organic food processing were taken up. 120 experts from 13 countries responded in the first round and 83 experts from 13 countries responded in the second round. The experts were chosen in such a way as to have a good representation of food processors from different sectors, with different field of activities. In the first round, 55% experts from food processing companies and 45% experts from non-processors, and in the second round 46% experts from food processing companies compared to 54% experts from non-processors participated.

One focus of the survey was to narrow and clarify definitions which are often used to characterise organic food processing. There does not seem to be as great a need for a conclusive definition of the terms ‘fresh product’, ‘careful processing’ and ‘authenticity’ as originally expected. Based on the feedback from the experts, we can conclude that instead of a final definition of the terms ‘careful processing’ and ‘authenticity’, a more elaborated definition of the production methods, as well as good labelling would be more helpful for the producers, as well for the consumers, when the intent of these two terms can be addressed indirectly.

Which criteria are important for an organic product to be successful in food markets? For most experts the most important criterion is the sensory quality. The second most important criterion is the minimal

use of additives and processing aids and the third most important criterion is the freshness, followed by authenticity.

- An important question was ‘Which aspects should be regulated’ on an EU regulation level and which ones on other levels (national, private company or label level) or not be regulated at all. The feedback from the experts was quite varied, depending on the different areas. On the EU regulatory level, the top priority mentioned was the minimal use of additives, followed by minimal and careful processing. Quality/sensory aspects, however, were not seen to be primarily on the EU level, because companies should have the chance to develop individual sensorial profiles for their products. We can conclude, based on the feedback from the food processing specialists and processors in the Delphi survey, that in the future revision of EU Regulation 2092/91 a much more differentiated approach is necessary. The experts clearly recommended that some new instruments be developed:
- EU regulation/state regulations: regulatory framework but with more flexibility for regional variation and private sector rules.
- Private standards: actually focus on the special quality and regional aspects.
- Private company level (internal quality standards): focus on the special sensory quality and general quality management.
- Common ‘code of practice’ for the organic food sector: setting the overall baseline for sustainability and health aspects. This is relevant for IFOAM and private umbrella organisations (e.g. of organic food processors) as well as private operators.
- GMP (good manufacturing practices): elaborated by organic and other advisory/consultancy services specialising in organic agriculture and organic food processing.

With regard to the question of whether EU Regulation 2092/91 is sufficient, an interesting difference between the answers of the processors and the non-processors was observed: 45.5 % of the food processors think EU Regulation 2092/91 is sufficient as opposed to only 33.3% of experts from the non-processing organisations.

In general, most of the experts expect special processing methods to be used in the production of organic food. But when asking the involved experts more specifically it was very difficult to select those methods that are usable/suitable or not usable/suitable. However, regarding the use of additives, the answers were very clear. There is a tendency to prefer additives of certified organic origin both from the processors’ as well as the non-processors’ points of view.

Code of Practice

The expert consultation has shown that there is a lack of clear guidance for operators on how to translate given regulations on a company level. A ‘code of practice’ for the organic food sector seems to be a good instrument which would eliminate the need for describing all the issues in detail in EU Regulation 2092/91. A number of problems which occurred in the last years were caused by insufficient implementation of the rules of EU Regulation 2092/91. Guidance is needed on the management level, but also for inspection/certification bodies, if more responsibility is given to the operators.

Crucial topics highlighted in concept papers

1. Concept of 'quality of origin' and criteria and procedures for the evaluation of additives for organic food processing:

This area of quality of origin is, on the one hand, relevant for the further development of marketing strategies. On the other hand, standard-setting/labelling organisations in particular can play an important role in developing this concept further by developing and promoting new private rules together with their partners (operators on the farm level, as well as on processing and trade levels), e.g. for certifying 'organic' additives, specifying lists of materials, standardising evaluation processes.

Some of these possible instruments are comparable to those that have been elaborated in more detail for fertilisers and plant pest and disease control products in the EU 'Organic Inputs' project (www.organicinputs.org).

2. Environmental orientation of organic food processing companies:

Some instruments and tools are described which could be integrated into EU or nationally funded promotion or research projects for organic/low input food processing:

- Encourage 'organic' companies to focus more on environmentally friendly production methods. Help these companies to implement environmental management systems (support consultants, support the establishment of a knowledge-exchange network among companies with experience with these systems, etc.)
- Proposals for amendments of EU Regulation 2092/91. It could be mandatory for companies to have an EMAS certification (EU Eco-Management and Audit Scheme) after a deadline, e.g. from 2008 on.
- Enhance public procurement of organic products and 'market pull' policies. Besides the claim that the food should be organic, the public procurement could also contain a requirement that the companies involved need to have EMAS certification.

3. Processing methods and their labelling

There are private as well as public instruments and tools to achieve better labelling.

- The EU legislation should offer recommendations regarding what is allowed to be labelled and what cannot be labelled.
- The national authorities and private standard-setting bodies have the opportunity to decide in their standards what kind of information about processing methods companies should put on the labels of their products.

4. Improvement of separation practices in the case of parallel processing of conventional and organic products

EU Regulation 2092/91 already gives guidance with a clear goal in requesting a 'sufficient separation during the harvesting, transportation, processing and packaging of organic food'. What has been missing is a stronger focus on a risk-based approach. As a consequence, EU legislation should explicitly request that a company with parallel processing identify the risks and make a company-specific HACCP concept in which the critical aspects of separation of organic and non-organic food are included. This concept would be the basis of the annual inspection and certification. Details have yet to be elaborated. Experience gained in a risk-oriented analysis of the supply chain from the EU 'Organic HACCP' project should be taken up.

To summarise, all of the four topics that were outlined by the research consortium are very important from the perspective of consumers, who have a certain perception of organic food production. If those expectations cannot be met, the organic food sector risks creating a situation in which consumers feel deceived and will buy other labelled, non-organic products which might give the impression of being more sustainable or more authentic. Therefore, it is necessary for the organic food sector to find ways to better meet consumer expectations and reduce the risks of an image of damaging practices. How this will be achieved is up to the sector.

- The integrity of organic produce might be achieved by strengthening the ‘quality of origin’ concept, which can be expanded with regard to additives which can be produced with raw materials of certified organic origin.
- A better integration of environmental issues not only in agricultural production but also in processing might be achieved mainly through the good examples set by pioneering companies that have already introduced environmental management systems.
- Consumer trust could be improved by considering specific additional labelling to ensure that consumers are not misled about the nature of processed products but in a way that does not discriminate against organic products compared with conventional products, which do not have to label certain processing steps.

The final recommendations for the development of organic food processing are addressed to different groups of actors:

a. Recommendations for the private sector:

The following examples are to highlight possible activities:

- New labelling concepts;
- Food safety prevention and monitoring;
- Sensory quality improvement;
- Environmentally friendly processing techniques.

b. Recommendations for competent national authorities

Possible examples could be:

- National code of practice for organic food processing through initiating platform structures;
- Support for research projects.

c. Recommendations for the European Commission

Possible examples:

- Minimising the use of additives (maintain a restricted list);
- Defining and promoting careful processing and the authenticity of food;
- Revising the regulations for organic food and farming based more on principles.

It is important that there be an ongoing debate regarding how it might be possible to respond better to consumer expectations while maintaining the principles of authenticity of organic food production.

1. Introduction

Otto Schmid and Ursula Kretzschmar

The market for organic food is still expanding in many countries in Europe and around the world. More and more processed food is available these days. The range of products is broad and includes all kind of products from simple to highly processed ones. More and more convenience food is being offered, including that with a long shelf life. There might be a significant risk of harming the integrity of organic food and losing consumer confidence, by not fulfilling their expectations. There is evidence that consumers of 'low input' and organic foods have specific expectations with respect to quality parameters of processed food (Schmid, Beck, Kretzschmar, 2004). These may relate to the degree of processing, concern about specific additives, nutritional composition, integrity or whole food concepts, the degree of convenience, the level of energy use and transportation distances, as well as food safety. These issues need to be addressed in organic and other 'minimum/low input' processing standards, which is quite a challenge for the development of the organic food sector in the future.

Organic processing standards prohibit the use of many preservatives and other food additives widely used in the processing of conventional foods (Codex Alimentarius Commission 1999 & 2004; European Commission 2005, IFOAM Basic Standards 2005). However, there are frequent discussions regarding the underlying rationales and criteria used to allow some but not other processing methods and additives, especially when new processing technologies or additives have to be assessed for conformity with organic processing standards (Beck 2000; Gallmann 2000). A range of other processing standards focused on 'minimum processing' or 'low additive input processing' are also emerging. These often have underlying aims very similar to those of organic processing standards (Beck 2000; Gallmann 2000; Schmid et al. 2000).

Furthermore, the intensive discussions in recent years about EU Regulation 2092/91 for organic food and farming have shown that there is a strong need to have a clearer idea of a consistent concept of organic food processing which can be translated into guiding principles and decision criteria for the further development of the mentioned EU regulation. The lack of such principles and criteria might have been one reason why it took many years to complete Annex VI of the current EU regulation for organic food and farming with additives and processing aids for animal products (in April 2006).

Aware of the lack of such principles, on 21 December 2005 the European Commission finalised and published a new draft for a Council regulation for organic food and farming, and hereby created a separate article to formulate principles for the preparation/processing of organic food. It will take at least until 2007 to finalise this new regulation, including revising the annexes with detailed production rules and lists of additives and processing aids. The results from this subproject can contribute substantially to this process.

In order to deal best with these challenges, the subproject research team has chosen the following main objectives and methodology:

- to identify and review the different underlying principles proposed for organic and other 'minimum processing' and 'low input' food processing' with a literature review.
- to analyse current approaches and concepts in organic food processing with a Delphi expert consultation involving processors and other stakeholders;

- to elaborate a practical code of best practise for organic food processing in order to give responsible persons in companies as well as other interested actors a comprehensive introduction and a tool for the most important requirements of the organic food sector applicable for daily practices;
- to give recommendations for further development of organic food processing to the European Commission and to different actors by means of the elaborating on concept papers based on the literature survey and the expert consultation, summarised in a final report.

Our research explored the situation regarding organic food processing in Europe in three steps:

1. Reflecting on the past with a literature survey of underlying principles in organic and 'low input' food processing to identify the 'processing principles' of the organic food sector and other perspectives for 'minimum' and 'low additive input' processing and to identify differences between different approaches (see chapter 2).
2. Based on the literature survey, an expert survey was created to reflect the actual situation in different European countries. The work was carried out as a two-step Delphi survey, in which 250 experts in 13 countries in Europe were identified and were asked to respond to a standardised questionnaire. The survey was designed in such a way that the most important and currently discussed aspects regarding organic food processing were included (see chapter 3).
3. Based on the literature survey and the Delphi survey, two practical documents were developed:
 - a. ***Concept papers outlining parameters or further development of organic food processing – Crucial topics or the revision of EU Regulation 2092/91*** with the aim of having a basis for the discussion of the four most important subjects regarding organic food processing. In the paper we tried to indicate which parties (private sector, competent authorities or the EU Commission) could have what kind of role in the future discussion and development process (for details see chapter 4).
 - b. ***Code of Practice for Organic Food Processing*** having the aim of contributing to the further development of the practices of organic food processing in terms of increased safety, quality, transparency and success (for details see chapter 5).

Based on this work, the authors have developed global recommendations for the European Commission and different actors regarding the further development of organic food processing.

2. Underlying Principles in Organic and ‘Low-Input’ Food Processing – Literature Survey

Otto Schmid, Alexander Beck and Ursula Kretzschmar

This chapter summarises the literature survey about the processing of organic and ‘low input’ food (Schmid et al. 2004).

The **objective of the literature review** is to identify the regulatory framework and current practices for ‘minimum’ and ‘organic’ food processing, analysing the underlying principles as well as consumer expectations. Sources were international and national standards/regulations, scientific, and grey literature. The focus was less on technological issues than on the underlying principles.

First, the historical **development of the standards and regulations** was analysed. In 1980 the first international standards were developed by the International Federation of Organic Agricultural Movements (IFOAM) under the title of ‘Basic Standards’. These standards were to guide national organisations in the development of their own standards. Since 1996 new editions have also described criteria for the evaluation of organic food processing, in particular with regard to the use of additives and processing aids.

Since 1985 several private label organisations and their umbrella organisations have been working on standards for processed organic food, in particular the organisations Demeter, Bioland and Naturland (Germany) as well as Bio Suisse (Switzerland), which have all developed product-specific standards.

EU Regulation 2092/91 came into force in 1991. It was completed in 1993 with a special Annex VI, listing the allowed additives and processing aids for the processing of organic food (EU Regulation 207/93). Two new positive lists were established for ingredients of non-agricultural origin and for processing aids, which were amended several times later on.

In 1991, the Codex Alimentarius Commission, a joint FAO/WHO food standards programme, started to hammer out guidelines for the production, processing, labelling and marketing of organically produced food. In 2001, it finalised guidelines for organically produced food, including some criteria for the use of additives and processing aids in plant and animal products. In 2004, the criteria for crop inputs and additives for food processing were updated (Codex Alimentarius 2004).

Despite the existence of the international and European regulatory framework for organic agriculture, there is an ongoing discussion among the main actors about how to define ‘the processing of organically produced foods’. For many years the European Commission discussed list of additives for the processing of organic food of animal origin in Annex VI of EU Regulation 2092/91, which was finally decided on in April 2006. EU Regulation 2092/91 hasn’t yet further developed their criteria for the evaluation of additives and processing aids, which might be an explanation for why it has been difficult to get a consensus regarding the use of additives and processing aids for animal products.

Another aspect which was explored is the concept of natural nutrition. As one consequence of the industrialisation in Europe in the 19th and 20th centuries a ‘back to nature’ movement emerged as a lifestyle, within agriculture, nutrition, education and health management. This movement was the source of a natural concept for sustainable living. The **concept of natural nutrition** is a modern adaptation of this. It takes into account that:

- eating and drinking is one of the most intensive interactions human beings have with nature (food means to incorporate nature);

- food should support human well-being (physical and psychological as well as social criteria according to WHO's health definition);
- food and beverages should be flavourful and create a regional food culture;
- food should be diverse in order to support biodiversity of regional resources.

These elements should be considered when developing a concept for organic food processing.

Aside from the term 'organic agriculture', the terms 'sustainable' and '**sustainable development**' are common and generally recognised. Therefore the sustainability approach is compared to the organic agriculture movement. Organic agriculture and processors of organic foods focussed on developing new (innovative) production methods whereas sustainability strategies aimed at improving/adjusting already existing production technologies instead. Today there is more likely to be a convergence between sustainability strategies and strategies developed for organic agriculture and organic food processing. But the strategies basically emerged from different perspectives.

Systems for ecological or sustainable management have been introduced on a voluntary basis in many organic food producing companies. Some private business standards deal with some aspects of sustainability with regard to the manufacturing of food whereas EU Regulation 2092/91 has almost no specific requirements.

The European Common Agricultural Policy recognises organic farming as a strategy for environmental and sustainable development. To further develop the sustainable processing of food it is important to transfer and develop sustainable processing technologies and management systems which are in accordance with the internationally recognised organic food production principles and guidelines, as outlined by IFOAM (2005) and the Codex Alimentarius (2004).

Historically, organic food processing was often associated with a more human-oriented technology, frequently described as 'appropriate technology'. The term or concept of 'appropriate' or 'intermediate' technology was mainly used in 1970s. Although the term seems to be almost 'old-fashioned' today, the concept has some interesting elements that should be considered when speaking about organic food processing and sustainability.

The analysis shows that several aspects of '**appropriate technology**' are in line with the aims of organic agriculture. But appropriate technology focuses much more on the social and ecological aspects of food processing than on the purely technical aspects. Regionalisation of production, size of the processing units, flexibility of the units, consequences for the job market, environmental optimisation of the whole supply chain and ownership are the main elements of appropriate technology. These could be important elements for the further development of organic food processing and will need further consideration. Some organic food projects already use this approach in practice.

In several standards guidelines and publications organic food processing is strongly associated with '**minimal processing**' and '**careful processing**'. Nowadays, the term 'minimal processing' is used a lot in the food processing industry in general and described in literature. In contrast, the term 'careful processing' is used particularly in the realm of organic food processing but is not yet clearly defined. The concept of carefulness seems to fit very well with the processing of organic foods, especially if it is meant in a broader sense. Indeed, 'care' is an essential value in organic food production: it encompasses care for the product, the environment and people. With this perspective, one can make a stronger link between careful processing and concepts of sustainability and of appropriate technology.

Consumer perceptions of organic food quality is a key factor for the further development of organic food processing. The concept of food quality needs to be explored further, and its specific contents must be investigated thoroughly. A number of definitions have been suggested and applied. Food is the meeting

point of numerous symbolic codes: personal, familial, cultural, biological, industrial and environmental, as well as the ethical dimensions of social justice. Consumer concerns about food quality appear to be connected to both food production and food processing. Concerns about long-term consequences for health and for the environment are also commonly mentioned when consumers talk about food.

Food quality is a concept of crucial importance for understanding consumer attitudes towards organic food. It is evident that expectations about product quality are as high for organic foods as they are for conventional foods. In some cases the expectations are higher for organic foods, and there might even be additional quality features specific to organic food. Several studies focusing on consumer expectations concerning organic foods have been published in Europe in the past few years. The issues to which the studies refer often relate to the main differences between conventional and organic farming practices, as well as to the use of industrial technologies, artificial fertilisers and pesticides, as opposed to less industrialised methods based on a balance between plant and animal production. The use of food additives is a common concern of consumers, and choosing organic food might be one strategy for limiting the intake of additives, as the utilisation of additives is limited by the regulations for the processing of organic food.

Holistic concepts of food quality and processing involve both the product-orientated and process-orientated assessment of food quality. Quality assessment of the product itself includes the evaluation of the nutrient content (desirable and undesirable components) as well as complementary methods – called holistic methods – based on the understanding, that ‘the whole is more than the sum of its parts’. The hypothesis is that nutrients in food are bound to the matrix and that holistic methods are able to show quality beyond the nutrient level (e.g. structural energy, binding form, entropy). These methods need to be validated according to ISO standards; and food derived from different farming systems and/or processing techniques should be investigated.

Methods evaluating the process-orientated quality of food are able to assess the social, economical and ecological factors that are linked to the production of food in agriculture and food processing (e.g. life – cycle assessment). The process-orientation is a basis for the definition of organic foods.

Nowadays a number of different **private standards for processing are in place, as are state regulations** for organic foods: EU Regulation No. 2092/91 of 24 June 1991, the ‘National Organic Program’ of the United States as well as Codex Alimentarius’ ‘Guidelines for the production, processing, labelling and marketing of organically produced foods’. Parallel to the state regulatory framework for organic agriculture, many private business standards have been introduced all around the world. The basis of most of those standards is the ‘Basic Standards’ of the ‘International Federation of Organic Agriculture Movements’ (IFOAM 2005). To a certain extent, this international standard reflects a broad international agreement at the private level concerning the signification and meaning of organic food and of organic food processing. All standards consist of positive lists of methods and inputs allowed. Most of the private standards are written in a language that can be understood quite easily by a majority of operators.

In summary, most standards require a certified quality management system in place to ensure the ‘true’ labelling of organic foods. There are different approaches with regard to the quality profile of the products. For all of the regulations the labelling provisions of the ingredients are very important. At the private level however some organisations have developed much more detailed standards for each product group.

The processing of organic fruits and vegetables has been regulated for a number of years by EU Regulation 2092/91. In the organic vegetable sector inhibition of the browning reactions in fresh and dried products while processing is challenging, because sulphite compounds are not allowed for organic processing. Organic acids and enzymes may solve some problems, but they are not as effective as the sulphite compounds. In addition, organic acids might be problematic at the organoleptic level, which is

the reason why they aren't used at a larger scale at the moment. The use of ozone might be an option, and will be studied as part of the QLIF Project at a later stage. Applicable enzymes can inhibit browning reactions and enzymes have an important role in the processing of fruits and berries. They can also be used in peeling processes. The fundamental problem here is whether we can guarantee that the enzymes used aren't produced by genetically modified organisms.

The microbiological quality of organic, fresh, ready-to-eat salads should be as good as that of corresponding conventional products. Chlorine compounds are commonly used, but they are not allowed for the processing of organic products, so other methods need to be found. Organic acids, ozone treatment and other sanitising agents should be studied for this purpose.

The **processing of cereal-based organic products** has been regulated since 1993 by EU Regulation 2092/91. In particular, Article 5 and Appendices III and VI are relevant in this matter. However this standard does not address any specific requirements for organic cereal processing; but instead draws up general requirements for plant products.

It is uncommon to encounter product-specific standardisation for the processing of organic cereal-based food. Most private business standards do not have any product-specific requirements. The few standards which developed requirements for cereal-based foods are dealing with the following principles: raw materials from certified organic origin; requirements and recommendations for storage; minimisation of the use of additives and processing aids; the use of whole-grain products are recommended; biological and traditional processing methods are preferred; processing methods are selectively restricted (for example extrusion); ecological and adapted pest-management systems, cleaning regimes and packaging materials are enforced.

There are a number of important questions, which are actually discussed in relation to organic cereal products. These questions are addressing aspects of the evaluation of additives and technologies as well as the definition of underlying principles for the processing of cereal-based foods in relation to nutrition styles, understanding of health, meaning of traditional processes or handicraft, as well as to the concept of regionalisation of the food production. New developments, e.g. organic starter cultures, demonstrate the possibilities for innovations adapted to the needs of the organic food sector.

EU Regulation 2091/92 did not address **dairy products** for a long time. The processing of animal products is regulated by a wide range of different national standards and regulations. Only recently – since April 2006 – was Annex VI amended with additives and processing aids for milk processing.

Milk is a highly perishable food and one must therefore have good knowledge and an understanding of the techniques used and of the complexity of microbial interactions. The challenges imposed by the tendency to go towards longer shelf life and greater food safety of products should not be achieved at the expense of their freshness, for example. Concerning the microbiological quality and safety of dairy products, zero risk is not a reality and this fact needs to be accepted by consumers, too. It is necessary to provide consumers with more accurate information on food risks and to encourage behaviour modification where needed (like proper storage temperatures). In addition to the minimal processing techniques which aim at maintaining the nutritional and vital quality of the product, some novel techniques and treatments or combinations thereof could be considered (high temperature pasteurisation, high pressure treatment, micro filtration etc.). There could be many interesting applications for enzymes in organic dairy industry if GMO-free enzymes were available. Organic dairy products and functional foods are also an interesting combination, because the best known functional foods at the moment are milk products fortified with probiotic bacteria. Moreover the CLA content (conjugated linolic acid) of organic milk seems to be naturally higher. So could there be functional food products exist 'naturally'?

EU Regulation 2091/92 has only been addressing **meat products since April 2006**. Similar to dairy products, the processing of meat products is regulated by a wide range of different national standards and regulations. Some countries have very strict regulations on additives for organic meat products. Standard setting often requires a balance between maintaining the integrity of the organic food system and ensuring that certain quality demands are met. This dilemma has been clearly recognised, especially for meat.

Currently the most urgent challenge for the organic meat sector is to offer products with a high microbiological quality and safety without using critical additives like colouring agents or nitrite. Although in the adapted Annex 6 of EU Regulation 2092/91 nitrates and nitrites are now allowed for meat processing (with restrictions), the search for alternatives and alternative approaches to the use of nitrite in processed meat should be continued. Furthermore, the discussion about security should be connected to entire life cycles of the products, including, for instance, appropriate storage temperatures and cooling requirements in retail shops.

When analysing the development of the organic food market it is obvious that this market segment is not only one of the fastest growing markets in the food sector, but also one of the most **innovative food sectors**. An impressive number of new raw materials, technologies and products have been introduced during the last 20 years in the organic food sector. This innovative sector has also given substantial impulses to the conventional food sector. The observation of recent developments in the organic food market and the briefly described examples of innovative firms shows that nutrition issues are an important source of activities for companies present in the organic food market. Environmentally friendly production systems are the next most important aspect. Working together with farmers is not only a key issue for success; it is part of a social concept, too. The development of technological methods which are adapted to the needs of organic food production, to healthy styles of nutrition and which relate to the 'naturalness' of food by limiting the use of the additives is the next aspect to consider.

Finally, some processors of organic food try to emphasise the relationship between the consumers and the farmers. They want to restore the identity of this relationship to the food. The following statement summarises the practical situation: 'The industry's main task is to take the raw material from its organic origins and transfer it to the consumers in the form of well recognised attractive products without destroying its original quality, the result of the organic farmer's work.'

An overview is given below of the **identified principles in organic food processing and controversial areas**. The literature review has shown that a broad range of ideas exist about the processing organic food. This is reflected by the very different types of products, different processing standards and marketing concepts. Some of the principles are basic, others are shared broadly and some principles are in discussion mainly in the private sector.

Controversial areas in the presented product groups were summarised. It seems critical to decide if new processing technologies like enzymes or extrusion technologies, ion exchange technologies, modified atmosphere, and new packaging materials, are in line with the concept of organic food. Apparently there is a lack of guiding principles and related criteria, which are needed to make a decision about such methods.

However, the organic food sector is under pressure, because consumers demand that it offer the same product quality, with the same shelf life, sensorial quality and high safety level that they are used to experiencing with conventional products. This demand stimulates the development of new innovative concepts, which use natural substances with appropriate technological properties or less critical additives than are used normally, or the development of technologies based on additive-free processes. Nevertheless, in most cases this results higher production costs.

Sometimes aspects of consumer acceptance in relation to well known product profiles like sausages treated with nitrites or nitrates might cause strong contradictions for the organic food sector.

It is very important to further investigate consumers' perceptions about organic food processing. A majority of organic food are sold as processed products. Processing has a strong influence on the characteristic and the quality of products. The future development of organic food processing should follow much more a 'farm-to-fork' approach, taking consumer expectations into account.

Other important aspects are the risk of contamination (e.g. microbiological contamination, banned substances) and the origin of the substances used in organic food products. This last question is strongly related to the whole debate about the use of GMO techniques for the production of additives and processing aids, during the production of starter cultures and enzymes and to the coexistence question in relation to the production and processing of GMO crops. Furthermore, it seems to be more acceptable for the organic food sector to use ascorbic acid out of acerola cherry than to use it from a biotechnological source. The organic origin of the product is a basic principle, which has a higher recognition factor than the chemical structure of the substance in the organic food sector.

In the literature survey consumer perceptions were compared to the identified principles for organic food processing and to actual standards. The result was that a number of principles are covered at all levels (EU regulations, private standards and by company concepts). Other principles are not or only partly implemented. This means that several consumer perceptions are not completely fulfilled by state regulations, private standards and company concepts.

The **conclusions** show that EU Regulation 2092/91 covers a number of consumer perceptions such as a certification system, traceability, minimal use of additives, a labelling concept and the use of organic raw materials. However a number of other consumer expectations and discussed topics are not fulfilled, such as careful processing, freshness, healthfulness or fair trade.

The open and difficult discussion in the European Union about the acceptance of additives for organic food processing at the state and private levels point to the absence of a generally acknowledged theoretical quality concept about organic food, upon which decisions would be taken. A similar situation can be observed regarding processing methods: a number of them stirred up controversy. It seems that it is difficult to decide whether specific methods are in line with the principles of organic food production or not.

To enable a consistent further development of EU Regulation 2092/91 it is important to develop principles and related criteria for the evaluation of additives and processing methods. In addition, some technological problems have been identified (e.g. oxidation of fruits and vegetables), where appropriate solutions have to be found and/or developed.

Obviously in the mind of consumers and of other actors in the organic food sector a range of additional principles is present, when compared with the official regulation. This gap between consumer expectations and the rules provided by EU Regulation 2092/91 can cause problems. Therefore it is important to clarify the situation and to build a solid link between the regulations and consumer perceptions.

3. Approaches Used in Organic and Low Input Food Processing – Impact on Food Quality and Safety: Results of a Delphi survey from an expert consultation in 13 European countries

Ursula Kretzschmar and Otto Schmid

3.1. Background

Study design

The overall objective of the subproject on processing, where the Delphi expert survey was an important task, is ‘to develop of a framework for the design of “minimum” and “low input” processing strategies, which guarantee food quality and safety.’ It should support the overall aim of the integrated QLIF project (Quality of Low Input Food) in improving quality, ensuring safety and reducing costs along the European organic and ‘low input’ food supply chains through research, dissemination and training activities (Kretzschmar/Schmid 2005).

The method chosen was the Delphi method. The work was carried out in the form of a two-step Delphi survey. In the first round 250 experts in 13 countries in Europe were involved, and were asked to respond to a standardised questionnaire in October and November 2004 and a second round in March to May 2005. The Delphi expert survey was designed in such a way that the most important and currently discussed aspects regarding organic food processing were taken up.

120 experts from 13 countries (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Italy, Netherlands, Slovakia, Spain, and Switzerland) responded in the first round and 83 experts from 13 countries responded in the second round. Based on experiences from other EU projects (Hamm et al. 2002) a classification was made with regard to the development stage of the country in organic market development.

Table 1: Country classification in organic market development.

<i>Mature market countries</i>	<i>Growth market countries</i>	<i>Emerging market countries</i>
Austria Denmark Switzerland	Finland France Italy Netherlands United Kingdom Germany	Belgium Czech Republic Slovenia Spain

Two-fifths of the respondents were from mature market countries and two-fifths from growth market countries whereas one-fifth came from emerging countries. This corresponds quite well to the actual market situation in Europe.

3.2. Expert selection

The experts were chosen in such a way to have a good representation of food processors from the dairy, meat, vegetable/fruit and cereal sector, as well as processing specialists, with different fields of activities (research, consultation, certification, consumer information, government agencies). In the first round there was a ratio of 55% food processing companies to 45% non-processors and in the second round 46% food processing companies to 54% non-processors.

3.3. Definitions

Defining organic food processing

The main focus of the first part of the survey was to narrow and clarify definitions, which are often used to characterise organic food processing. When asking questions about minimum processing and freshness/fresh produce the answers did not vary very much. However exploring the definition of careful processing and authenticity the experts had a quite different understanding of these terms. On the other hand, in the second round of the survey, we found out that authenticity is regarded as very important for an organic product. In the second survey we tried to find a suitable definition. The definitions with the greatest acceptance for the terms 'careful processing', 'fresh product' and 'authenticity' are as follows:

Careful processing: **'the maximum to keep the important compounds and the maximum to avoid undesired compounds or nutritional losses'**.

Fresh product: **'Product with a short shelf life needs to be stored at a specific temperature or under controlled temperature conditions'**.

Authenticity: **'Production and processing steps and the origin are visible/recognisable to the consumer'**

There does not seem to be as great a need as originally expected to finalise definitions for the terms 'fresh product', 'careful processing' and 'authenticity'. Based on the feedback from the experts we can conclude that instead of a final definition of the terms 'careful processing' and 'authenticity' a more detailed definition of the production methods as well as a good labelling would be more helpful to producers and consumers, when the intent of these two terms can be addressed indirectly.

3.4. General comments

Important aspects in organic food processing

The most interesting thing about part two of the survey was the finding that aspects like sensory quality, freshness, minimum use of additives and authenticity are regarded as the most important aspects for success on the market — all aspects that are recognisable to the consumer.

3.5. Food safety

Regarding food safety issues, most of the experts do not expect more problems with organic food compared to conventional food.

Nevertheless, some experts did mention expecting more food safety problems. For example: higher contamination by mould spores; higher risk of contamination in food by micro-organisms; animal problems with parasites; higher residues of dioxin in organic eggs; problems with naturally occurring mycotoxins and toxic micro-organisms.

3.6. Ways to regulate or clarify/harmonise organic food processing issues

An important question was ‘Which aspects should be regulated’ on an EU level and which ones on other levels (national, private company or label level) or do not need to be regulated at all. The feedback from the experts was quite varied depending on the different areas. On the EU regulatory level, the top priority mentioned was the minimal use of additives, followed by minimal and careful processing. Quality/sensory aspects however were not seen to be primarily on the EU level, because companies should have the chance to develop individual sensorial profiles for their products. We can conclude, based on the feedback from the food processing specialists and processors in the Delphi survey, that in the future revision of EU Regulation 2092/91 a much more differentiated approach is necessary:

- **EU regulation/state regulations:** regulatory framework but with more flexibility for regional variation and private sector rules.
- **Private standards:** actually focus on the special quality and regional aspects.
- **Private company level (intern quality standards):** focus on the special sensory quality and general quality management.
- The experts recommended clearly that some new instruments should be developed:
- **Common ‘code of practice’ for the organic food sector:** setting the overall baseline for sustainability and health aspects focussing on IFOAM and private umbrella organisations (e.g. of organic food processors), operators.
- **GMP (good manufacturing practices):** elaborated by organic and other advisory/consultancy services specialising in organic agriculture and organic food processing.

The table below provides an overview of all interviewed subjects regarding regulation or clarifying/harmonising organic food processing issues.

Table 2: What to regulate on which level

ISSUE	Relevance in survey	EU Reg. /state (all)	EU Reg/state (processors)	Private standard	Private company	Code of Practice	GMP private
Freshness	high	+	~	+	+	+	+
Minimal/careful processing	high	++	++	+	~	+	~
Minimal use of additives	high	+++	+++	~	~	~	~
Sensory quality	medium		~		++	+	+
Environ. friendly processing	high	+	~	+	~	+	+
Environ. friendly packaging	high	+	~	+	+	+	+
Social standards	medium	~	~	+	~	+	+
Regionality	medium	~	~	++	+	~	+
Seasonality	lower	~	~	+	+	+	~
Whole food	lower	~	~	~	~	+	+
Health aspects	lower	+	~	~	~	+	+
Authenticity	high	+	++	+	~	~	~
Restricted use sugar/salts	no	~	~	~	~	~	~

Scale: 0-15 % of experts = ~ not significant 15-30 % = + 30-45 % = ++ > 45 % = +++

With regard to the question of whether EU Regulation 2092/91 is sufficient an interesting difference between the answers of the processors and the non-processors was observed: 45.5 % of the food processors think EU Regulation 2092/91 is sufficient as opposed to only 33.3% of the non-processing organisations. This difference between food processors and non-processing organisations was observed several times. We need to think about what the reasons for this discrepancy are, but in general it can be stated that, with the exception of having clear rules for the minimal use of additives and processing aids, no significant preferences or only tendencies regarding the possible ways to regulate or harmonise different aspects of organic food processing have been identified. However, a 'code of practice' for the organic food sector seems to be a good instrument which would allow not all issues to be described in detail in EU Regulation 2092/91. The organic food sector should take more responsibility by defining such a code of practice. A general code of practice for organic food processing will be fleshed out and published as an outcome of QLIF Subproject 5 by the end of 2005 (see: www.qlif.org).

In general, most of the experts expect special processing methods to be used in the production of organic food but when asking for more specificity from the involved experts it was very difficult to select those methods that are usable/suitable or unusable/unsuitable for it. Regarding the use of additives, the answers

given however were very clear. There is a tendency to prefer additives of certified organic origin both from the processors' and non-processors' point of view.

Furthermore, clear separation guidelines based on HACCP concepts (organic HACCP) in order to reduce the risk of contamination with GMOs or conventional pesticides were supported, in particular by 64.8% of the experts from non-processing organisations. Processors show a nearly equal result of 45.3% pro and 39.1% contra HACCP guidelines. With regard to stricter labelling requirements, the non-processing organisations prefer stricter guidelines. The same preference was also expressed regarding packaging.

Table 3: Possible new appendices to EU Regulation 2092/91, especially Annex VI

Subject area	Current	New
Flavours: 67.5 % think that flavours should be certified organic (20.5% no).	Natural flavours	Flavours certified organic
Flavour enhancers: 85.5% wouldn't allow the use of flavour enhancers.	Not clearly regulated	Prohibited
Colouring: 85.5 % think that the current regulation is sufficient.	Colouring with certified organic ingredients	No revision; Colouring with certified organic ingredients
Antioxidants: 74.2% prefer the use of organic antioxidants and also a high percentage of 60.2% would support the requirement of using certified organic antioxidants.	Synthetic antioxidants allowed	Antioxidants certified organic and of non-synthetic origin
Preservatives: the prohibition of preservatives generally in the organic food sector is acceptable for 55.4% (36.1%no).	Some preservatives are allowed	Stronger restrictions for preservatives
Raising agents: 67.6% think that the carrier should be certified organic.	Carrier can be non organic	Carrier must be certified organic
Emulsifiers: With regard to the risk of GMO contamination 83.1 % think that emulsifiers should have to be certified organic.	Conventional	Certified organic
Enzymes: 52.5% think that the use of enzymes in organic products is acceptable. 66.3 % don't accept the use of enzymes for the sole use of standardising the process/product.	GMO free	Specific requirements depending on the use

Subject area	Current	New
Micro-organisms: 56.6% in 2nd round (72.5% 1st round) think that micro-organisms should be certified organic in comparison to 31.3% in 2nd round(20.8% 1st round) who don't see a need.	Conventional	Certified organic
Anti-caking agents: 53% think that anti-caking agents should be certified organic in comparison to 22.9 % who don't see a need.	Conventional	Certified organic
Separation in the production process (parallel processing): 68.7% think that specific separation guidelines would be helpful.	Sufficient separation	Product specific separation guidelines (based on HACCP concept)
Labelling processing methods: 54.2% would prefer the processing methods to be listed on the packaging compared to 38.6% who wouldn't.	Non-organic ingredients, certification body	Labelling of some processing methods
Labelling of processing aids: 58.5 % say yes to a labelling of processing aids compared with 31.7% who say no.	Non-organic ingredients, certification body	Declaration of certain processing aids like enzymes (extended labelling rules)
Labelling of the origin: 69.9% would support the labelling of the origin of the ingredients and 25.3 % would not.	Non-organic ingredients, certification body	Indication of the origin of the ingredients
Packaging: 75.9% would prefer environmentally friendly packaging but 69.2 % also have the opinion that the packaging which provides the best protection of the product is acceptable instead of environmentally friendly packaging	No requirement in the regulation	No revision at the moment

The survey provides interesting food for thought for the newly started major revision of EU Regulation 2092/91 with regard to processing, in particular for the revision of Annex VI and Article 5.

Minimal and careful processing methods would be interesting fields for research. Due to the limited possibilities for using additives and processing aids in organic food processing, it is important to research and develop suitable production and processing methods with respect to the requirements for an organic product and the principles of organic agriculture.

4. Concept papers outlining parameters or further development of organic food processing – crucial topics or the revision of EU Regulation 2092/91

Alexander Beck, Ursula Kretzschmar and Otto Schmid

With contributions from Marita Leskinen, Marjo Särkkä-Tirkkonen, Thorkild Nielsen and Niels Heine Kristensen

4.1. Introduction

While doing the research started in April 2004, the authors identified the need to develop concept papers on four crucial topics in the form of discussion papers for the European Commission and the main actors in the organic food processing sector. This report aims to stimulate discussion about these topics between the private sector and the competent authorities. The project team has included its own opinion and has put forth proposals for the further development of these areas.

The four concept papers outline parameters for the further development of organic food processing (Beck et al. 2006). They are based on other work already executed for Subproject 5 Processing of the QLIF project, in particular the literature survey on 'Underlying Principles in Organic and "Low-Input" Food Processing – Literature Survey' published in 2004 by Schmid, Beck and Kretzschmar, as well as the 'Approaches Used in Organic/Low Input Food Processing – Impact on Food Quality and Safety', the results of a Delphi survey of an expert consultation in 13 European countries. (Kretzschmar/Schmid, 2005).

The above-mentioned literature survey and in particular the 2 Delphi expert surveys have produced a number of interesting results, which were used for developing concept papers. Results of two seminars organised by the subproject coordinators, one at the Research Conference in Newcastle in January 2005 and one in February 2005 at the Biofach fair/exposition in Nuremberg, are also reflected in these papers. The proposals have to be discussed intensively with regard to the major revision of EU Regulation 2092/91, which started in autumn 2005.

The authors are very much aware that the recommendations given in this paper should be understood as a first proposal. Only an intensive debate involving all stakeholders can clarify if and on which level these topics can or should be addressed by the organic food sector!

The four crucial topics highlighted in the concept papers are summarised below:

1st Concept paper on the chances of developing a concept of 'quality of origin' and on criteria and procedures for the evaluation of additives for organic food processing

This area of quality of origin is, on the one hand, relevant for the further development of marketing strategies. On the other hand, standard-setting/labelling organisations in particular can play an important role in developing this concept further on by developing and promoting new private rules together with their partners (operators on farm, an processing and trade levels), e.g. for:

- certifying ‘organic’ additives;
- specifying lists of materials;
- standardising evaluation processes.

Some of these possible instruments are comparable to those that have been fleshed out in more detail for fertilisers and plant pest and disease control products for the EU ‘Organic inputs’ project (www.organicinputs.org).

2nd concept paper on the environmental orientation of organic food processing companies

This paper describes some of the instruments and tools that could be integrated in EU or nationally funded promotion or research projects for organic/‘low-input’ food processing:

- Encourage ‘organic’ companies to focus more on environmentally friendly production methods. Help these companies to implement environmental management systems (support consultants, support the establishment of a knowledge-exchange network among companies with experience with these systems, etc.)
- Enhance public procurement of organic products and ‘market pull’ policies. Besides the claim that the food should be organic, the public procurement could also contain a requirement that the companies involved need to have EMAS certification.
- Proposals for amendments to EU Regulation 2092/91. It could be mandatory for companies to have EMAS certification after a deadline, e.g. from 2008 on.

3rd concept paper on processing methods and their labelling

There are private as well as public instruments and tools to achieve better labelling.

- The EU legislation should offer recommendations regarding what is allowed to be labelled and what cannot be labelled.
- The national authorities and private standard-setting bodies have the opportunity to decide in their standards what kind of information about processing methods companies should put on the labels of their products.

4th concept paper on the improvement of separation practices by parallel processing of conventional and organic products

EU Regulation 2092/91 already gives guidance with a clear goal in requesting a ‘sufficient separation during the harvesting, transportation, processing and packaging of organic food’.

What has been missing has been a stronger focus on a risk-based approach. As a consequence EU legislation should explicitly request that a company with parallel processing identify the risks and make a company-specific HACCP concept in which the critical aspects of separation of organic and non-organic food are included. This concept would be the basis of the annual inspection and certification. Details are yet to be elaborated. Experience gained in a risk-oriented analysis of the supply chain from the EU ‘Organic HACCP’ project should be taken up.

To summarise, all the four topics, which are outlined in this report, are a very important from the perspective of consumers, who have a certain perception of organic food production. If those expectations cannot be met, the organic food sector risks creating a situation in which consumers feel deceived and will

buy other labelled non-organic products which might give the impression of being more sustainable or more authentic. Therefore, it is necessary for the organic food sector to find ways to better meet consumer expectations and reduce the risks of an image of damaging practices. How this will be achieved is up to the sector.

- The integrity of organic produce might be achieved by strengthening the ‘quality of origin’ concept, which can be expanded with regard to additives which can be produced with raw materials of certified organic origin.
- A better integration of environmental issues not only in agricultural production but also in processing might be achieved mainly through the good examples set by pioneering companies who have already introduced environmental management systems.
- Consumer trust could be improved by considering specific additional labelling to ensure that consumers are not misled about the nature of processed products but in a way that does not discriminate against organic products compared with conventional products, which do not have to label certain processing steps.
- Risks with parallel organic and non-organic production/processing lines might be reduced primarily by the consistent introduction of specific, more flexible and effective HACCP concepts for the separation of production lines. Such systems must be established by the organic food industry and accepted by the authorities.

The feedback from the Delphi expert survey has also shown that it is important that the private sector keep the lead in developing trustworthy and authentic ways of developing these areas, e.g. with a common ‘code of practice for organic food processing’. The competent state authorities and, in particular, the EU Commission should only assist this process by instituting additional legal requirements, in case the private sector cannot successfully develop these new concepts.

The purpose of these four concept papers is to stimulate discussions on these topics, which the authors of this publication view as being highly relevant. When analysing the proposed regulation the Commission elaborated on in December 2005, we can see that several approaches of these papers are reflected in the changes made. We found some problem areas in the following articles: Art. 1 Quality of Origin, Article 6 Environment, Art. 18/20 Labelling. The problems with the separation practices are explicitly mentioned in the separation practice of feedstuffs.

The project group is convinced of the ability of the organic food sector to adopt, improve and further develop the quality of the work and the products. More transparent standards and risk-based inspection systems on all levels are what will guarantee a positive development of the whole sector in the future.

4.2. Reasons for the selection of the four crucial topics

The reasons why these four crucial topics are seen as important for the further development of organic food processing are given below and are therefore outlined in concept papers. The order is done with respect to the current revision of the EU Regulation 2091/92.

1. Chances of developing a concept of ‘quality of origin’ and criteria and procedures for the evaluation of additives for organic food processing

The concept of ‘quality of origin’ is a central part of the whole concept of organic agriculture. Therefore it seems to be logical that this concept should also be applied for conventional inputs, e.g. additives listed in Annex VI. Furthermore, the question of naturalness of such substances as well as the degree of isolation of substances is an important issue which has to be discussed. Better criteria, based on the principles of organic agriculture, might be helpful for amending Annex VI.

2. Environmental orientation of organic food processing companies

Organic agriculture is often described as being very ecological and being an environmentally friendly food production method. Consumers highly identify organic foods with environmental terms (Schmid, Beck, Kretschmar 2004). But when analysing EU Regulation 2092/91 there are practically no specific environmentally orientated requirements or standards, whereas in the area of agriculture this issue is a part of the concept. Therefore, it seems it would be interesting for the further development of the sector to discuss whether additional requirements for the environmentally friendly management of companies producing organic foods can be included in the framework. The paper will describe the situation, explore practical possibilities of improving the environmental impact of organic food chains and describe different scenarios and proposals for amendments of EU Regulation 2092/91.

3. Processing methods and their labelling

Transparency is an important part of the organic food concept. The Delphi expert survey for this project showed that experts have different view points about whether there is a need to give more information about the applied processing methods on labels. For years, there has also been a discussion about an expanded ingredient list for organic products, which would provide more information for consumers, e.g. about processing aids or processing methods. In reality, organic foods have exactly the same transparency on the label as conventional ones! Therefore, it would be interesting to work on this subject. On the other hand, expanding the labelling only for organic food could confuse the consumers, e.g. labelling for the use of enzymes, when the conventional products do not have such an obligation.

4. Improvement of separation practices by parallel processing of conventional and organic products

The whole question of parallel production will become very important in the future. In particular since the beginning of the debate on GMO organisms it has become very clear that separation practices can have a strong influence on the authenticity of organic foods. To date, the EU Regulation only contained, with the exception of animal feed, some general standards regarding how parallel production must be organised and carried out. Therefore, it seems to be important to discuss in this concept paper whether or not the existing standards should be improved or even if additional guidelines (criteria) are needed.

4.3. Concept paper on the chances for developing a concept of ‘quality of origin’ and criteria and procedures for the evaluation of additives for organic food processing

Alexander Beck

4.3.1. Introduction

The concept of ‘quality of origin’ is a central part of the whole organic food and farming concept. Therefore, it seems logical that this concept should also be applied to conventional inputs such as additives in Annex VI of EU Regulation 2092/91, which can be produced with organically produced ingredients. Hereby the question of naturalness, or in other words the degree of isolation, is an important issue, in particular when looking at the expectations of consumers (Schmid, Beck, Kretzschmar, 2004).

It is interesting to check if the principles of organic agriculture can also be applied to additives and processing aids. Such an approach is related to:

1. marketing strategies of the operators;
2. the evaluation process for additives and processing aids;
3. the selection of trade products from accepted additives and processing aids;
4. the system of the EU Regulation which actually defines substances in Annex VI as substances of non-agricultural origin.

4.3.2. State of the art and status of current regulations

Permitted substances of agricultural and non-agricultural origin are listed in Annex VI of EU Regulation 2092/91. In private standards and/or some state regulations we find similar systems with positive lists of additives and processing aids. Obviously, a number of these substances like lecithin (E 322), tocopherol (E 306-309) or gelatine are based on agricultural products.

Nowadays there are a number of such substances that are labelled as e.g. ‘organic lecithin’ or ‘organic yeast’ on the market. In general, the private sector agrees that this is a positive development, which helps to improve the authenticity of organic products. On the other hand, we are facing a problematic legal situation because these substances are defined by EU Regulation 2092/91 itself as substances of non-organic origin!

As an operator you normally would have the chance to select between different products on the market. If you want to buy an ascorbic acid, it is possible to choose between ‘acerola cherry powder’, ‘ascorbic acid of natural origin’, ‘ascorbic acid of biotechnological origin’ and a ‘synthetic ascorbic acid’. It could be discussed if the concept of ‘quality of origin’ can be applied to the selection process for trade products on the level of operators. As a consequence, this would mean that e.g. ‘certified organic additives’ as well as ‘certified organic starter cultures’ would have to be used, if available!

So far the evaluation process for substances, proposed for inclusion in Annex VI, has not been strongly standardised. Therefore, for a number of years, discussions have been taking place with the aim of improving the evaluation process by giving more and more precise criteria. EU Regulation 2092/91 does not currently have clear criteria for food processing, whereas the preamble to EU Reg. 207/93 clearly states the principle of a minimal use of additives for organic food.

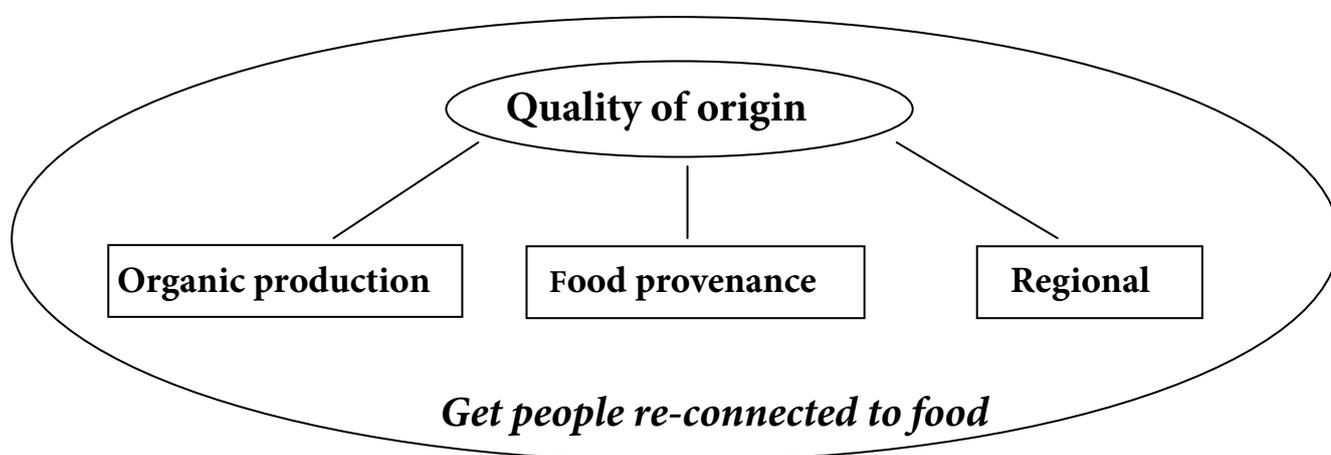
4.3.3 Discussion

'Quality of origin'

Since the beginning of the organic agriculture movement the concept of 'quality of origin' has been a central principle. The 'process orientation' which is emphasised by private standards and by EU Regulation 2092/91 is one tool for translating this concept by defining '**organic origin**' in a practical approach. Therefore, the EU regulation requires that in a processed product with several ingredients a minimum of 95% must be from certified organic origin for it to be labelled as 'organic product'.

The second important tool for a concept of origin is the concept of '**regional foods**'.

The third important tool for a concept of 'quality of origin' is the concept of 'traceability'. If you understand the term 'traceability' the other way round you can call it a concept of '**food provenance**'. This is, however, also linked to the concept of 'regional foods'.



The concept of 'quality of origin' contributes towards an 'individualisation' of the food and therefore helps the consumer to get re-connected to food.

Re-connecting people to their food is and can be transformed by companies or farmer associations or labelling organisations. Different marketing activities are in place, that use these tools to enter the market more effectively.

This area of quality of origin is, on the one hand, relevant for the further development of marketing strategies. On the other hand, standard-setting/labelling organisations in particular can play an important role in developing this concept further by developing and promoting new private rules together with their partners (operators on farm, processing and trade levels), e.g. for:

- certifying 'organic' additives;
- specifying a list of materials;
- standardising evaluation processes.

‘Organic‘ additives

With regard to Regulation 2092/91, only one aspect seems to be important in relation to this topic. Annex VI A of the Regulation defines which inputs of ‘non-agricultural origin’ can be used in organic food products. Related wording can be found in the main text of the regulation too (e.g. Article 5). A number of these substances listed in Annex VI A are in reality of agricultural origin or produced from products of agricultural origin. For several years, companies have been developing ‘organic’ lecithin, ‘organic’ locust bean gum, or ‘organic’ yeast. The problem is however that by definition of EU Regulation 2092/91 these substances cannot be called ‘organic’.

For the further development of the organic food sector, it is very important to ensure that technical substances can also be produced in ‘organic’ quality. This would contribute towards a clear organic concept and reduce risks coming from allowed conventional inputs in organic products (e.g. GMO contamination). EU Regulation 2092/91 should promote such a development. Therefore, the wording and definition of ‘non-agricultural origin’ and the need to produce certain additives from ingredients from certified organic origin, must be discussed.

When reflecting upon the structure and content of Annex VI, it should also be taken into consideration that the principle of an only minimal use of additives is a very important factor for the success of an organic product on the market, and reflects the expectations of consumers.

Differentiated list of technical materials allowed for organic food processing

As already outlined, if a processor wants to have an antioxidant there are different ‘qualities’ to choose from: ‘acerola cherry powder’, ‘ascorbic acid of natural origin’, ‘ascorbic acid of biotechnological origin’ or a ‘synthetic ascorbic acid’. In this area the companies and the standard-setting/labelling organisations in particular can play a part in the further development of this area. The development of a ‘list of trade products from additives and processing aids accepted by Annex VI’, which gives better information about the source of the additive or processing aid, could be a tremendous step forward. At a later stage such a materials list could make a positive contribution to the certification process, too.

Standardised evaluation process

The evaluation of inputs for processing organic foods is a difficult subject. Currently, EU Regulation 2092/91 has very few criteria; however more detailed criteria for additives are found in general EU Regulation 207/93. The practice of the application and evaluation procedures in recent years had to follow for more standardised application formats.

All organisations (Codex Alimentarius, EU, private labelling organisations, IFOAM) involved in the evaluation of additives and processing aids for the processing of organic foods have been searching for instruments to make the evaluation process both more science-based and more transparent.

In addition, operators in the organic food sector are searching for transparent criteria to understand which additive could be acceptable or not. Processors need clearer guidance for product development projects. Detailed criteria addressing the ‘quality of origin’ issue would be a help for the operators as well as for the authorities and could facilitate an involvement of different stakeholders in the evaluation process.

4.3.4. Possible instruments and tools

In Annex 1 the following types of instruments and tools are principally outlined in more detail:

- I. Administrative guidance for requests for authorisation of food additives and processing aids in organic food processing;
- II. A procedure for evaluation as outlined in the IFOAM Basic Standards;
- III. Criteria for additives and processing aids from the Codex Alimentarius Guidelines.

Some of these possible instruments are comparable to those that have been elaborated in more detail for fertilisers and plant pests and disease control products in the EU 'Organic inputs' project (www.organicinputs.org).

4.3.5. Recommendations

The process of enforcing concepts with regard to 'quality of origin' needs creative approaches. A number of aspects are capable of enforcing these concepts:

For the project team it is very important that the EU Regulation facilitates the development of new concepts in organic food processing and labelling and enforces the further development of the sector. That should be carried out not only on a practically level playing field but also by regulations that are flexible enough to allow for creative further development of the sector.

It should be possible to certify technical ingredients as organic in order to improve the integrity of organic foods.

A creative concept could be to start a call for tenders for a European innovation prize for organic processors in order to stimulate the creativity of the sector by highlighting examples of best practices .

The following recommendations are given:

Topics	Private sector	Competent authorities	European Commission
Organic additives	<ul style="list-style-type: none"> ▪ Standard-setting/labelling organisations should promote organic functional ingredients by their standards ▪ Companies should develop technological or functional ingredients from raw materials produced in accordance with the principles of organic food processing. ▪ Labelling organisations could underline that development by implementing the concept of ‘quality of origin’ strongly in their standards. ▪ Companies should use certified organic technical or functional ingredients. 		<ul style="list-style-type: none"> ▪ Change the title of Annex VI A to ‘Additives and other ingredients allowed for processing of organic foods’. Related to this change other formulations in Article 5 (3) c) and Article 5 (5a) d) must be changed too.
Differentiated list of technical materials	<ul style="list-style-type: none"> ▪ Standard-setting/labelling organisations should develop materials lists for trade products of additives and processing aids used in organic food processing. This list should include information or a kind of ranking related to the sources of the materials. 	<ul style="list-style-type: none"> ▪ Authorities and inspection bodies should use specific material lists as a tool for inspection and certification. 	
Standardised evaluation process	<ul style="list-style-type: none"> ▪ The standard-setting/labelling organisations should test and implement standardised formats and criteria for the evaluation of inputs. 		<ul style="list-style-type: none"> ▪ The enclosed standardised application format should be used by all applicants for new substances which are proposed for Annex VI. (Annex 1 in this report) ▪ The criteria catalogue should be used as a basis for the further development of criteria given in EU Regulation 207/93 amending EU Regulation 2092/91. (See Annex 1 of this report) ▪ Evaluation of inputs for EU Regulation 2092/91 should be criteria based and organised by standardised formats.

4.4. Concept paper on environmental orientation of organic food processing companies

Thorkild Nielsen

4.4.1 Introduction

For many consumers organic foods are closely connected to environmental issues. But for transport, handling, packaging and processing EU Regulation 2092/91 has practically no environmentally orientated standards. When it comes to agriculture, environmental issues are parts of the organic farming concept. Therefore, it is interesting for the further development of EU Regulation 2092/91 to discuss whether additional requirements for environmental issues could be included.

Since the beginning of the history of organic agriculture, there has been an ongoing discussion about the need for sustainable principles and methods. The organic farming system (primary production) comprises an ecologically optimised production system (Köpke, 2002). Looking at the processing level, the use of organic raw materials is an important ecological task, but does not mean that the whole processing system is fully ecological. A number of other aspects are important: waste management, energy, transportation, transport equipment and distance, cleaning and disinfection, etc. (BMU 1995).

The response of the food industry to the sustainability issue was that, in recent years, a rising number of firms have introduced new technologies (best available technology) and different environmental management systems.

Sustainable development has been recognised by the EU (European Commission 2001 and other international and national authorities (WTO 2001, UN 2004, and World Bank 2004). It is broadly defined and enhanced by major political institutions. In many sectors the definition and policies of sustainability are taken into consideration. The open definition of sustainability is a dynamic factor – facilitating more stakeholders to subscribe to the concept. In this perspective the concept is a very helpful tool for involving more stakeholders, companies etc. in the common aim of sustainability. In 1993, the EU established with EU Regulation No. 1836/93 a regulatory basis for environmental management systems at the company level. The EU Eco-Management and Audit Scheme – called EMAS – is now based on EU Regulation No. 761/2001. Over the last decade a large number of food companies have introduced systems such as these (www.emas.gv.at, 2004).

4.4.2 State of the art and status of current regulations

Environmental aspects

Most of the standard-setting bodies mention environmental aspects in their standards or regulations, but do not implement them for processing and handling organic products. To give an example: only a few details can be found with regard to transportation (distance, transportation methods, etc). Only Bio Suisse excludes in their private standards the transportation by aircraft for certification. None of the standards require an ISO 14000 accreditation or an EU Eco-Audit.

The only area where some restrictions can be found (not even in all standards) was on packaging (exclusion of PVC) and on pest management agents in storage areas, where some products are excluded. An evaluation by Schmid et al. (2000) showed that environmental (and social) aspects are mostly

neglected or only mentioned in the form of recommendations. This situation has not changed in the standards currently used. There needs to be further discussion regarding the way environmental issues could be better taken up in standards.

Currently, in several European countries, an EMAS and ISO 14000 system is being used by a rising number of organic food enterprises, but primarily as an internal management tool. These systems are not yet playing an important role in communication with the consumers.

4.4.3 Three scenarios for the year 2012

The future development of the organic food sector can take a number of directions. Given the European Commission's potentials to influence the direction of the further development of EU Regulation 2092/91, three different scenarios or future approaches are proposed:

1. Scenario I: Stricter food safety and environmental certification standards for the food industry

Scenario I emphasises the private approach. As the concern for food safety has become connected to the ability of food producers to control their general input and output, environmental certification has also become a competitive tool. Successful producers of organic food have now been able to comply with EMAS and ISO 14000 systems, although these systems are not strongly promoted to the consumers. But as the main dominating food companies have experienced the importance of being able to also document environmental issues in public, this approach became a standard amongst the internationally oriented organic food companies.

Since major European food companies have established their own industry standards the European Commission has taken up initiatives to include more environmental restrictions in the specific organic regulation.

2. Scenario II: Stricter EU regulation as a reaction to food safety and environmental incidents/scandals.

This scenario assumes that after a number of food safety and environmental incidents/scandals with very negative environmental impacts, the European Commission decided to upgrade the organic food regulation as part of a general revision of food legislation and regulations. The political interest in consumer protection and environmental protection became an important issue as the negative impacts had reached a dimension that required highly expensive public rehabilitation programmes in many European countries. These incidents were the main reasons why the European Commission decided to develop stricter regulations. The EMAS criteria were enforced and the certification has become mandatory for companies with more than 50 employees, which would mean over 95% of the organic food companies. This contributed to a much higher acceptance of stricter requirements for environment in EU Regulation 2092/91.

3. Scenario III: Organic food industry supportive of stronger environmental principles

The assumption of this third scenario is that the organic aims and principles have been 'watered down' over a number of years.

At the same time, organic market development began to decrease and the organic industry was facing stronger internal competition and loss of turnover. Prices and profits in the organic agricultural food

chain dropped. As a consequence, some of the less effective but more holistically oriented producers stopped organic farming.

After this crisis in the organic industry, a new development and direction was decided. A new network, that included amongst others representatives and ideas from the “slow food” movement, gained influence. A radical change in the formerly dominant strategy started.

This also meant that today’s objectives for organic food and farming were better implemented, including a stronger regulation of sustainability within each ‘organic’ enterprise in the commodity chains. As it became obvious that the research and technology development in the organic food sector had been favouring larger enterprises for some time, it was decided to boost a technological development that complied with these overall sustainability objectives. For a long time, there were huge obstacles to installing these stronger objectives. It happened only after many enterprises, which were able to take advantage of new more environmentally friendly technologies, implemented these new methods. This was also in favour of smaller and local producers which were able to deal with environmental issues.

4.4.4 Discussion

Results from a recently finished consumer study of the European research OMIaRD project (Zanoli, R. et al, 2004) indicate that environmental concerns are an important motive for buying organic foods in most European countries. Consumers see the consumption of organic foods as a means of contributing to a sustainable environment. Contributing to environmental protection and sustainability by buying organic products soothes the consumers’ conscience and makes them feel good.

The results from this European research project also showed that there are enormous differences among the European countries with regard to environmental concern as a motive for buying organic products, with the northern and central European consumers appearing to be more concerned about the environment and more conscious of the relationship between organic food purchase and sustainability.

Although the environmental motive is less strong than non-altruistic values, such as personal health, these two motives seem to be connected. This indicates that there is a link to another important concept for organic food processing, namely ‘careful processing’ (Nielsen 2004).

A broader environmentally oriented focus on the whole food chain (from field to fork) has been ‘supported’ by a development in the market where supply chain management has been developed as a more market-oriented concept. As a result of the EU regulation on organic farming organic products in general fetch premium prices. Examples of food processing companies that have already achieved an environmental certification (EMAS or ISO 14’000) indicate that environmental restrictions might have only a marginal impact on consumer prices (Kristensen et al, 2004).

4.4.5 Possible instruments and tools

What possibilities exist at an EU or member state level to facilitate an environmental orientation of the organic food industry?

Below are some instruments and tools that could be integrated into EU or nationally funded promotion projects for organic/low-input food:

- Encourage ‘organic’ companies to focus more on environmentally friendly production methods. Help these companies to implement environmental management systems (support consultants, support the

establishment of a knowledge-exchange network between companies with experience in these systems, etc.).

- Enhance public procurement of organic products and ‘market pull’ policies. Besides the requirement that the food be organic, the public procurement could also contain a requirement that the companies involved need to have an EMAS certification.
- Proposals for amendments of EU Regulation 2092/91. It could be mandatory for companies to have an EMAS certification after a deadline, e.g. from 2008 on.

4.4.6 Recommendations

It is recommended that in the 7th EU research framework programme (or national research programmes) the following topics could be taken up:

- Evaluation of private and public standards and certification systems related to organic food manufacturing, distribution etc. with regard to sustainability aims;
- Develop new methods and technologies for small- and medium-sized food companies with environmentally friendly performances (inspirations from the wind turbine industry can be utilised);
- Analyse the potentials and possibilities of combining the EU regulations on organic food and environmental regulations);
- Develop a set of instrument and tools that can promote the market competition of organic products produced and manufactured in an environmentally friendly manner through out the food chain (public procurement policies, development projects, campaigns etc);
- A European innovation prize including a category for environmentally friendly plant design for organic processors in order to stimulate the creativity of the sector by highlighting examples of best practices.

The following recommendations are given:

Topic	Private sector	Competent authorities	European Commission
<i>Environment certification</i>	<ul style="list-style-type: none"> ▪ Private sector should promote the environment certification of companies based on EMAS or ISO 14000 systems. This requirement could be taken up in a code of practice of the organic food sector. 	<ul style="list-style-type: none"> ▪ Authorities and inspection bodies should develop concepts how the organic inspection and certification could be combined with environment certification 	<ul style="list-style-type: none"> ▪ Projects should be financed which focus on the implementation problems of more environmentally friendly processing and handling practices. ▪ A deadline could be set starting when companies would need to follow an EMAS/ISO 14000 Certification in case the private sector measurements do not have sufficient environmental orientation

4.5. Concept paper on processing methods and their labelling

Marjo Särkkä-Tirkkonen and Marita Leskinen

4.5.1. Introduction

Processing methods have, on the one hand, a strong influence on the quality of food, both on the nutritional quality as well as on food safety. On the other hand, one can use different processing methods to improve the quality of food, e.g. fermentation processes. Nevertheless, most processing methods dilute the natural properties and the nutritional quality of food.

Organic food should be of high nutritional and high natural quality. Some private standards or private companies demand that organic food should fulfil criteria of wholesome nutrition, where processing methods must be seen as relevant tools.

Transparency is an important part of the organic food concept. Transparency of processing methods as an additional part of labelling has been under discussion recently. The general EU food legislation only recommends or requires the labelling of some selected methods, such as GMO or irradiation.

This concept paper outlines and discusses the way in which a more extended labelling of processing methods could be realised.

4.5.2. State of the art and status of current regulations

Labelling of processing methods

Only very little information about processing methods can be found on labels of foods. Sometimes additional leaflets give a clearer picture of how the food was produced. On the other hand, there are a number of processing methods that can be recognised directly when a consumer buys a specific food. Bread is always baked and frozen vegetables are obviously frozen. That means no additional information is needed.

The situation is much trickier if bread that is sold as 'fresh' is baked from frozen dough. Normally, consumers have no chance of finding out about that process unless they get additional information directly from the retailer or the baker.

With current EU regulations and national food laws only selected processing methods have to be labelled. For example, GMO methods, irradiation or the heating methods for milk must be labelled. Mandatory labelling is recommended for e.g. homogenisation of milk or dairy products.

In the organic food sector EU Regulation 2092/91 does not require any further labelling in relation to the processing methods. Nearly the same situation applies to private standards for processing of organic food. There are some exceptions for some standards (like Demeter, Bioland, Naturland in Germany and Bio Suisse in Switzerland), where at least some of the processing methods have to be listed (e.g. in the Bio Suisse processing standards: homogenisation, pasteurisation, thermisation, sterilisation, blanching, deep-freezing, use of enzymes, etc.). Only some companies give additional information about their processing methods on the labels or in product-related information material.

EU Regulation 2092/91 deals with processing methods only by excluding some methods. Some private standards have developed a type of positive description/list of accepted processing methods. But, once again, special labelling requirements cannot be found, with some minor exceptions.

4.5.3 Discussion

Influence of processing methods on the food quality

Most processing methods have more or less strong influences on product properties. Heat treatments have in general a negative impact on food with regard to nutritional quality; but with regard to food safety heat treatments have a positive impact. Heat treatments have negative impacts on lipids, proteins and vitamins. Microwave heating has an impact on lipids and proteins. By using filtration methods we change the natural relationships between different compounds.

Fermentation has positive influences on food. During fermentation lactic acid bacteria and enzymes are formed. Lactic acid bacteria produce bioactive peptides, which are also good for health.

Consumer's right to know relevant processing methods

One can argue that interested consumers have the right to know which processing methods are being applied.

However, consumers' knowledge of processing methods is generally very poor. They make decisions or form their opinions based on their feelings or information they have got from different media: newspapers, TV, radio, Internet and so on. Therefore, it is very important to analyse very critically how much information we give to consumers. On the other hand, consumers who buy organic food are more interested in their health and also require accurate information. In any case, it is clear that consumers have to be educated to understand the meaning of basic food processes. And this requires money and that must be resourced.

There are a number of problems that might arise when giving more information to consumers about processing methods:

- Too much additional information about processing methods can also be misunderstood by consumers. Some consumers can assume that the organic foods are more strongly processed than the conventional ones and might be frightened by getting this kind of additional information about processing methods for an organic food that is not obligatory for food in general.
- The size of the label of food product is normally very small. Food companies are being required to give more and more information about the product because of the requirements of EU-food legislation. Therefore, it might be difficult to find enough space on labels for new information.
- Organic food products and the organic food market differ from country to country in the EU. In some countries organic food processing has just started and it is important that regulations not be too complicated. On the other hand, in some countries organic food is very common and the market is mature. From their point of view it is important to give as much information as possible about products and processing methods. Additional information concerning processing methods might also be one way for companies to differentiate themselves from the competitors.
- When making health claims there are some legal restrictions to follow. If some processes are stated in labelling as being good for health, like fermentation, the state authorities might require that such claims be documented with clinical experiments. Although organic food is often considered 'healthy' based on the EU regulation 2092/91, special general health claims are not allowed on the products.

There is a whole debate about misleading claims in the Codex Alimentarius food labelling committee, which shows how difficult this issue is to handle.

4.5.4. Scenarios

Transparency will be an increasingly important question in future. In addition, attitudes about food additives and processing aids including enzymes will be stronger. Consumers would like to buy home-made food from supermarkets.

There are three scenarios that could be followed:

- Scenario I: Labelling of certified organic food additives: A positive labelling of some of the relevant processing technologies.
- Scenario II: Labelling of processing technologies which might mislead consumers (e.g. reconstitution of fruit juice concentrates) or might be less favourable for achieving high nutritional quality, but which do not have to be labelled by law.
- Scenario III: A special labelling of certain processing steps with special positive effects on quality and on the environment. This would make sense for labelling fermentation processes, which are perceived positively by the consumers.

Basically these three scenarios can be implemented alone, in combination or all together.

4.5.5. Possible instruments and tools

There are private as well as public instruments and tools to achieve better labelling:

- The EU legislation should provide recommendations regarding, what is allowed to be labelled and what cannot be labelled.
- The country authorities and private standard-setting bodies have the opportunity to decide in their standards what kind of information about processing methods companies should be putting on the labels of their products.

4.5.6 Recommendations

Accurate labelling is a very important part of the organic food concept. Therefore, the aspect of how to develop labelling concepts further down the line is important. Private companies and labelling organisations have to take the first step by developing new labelling concepts such as this. It is of the utmost importance that the consumers understand those new messages. Therefore, key questions have to be identified as is proposed in this chapter.

Creative labelling solutions must be developed to enable consumers to understand the communication and to avoid additional labelling that leads to misunderstandings. In the worst case scenario consumers could have the impression that, for example, additionally labelled ingredients mean that the product is processed with more additives than comparable conventional products. New communication concepts of working with text and pictures are needed.

Perhaps new types of labelling systems that guarantee that the product is, for example 'carefully processed' or 'hand-crafted' could also be considered.

We anticipate that expanded labelling could cause problems, for example with competing regulations. Therefore, labelling regulations and other relevant regulations have to be checked to see whether conflicts may arise.

The following recommendations are given:

	Private sector	Competent authorities	European Commission
Ingredients, food additives and processing aids	<ul style="list-style-type: none"> ▪ The use and labelling of organic certified additives and other ingredients with technological functionalities should be promoted ▪ Develop a system for labelling carry-over substances ▪ Additives should be listed in the list of ingredients by name ▪ Labelling systems for the processing aids used should be developed 		<ul style="list-style-type: none"> ▪ The EU legal framework for new labelling systems has to be reconsidered and adapted ▪ EU should accept the certification of substances mentioned in Annex VI A as organic
Processing technology	<p>Should develop labelling systems for:</p> <ul style="list-style-type: none"> ▪ Blanching ▪ Pasteurisation and sterilisation ▪ Concentrating ▪ Extrusion ▪ Ultrafiltration ▪ Post-pasteurisation ▪ Drying of dairy products ▪ Reverse osmosis ▪ Microwave/infrared heating ▪ Reconstitution of dried products ▪ Packaging material 		<ul style="list-style-type: none"> ▪ The EU legal framework for new labelling systems has to be reconsidered and adapted
Processing methods having positive effects on the nutritional quality of the product or on the environment.	<p>Should develop labelling systems for:</p> <ul style="list-style-type: none"> ▪ Fermentation: Should be mentioned because lactic acid bacteria is good for human health; lactic acid bacteria produce bioactive peptides ▪ If –not used: should be mentioned if the process typical for the conventional manufacturing is not used, like homogenisation in milk processing ▪ Biodegradable packaging materials: positive effects on environment 		<ul style="list-style-type: none"> ▪ The EU legal framework for new labelling systems has to be reconsidered and adapted.

4.6. Concept paper on parallel production and the improvement of separation practices

Ursula Kretzschmar

4.6.1. Introduction

The whole question of parallel production and processing of organic and non-organic products will become more significant in the future. The debate about contamination with GMO organisms shows clearly that the separation practices can have a strong influence on the authenticity of organic foods. EU Regulation 2092/91 currently only requires some general standards regarding how parallel production must be organised and carried out. Therefore, it is important to discuss whether those standards/regulations should be improved for the production of organic food, or even if additional requirements (criteria) are needed. Since the 'Regulation for organic feedingstuffs 223/2003' became operative, the rules for producing organic feedingstuffs have become much stronger. The regulation contains additional risk-based inspection/measures to reduce the risks of contamination; it requires the introduction of measures in the form of a HACCP-orientated concept.

4.6.2 State of the art and requirements of current EU Regulation 2092/91

As already mentioned, EU Regulation 2092/91 has regulated the separation of organic food from non-organic food in the following way:

EU Regulation 2092/91, Preparation units also handling products not from organic production

Where products not referred to in Article 1 are also prepared, packaged or stored in the preparation unit concerned:

- the unit must have areas separated by place or time within the premises for the storage of products as referred to in Article 1, before and after the operations;
- operations must be carried out continuously until the complete run has been dealt with, separated by place or time from similar operations performed on products not covered by Article 1;
- if such operations are not carried out at regular times or on a fixed day, they must be announced in advance, with a deadline agreed on with the inspection body or authority;
- every measure must be taken to ensure identification of lots and to avoid mixtures or exchanges with products not obtained in accordance with the rules laid down in this Regulation;
- operations on products in accordance with the rules laid down in this Regulation must be carried out only after cleaning of the production equipment. The effectiveness of the cleaning measures must be checked and recorded.

In private standards for organic agriculture we find similar systems requiring that the processing company has to ensure a sufficient separation during storage, processing and packaging. The question is how these requirements should be implemented in practice.

4.6.3 Discussion

The challenge is how an operator can fulfil the legal requirements and the general wish to have a sufficient separation between organic and non-organic products, in particular when non-organic products contain genetic modified organisms (GMOs). Crucial questions have to be answered, such as:

- Are the actual cleaning steps and the current separation practices sufficient to prevent mixing of organic and non-organic products?
- Are the actual cleaning steps and the current separation practices sufficient to prevent the risk of a GMO contamination?
- Is it realistic to ask for zero tolerance with regard to traces of GMOs in organic food products?
- How significant is the risk of contamination with pesticides, fungicides, germination blockers in organic food, e.g. when organic food is transported or stored next to non-organic food or when the same packaging boxes/materials are used?

So far, EU Regulation 2092/91 has given operators the option of defining their own separation concept in cooperation with the certification and inspection body. In order to fulfil consumer expectations that organic products be produced, handled and processed separately from the field to the table, the question is if in the future the development of specific separation guidelines for each product group will be helpful or needed. Or at least it might be useful that, for specific cases and critical production chains, for example in mills, it could be a goal to have separate processing lines or production places.

But even if such guidelines do exist, the general problem of the use of the same harvester, the same transporters, the use of conventional additives, micro-organisms, enzymes, anti-caking agents is not solved at all. On the other hand general food regulations require an integrated HACCP concept: It remains to be seen if this concept can also be adapted with regard to the separation question and whether it would be a guarantee for a good functional separation practice.

Better and more in-depth knowledge of the critical separation aspects with regard to different products as well the different situations in companies could be a more efficient approach than specific separation guidelines. With an integrated HACCP concept for the separation of organic and conventional food it is necessary to identify the critical control points such as the use of the same harvester, the same transporters, the use of conventional additives, micro-organisms, enzymes, anti-caking agents, etc.

4.6.4. Scenarios

A good and harmonised separation practice will become more and more important in the future. Consumers will increasingly call for the authenticity of organic products. Consumers want to buy 100% organic food. One scandal regarding GMO contamination in organic food is always risky for the organic food sector as it questions the certification of the product as 'organic'. Basically, there are two main scenarios or a combination of the two which can be followed:

- Scenario I: Better separation practices are achieved **indirectly** with measures such as the requirement of a special HACCP concept and special requirements for certification. This can be achieved on a private basis in the organic food sector (e.g. as part of a code of practice) and if this is not strong enough with a legal requirement in the form of EU Regulation 2092/91.
- Scenario II: By imposing stronger separation rules not only for feed (as now planned in EU Regulation 2092/91) but also for food in EU Regulation 2092/91, making it practically impossible to have mixed processing operations.

Scenario II might be necessary if the measures in Scenario I are not successful.

4.6.5 Possible instruments and tools

EU Regulation 2092/91 already provides guidance with a clear goal in requesting a 'sufficient separation during the harvesting, transportation, processing and packaging of organic food'.

What has been missing is a stronger focus on a risk-based approach. As a consequence, EU legislation should explicitly request that a company with parallel processing identify the risks and that a **company-specific HACCP concept** be elaborated in which the critical aspects of separation of organic and non-organic food be included. This concept would be the basis of the annual inspection and certification. Details have to be elaborated. Experience gained in a risk-oriented analysis of the supply chain from the EU 'Organic HACCP' project should be taken up.

Concretely, this would look as follows:

The organic HACCP concept would be built upon an existing quality management system or existing HACCP concept. Thereby all processing steps from procurement to production, storage and transportation will be considered. In contrast to the normal HACCP concept, the basis for the evaluation of the risks is not the health aspect or the quality. These aspects are already covered by the existing quality management system. The definitions of the risks are focussed as mentioned above regarding these specific aspects: mixing conventional-organic, risk of GMO contamination, risk of contamination with pesticides, fungicides including residues resulting from insufficient pest control application.

This analysis of the hazard would follow a systematic rating of the risks. This would be the basis for defining additional control points for organic products. The control would be done by the companies as well as forming part of the annual inspection. An indication of whether the measures are effective or not would be an analysis of the consumer complaints.

4.6.6 Recommendations

The following recommendations show possible ways to improve the separation practices and ensure the integrity of the organic food on the basis of Scenario I (HACCP approach).

Tab. Recommendations for separation practice

Topic	Private sector	Competent authorities	European Commission
<i>Separation practice</i>	<p>Private sector should follow a step-wise approach:</p> <ul style="list-style-type: none"> ▪ develop an organic HACCP concept as part of a code of practice of the organic food sector ▪ develop non GMO-risk micro-organisms, enzymes, anti-caking agents with certified organic ingredients (with the exception of mineral salts) ▪ demand separate packaging boxes for organic products <p>If these measurements are not sufficient in a medium-time frame:</p> <ul style="list-style-type: none"> ▪ verify where separate processing lines are needed (as a consequence of the implementation of the HACCP approach) ▪ in the future support mainly those companies which produce and handle only organic products. 	<ul style="list-style-type: none"> ▪ Authorities and inspection bodies should further develop an organic HACCP with the companies and the European Commission and develop guidelines for inspection and certification 	<ul style="list-style-type: none"> ▪ The EU Commission should introduce as part of EU regulation 2092/91 that when parallel production is in place a company has to lay out their specific HACCP concept in which the critical aspects of the separation of organic and non-organic food are included. This concept will be the basis of the annual inspection and certification.

4.7. Conclusion

Alexander Beck and Otto Schmid

The four concept papers, which are based on the results of the literature survey (Schmid et al. 2004) and the expert consultation using the Delphi method (Kretzschmar/Schmid 2005) as a part of this project, indicate crucial topics and parameters for further development of organic food processing. These topics have to be discussed carefully among the parties involved. In the report the authors try to indicate which parties (private sector, competent authorities or the EU Commission) could have what kind of role in the upcoming discussion and development process.

It is quite clear that a number of these proposals have to be developed and implemented by the private sector first. This would give the industry the opportunity to determine whether the proposed concepts are working. The organic food industry needs to be given a chance to fulfil the different demands! First new labelling concepts have to be communicated and established. Finally, the messages must be understandable and must have an importance for the consumer and, therefore, a meaning for the market.

To summarise, all of the four topics which are outlined are very important from the perspective of a consumers, who have a certain perception of organic food production. If those expectations cannot be met, the organic food sector risks consumers feeling deceived and buying other labelled products instead of organic products that might give the impression of being more sustainable or more authentic. Therefore, it is necessary that the organic food sector finds ways to better meet consumer expectations and reduce the risks of an image of damaging practices. How this will be achieved is up to the sector.

The four concept papers have the purpose of stimulating discussions on these topics, which the authors of this publication view as being highly relevant at the present time.

- The integrity of organic produce might be achieved by strengthening the ‘quality of origin’ concept, which can be expanded with regard to additives that can be produced with raw materials of certified organic origin.
- A better integration of environmental issues not only in agricultural production but also in processing might be achieved mainly through the good examples set by pioneering companies that have already introduced environmental management systems.
- Consumer trust could be improved by considering selective additional labelling to ensure that consumers are not misled about the nature of processed products but in a way that does not discriminate against organic products compared with conventional products, which do not have to label certain processing steps.
- Risks with parallel organic and non-organic production/processing lines might be reduced primarily by the consistent introduction of specific, more flexible and effective HACCP concepts for the separation of production lines. Such systems must be established by the organic food industry and accepted by the authorities.

The feedback from the Delphi expert survey has also shown that it is important that the private sector keep the lead in developing trustworthy and authentic ways of developing these areas, e.g. with a common ‘code of practice for organic food processing’. The competent state authorities and, in particular, the EU Commission should only assist this process by instituting additional legal requirements, in case the private sector cannot successfully develop these new concepts.

The project group is convinced of the ability of the organic food sector to adopt, improve and further develop the quality of the work and the products. More transparent standards and risk-based inspection systems on all levels are what will guarantee a positive development of the whole sector in the future.

5. Code of Practice for Organic Food Processing

Alexander Beck

with contributions from Ursula Kretzschmar, Angelika Ploeger and Otto Schmid

5.1. Why a code of practice for organic food processing

The consumers of 'low input' and organic foods have specific expectations with respect to quality parameters for processed food. These may relate to the degree of processing, concern about specific additives, nutritional composition, integrity or whole food concepts, the degree of convenience, the level of energy use and transportation distances, as well as food safety.

For many processors, meeting all of these expectations is a tremendous challenge in understanding and implementing the standards requirements in daily practice. Therefore, it is necessary to have in this field a guidance document for processors as well as standard-setting institutions and certification/inspection bodies.

As part of the EU project on 'Quality of low input food' (QLIF, No. 50635), which deals with food safety and quality issues related to food from low input and organic food systems, it was possible to elaborate a specific code of practice for food processing as part of Subproject 5 on processing.

The starting point for this publication was the literature survey about underlying principles of organic and low input food processing (Schmid, Beck, Kretzschmar, 2004) and a broad European-wide consultation in 2 rounds, which was also undertaken as part of the QLIF-project. The results of these studies showed, as we have seen in chapter 2 and 3, that many companies have serious questions related to the implementation practice of the complex requirements for organic food. Some recent scandals in this sector have made it clear that in several areas an improvement of the current practices is necessary, e.g. the separation practices between organic and conventional foods.

The aim of this 'Code of Practice for Organic Food Processing' (COPOF) is to give companies a comprehensive introduction to the most important requirements of the organic food sector applicable for daily practice. Additionally, the COPOF offers a number of tools that make it possible to:

- a) improve production skills effectively;
- b) improve and maintain the quality of organic foods and
- c) guarantee the safety of organic products.

The basic idea of the code of practice was that the responsible persons in companies producing and handling the products have the strongest influence on the final product characteristics. Therefore, their knowledge, abilities and the structural conditions for their work are the most important factors for ensuring high quality and safety of the produced food.

This code of practice was developed by taking the perceptions of consumers of organic food into consideration. Therefore, at several points in of this publication we have included some reflections by Professor Angelika Ploeger of University of Kassel, a member of the subproject team. These reflections are placed in separate boxes (see below).

Consumer perceptions!

Literature reviews show that consumer concerns about food quality and safety embrace broad and interconnecting realms. Health, environment, ethics, authenticity, taste and concerns about the relationship between people and nature are examples of broad themes that recur in the literature. Health and environment tend to be interwoven and a strong motive for buying organic food. A typical rationale is that healthy soils, plants and animals are a basis for human health. It is evident that expectations of product quality are as high for organic foods as they are for conventional foods. Indeed, in some cases the expectations are higher for organic foods, and there are additional quality features specific to organic food (such as authenticity as an important quality parameter for processing).

An important issue for this paper is consumers' distrust of producers' motives: Some have the perception that the practices of processors (e.g. food ingredients, food technologies) reflect an interest in profit rather than in the production of good and healthy food. Concepts such as 'homemade' and 'natural' appear to stand out. They express a preference of the consumer for food that has been produced with little or no use of artificial fertilisers, pesticides, food additives and technologies like genetic modification. The use of food additives is a common concern with consumers, and choosing organic food might be one strategy to limit additives in food, as there are limits on additives in the regulations governing organic food processing. For the organic produce market it is of primary importance that new guidelines for organic food processing take these consumer concerns into account. As most of the consumers do not have up-to-date knowledge about today's processing techniques for conventional food it is difficult for the organic processors to communicate their processing techniques and the resulting 'organic quality' (e.g. authenticity) to consumers. New ways of providing information (media and labelling) have to be identified (e.g. research).

To summarise, a code of practice for organic food processing is needed because:

- Expert consultation has shown that there is a lack of clear guidance for operators about how to translate given regulations on a company level.
- A number of problems that occurred in recent years were caused by insufficient implementation of the rules of EU Regulation 2092/91.
- Guidance is needed on the management level, but also for inspection/certification bodies, if more responsibility is given to the operators.

Below is a summary of the aims, the structure and the content of the code of practice. The detailed document can be downloaded or ordered from the QLIF Project website (www.qlif.org) and at <http://orgprints.org/7031/>.

5.2. Aims of a code of practice for organic food processing and its structure

If a business wants to produce organic food today it is very important that the best possible conditions for processing these organic products are established right from the beginning. Compliance with norms plays an important role in this. However, the decisive factor is that a business that is getting involved in the production of organic products for the first time starts production as reliably and efficiently as possible. This is what ultimately guarantees that these products can be sold successfully and that the business can operate successfully in this market segment. The production of organic food requires such extensive action that it is necessary, right from the beginning, to budget an appropriately large proportion of the turnover for this part of the business.

The aim of this 'Code Practice for Organic Food Processing' (COPOF) is to contribute to the further development of the practice of organic food processing in terms of increased safety, quality, transparency and success.

The aims of a code of practice for organic food processing are:

- to describe the duties of a company on a management level to establish and run a organic production on the basis of Regulation 2092/91 and additional important aspects (e.g. principles, business aims and environment);
- to help companies develop an efficient and reliable organic production process;
- to define an interface between certification bodies and companies;
- to offer a checklist to verify the performance of the company for internal and external audits.

Furthermore, the COPOF is not only for newcomers but should also help firms that already produce organic food to check and improve current production practices.

Chapters of the code of practice

The COPOF is structured in such a way that the most relevant tasks or important features which exist in the relevant areas of activity are outlined in separate chapters:

- organisational requirements and business policy;
- raw materials and storage;
- production/processing;
- cleaning and disinfection, pest control;
- appearance, packaging, advertising;
- outside processing;
- quality management;
- environment management.

Included at the end of the code of practice is a specific business evaluation form, which is designed as a checklist.

The COPOF puts a strong emphasis on the specific features of organic processing practice. However, general quality assurance measures are not explicitly described. Also, only limited attention is given to all the reporting requirements for inspection bodies and competent authorities, as this information is usually already provided by those institutions themselves.

In this document a clear distinction is made to distinguish between ‘compulsory’ and ‘optional’ requirements. The aim of this differentiation is to quickly make it clear to the reader where specific duties lie. However, this should in no way be taken to mean that the ‘optional’ requirements are unimportant. Quite the contrary, these are often of major importance for the success and the quality assurance of the business and they enable companies to profile their product range. Not every requirement or chapter has the same relevance for every business. Depending on the type of business, products and production set-up, appropriate consideration and appraisal of the actual conditions must be made.

As a result, a relatively broad overview of the specific challenges related to production and processing practices in businesses producing organic food will follow. Particular reference will be made repeatedly to the specific requirements for businesses that process organic and non-organic products in parallel.

5.2.1 Regulatory public and private framework

The basic regulatory framework and requirements for organic food processing is laid down in public regulations and private standards.

There are three essential sources that are the basis for good practice in organic food production:

- EU Regulation 2092/91 give the minimal requirements. However, in some countries additional state regulations or implementation rules/directives also exist;
- Agreements under private standards (IFOAM Basic Standards 2002² or other private standards for labelling of organic foods)
- ‘Promise’ and the commitment of the organic food sector to give consideration to consumers’ demands for organic food.

5.3. Content and examples of the code of practice

In this part two examples are use to demonstrate the kind of principles behind the subject and how these principles could be evaluated as well translated into practice:

The code of practice is a regulatory framework with respect to fundamental aims which has been built up with regard to the following principles:

- **the production of high-value organic food that complies with the standards;**
- **ensuring that no mixing of non-organic and organic products takes place;**
- **preventing mistakes in the production of organic foodstuffs;**
- **establishing transparency through traceability and verification of production methods;**
- **protecting market participants from deception.**

The content is structured in the following way:

1. **Identification of relevant areas or organisational levels**
2. **What is the area-related (working) principle?**
3. **Description of how the principle must or should be implemented (differentiation between ‘hard’ factors given in the regulation and ‘softer’ factors which are still important for successful implementation)**
4. **References to EU Regulation 2092/91 and IFOAM Basic Standards**
5. **Where available, links to consumer perceptions**
6. **Checklist for companies**

Example 1: Organisational requirements and business policy

Principle:

A company has to have or to introduce appropriate and efficient organisational tools to guarantee the proper implementation of all requirements necessary for the processing of organic foods.

Checklist – Example 1: Organisational requirements and business policy

	Status	Requirement	Actual	Measure
2.1		Business aims		
	Optional	Re-organise business with regard to organic foodstuffs		
2.2		Responsibility of the business management team		
	Optional	Clarify responsibilities within business management team.		
	Optional	Regularly check the orientation of business towards organic foods.		
2.3		Organisational structure		
	Compulsory	Design the organisational structure in such a way that organic foodstuffs can be produced in compliance with the regulations.		
		Integrate requirements particular to parallel production		
2.4		Responsibilities in the various areas of operations		
	Compulsory	The responsibilities for organic production must be precisely assigned within the various areas of operations.		
2.5		Business management in small/medium-sized enterprises		
	Compulsory	The responsibility for organic food in small/medium-sized businesses must primarily be taken by the general manager.		
	Optional	The responsibilities for special quality assurance measures should be delegated.		

2.6		Further education of people in charge and employees		
	Compulsory	Employees must be trained properly to complete the tasks they are entrusted with.		
	Optional	Employees' knowledge is regularly refreshed.		
2.7		Process description		
	Compulsory	The production processes of organic products must be described in detail.		
	Compulsory	The particular aspects that have to be considered for organic production must be clearly described.		
	Compulsory	The product flow separation measures must be precisely described for the entire operation.		
	Optional	All relevant information should be included in the organisational handbook.		
2.8		Bookkeeping -Traceability		
	Compulsory	Description of premises including all outside storage facilities and areas of operation.		
	Compulsory	Lists of suppliers and customers for organic food have to be regularly updated.		
	Compulsory	List of outside processors in charge of organic food has to be regularly updated.		
	Compulsory	All incoming and outgoing movements of organic products must be recorded.		
	Optional	Easily accessible overview of all organic product movements has to be kept up-to-date.		
	Compulsory	Traceability and documentation of product flows must be established.		
	Compulsory	Proper separation of non-organic and organic product flows in all production related documentation.		

Example 2: Processing and/or handling

Principle:

The integrity of the organic raw materials must be protected during processing. The quality should be maintained or further developed.

Checklist – Example 2: Processing and/or handling

5.1		Recipe composition		
	Compulsory	Make exact descriptions of recipes, their ingredients and processing aids.		
	Compulsory	Check whether 'GMO free' declarations exist for non-organic ingredients and processing aids.		
5.2		Preparative cleaning and time management		
	Compulsory	Ensure for parallel production that a proper cleaning in between organic and non-organic batches is conducted.		
	Compulsory	Regularly check and document the effectiveness of the cleaning steps.		
	Optional	Ensure a uniform identification of all organic production ingredients.		

5.3		Production procedures		
	Compulsory	Indicate the production ('organic products being produced')		
	Compulsory	Correctly indicate the ingredients and semi-finished products.		
	Compulsory	Ensure that production records for traceability are made		
	Compulsory	Indicate of non-organic and organic product in the documentation.		
5.4		Minimisation of mixing		
	Compulsory	Gain precise knowledge of processes where mixing could occur and/or cannot be completely eliminated is required.		
	Compulsory	Document that a minimisation strategy of mixing organic/non-organic is followed and defined for these processes. This should be agreed with the inspection body		
	Compulsory	Ensure the measures to minimise mixing by means of work instructions.		

5.4. Conclusions

The Code of Practice (COPOF) is an instrument that is used in other sectors and has already been implemented very well in the food production process. With this Code of Practice for Organic Food Processing we have adapted an existing instrument for the special aspects regarding organic food. The main focus is on the level of the company/operator. The instrument should help to fulfil consumers' expectations of organic products as well to comply with the private and legal regulations. The COPOF offers a number of tools that make it possible to:

- a) effectively improve production skills;
- b) improve and maintain the quality of organic foods and
- c) guarantee the safety of organic products.

A code of practice cannot be legally enforced, but it helps companies to better implement requirements and the goal is that it will be an important tool for managing operations. It also helps to make the inspection work more efficient and more risk-oriented.

As already mentioned, for more information the PDF version of the entire Code of Practice can be downloaded free of charge from the project website at www.qlif.org and at <http://orgprints.org/7031/>.

6. Recommendations

Otto Schmid, Alexander Beck and Ursula Kretzschmar

6.1. Basis for the recommendations

Our research has explored the situation regarding organic food processing in Europe in four steps:

1. Reflected the past with a literature survey of underlying principles in organic and 'low input' food processing to identify 'processing principles' for the organic food sector and other perspectives for 'minimum' and 'low additive input' processing and to identify differences between different approaches (see chapter 2).
2. Based on the literature survey, an expert survey was worked out to reflect the actual situation in different European countries. The work was carried out in a two-step Delphi survey. The survey was designed in such a way that the most important and currently discussed aspects regarding organic food processing were taken up (see chapter 3).
3. Based on the literature survey as well of the Delphi survey, two practical documents were worked out: *A Code of Practice for Organic Food Processing* (see chapter 5) with the aim of contributing to the further development of the practice of organic food processing in terms of increased safety, quality, transparency and success.
4. In addition, *concept papers outlining parameters for further development of organic food processing – crucial topics for the revision of the EU regulation 2092/91* were prepared with the aim of achieving a basis for discussion of the four most important subjects regarding organic food processing. The papers attempted to indicate which parties (private sector, competent authorities or the EU Commission) could have what kind of role in the future discussion and development process (see chapter 4).

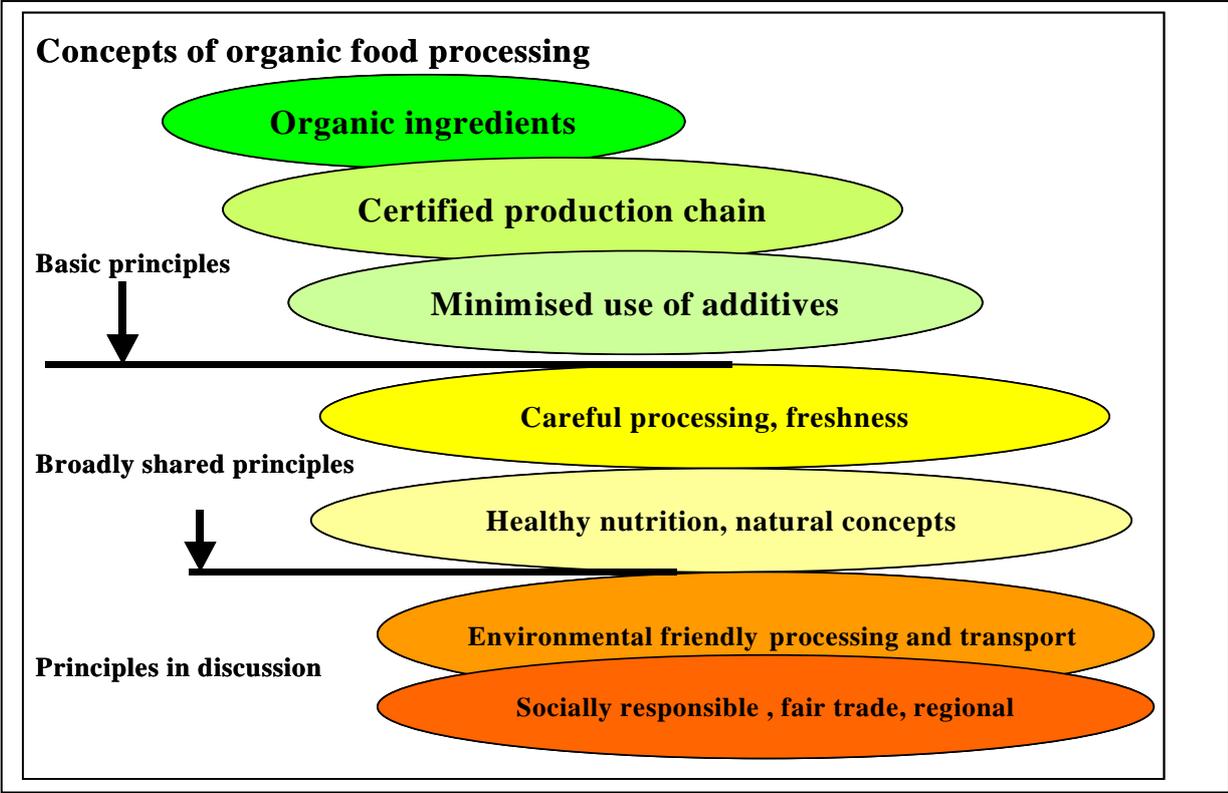
Based on that work, the authors have tried to make global recommendations regarding the further development of organic food processing.

6.2. Recommendations and possible approaches

In general, the authors recommend that topics related to processing of organic foods be studied carefully and be discussed in greater detail.

The project results made it obvious that opinions on the overall approach in processing of organic food are quite different. The graphic summarises these view points. It shows that some principles are common, others are broadly shared, whereas some principles are not shared at all among the stakeholders!

Graphic 1: Overview of principles for organic food processing



Further on we recognised, comparing the result of the literature survey, ‘Comparison of consumer perceptions of organic food quality in Europe’ to the expert survey, that there is a gap between consumers’ perceptions and the currently existing standards for organic foods. The authors recommend that a clearer link between consumers’ perceptions and the Regulation 2092/91 be realised. This might be achieved with more information about the content and the intention of the given regulation or by an improved regulation. What would be the most appropriate has to be decided according to the task.

Table 4: Comparison of consumer perceptions and identified principles for organic food processing.

Main topics of consumer perceptions	Corresponding identified principles for organic food processing	Covered by EU Regulation 2092/91	Covered by private standards	Covered at the company level
<i>Limitation of chemicals</i>	Organic ingredients	Covered	Covered	Covered
	Minimised use of additives	Covered	Covered	Covered
	Environmentally friendly processing	No	Partly	Partly
<i>Trust in the operator</i>	Certification	Covered	Covered	Covered
	Socially responsible, regional	No	Partly	Partly
<i>Traditional technologies</i>	Careful processing	No	Partly	Partly
	Minimised use of additives	No	Partly	Partly
<i>Better taste</i>	Organic ingredients	Covered	Covered	Covered
	Careful processing	No	Partly	Partly
	Careful processing	No	Partly	Partly
<i>Healthy food</i>	Healthy nutrition	No	Partly	Partly
	Minimised use of additives	Covered	Covered	Covered
	Organic ingredients	Covered	Covered	Covered
<i>Environment</i>	Organic ingredients	Covered	Covered	Covered
	Packaging, Transport	No	Partly	Partly
	Environmentally friendly processing	No	Partly	Partly
<i>Animal welfare</i>	Organic ingredients	Covered	Covered	Covered
	Appropriate processing (slaughtering)	No	Partly	Partly

Source: Schmid, Beck, Kretzschmar, 2004

The research team recognised during their analysis that for some areas/topics the given regulations and standards are very well developed and clear, but the practical implementation is not always performed in an optimal way. Therefore, we recommend developing more instruments or tools to better implement the given regulations and standards. An example of such a tool is outlined in the *Code of Practice for Organic Food Processing*, which was a result of the project.

The specific recommendations of the research, which are based on the results of the project, are classified into three user groups: a. for the private sector, b. for the national competent authorities and c. for the European Commission.

The most important topics were outlined in chapter 4 (concept papers outlining parameters for further development of Organic Food Processing – Crucial topics for the revision of EU regulation 2092/91).

a. Recommendations for the private sector

It is quite clear that a number of these proposals have to be developed, implemented and tested by the private sector before they can be taken up on regulatory level. This would give the industry the opportunity to determine whether the proposed concepts are working. The organic food industry needs to be given a chance to fulfil the different demands!

The following examples highlight possible private sector activities:

- *Code of practice by the private sector*

One of the conclusions of the Delphi survey is that on the one hand there is a need to improve implementation of Regulation 2092/91 and on the other hand there is a need to fill the gap between consumer expectations and the issues addressed in the regulation. The organic food sector should take more responsibility by defining a code of practice for organic food processing so that not all issues have to be described in detail in the EU Regulation for food and farming. Such a code of practice has been described in detail as a part of this subproject (see summary in this report in chapter 5).

- *Processing methods and new labelling and communication concepts:*

The Delphi survey showed that there is a need for more information about processing methods. Initially, labelling and communication concepts have to be further developed and established by the private sector. Communication about the added value of careful food processing methods needs to be understandable and must be important to the consumer and, therefore, be meaningful for the market. Truthfully labelling processing methods supports the concept of authenticity. For example, new labelling systems could be developed for 'careful' processing or 'hand-crafted' types of processing.

Two categories should be considered for labelling concepts (details see chapter 4):

relevant processing technologies such as bleaching, extrusion, microwaves, reconstitution, etc.;

specific processing methods which have positive effects on the nutritional quality of the product or on the environment should be introduced, such as for fermentation, non-use of homogenisation and biodegradable packaging materials.

- *Environmentally friendly processing techniques:*

A goal to strive for could be the use of the most cautious and environmentally friendly techniques for the processing of organic foods. This goal was supported by not all but at least 50 % of the experts. However, this is an important perception of consumers. The outcome of the Delphi survey has shown that this area should be developed first by the private sector. Companies and private standard-setting organisations should promote environmental certification of companies based on EMAS or ISO 14000 systems. These requirements could be taken up in a code of practice for the organic food sector. Possible topics addressed in such agreements could be environmental management, energy use and origin, waste management, packaging, transportation (see chapter 4 for details).

- *Sensory quality improvement:*

From 12 possible criteria (freshness, minimum and careful processing methods, minimum use of additives and processing aids, sensory quality: colour, smell and taste, environmentally friendly processing: e.g. ISO 14000, environmentally friendly packaging, certified social standards, regionality: produced, processed and sold in the region, seasonality, whole food, health and authenticity), the result of the survey was that the most important criterion is **the sensory** quality followed by **minimum use of additives and processing aids** and thirdly **freshness**, followed by **authenticity**. These are all aspects which are easily recognisable to the consumer.

The importance of the subjects of sensory quality and freshness for market success reflect clearly that consumers of organic food expect more than just organic food. It is important to advance the quality understanding by the different market players (including farmers)

b. Recommendations to national competent authorities

During the project it was stressed several times that some instruments have to be further developed to enable more efficient and safer practices in organic processing units. This might be done more easily on a national level, taking into account the specific national context.

Possible examples could be:

- *Recognition of private code of practice for organic food processing by national authorities*

The interface between national authorities and companies in terms of efficient implementation and control mechanisms could be further developed. The Code of Practice was proposed as one instrument. Such a code could be further developed as a code of conduct for the whole sector on a national level. This code of practice should be recognised and taken up in national regulations as a way to implement the rules in EU Regulation 2092/91.

One example could be focussing on promoting inspection based on quality management systems. Companies should have quality management systems in place which have incorporated all the requirements of the organic food regulation. Inspection should be organised in a way that the inspection instruments are adopted for internal quality assurance systems. The competent authorities should, for example, define the interfaces between internal quality assurance systems and inspection/certification based on EU Regulation 2092/91. This link must be part of a code of practice.

- *National support for research projects*

New research projects, carried out in collaboration with the organic food industry, could focus on careful processing methods that allow processors to avoid the use of additives with clever technologies or functional ingredients. Another example would be packaging materials which are renewable and do not have a contamination risk.

c. Recommendations for the European Commission

Regarding the revision of EU Regulation 2092/91, progress is needed in some areas. The Delphi survey has shown that the existing EU regulation is sufficient for an average of 43% of the respondents and partly sufficient for 32%. The food processors are more satisfied, 51% compared with 33% of the non-processing organisations. However, in the Delphi survey and other parts of the studies, a number of topics were identified where progress is possible or even required. In particular, it was demonstrated that consumer perceptions towards organic food are not always covered by EU Regulation 2092/91.

With the question addressed to the food processing experts ‘Where would it be helpful to have more detailed regulation or more requirements?’ it was apparent that the first priority was the minimal use of additives with an average of 84%, the second priority was minimal and careful processing methods, 72%, and the third priority was authenticity, with 66%. This result also supports the view that in some topics further development of EU Regulation 2092/91 might be needed. However this should not be achieved with new rules, but by helping the private sector develop and make practical experiments with new areas such as environmental orientation, social responsibility and fair trade concepts.

Possible examples include:

- *Further development of the specific requirements in and revision of EU Regulation 2092/91*

The revision proposal for EU Reg. 2092/91 is proof that there has not been any relevant progress over the last 15 years in theory building related to organic processing tasks. The new objectives and rules for organic processing proposed in the revision draft do not represent a progression compared to 1993. This

situation clarifies in an extraordinary way that tremendous research activities and an intensive discussion among the processors and the whole sector are needed in order to go further in developing the organic processing sector. It is important that the new regulation be based on well-founded principles and clear criteria for organic food processing, as outlined in this report.

The current revision of Regulation 2092/91 is a chance to take up issues such as:

- New general principles for minimal use of additives and careful food processing, to maintain the integrity and authenticity of organic food
- The further development of the criteria for the use of additives and processing aids
- Further development of the evaluation system based on clear criteria with standardised formats for applicants, evaluators and decision makers.
- Further development of areas in the regulation that are still very weak, such as the use of starter cultures, enzymes and flavours, e.g. by promoting the certification of such substances.
- The option of referring to codes of practices should be taken up in the new revised regulation for organic food and farming.

In the further development of the EU regulation a three-step scenario is proposed:

First, there is a need for standardising evaluation processes for the authorisation of additives for organic food. Secondly, a re-evaluation should be performed of the additives already permitted, which would allow in a third step of replacing ‘additives of agricultural origin’ with certified organic additives, organic functional ingredients or with careful technologies. (See chapter 4 for details).

- *Processing methods*

Ways of promoting the use of the most cautious and environmentally friendly techniques for the processing of organic foods should be considered (see chapter 4 for details).

In the survey the experts were asked to take a position regarding different technologies like microwaves, extrusion for cereal products, reverse osmosis in cheese and wine production and other areas. The result was disillusioning: specific processing methods for organic food production are generally expected but no clear indication was given about what kind of methods are acceptable. It seems that it is not possible to decide about processing methods in a general way. However this discussion can only be successful if the discussions are broken down to the level of product groups or single products. It is very clear that more research regarding careful processing is needed, which might result, at a later stage, in the inclusion of a specific requirement in the EU regulation for organic food and farming.

To conclude, it is important that there is an ongoing debate among all the stakeholders and actors regarding how the industry can respond better to consumer expectations while maintaining the principles of authenticity of organic food production.

6.3 Outlook – the future of organic food processing

The research has explored the idea that organic food processing is an important issue for the future success of organic food on the market. The principle of having authentic organic food, which is a consumer expectation, mainly covers the subjects of: processing, labelling, packaging, separation and environmentally friendly production. Consumer perceptions and the given regulatory frameworks at the private and state levels are not consistent. One scandal in one of these subject areas could have a big

influence on the credibility of organically processed food. A big step has already been taken with the awareness that the idea of organic cannot be implemented only in for organic production. In addition, the fact that the discussion about targets and aims of organic processing is being continued in wider circles, is testament to the fact that is no longer only the goal of some companies or label organisations. The support from the EU to promote project work such as this also confirms this development.

Possible ways and instruments concerning how these subjects can be implemented in the market and on which level the different aspects should be/could be addressed or regulated is one of the results of this work. It is vitally important to sensitise the stakeholders to these aspects! One step will be to support the stakeholders with the Code of Practice for Organic Food Processing and to pool the experiences that they have gathered with this instrument. It is also important to integrate the results, e.g. regarding additives and processing aids in the new EU regulation or in the evaluation processes for additives, to imbue the subject area with adequate importance.

One conclusion from the project is that further research is needed from the experts' point of view, in particular on careful processing, minimal use of additives, practical concepts of 'authenticity', etc.

The revision of Regulation 2092/91 as a whole presents a very good opportunity for introducing new concepts at a regulatory level. It has been promised that criteria for the evaluation process of additives and processing aids will also be developed and that Annex VI will be revised completely. All these activities provide excellent opportunities for implementing new concepts and results from these studies.

7. References

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QLIF Subproject Processing Partnership and Experts

The QLIF project team in the Subproject 5.1 Processing consisted of 4 partners and 9 subcontracted experts/institutions. The institutions and the main team members associated with them are described below: the researchers are listed in alphabetical order.

The following research partners have contributed as partners in the project.

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The following subcontracted experts/institutions have been working on the project:

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- **Consumer International Consultancy:** Contact Diane McCrea *Postal address: 127 Havannah Street Cardiff Bay, CARDIFF, CF 10 5SF Wales UK*
- **Green Marketing Consultancy for the Organic Business in CEE countries:** Contact Tom Vaclavik *Postal address: Vinohradská 261,664 34 Moravske Kninice, Czech Republic*
- **Marie Christine Monnier** *Postal address : 3 Rue du corps de garde, F-44100 Nantes, France*
- **Probila-Unitrab, Belgian National Professional Association of Processors and Distributors of Products Originating from the Organic Agriculture:** Contact Hugo Baert *Postal address: Leuvensebaan, 368, B-3040 St. Agatha Rode, Belgium*
- **Sociedad Española de Agricultura Ecológica (SEAE), ECA:** Contact Victor González *Postal address Camino del Puerto, s/n. Apdo 397 46470 Catarroja (Valencia), Spain*
- **Soil Association:** Contact Francis Blake *Postal address: Bristol House, 40-56 Victoria Street BS1 6 BY Bristol, England*
- **Warsaw Agricultural University SGGW, Faculty of Nutrition Science and Consumption:** Contact Dr. Sylwia Zakowska and Dr. Urszula Soltysiak *Postal address: Ul. Nowoursynowska 166 PL-02-78 Warszawa, Poland*

Detailed description of the research team



Ursula Kretzschmar (Researcher, Food Engineer, Dipl. LM-Ing. ETH) has been working for FiBL (Research institute of Organic Agriculture) Switzerland since 2004, where she is in charge of food processing issues with regard to organic products. She is the responsible co-ordinator of the food processing subproject within the EU project „Improving quality and safety and reduction of cost in the European organic and „low input“ food supply chains (QualityLowInputFood)“. She has a degree in food engineering. She was head of the processing and trade department of Bio Suisse (the Swiss umbrella organisation for organic farming) for 3 1/2 years and has 5 years of practical experience in the food industry in sales, product development and quality management. She also has experience in the inspection and certification of organic food, and is member of the Commission for Organic Food Processing and Trade of Bio Suisse since November 2005.



Otto Schmid (Senior Researcher, Agroeconomist) is involved at FiBL (Research institute of Organic Agriculture) in research on farm economics, marketing, analysis of agricultural policies and rural development. He has been closely involved in the development of standards and regulations for organic agriculture since 1977, being co-ordinator of the Standards Committee of IFOAM (International Federation of Organic Agriculture Movements) for 8 years and representing IFOAM in Codex Alimentarius work for 13 years. He is chair of the research subcommittee of the IFOAM EU Group. From 1976 to 1990 he was co-ordinator of the farm advisory service of FiBL. He is since many years an external lecturer at the Swiss Federal Institute of Technology/Technical University of Zurich (ETH) for organic farming, farming systems and agricultural marketing. He is involved as a senior scientist in the EU projects ORGAP (scientific coordinator), QLIF, EEC 2092/91 revision, ORWINE and COFAMI.



Dr. Alexander Beck (Senior Researcher, Food Quality) is an expert for the processing of organic food. He is board member and general director of AoEL (Assoziation oekologischer Lebensmittelhersteller), the German association of producers of organic food. He is the processing expert of IFOAM (International Federation of Organic Agriculture Movements) and has been an expert member of the German Codex Alimentarius delegation for several years now. He is head of a consultancy firm on food quality and also member of a number of research projects on topics related to organic food processing, some in collaboration with FiBL (Research Institute of Organic Agriculture).



Prof. **Dr. Angelika Ploeger** is head of the Department of Organic Food Quality and Food Culture at Kassel University. She has engaged for more than 20 years in research and research management as well as teaching at 3 different universities in Germany. Over the last 4 years her group has concentrated on the development of minimal processing strategies, sensory analysis and validation of new food quality assessment methods (complementary methods). Beside involvement in the QLIF EU project Angelika Ploeger also participated in EU FAIR 1 CT95 0360 Agro alimentaire paysan europeen. She is member of 2 scientific advisory boards for the German Ministry of Agriculture, Food and Consumer Protection (Nutrition and Consumer Policy as well as Biodiversity and Genetic Resources). She is Chair of the German Association of Nutrition Behaviour (AGEV) and Chair of the International Research Association for Organic Food Quality and Health (FQH).



Monika Roeger (Researcher, Dipl. oec. troph. FH) is responsible for sensory analysis in the Department of Organic Food Quality and Food Culture at Kassel University. Following her degree and a traineeship in industry (Kraft Foods) she established several trained panels for sensory analysis (e.g. within the EU-QLIF project) on vegetables and fruits samples as well as processed food.



Marita Leskinen (Senior Researcher, M.Sc., Food Technology) works at the University of Helsinki. She focuses on the following research areas: quality requirements of the food industry for organic raw materials, CA-storage and minimal processing of fruits and vegetables and microbiological risks of organic fertilizers in food industry. Since 1991 she has been working in a range of research projects addressing product development and SMEs. As concerns organic food processing, she has been an expert member of several working groups co-ordinated by the Finnish government.



Marjo Särkkä-Tirkkonen (Senior Planning Officer, M.Sc., Food Technology) works at the University of Helsinki in the following research areas: food safety in small and medium size enterprises, product development and packaging technology. She also teaches organic food processing at the University of Helsinki.



Thorkild Nielsen (Senior Researcher, M.Sc. in Geography) is working since 1990 as researcher at the Department for Innovation and Sustainability at the Technical University of Denmark. His main areas of research are: Environment and Society, Technology Assessment, Technological Development and Science and Technology Studies. For many years he has been involved in studies on sustainable food production. At present he is involved in an EU project about Ethical Food Production and Traceability (ETHICAL TRACEABILITY).



Niels Heine Kristensen (Associate Professor, Dr.) is working as researcher at the Technical University of Denmark. He is involved in research, academic lecturing and research schools on food policy analysis, environmental management, rural development and rural sociology. Since the 1990s he has been involved in policy analysis on organic agriculture for the Danish state and for the European Commission. Recently he has been initiator of the new international master course on Food Production, Innovation and Management which includes food policy issues and the concepts of sustainable and organic systems. He has published more than 100 papers, conference proceedings, reports and book chapters. He is currently involved in transnational research in the EU network ETEPS, in the EU projects ETHICAL TRACEABILITY and QLIF, and in the Nordic project HEALTHCAT.



“Organic Food Processing – Principles, Concepts and Recommendations for the Future” is the concluding volume based on four reports on the processing of organic and low input food. It was produced within the framework of the Integrated Project on “Quality Low Input Food” (QLIF), funded by the European Commission under the 6th Framework Programme for Research and Technological Development. Within the QLIF project a work package focused on developing a framework for the design of “minimum” and “low input” processing strategies that guarantee food quality and safety.

This publication summarises the main findings and conclusions generated by the research team. It includes results of a literature survey on the underlying principles of organic and low input food processing. It reports the results of a Delphi survey on “Approaches Used in Organic and Low Input Food Processing – Impact on Food Quality and Safety”, involving more than 100 food processors and specialists in 13 European countries.

A key result is that more guidance needs to be given to private operators and firms on how to implement EU regulation 2092/91 on organic food and farming at company level. A Code of Practice for the organic food sector is described as a possible instrument that would help to prevent the EU regulation from becoming over-prescriptive.

Furthermore, four concept papers outline parameters for further developing organic food processing. These provide: a “quality of origin” concept for ingredients; proposals for criteria and procedures for evaluating additives for organic food processing; recommendations for a more environmental orientation of companies processing organic foods; proposals for improved labelling systems as well as clearer separation practices in mixed organic and non-organic operations.

The final recommendations for the development of organic food processing are addressed to a range of actor groups, in particular the private sector, national authorities and the European Commission.

Detailed project information is available at www.qlif.org/research/sub5/.

The reports can also be downloaded at www.orgprints.org/view/projects/eu_qlif_sub5.html.

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