

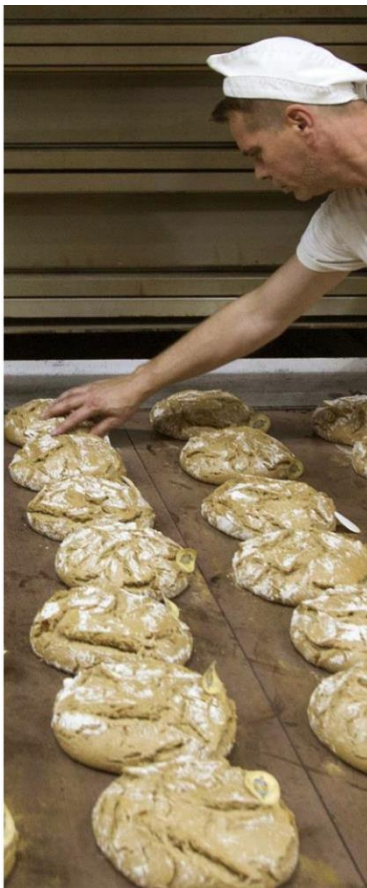


Recommendations from a market perspective for the development of a Code of Practice for organic food processors

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Code of Practice for Organic Food Processing (ProOrg)

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CORE Organic is the acronym for "Coordination of European Transnational Research in Organic Food and Farming Systems". As an ERA-NET action, it intends to increase cooperation between national research activities. CORE Organic Cofund is the continuation of the ERA-Nets CORE Organic I, II and Plus. The CORE Organic Cofund consortium consists of 25 partners from 19 countries.

<https://www.proorgproject.com/>

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1 Introduction

The market for organic food is currently growing rapidly and reached 112 billion US dollars in 2019 (Willer, 2021). A large part of the organic food consumed is processed (see Figure 1). This is a consequence of the increasing urbanization of lifestyles, as a result of which demand is rising for processed organic products that are easy to transport and store or are in demand as "ready to eat" (van den Berg, 2018).

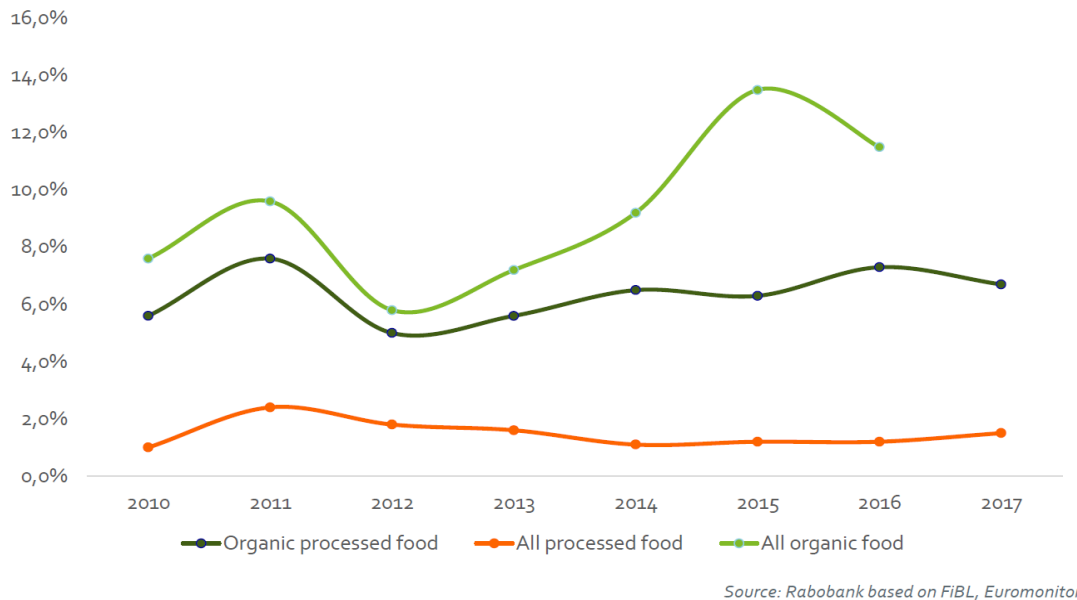


Figure 1: Annual growth rates of organic food, organic processed food and all processed food between 2010 and 2017. Source: Van den Berg, 2018

Hence, the organic food industry needs to adopt and innovate processing methods to keep the pace of increasing requests from the consumer and retailer market. Additionally new technologies in food processing are in the process of development and therefore guidance is needed which of the novel technologies would suit to the organic principles of a "careful and gentle processing" of food.

Today on the market are manifold food processing technologies ranging from traditional technologies such as sun or oven drying to highly specialized ones that can only take place in a professional setting, such as High Pressure Pasteurization (HPP). The range of technologies depends also on the product characteristics and therefore on the product type.

In Europe, organic farming and production is regulated by Council Regulation (EC) No 834/2007 and from January 1, 2022 No 2018/848, defining the official EU aims, objectives and principles of organic farming and production, and by two implementing regulations (No 889/2008 and No 1235/2008) detailing the organic production, labelling and import rules. Apart from a positive list of additives and technological aids and few private organic standards, mandatory standards for the processing of organic food are lacking, nor are there indications that guide processors in the selection of appropriate technologies and innovations in line with the general principles of organic production and processing.

To contribute to the sustainable innovation in the organic food sector, the project *Code of Practice for Organic Food Processing* (ProOrg) set the objective to develop a practicable Code of Practice for processors of organic food as well as for labelling organizations. ProOrg is a "CORE organic" collaboration (Coordination of European Transnational Research in Organic Food and Farming

Systems) between 27 partners in 19 countries/regions on initiating transnational research projects in the area of organic food and farming.

The Code of Practice for organic food processors aims to provide operators with strategies for making decisions that can help them to take the best choice for gentle processing methods or technologies and formulations free of artificial additives as well as sustainable packaging, while addressing high food quality, low environmental impact, and high degree of consumer acceptance as well. To labelling organizations, the Code will provide an assessment and decision support tool to evaluate the compliance of new additives and processing technologies with the general organic principles. Besides, the Code aims to address activities in operations from raw material procurement, through processing technologies to consumer information.

Previous studies have revealed that processing technologies can have an impact on several dimensions of food quality, including changes in sensory, biochemical, and nutritional properties (Kahl et al. 2014).

From a consumer perspective organic food processing seems to play a hidden role in the purchase of food. This was the main outcome of an online consumer survey in Switzerland and Germany in 2020. However, it indirectly plays an important role in consumers' milk choice behaviour in that it affects the product attributes taste, freshness, and shelf-life, which are important to consumers. The study revealed that the more consumers buy organic food, the more they pay attention to processing and the less they place emphasis on shelf-life. It also indicates, that consumers are sceptical towards new milk processing methods and prefer the method they know (Koch, 2021 and Hueppe & Zander, 2021).

However, less is known about the acceptance of organic market actors and stakeholders about different food processing methods and their influence to food quality attributes.

For that reason a comprehensive literature review was conducted and an Organic Market and Stakeholder Survey (OMSS) was designed as part of the "ProOrg" project (Richter et al., 2021).

As target groups of the OMSS processors, experts from different scientific disciplines, traders, labelling organizations and other relevant stakeholders have been addressed, as well as individual companies has been approached and invited to participate in the OMSS.

The paper presents a synthesis of the results from the literature and market review as well as the OMSS and provides recommendations to the elaboration of the Code of Practice.

2 Results

2.1 Literature review

The review covered the recent role of processed food in the organic food baskets and the role, which different processing technologies play from a marketing point of view. Besides the legal requirements of organic food processing have been reviewed both at EU Regulation level and by selected private standards. Finally, the market for organic processed food has been reviewed as well as processing claims and declarations of processing aspects in corporate and product communication.

Lack of appropriate organic food classification system

A review of current food classification systems tried to identify the position of processed food and organic food in academic literature and food business classification systems.

Food classification systems used for academic purposes are based either on processing stages or on the grade of convenience. Other classification systems are rather used in the food industry or define food categories in the food law.

According to the literature review differentiating, between food that are processed over and above food group categories remains a challenging issue. Most of those designed with consumer nutrition guidance as one aim take nutrients or substances in general as their main criteria. Only the so-called NOVA classification system takes processing techniques themselves into account (Borghoff et al., 2021). The NOVA classification system groups all food according to the nature, extent and purposes of the industrial processes they undergo.

Furthermore, according to Borghoff et al. only the Wholefood Nutrition Classification System (Vollwert Ernährung in Germany) takes environmental and additional impacts into consideration.

Altogether, none of the systems analyzed is appropriate for a deeper exploration of organic processed food and a differentiation within these or between non-organic and organic processed food.

Lack of distinguished market data for processed organic food

The organic sector finds itself in a dynamic growth phase in the European Union and worldwide (Willer et al. 2019). This is not only limited to organic farming but also includes the production and processing of organic food. Nevertheless, fresh food in general outgrows processed food over the past years in general. This is the same with organic food. The market growth of fresh organic food is much higher than that of organic processed food. The product category with the highest penetration rate is baby food, followed by milk and infant formula. Spreads, tea and pasta, breakfast cereals, edible oils, soup, coffee, and bread follow this. The lowest penetration rates are for the categories frozen food, sweet biscuits, savory snacks, confectionary, sauces, ready meals, and ice cream. Organic processed food are often premium priced. Rabobank expects an ongoing growth of the organic processed food market in Western Europe (van den Berg, 2018).

Trends in the data studied suggest an increase in very highly processed organic food, such as convenience and luxury food. This development needs to be referred to the overall guiding principles for organic food and farming and addressed by the sector.

However, although Rabobank made a thorough market analysis, it only could draw on data from few European countries. The market analysis could not deeper distinguish between processed organic food in many European countries.

Hardly any communication about used food processing technologies

Communication of processing-related aspects of organic products as studied on producer websites, corporate video material of organic food processors and product packaging show little differentiation to that of non-organic products. Both would seem to use vague terms about the kind of processing and avoid professional visuals about the processing steps.

2.2 Organic Market and Stakeholder Survey

The Organic Market and Stakeholder Survey (OMSS) was conducted in spring 2021. It covered, among others, the importance of quality aspects in the selection of processing technologies, the acceptance of quality changes in organic food processing, and the suitability of potential technologies for organic food processing. 310 stakeholders throughout Europe took part on the OMSS.

Organic Stakeholders welcome a Code of Practice

A central question was whether a Code of Practice (CoP) is welcomed among organic stakeholders including representatives of the organic food processing industry. The CoP aims to provide operators with strategies for making decisions that can help them to take the best choice for gentle processing methods or technologies.

According to the results of the survey, two thirds of all respondents would welcome a CoP for organic food processors (see Figure 2).

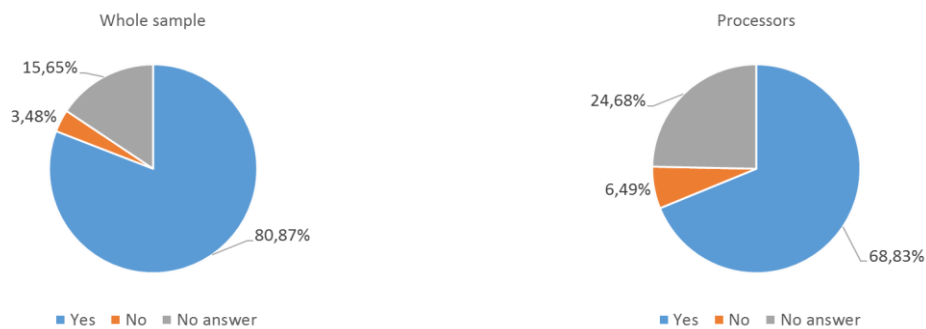


Figure 2: Stakeholder opinion whether a CoP would be helpful for food processors to identify and decide which processing technologies are best suited for organic food processing
Question: Would a code of practice be helpful for food processors to identify and decide which processing technologies are best suited for organic food processing? (n = 310)

However, a lower share of 68,8 % of organic food processors as main target group affirm to that question.

Lack of a clear definition of the term “organic food processing”

A conceptual background for organic food processing is given by the underlying paradigms and principles of organic farming and organic food as well as on organic processing. However, as the hereby used term “gentle processing” is frequently cited but nowhere defined in writing, the OMSS revealed heterogeneous definitions of the term “gentle processing”.

Organic Stakeholders most frequently describe, “gentle processing” in the following way with their own words. “Gentle processing” is:

- when as little intervention is done as possible and as much as necessary for an excellent taste or to extend the shelf life of food products,
- when all or the most valuable components and ingredients of the raw material are preserved in the processed food as much as possible,
- when the sensory parameters are not or less affected by the applied technologies,
- when the natural quality of the raw material is respected during all processing steps,
- when the true character of the product has been preserved after all processing steps.

Importance of food quality properties to select suitable processing methods

The food processing method can affect 1) the taste and 2) the nutritional content of the food. It also can have an impact on 3) the environment e.g. water and energy consumption, CO₂ emissions, etc. (Kahl et al., 2014). Hence, the study authors wanted to gain insights how important the three aspects

are in the decision process whether a certain method can be considered as suitable for organic food processing or not.

The results indicate that the relative importance of all quality aspects is high but varies depending on the food categories. In tendency, maintaining a high nutritional value is most important, while the influence on the sensory quality seems to be slightly less important for the choice of a processing technology. The relative importance varies between the tested foods categories (food in general, staple food, convenience food, luxury food), with the queried quality aspects being more important for staple food of daily consumption than for luxury and convenience food (see Figure 3).

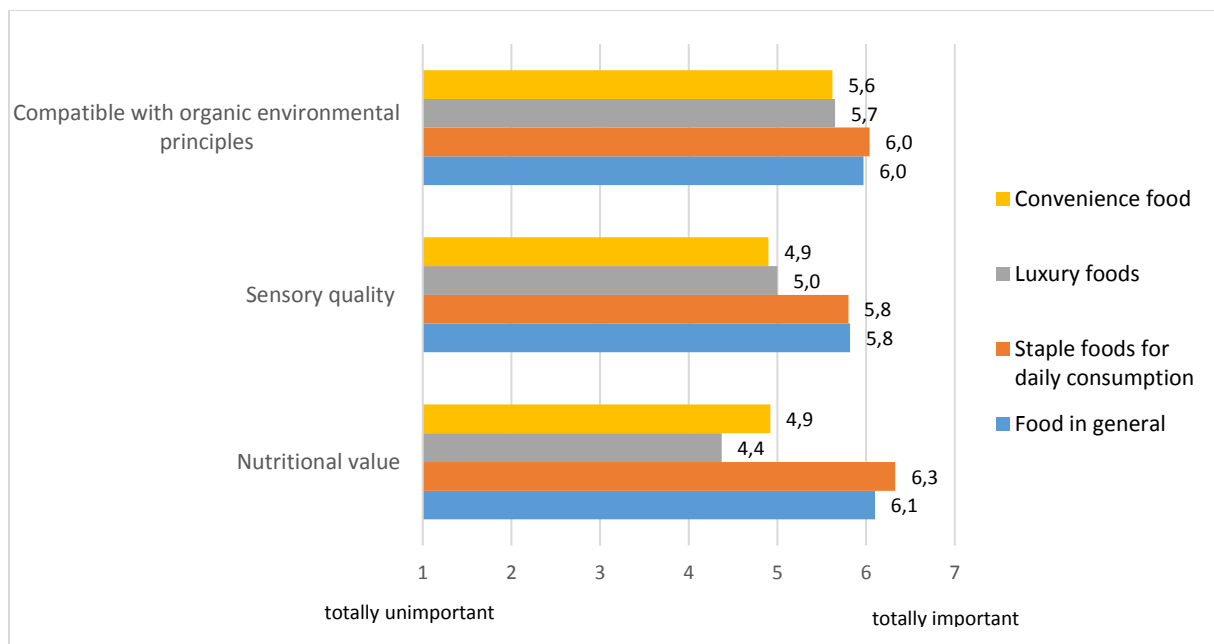


Figure 3: Importance of quality aspects in organic food processing, by different food categories. Source: own calculation
Question: How important are the following three aspects to you, to consider whether a processing method would fit to organic or not. (n = 310)

Further, respondents were asked to decide whether food still could be considered as "organically processed" if the sensory quality, the mineral content, the nutritional value and the environmental impact have been influenced due to the application of a certain food processing method. In general, respondents do not accept a large change in mineral content. In contrast, a change in vitamin content because of processing steps seems to be rather accepted by the respondents. Comparing the different product groups, respondents accept a lower degree of change in quality characteristics for staple food than for luxury food and convenience food. In contrast, the kind of product does not matter with regard to ecological consequences through the choice of a processing method. To avoid a negative ecological impact of organic food processing seems to be of high importance in the choice of the suitable technology.

Suitability of processing methods for organic food processing

Respondents to the survey were asked to indicate how suitable different technologies are with the aim to extend the shelf life of food. The most accepted technologies in the order of acceptance are Drying, Pasteurization, Deep Freezing, Freeze Drying, Microfiltration, High Temperature Pasteurization, Sterilization, Bactofugation, Reverse Osmosis, UHT, and HPP. Cold Plasma Treatment and Irradiation are the least accepted.

For those technologies queried for improving the maintaining of quality attributes, the order of suitability was as follows: Cutting, Peeling, Washing (fruits, vegetables), Pressing (fruits, vegetables), Fermentation to maintain product quality, and Milling to process grains. Besides, Puffing for processing cereals, the Homogenization of milk, the HPP treatment for milk or fruit juices or the Extruding processes are rather accepted, although less than the previously listed methods. The technology that was by far the least accepted is the use of Microwave Irradiation, e.g. for thawing meat and fish.

3 Recommendations

Need for better integration of organic food in food classification systems

Organic food covers all categories within studied processed food classifications, including very highly processed food categories. Given the growing attention paid to processing of food and their connection with human health, as well as the dietary recommendation made by several private and national nutrition bodies to avoid very highly processed food, the organic sector does need to address this issue. One avenue could be to build on existing classification systems and adapt these to include organic specifications or else to develop a new classification, drawing on organic principles and the organic perspective as a guiding framework. The legislation for organic processing of food provides a general framework with guiding principles and permitted substances for processing; some few technologies are specifically mentioned and forbidden. The private standards of some organic associations provide more detailed guidance, though again, this is mostly limited to restriction of permitted substances and applications.

Broad consensus, that a Code of Practice is needed

The results of the survey indicate that the vast majority of the market actors and stakeholders welcome a CoP. That means, there is a need for a tool to guide processors to make the best choice for careful and sustainable processing methods. The ProOrg project team has developed the CoP. Appropriate communication strategies must be developed subsequently to make the CoP known among the food processing companies and the organic and business associations.

The used food processing technology matters

Those technologies, which can be considered to have a low impact on the quality parameters of food and the natural/environmental resources, are clearly preferred by the processors and other organic stakeholders, particularly in staple food for the daily consumption.

The surveyed market actors and stakeholders would accept just a lower level of change in terms of product taste, vitamin content or mineral substances through the use of processing methods. Hence, the selection of the right processing technology seems to be a sensitive issue for decision makers in the food processing industry and standard setters both.

In tendency, well-known technologies are rather preferred over novel processing technologies. An example to illustrate that phenomenon is the use of Pasteurization or High Pressure Pasteurization (HPP) for fruit juice or milk processing. HPP is a cold pasteurization technique by which products, already sealed in its final package, are introduced into a vessel and subjected to a high level of isostatic pressure (300–600MPa) transmitted by water. High Pressure Processing respects the sensorial and nutritional properties of food better as Pasteurization, because of the absence of heat treatment, and therefore maintains its original freshness throughout the shelf-life. Hence, HPP could be considered as a more gentle processing method as Pasteurization. Nevertheless, a higher number of stakeholders

(including processors) seem to consider Pasteurization as more suitable method for organic food processing as HPP.

Consequently, tools such as the CoP or the Assessment Framework, which were elaborated in the frame of the ProOrg project, could enable food processors to take better-informed decision. In addition, any other form of communication is welcome which presents to processors not only price data and functional specifics of certain technologies, but also describes holistically sustainability criteria of individual technologies.

More and better communication of used food processing methods to consumers

There is a chance for better promotion of organic food if unique organic processing attributes can be distinguished on the product package. Raising consumers' awareness about impacts of processing on relevant product attributes is crucial, when rather unknown but gentle processing methods shall be promoted to reach a broad market penetration. Moreover, a better communication to consumers even would allow setting higher prices for organic products as according to Koch (2021) consumers are willed to accept higher prices for using gentle food processing methods, when they would preserve the core nutrients and the natural character of a food item.

A majority of organic stakeholders express the wish to find explicit information about the processing technology clearly declared on the front of a product packaging. Especially when new or less common processing technologies are applied, a sufficient set of information should be provided to the consumers that enable them to understand the benefits compared to other traditional or well-known technologies. However, as consumers have less knowledge about processing technologies at all, it should be considered, not only to declare the used method on the packaging, but also rather to declare the benefit in combination with the used method (e.g. "higher content of vitamins preserved by using HPP").

Final remarks

It can be concluded, that the type of used technology matters to the organic market actors and stakeholders: A Code of Practice is highly welcomed among the stakeholders, and those technologies, which have only less negative impact on the quality parameters of food and the environment are clearly preferred, particularly in processing of staple food, such as dairy products or products, based on fruit and vegetable processing, which have been focused in ProOrg project.

In the past, the B2B and B2C communication focused mainly on organic agriculture, its standards and its benefits for humans, animals and the environment. However, it has been neglected to present the the whole production cycle of organic food, including the steps and processes that are necessary to produce a carefully manufactured food based on organic raw materials.

In future, this communication gap should be closed, as the decision for or against a certain processing method can have a significant positive or negative influence on the overall ecological and quality balance of an organic product. Herein may lie a chance for better promotion of organic food if unique organic processing attributes can be distinguished. Especially organic associations as well as organic processors have a great potential, which is just waiting to be better exploited.

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