

WORK PACKAGE NO. 6

CONSUMER ACCEPTANCE, PREFERENCES
AND COMMUNICATION

REPORT ON THE OUTCOME OF THE
FOCUS GROUP DISCUSSIONS (D6.1)

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EXECUTIVE SUMMARY

The project “ProOrg – Code of Practice for organic food processing” aims at developing a code of practice (CoP) for organic processors. Processors lack a guide for the selection of appropriate technologies and innovations in line with the organic principles: careful processing, high food quality, low environmental impact and high degree of consumer acceptance. This work has been carried out within work package no. 6, “Consumer acceptance, preferences, and communication.” It is the outcome of task 6.1 of the project: “Identifying consumer knowledge and preferences of selected food processing technologies and trade-offs between different organic food attributes”. The aim of this research meets exactly what can be found in the title.

Since little research had been done on consumer preferences and processing technologies, this study followed a qualitative approach with an explorative focus. Eight focus group discussions with organic product consumers were conducted in Germany and Switzerland. According to the project specification, dairy and fruit or vegetable products were to be discussed. When discussing complex topics with consumers, such as processing technologies, well known products should be referred to. Hence, we chose milk, orange juice, and cookies focusing on varying degrees of processing and technologies mainly concerning shelf life.

The outcomes of the focus groups provided first insights into consumers’ current state of knowledge and preferences regarding processing technologies for organic products. No matter which technology was discussed, participants always had various and often contradicting opinions.

Knowledge of processed food:

- Processing was mainly associated with concepts like additives, artificial flavors and preservatives, E-numbers, chemicals, and packaging, often negatively connotated; deep-freezing and pasteurization were the only processing technologies mentioned.
- Advantages of processed foods: time-savers, convenient, easy to portion, and enabling consumption of a non-seasonal variety of goods.
- Processed foods cause a general insecurity concerning and the multiple aspects related to it, e.g. ingredients, packaging, or CO₂ footprint.

Expectations of processed organic food:

- Advantages also held true for processed *organic* food.
- Processing technologies were mostly not part of their concept of ‘organic’.
- Participants clearly associated transparent and environmentally sustainable value chains with organic foods.

Milk:

Which type of milk participants consumed, depended primarily on their lifestyle and habits, nutritional values only came second.

- **Homogenization**
 - Whether milk should be homogenized or not, seemed to be mainly a matter of habits and age.
 - As a mere physical treatment, homogenization was in line with most participants’ idea of organic processing because the product did not change its nature.
- **Preservation technologies for milk**
 - Pasteurized milk as a widely and long-established product was not questioned.
 - For many microfiltrated ESL milk, that is ‘fresh milk’ with the addition ‘longer durable’, was a good alternative to just pasteurized milk due to a longer shelf life.
 - Few critical consumers stated that ESL milk is far too processed.
 - Others associated the longer shelf life of ESL milk with less food waste.
 - UHT milk was the most debated: participants either stated that UHT milk is not in line with their idea of *organic* processing and, thus, they refused to buy it, or they consciously bought it out of habit or convenience.

- For many participants, the organic nature of the animal husbandry matters more than the technology and nutritional values.

Trade-off:

- With a fast-moving lifestyle and milk being a highly perishable food, participants faced a trade-off between convenience and quality.
- For most of the participants it seemed like being a minor conflict. Many participants simply chose even conventional products when the organic ones did not entirely fit their needs.

Orange juice:

- **Direct juice vs juice from concentrate**
 - Juice from concentrate often evoked a spontaneous negative reaction.
 - Some participants were also positive towards juice from concentrate due to equally good nutritional values and the environmental benefit of transportation.
- **Preservation technologies for orange juice**
 - Participants unanimously preferred and associated fresh juice with organic orange juice
 - Participants were generally positive towards high pressure preservation (HPP); some had environmental concerns, such as presumably high energy consumption and use of required PET-bottles.
 - Participants associated a longer shelf life with less food waste.

Cookies:

- Participants unanimously agreed that every single component should be organic, high quality, and known to the consumer, not hidden as an E-number
- Some perceived organic cookies as healthier due to ingredients such as raw cane sugar and spelt flour
- Others perceived cookies and junk food in general as not worth being organic

Careful processing:

- Due to its vagueness, it turned out to be a rather difficult term to discuss
- Participants had no specific association with the term 'careful processing' and

perceived the term as misleading

- Participants unanimously viewed UHT milk as not carefully processed.
- Direct juice was perceived as more carefully processed than juice from concentrate.
- Concerning HPP, participants had different opinions: some perceived it as more careful than pasteurization, other as less.

Conclusion

Generally, consumers know very little about processing technologies and rather focus on organic production. Regarding processing, organic consumers have a rather narrow idea of the concept 'organic'. Thus, asking participants for their preferences for processing technologies often overstrain their judgement, although some basic information was provided. Moreover, many participants buy conventional products if purchasing organic products requires a greater effort regarding time management, a change of habits, or willingness to pay. Concluding, although most consumers of organic food are not always loyal to organic products, the future development of organic products is still relevant to them. Indeed, a great uncertainty and a lack of knowledge concerning organic production and processing does not imply that consumers generally do not care about processing technologies. On the contrary, consumers expect information and transparency from organic products.

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1. INTRODUCTION

Worldwide, increasing market shares for organic foods is no news. Yet, the market growth for organic processed and convenience food is a more recent development (Willer *et al.*, 2019). The societal debate of health risks in foods caused by food scares, additives, and pesticide residues increases the interest in organic foods, especially in wealthy countries (Batte *et al.*, 2007). Indeed, according to BÖLN, 2019, 78% of German consumers state to purchase organic products at least occasionally. Thus, organic products have now arrived in the center of society and with it the interest and demand for organic processed food.

Starting at the European level, the European Regulation lacks mandatory standards for the processing of organic food. Hence, also processors lack a guide for the selection of appropriate technologies and innovations in line with the organic principles: careful processing, high food quality, low environmental impact and high degree of consumer acceptance. The project 'ProOrg' aims at developing such a guide or code of practice (CoP) for organic processors.

Looking at the literature, scientists studied consumers' perceptions of organic products (Schleenbecker and Hamm, 2013; Shafie and Rennie, 2012; Stolz *et al.*, 2009), of consumer trust in organic markets and labels (Nuttavuthisit and Thøgersen, 2017; Ellison *et al.*, 2016; Zander *et al.*, 2015; Janssen and Hamm, 2012), and consumers' purchase motivations (Baudry *et al.*, 2017; Hwang, 2016; Henryks *et al.*, 2014; Naspetti and Zanolli, 2002). Moreover, Thøgersen *et al.* (2019), Pedersen *et al.* (2018), and Zander and Hamm (2010) looked at consumer preferences related to country of origin respectively additional ethical attributes of organic foods.

However, little has been done on consumers' expectations and preferences related to processing technologies (Lee *et al.*, 2017; Arvola and Lähteenmäki, 2003). Schleenbecker and

Hamm (2013) suggest to take consumers expectations and preferences on transparency and quality into account when developing processing technologies for organic products.

Thus, this study aims at exploring consumers' knowledge, expectations and opinions of selected processing technologies in organic foods. Therefore, we carried out focus groups with occasional organic consumers. According to the project specification, dairy and fruit or vegetable products were focus of discussion. When discussing complex topics with consumers, such as processing technologies, well known products should be referred to. Hence, we chose milk, orange juice, and cookies focusing on varying degrees of processing and technologies mainly concerning shelf life.

2. METHODOLOGICAL APPROACH

2.1. FOCUS GROUPS

Since little prior research exists regarding consumers and processing technologies, focus groups ('FG') as an explorative method are chosen to collect primary data. FGs are carefully planned discussions following a structured, yet variable set of guiding questions (Krueger, 1994). FGs are rather heterogeneous and so called ad-hoc groups. That means besides their purchase behavior of organic food, participants met different socio-economic criteria and did not know each other before the discussion. Heterogeneous groups usually lead to more lively and controversial discussions. Following, these FGs aim to obtain content-related results rather than examining social-psychological or group-dynamics.

Besides their explorative character, FGs usually create a natural and relaxed atmosphere, reminding participants of an everyday communication situation. This encourages participants to express their honest opinions, enhance mutual learning, a lively discussion and at last, allows assuming realistic results (Lamnek, 2005). An open and flexible setting also comes with challenges: group dynamic processes which may hinder expressing individual opinions, encourage opinion leaders to speak a lot and others to remain silent. These dynamics cannot be avoided but should be balanced by the moderator. Thus, moderators face the challenge of keeping the discussion open, fair, and relatively close to the topic while mainly remaining in the background to allow a self-dynamic discussion among the participants (Lamnek, 2005).

For this study, FGs are heterogeneous ad-hoc groups. The discussion followed a set of guiding questions to explore participants' knowledge, expectations, and opinions of processing technologies.

2.2. SAMPLE DESCRIPTION AND DATA COLLECTION

In line with the overall project goal, the sample consisted of people who consumed organic food. The purchasing frequency for organic products differs a lot: according to BÖLN (2019), 78% of German consumers buy organic products at least occasionally whereas 22% never consume organic products. For this study, consumers had to buy organic products at least once in two weeks to qualify as “organic food consumers”. Hence, some participants just met the minimum requirements of purchasing organic products once in two weeks, whereas others stated to purchase organic products up to two times per week. The range of products they bought as well as their opinion of which organic label qualifies as ‘really’ organic differed a lot.

To exhibit the variety of opinions, we conducted eight focus group discussions with nine to 11 participants. Thus, the sample was composed of 80 people who were recruited by a market research agency: 40 people in Hamburg and Berlin, Germany, and 40 people in Bern, Switzerland.

For the recruitment, the following criteria were applied:

- Age: between 18 to 75 years
- No employment within market research
- Consumers of organic food (purchase of organic food at least once in two weeks)

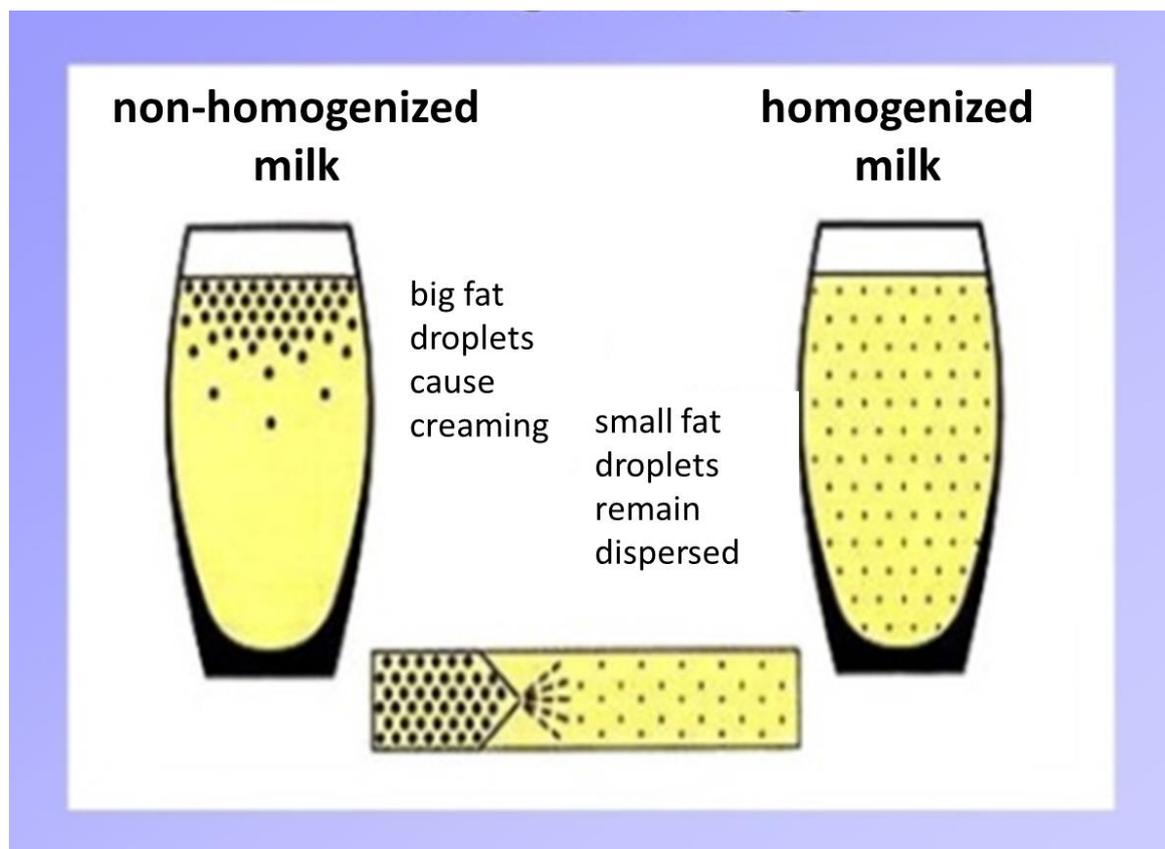
For each focus group:

- Gender: 33% to 66% female participants
- Age: 50% between 18 and 45 years and 50% between 46 and 75 years
- Employment: min. 33% and max. 66% full or part-time employed

The FGs were conducted in March 2019. The FGs in Germany were held in relatively neutral

places such as adult education centers, whereas in Switzerland, the FGs took place in a room of the organization of Swiss milk producers. Each FG was moderated by the scientist herself according to a loosely structured discussion guideline which was flexibly used in every FG.

FIGURE 1: HOMOGENIZATION



Source: Kees, 2004

The FGs started with investigating consumers' general knowledge and expectations of processed organic products in comparison to non-organic processed products. As mentioned before, two well-known products, milk and orange juice, were then selected to enable and facilitate the discussion. At first, milk was chosen and participants were asked what kind of milk they bought and for how long milk should last. Then, the technologies homogenization,

pasteurization, microfiltration, and ultra-high temperature treatment were discussed. Therefore, some extra information about the technologies was presented to enable a discussion with corresponding knowledge (Fig. 1 and Table 1).

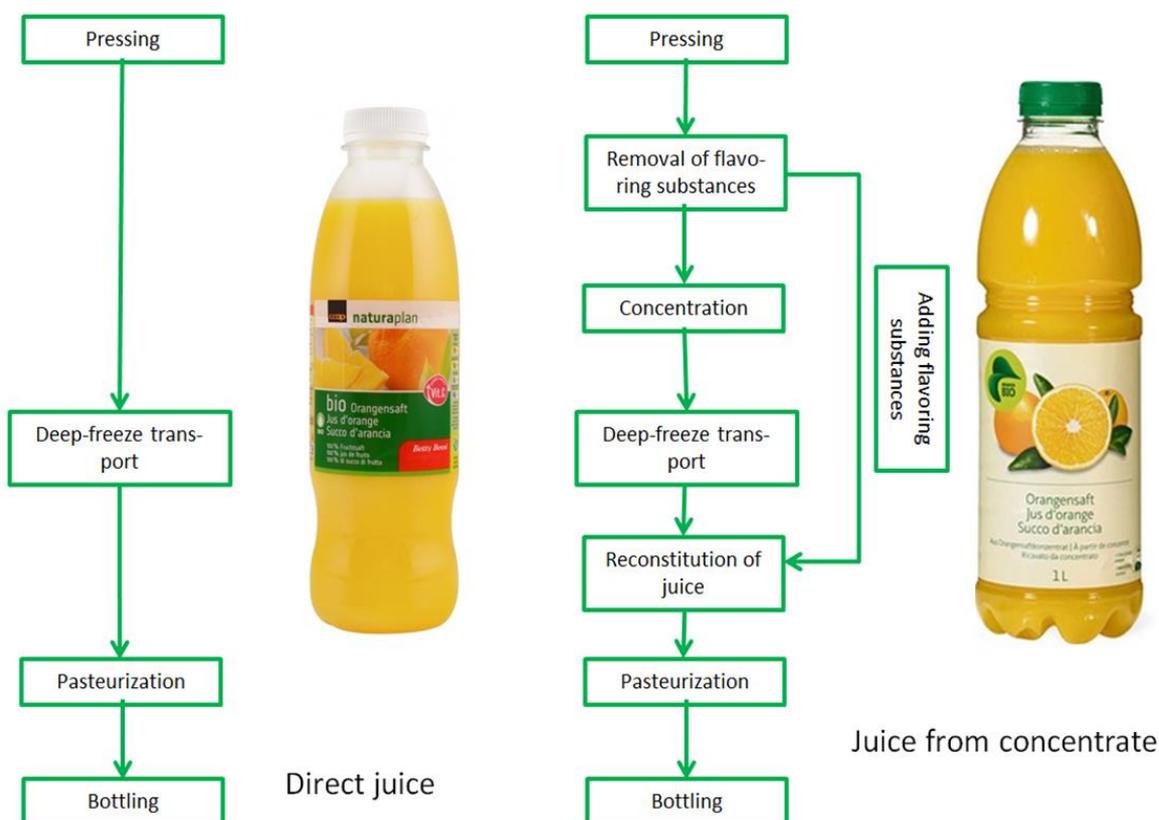
TABLE 1: PRESERVATION TECHNOLOGIES FOR MILK

Milk	Fresh milk traditionally produced	Extended shelf - life (ESL) microfiltrated	UHT milk
	1. Separation in cream and skimmed milk 2. Standardization of fat content		
Temperature	72°C	Cream 125°C Mixture 74°C	135-150 °C
Time	15 sec	Cream 2 sec Mixture 20 sec	3 sec
Vitamin content			
Shelf life	10 days	3 weeks	6-9 months

Source: Own compilation based on (Strahm and Eberhard, 2010)

Thereafter, orange juice was discussed, following a similar structure. First, a package of juice from concentrate was presented and the ingredients read to the participants. Then they were asked about their spontaneous thoughts concerning orange juice from concentrate. Afterwards, we presented the processing steps for direct juice and juice from concentrate (Fig. 2) and discussed their preferences.

FIGURE 2: PROCESSING STEPS FOR DIRECT JUICE AND JUICE FROM CONCENTRATE



Source: R. Bickl (FiBL.org)

While discussing preferences, shelf life already became part of the discussion. Thus, an overview over different preservation technologies was presented to the participants: pasteurization and high-pressure preservation as well as fresh juice as an example of minimal processing (Table 2).

TABLE 2: PRESERVATION TECHNOLOGIES FOR ORANGE JUICE

Juice	Fresh	HPP high pressure pasteurization cold	Pasteurization
Processing	only pressing	high pressure (6000 bar) in PET-bottles	heating to 80°C
Vitamins	fully kept	fully kept	less
Flavours	fully kept	fully kept	slight loss
Shelf life	7 days (cooled)	2-4 weeks (cooled)	4 weeks (up to several months)

Source: Own compilation based on R. Bickl (FiBL.org) and A. Matser (wur.nl)

As a last point, we discussed the term ‘careful’ and ‘careful processing’. As stated in the major guidelines and regulations concerning organic agriculture and processing, such as the norms of the International Federation of Organic Agriculture Movements (IFOAM) and EU regulations (IFOAM-Organics International, 2017; European Commission, 2007), the term ‘careful’ is used in differing contexts, yet rarely defined (Beck *et al.*, 2012). Thus, the discussion around the term ‘careful’ in general and finding an applicable definition of ‘careful processing’ in particular, is part of the ProOrg project proposal and hence, also subject of these focus groups.

The brands of the discussed products – milk, orange juice, and cookies – were adapted to each country. In Germany, we presented products from “Edeka”, “Uppländer”, “denree”, and “Alnatura” whereas in Switzerland we presented products from “Migros”, “Knospe”, and “Coop”.

The FGs lasted for 90 minutes and were all held in German language, were audio and video recorded as well as fully transcribed by a professional transcription office.

2.3. DATA ANALYSIS

Since no major differences were observed between the German and Swiss FGs, both groups were analyzed together. The analysis followed a structured qualitative content analysis (Kuckartz, 2016). Coding of the FGs followed a deductive and an inductive approach. At first, the FGs were roughly coded building thematic categories according to the leading questions of the discussion guidelines. In a second round, these categories were split in sub-categories. In a last step, following an inductive approach, analytic categories were build based on the emerging trade-offs discussed in the FGs. Afterwards, each category was compared across groups to identify common responses and to get an overview about the variety of responses of each category.

Every quote was translated from German to English by the author of this text. Although efforts were made to keep the original wording, some sentences were analogously translated.

3. RESULTS

This chapter presents the results following the general structure of the discussion guideline: first, a general part about participants' state of knowledge regarding processed products; second, participants' expectations regarding processed *organic* products; third, participants' knowledge, opinions, and preferences for different processing technologies for organic milk and organic orange juice; fourth, participants opinions and preferences of organic cookies as an example of a highly processed product; and fifth, discussing participants' understanding of the term 'careful' in general and in terms of processing in particular.

3.1. KNOWLEDGE OF PROCESSED FOOD

After an opening round, we asked participants about their general understanding of processed foods as well as for advantages and disadvantages of the same. First and foremost, concepts like additives, artificial flavors and preservatives, E-numbers, chemicals, and packaging waste dominated the discussion, often in a negatively connotated way. Although thinking about a broad variety of aspects, participants were rather less conscious about processing technologies: deep-freezing and pasteurization were the only ones mentioned.

“[With processed foods] I also associate something unhealthy, too much sugar, too much salt, too much fat, and also all these E-numbers” (FG Berlin_2, P3).

Moreover, participants mentioned a general insecurity concerning processed foods and the multiple aspects related to it, e.g. ingredients, packaging, or CO₂ footprint:

“I think there are a lot of myths around processed foods and you do not really know” (FG Hamburg_2, P5).

When asked for advantages, participants appreciated processed foods as being time-savers, convenient, easy to portion, and enabling consumption of a non-seasonal variety of goods.

“The advantages of processed food are also when you are lazy. You buy it ready made and you simply have to heat it up, for example.” (FG Bern_2, P2).

3.2. EXPECTATIONS OF PROCESSED ORGANIC FOOD

After having discussed processed food in general, we focused the discussion on *organic* processed food. Indeed, the positive aspects of processed food also held true for most participants for processed *organic* food. Participants expected processed organic food to have organically produced ingredients, and to be mostly local and healthy. Few participants viewed ‘organic’ as an attitude including attentiveness for animals, plants, and humans. Hence, organic was more to them than just the way of production. However, for most participants, ‘organic’ meant raw products from rather small-scale agriculture with a focus on animal-welfare and plants grown without pesticides and fertilizers. Organic products from abroad were expected to be fair trade. Moreover, they expected no or fewer additives, artificial flavors or preservatives, and as little ingredients and processing steps as possible. Processing technologies were mostly not part of their concept of ‘organic’ and thus, rarely mentioned.

“Well, it matters little how [the milk] is heated afterwards, whether it is organic or not. It depends on the origin of the product; how the cows were fed, which kind of medicine they got, and not on the heating method.” (FG Bern_1, P11).

Moreover, participants showed a great uncertainty regarding the complexity and opacity of the topic and often digressed from expectations of organic food to discussing what ‘organic’ means to them.

“Right now, I read a lot in the media. But then what I am reading, then I thought, oh, now I do it right and then, I read another article and then it is wrong again. So, sometimes I am so overwhelmed with the diet and with the purchase.” (FG Berlin_1, P9).

Participants were aware that their ideal of ‘organic’ deviated from reality and thus, their purchase behavior in daily life varied as well. There were participants who expected organic to be local but who still bought an organic cookie perceiving organic to be best for the environment. And there were others buying cookies and highly processed products independent of their geographical origin if production was organic, being aware that local production is not always possible. A third part shared the latter view, with the consequence that for products, such as oranges, which have a big CO₂- footprint already, it did not matter if they were organic or not.

Within this discussion, transparency and distrust were two always emerging topics around the term organic. Participants clearly associated transparent and environmentally sustainable value chains with organic foods which, for some, were even more important than the processing technology itself. Therefore, a lack of transparency, e.g. as misleading perceived declarations on packaging, unsustainable packaging, e.g. organic foods wrapped in plastic, and a high CO₂ footprint due to long transportation routes caused general distrust in the organic sector. Distrust was also often mentioned around the discussion of organic labels and associated inspections. Participants were skeptical towards organic products produced in foreign countries, inside and outside the European Union, doubting the quality standard of the produce as well as the enforcement of frequent and independent inspections.

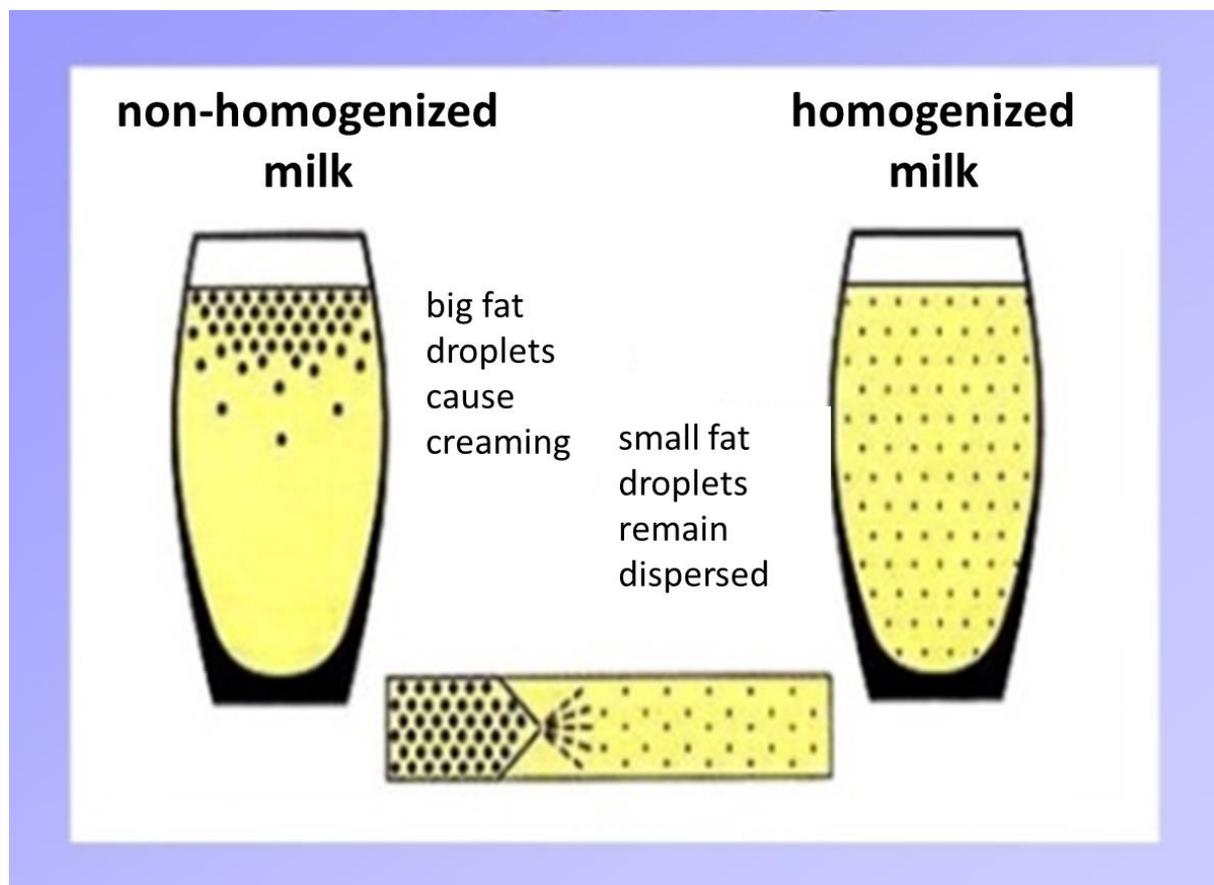
3.3. MILK

Now that we already set the frame to discuss organic processed food, we moved on to look at single products, starting with milk and focused on homogenization and processing technologies regarding shelf life. We started with the general question of what kind of milk participants buy and for how long milk should last. It turned out that participants had very different preferences regarding shelf life and whether milk should be organic. Some bought only UHT milk due to limited cooling capacities and hence, a need for a long shelf life or simply out of habit, and some bought extended shelf life milk as a compromise between freshness and taste on the one hand, and convenience due to longer shelf life on the other hand. There were participants only buying pasteurized milk due to taste or preference of little processing or milk directly from the farm. Others bought only organic milk, and some just the milk which was on sale, no matter if organic or not. Hence, which type of milk participants consumed, depended primarily on their lifestyle and habits, nutritional values only came second.

3.3.1. *HOMOGENIZATION*

Following this general introduction into milk, we pointed participants towards homogenization as a first processing technology. Homogenization is the process of pressing milk through a nozzle and hence, preventing a separation of fat and water, that is creaming (Strahm and Eberhard, 2010). Thus, we first asked participants what they associated with the term ‘homogenization’. Participants’ state of knowledge differed: some knew what it was, others confused homogenization with pasteurization. Therefore, we presented a simple figure (Fig. 1) to allow for a discussion with corresponding knowledge.

FIGURE 3: HOMOGENIZATION



Source: Kees, 2004

Whether milk should be homogenized or not, seemed to be mainly a matter of habits and age. Some participants preferred homogenized milk over non-homogenized milk: either because they were used to it, respectively never saw non-homogenized milk, or were disgusted by the latter. Other participants preferred non-homogenized milk because it reminded them of their childhood, or they associated milk with a natural and fresh product and thus, creaming was wanted. Moreover, as a mere physical treatment, homogenization was in line with most participants' idea of organic processing because the product did not change its nature.

3.3.2. SHELF LIFE OF MILK AND ITS TECHNOLOGIES

Moving on, we showed three types of processed milk to the participants: pasteurized, extended shelf life (ESL), e.g. microfiltrated milk, and UHT milk and thus, three different preservation technologies (Table 1). Within any milk treatment and before applying any preservation technologies, all milk is standardized. That means, milk is separated into cream and skimmed milk and mixed together again in ratios that correspond to the desired fat content of the final product (Table 1).

TABLE 1: PRESERVATION TECHNOLOGIES FOR MILK

Milk	Fresh milk traditionally produced	Extended shelf - life (ESL) microfiltrated	UHT milk
	1. Separation in cream and skimmed milk 2. Standardization of fat content		
Temperature	72°C	Cream 125°C Mixture 74°C	135-150 °C
Time	15 sec	Cream 2 sec Mixture 20 sec	3 sec
Vitamin content			
Shelf life	10 days	3 weeks	6-9 months

Source: Own compilation based on (Strahm and Eberhard, 2010)

The first and widely known technology we presented was pasteurization. In this case, milk is heated to 72°C for 15 seconds, cooled down and bottled. Stored cool, pasteurized milk lasts for seven to 10 days and is also called ‘fresh milk traditionally produced’ (Strahm and Eberhard, 2010). The second technology we presented was microfiltration as an example of extended shelf life (ESL) milk. For this technology, skimmed milk is microfiltrated and the cream is pasteurized at 125°C. Afterwards, both components are mixed together and are again pasteurized at 72°C for 20 seconds. Due to its fresh taste, similar to pasteurized milk, ESL milk is also called ‘fresh milk’ with the addition of *länger haltbar* (“longer durable”) which is printed on one side of the packaging. ESL milk has slightly fewer valuable ingredients compared to pasteurized milk. It lasts for up to 21 days when stored cool (Strahm and Eberhard, 2010). The third and well-known technology we presented was ultra-high temperature (UHT) treated milk. UHT milk is heated up to 135-150°C for three seconds which kills all microorganisms and spores. Therefore, it has a ‘cooked’ taste and less valuable ingredients than pasteurized or microfiltrated milk. UHT milk lasts up to six to nine months at ambient temperatures (Table 1) (Strahm and Eberhard, 2010).

Generally, consumers had different opinions about processing. Some participants perceived processing as being a precondition to make milk tradable whereas others were rather reluctant and perceived processing as being a suspect process of taking individual components of the milk apart and putting them back together.

Pasteurization

After presenting the different technologies to the participants, pasteurized milk as a widely and long-established product was not questioned. For some participants it was the most natural and fresh product accessible, and thus, the best they could get. Others claimed that the shelf life of pasteurized milk was enough and hence, other technologies, such as ultra-high temperature treatment or microfiltration, were unnecessary.

ESL

For many participants, microfiltrated ESL milk, that is ‘fresh milk’ with the addition ‘longer durable’, was a good alternative to just pasteurized milk due to a longer shelf life. However, participants disagreed with the term ‘fresh milk’ when milk is microfiltrated and indeed longer lasting. Moreover, some participants associated a fresh taste with milk and thus, they preferred ESL milk over UHT milk. Others needed only small amounts of milk and hence, preferred ESL milk to prevent food waste. There were also a few critical consumers, who stated that ESL milk is far too processed, betraying their understanding of and trust in organic foods.

UHT

UHT milk was the most debated: participants either stated that UHT milk is not in line with their idea of *organic* processing and thus, they refused to buy it, or they consciously bought it out of habit or convenience. Participants who refused to buy UHT milk associated milk with freshness and naturalness and thus, UHT milk did not fit their criteria. The ones who favored UHT milk were used to its taste, respectively had limited cooling space or had it as a stock for shortages due to its long shelf life. Some of these participants also emphasized that the organic nature of the animal husbandry matters more than the technology and nutritional values. Thus, there is a preference and acceptance for organic UHT milk in the market.

High Pressure Preservation (HPP)

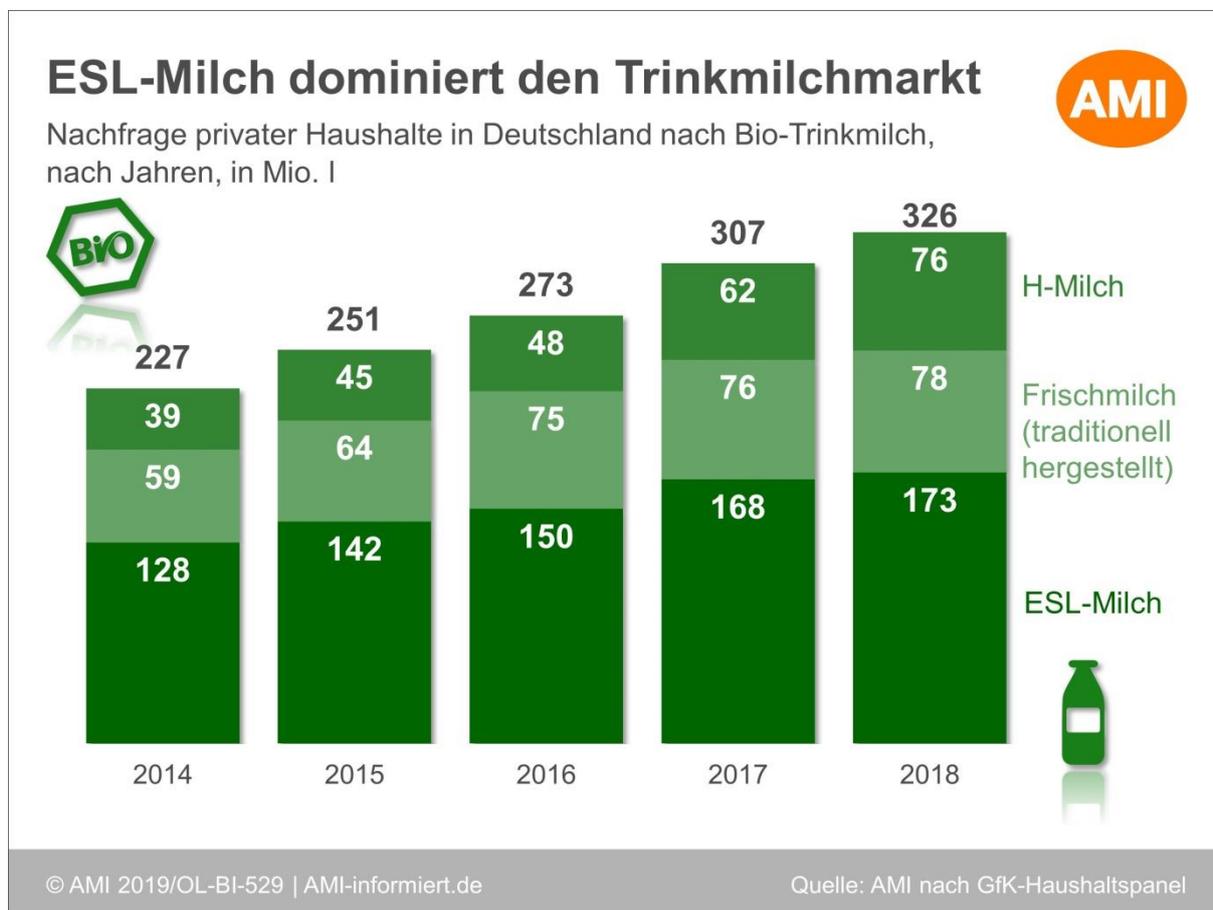
Already well into the process of data collection, we got the information that in Australia and Mexico there is another preservation technology for milk with a shelf life similar to microfiltration: high pressure preservation (HPP). HPP is already used in Europe for juices but not for milk. This technology uses high pressure instead of heating to preserve a product and PET-bottles for storage (see more detailed description in section 3.4.2). Thus, after discussing HPP for orange juice, we asked participants of the Swiss FGs what they thought about HPP for milk. Similar to the discussion of HPP for orange juice, participants were mostly open and positive towards HPP for milk. Some argued they would prefer HPP treated milk over pasteurized milk due to its better nutritional values which would also be in line with their idea of 'organic'. Others preferred microfiltration over HPP, raising concerns that the high pressure may alter the microbiological components of the milk too much. Another barrier might be the presumably high energy consumption and PET-bottles which contradict some participants' idea of 'organic'.

3.3.3. TRADE-OFF

Throughout the discussion it became clear that with a fast-moving lifestyle and milk being a highly perishable food, participants faced a trade-off between convenience and quality. Some participants were not willing to change their habits, such as purchasing behavior or time management, in favor of a higher quality product or better nutritional values. Thus, participants made a conscious compromise and bought ESL milk instead of just pasteurized milk to keep some quality while serving their needs for a longer shelf life. And yet another group would buy UHT milk because it is easy to store and always accessible. Thus, participants preferred the longer shelf life as well as the time saving aspect of convenience foods and hence, accepted a loss of nutritional quality. For most of the participants, it seemed like being a minor conflict. And many participants simply chose even conventional products when the organic ones did not entirely fit their needs.

This general trend towards more convenient food is also resembled in the increasing consumption of organic ESL milk (Fig. 2) (AMI, 2019a, 2019b).

FIGURE 4: DEMAND OF ORGANIC MILK IN GERMANY (in mill liter)



ESL-Milch = ESL milk; Frischmilch (traditionell hergestellt) = fresh milk (traditionally produced); H-Milch = UHT milk

Source: (AMI, 2019a)

3.4. ORANGE JUICE

After discussing processing technologies for milk, we moved on to discuss processing technologies for another well-known product: orange juice. More precisely, we discussed juice from concentrate versus direct juice to then move on to shelf life and hence, pasteurization and high-pressure preservation (HPP).

3.4.1. DIRECT JUICE VERSUS JUICE FROM CONCENTRATE

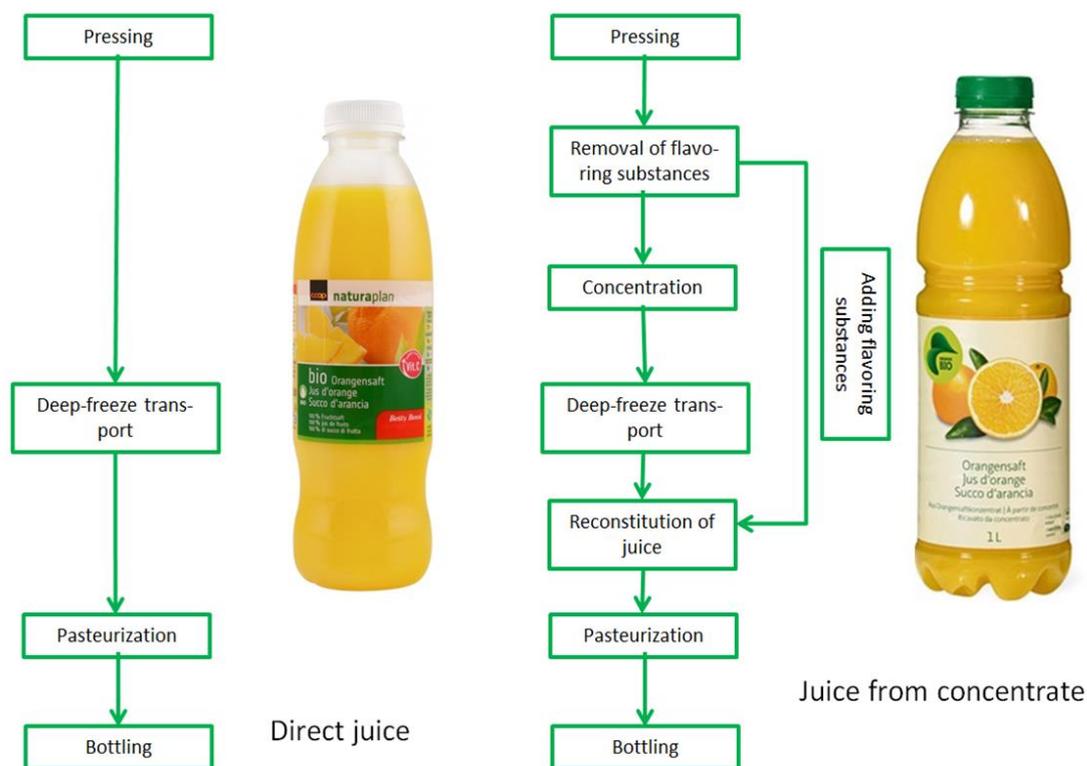
To open the discussion, we presented a package of juice from concentrate to the participants, read the ingredients to them, and asked for their spontaneous thoughts about it. Afterwards, we presented the processing steps for direct juice and juice from concentrate in order to allow for a discussion with corresponding knowledge (Fig. 3).

Direct juice is pressed, transported deep-frozen, pasteurized, and bottled, whereas to produce juice from concentrate, flavours and water have to be removed, and the concentrate is transported deep-frozen. In order to make a juice from concentrate, water and flavours have to be added to then be pasteurized and bottled. Thus, to produce juice from concentrate always takes more processing steps compared to direct juice.

Presenting direct juice and juice from concentrate to the participants often evoked a spontaneous negative reaction which was confirmed after giving participants information on the processing steps of direct juice and juice from concentrate.

“So, if that’s juice from concentrate, I don’t need it [...]. (FG Berlin_2, P3).

FIGURE 5: PROCESSING STEPS FOR DIRECT JUICE AND JUICE FROM CONCENTRATE



Source: R. Bickl (FiBL.org)

Besides the high use of energy and water, participants had several more reasons against juice from concentrate: the high number of processing steps, loss of nutritional value, adding of extra sugar, declared flavours which they assumed to be additional to the original flavours, the origin of the fruits, the production conditions, the doubt of what kind of water had been added when the concentrate was liquefied or a general distrust.

“No, when I hear that, concentrate and all that has nothing to do with organic anymore. That [juice from concentrate] has simply, that may have stood next to the orange or something. I just don’t trust it.” (FG Berlin_2, P10).

Many participants clearly preferred direct juice. Some participants even chose conventional direct juice over organic juice from concentrate.

However, some participants were also positive towards juice from concentrate. They mentioned the equally good nutritional values and the environmental benefit of transporting only concentrate from southern countries of origin instead of juice or fruits.

“For the transport it [concentrate] is pretty good. When you transport it without all the water, you can transport more, quite a lot!” (FG Hamburg_2, P3).

Others emphasized that rather than the technology, taste and fruit content was decisive or that the fruits were grown organically.

“So, I do not buy [juice from concentrate], but not because I think it is not organic. Rather, because I simply don’t like the taste of it, but for me, it is still organic, even if it is concentrated.” (FG Bern_1, P11).

Summing up, both, direct juice and juice from concentrate have demanders on the organic market. Less processing and hence, direct juice was perceived as being more in accordance with their idea of organic juice.

3.4.2. SHELF LIFE OF ORANGE JUICE AND ITS TECHNOLOGIES

Similar to milk, we discussed different preservation technologies for orange juice (Table 2). First, we presented fresh juice which is only pressed and bottled and lasts up to seven days when cooled. Second, we presented juice which was preserved with high pressure (HPP). For the HPP technology, juice is filled in PET bottles and put under water to be then exposed to 6000 bar pressure. The pressure kills harmful microorganisms while vitamins are kept and shelf life is increasing up to three weeks. And third, we presented pasteurized juice. This juice is heated up to 80°C and lasts for several months at ambient temperatures. Due to the

heating, the vitamin content decreases and the flavors are slightly less (Table 2).

TABLE 3: PRESERVATION TECHNOLOGIES FOR ORANGE JUICE

Juice	Fresh	HPP high pressure pasteurization cold	Pasteurization
Processing	only pressing	high pressure (6000 bar) in PET-bottles	heating to 80°C
Vitamins	fully kept	fully kept	less
Flavours	fully kept	fully kept	slight loss
Shelf life	7 days (cooled)	2-4 weeks (cooled)	4 weeks (up to several months)

Source: Own compilation based on R. Bickl (FiBL.org) and A. Matser (wur.nl)

Participants unanimously preferred and associated fresh juice with organic orange juice. However, the rather short shelf life of seven days was a challenge for some participants. Although participants had some environmental concerns, such as presumably high energy consumption and use of PET-bottles, they were generally very positive towards HPP. They did not perceive the necessary pressure of 6000 bar as problematic if the nutritional values would be kept, and convenience would increase due to a longer shelf life.

“So, I think [HPP] is a great option because I usually only buy fresh juice. I really like fresh juice, it tastes excellent. But when I can make it longer durable while keeping the vitamins, perfect!” (FG Berlin_1, P10).

Participants associated a longer shelf life with less food waste so that the benefits of HPP often overrode the environmental concerns. Some argued they would prefer HPP treated juice due to its nutritional values, and consciously offset the environmental impact of the production process with environmentally friendly consumption or behaviour elsewhere.

For some, the presumably high energy consumption and the need for PET-bottles were not in line with their idea of 'organic'. Respectively, the actual impact of the energy consumption would be a decisive criterion whether preferring HPP over pasteurization or fresh juice. These participants would rather prefer recyclable glass bottles.

Summing up, high pressure as the actual and merely physical processing technology seemed to be accepted or even preferred over pasteurized juice when a longer shelf life was needed. Rather the accompanying conditions, such as the presumably high energy consumption and PET bottles were problematic for some.

3.5. COOKIES

The last product we presented to the participants was a highly processed product: a spelt sandwich cookie filled with chocolate cream (see Annex). After reading the ingredients to the participants, the first five being spelt flour, palm oil, raw cane sugar, powdered milk, and cocoa powder, we asked them what they would expect from an organic cookie.

“For such an organic product [cookie], I expect the list of ingredients to be shorter than the one of a conventional product“ (FG Berlin_2, P8).

Participants unanimously agreed that every single component should be organic, high quality, and known to the consumer, not hidden away as an E-number. Moreover, some disliked palm oil and raw cane sugar. They would prefer a replacement with local products such as butter or oil, respectively beet sugar. For organic products from developing

countries, they would also expect fair trade and fair working conditions.

This way of thinking was taken further by some participants who associated organic cookies as healthier due to ingredients such as raw cane sugar and spelt flour and as a way of ‘doing something good’ to themselves or to the environment.

“Yes, for me, in fact, because I think, if I eat junk food, it can as well be organic.” (FG Hamburg_2, P6).

Other participants perceived cookies and junk food in general as not worth being organic. Taste was the most important to them and since they viewed cookies as an industrial and unhealthy product anyways, ingredients such as palm oil and powdered milk did not make a difference in the end.

“Yes, for me, in fact, because I think, if I eat junk food, it doesn’t have to be organic. I really don’t care about it!” (FG Hamburg_2, P2).

3.6. CAREFUL PROCESSING

In the organic food sector, it is quite common to promote products such as milk or orange juice with the claim “careful processed”. Thus, we encouraged the participants to discuss what they understood and expected from the term ‘careful’. Due to its vagueness, it turned out to be a rather difficult term to discuss. Despite its widespread use on food packages, many participants did not associate the term ‘careful’ with organic food or processing technologies. Instead, they rather expected a clear definition and transparent communication in the promotion of organic food. The common question was: “careful to whom?” Hence, ‘careful’ was a matter of perspective: they associated processing

technologies, ingredients and quality aspects as well as environmental aspects, and small scale agriculture with a focus on animal welfare with it. Concerning animal welfare, participants associated a 'good life' and little stress prior to slaughter as careful. Regarding environmental aspects, careful meant recyclable packaging and low energy consumption.

As for the ingredients and quality aspects, they associated 'careful' with 'keeping the good things' in a product while keeping out harmful substances. Thus, organic products were also associated as being more valuable from the outset compared to conventional products: being free of residuals of e.g. pesticides or antibiotics. Hence, they should be processed in a way that keeps this value, based on the understanding that organic loses less as opposed to the assumption that organic products gain value (FG Bern_2, P3).

Taking this further and looking at the processing technologies discussed earlier, participants unanimously viewed UHT milk as not carefully processed. In case of orange juice, participants clearly perceived direct juice as more carefully processed than juice from concentrate. For HPP, participants had different opinions. Some perceived high pressure as less careful than heating and thus, preferred pasteurization, whereas others perceived HPP as more careful than pasteurization because the product was not heated and hence, more vitamins were preserved.

4. CONCLUSION

The overall aim of this study is to explore the knowledge, expectations, and opinions of organic food consumers regarding processing technologies in organic foods. Throughout the FGs, findings suggest that organic food consumers know generally very little about processing technologies and rather focus on organic production.

Regarding processing, organic consumers have a rather narrow idea of the concept 'organic'. In addition, for every purchase decision, consumers face an opaque and complex bouquet made of choices regarding organic production and processing, marketing strategies of the food retail industry, and own preferences.

Moreover, producers and processors should be aware that consumers have no specific association with the term 'careful processing' and might perceive the term as misleading. Thus, asking participants for their preferences for processing technologies often overstrain their judgement, although some basic information was provided. Participants rather feel that they would need more than the provided information to be able to judge a technology. Indeed, even critical organic consumers who seem to have a more comprehensive understanding of 'organic', feel overwhelmed by the purchase choices they have to take. This overstraining might also be among the reasons why many participants do not face serious trade-offs: they buy conventional products if purchasing organic products requires a greater effort regarding time management, a change of habits, or willingness to pay.

Concluding, although most consumers of organic food are not always loyal to organic products, the future development of organic products is still relevant to them. Indeed, a great uncertainty and a lack of knowledge concerning organic production and processing does not imply that consumers generally do not care about processing technologies. On the contrary, consumers expect information and transparency from organic products, as was

already suggested by Beck (2006).

The research presented here is the outcome of focus group discussions. It gives first insights into consumers' knowledge, opinions, and expectations regarding processing technologies. Due to the specific character of the focus groups, that is qualitative and explorative, the findings are not representative. A follow up quantitative research might help to get a more comprehensive and representative picture. Moreover, participants' limited knowledge as well as little concern and interest in processing technologies also limited the depth of the analysis.

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ANNEX

1. MILK PACKAGES GERMANY

Pasteurized fresh milk, partly homogenized



0,5 Liter
frische Bioland-Vollmilch
mit natürlichem Fettgehalt
mindestens 3,7% Fett,
pasteurisiert, teilhomogenisiert

ESL milk 'longer durable', microfiltrated



Frische Vollmilch, 3,8% Fett, pasteurisiert, homogenisiert, länger haltbar

Die BIO Milch wird durch ein spezielles Verfahren mikrofiltriert und pasteurisiert und ist dadurch länger haltbar. Wertvolle Inhaltsstoffe der Milch bleiben bei diesem Verfahren erhalten.

DURCHSCHNITTLICHE NÄHRWERTE	pro 100 ml	% RM* pro 100 ml
Energiewert kJ/kcal	285/68	3 %
Fett	3,9 g	6 %
davon:		
- gesättigte Fettsäuren	2,6 g	13 %
Kohlenhydrate	4,9 g	2 %
davon:		
- Zucker	4,9 g	5 %
Eiweiß		

2. MILK PACKAGES SWITZERLAND

Pasteurized fresh milk, homogenized



UHT milk




CORE organic

PRO-ORG **COORDINATOR** CREA (ITALY)

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3. ORANGE JUICE PACKAGES

Orange juice from concentrate in Germany



Orange juice from concentrate in Switzerland



Orange juice pasteurized in Switzerland



4. COOKIES

Germany: Spelt sandwich cookie



Switzerland: Spelt sandwich cookie

