

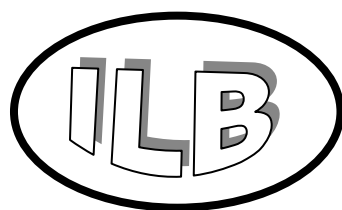
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What do German Consumers Expect from Sustainable Aquaculture?

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Abstract

Aquaculture is criticized for its potential negative impacts on the environment and for its consequences on fish welfare. One solution to these problems and a promising development track for the German aquaculture sector is the adoption of sustainable production methods. The establishment of a new market segment for domestic sustainable fish would accommodate to the trend towards ethical consumerism. So far, only little is known about the consumers' knowledge and perception of sustainable aquaculture. Against this background the present contribution aims to explore perceptions and knowledge of German consumers with regard to sustainable aquaculture, its production systems and related labels by using focus groups. Recommendations for further communication of sustainable aquaculture to consumers are deduced. One central result is that consumers were mainly unfamiliar with aquaculture in general. However, they had some clear expectations towards sustainable aquaculture. The use of drugs should be minimized; production systems should be close to nature and should respect fish welfare. Obviously, participants deduced their understanding of aquaculture from theirs of terrestrial animal husbandry. The study also shows consumers' low awareness of the existing sustainability labels on the German market.

Keywords: *Aquaculture, fish farming, sustainability, consumer, communication, label*

1 Introduction

Aquaculture, also called fish farming, is "the farming of aquatic organisms in inland and coastal areas, involving intervention in the rearing process to enhance production and the individual or corporate ownership of the stock being cultivated" (FAO, 2013). Currently, aquaculture is one of the fastest-growing food-producing sectors globally (FAO, 2012). From 1980 to 2010 world production of farmed fish has increased nearly 12 fold with an average annual growth of 8.8 percent (FAO, 2012), whereas capture fisheries production remained constant. Thus, the steady growth of aquaculture is primarily responsible for the increase in world fish supply of the last four decades. In 2012 aquaculture accounted for 41% of world fish supply, and it is expected to grow further during the next decade (FAO, 2012).

However, as the global demand for seafood also rises, hopes are up, that aquaculture might contribute to global food security while simultaneously reducing the pressure on wild fish stocks (Swaminathan, 2012). Yet, these hopes involve some problems, which have to be faced by the aquaculture industry in order to prosper further. As several studies suggest (FAO/NACA, 2010; Jacobs et al., 2002; Naylor et al., 2000; Olesen et al., 2011), the rapid expansion of aquaculture has entailed and can entail ecological and social problems as well as potential health risks for consumers. For example Naylor et al. (2000) showed in their study that some types of aquaculture add to the reduction of wild fish stocks because of their need of wild fish for feed or through various ecological impacts like habitat modification. Moreover, aquaculture is criticized for its potentially negative consequences on fish welfare (Mackensen, 2011).

So far the German aquaculture sector has had no share in increasing worldwide production. Nearly 90% of fish consumed in Germany are imported, mainly from Asian countries (FIZ, 2013). German aquaculture competes with production from countries with lower labor costs and frequently lower environmental standards. Thus, production costs in Germany tend to be higher. In order to grow, the German aquaculture sector needs to develop new high price market segments. A promising development track for the German aquaculture sector is the adoption of sustainable production methods including animal welfare considerations. In accordance with the "Brundtland Report" (WCED, 1987) sustainability is defined as integrating the three dimensions of environmental, social and economic development. The establishment of a new market segment for domestic sustainable fish would accommodate to the trend towards ethical consumerism. Various studies (e.g., Jaffry et

al., 2004; Verbeke et al., 2007a; Olesen et al., 2010) found that sustainability with respect to fish is important to consumers. Also German aquaculture might meet the requirements for sustainable production easily, as most of the German fish farms are extensive and work with systems close to nature (e.g. earth ponds) (DESTATIS, 2013).

Nonetheless, so far only little is known about consumers' knowledge and perception of sustainable aquaculture. Against this background the present contribution aims to explore perceptions and knowledge of German consumers with regard to sustainable aquaculture, its production systems and corresponding labels. From these findings we deduce recommendations for an improved communication of sustainable aquaculture and its products to consumers.

2 Methodology

We conducted six focus groups each consisting of 7 to 12 participants in three German cities (Stuttgart, Leipzig and Hamburg) in April 2013. This qualitative approach was chosen due to the explorative character of the study. Focus groups offer the possibility to gain deep insights into consumers' perceptions by letting them exchange thoughts and opinions in a dynamic manner (Blank, 2007). Participants were recruited through an Online Access Panel run by a market research agency. In total 56 people participated. Quota sampling was used with respect to age, employment and income. Additionally, all participants had to purchase fish at least once per month. Three groups consisted of consumers of organic food, whereas the other three groups were made up of consumers buying conventional food. Consumers were classified as buying organic if they purchased organic food at least once per week. Each focus group discussion lasted between one to one and a half hours and followed a thematic guide-line.

In the focus groups, participants were asked to describe the criteria they thought sustainable aquaculture should fulfill. The participants were expected to have only limited knowledge of aquaculture production systems. Thus, they were informed about three production methods prevalent in Germany (earth pond, flow-through system and closed recirculating system) (see Fig. 1) and asked about their attitudes towards the presented systems.

Afterwards, we showed the participants the five most prominent sustainability labels present on the German market on aquaculture products: the three labels indicating organic production (the EU organic logo; 'Naturland'; the German 'Bio-Siegel'); the producer label of Femeg 'zertifiziert kontrolliert nachhaltige Fischzucht' and the label of the World Wildlife Fund (WWF). Even though the WWF-label does not stand for a certification scheme, it was considered in the study. Consumers could interpret the WWF-label as being related to sustainable production because it is well-known as a logo for environmental issues. Additionally, we showed the Aquaculture Stewardship Council label (ASC). The ASC label was introduced in 2012 to the German market and was listed because the food industry expects it to become an important sustainability label. We did not assess the objective sustainability of the labels shown to the participants, as the study focused on consumers' perceptions and evaluations of sustainability claims and related labels on aquaculture products. The products had to appeal to consumers as being sustainable. The participants were asked whether they had seen any of these labels on fish products. Finally, participants discussed their information requirements regarding aquaculture products.




Earth ponds	Flow-through systems	Closed recirculation systems
 <p data-bbox="268 443 496 465">Fritzsche & Wohlfeil 2010</p>	 <p data-bbox="735 443 852 465">Feucht 2013</p>	 <p data-bbox="1134 443 1283 465">Klinkhardt 2012</p>
<ul style="list-style-type: none"> - Mainly farming of carp and small numbers of accompanying fish like tench, zander, pike & cat fish - Close to nature system - Small stocking rate - Seasonal variation in production - High demand for land 	<ul style="list-style-type: none"> - Farming of trout, salmon trout and samlet - High water demand - High stocking rate - Feeding necessary - Low demand for land 	<ul style="list-style-type: none"> - Farming of thermophile fish – wide variety of fish - No drug usage - No environmental pollution through discharged substances (e.g. feed remains, excrements) - High energy demand - Very high stocking rate - Feeding necessary - Alternative: Production in Tropics and Subtropics

Figure 1. Information given to the participants about the presented production methods

All sessions were audio- and videotaped and transcribed for qualitative analysis. We used content analysis according to Mayring (2010) to analyze the transcripts. The basic unit of analysis was a word. The categories for examining the text units were developed inductively. The deduction of categories from the text instead of a prior formulated coding agenda offers the opportunity to explore unexpected aspects. The identified categories were divided in principle and sub categories and compiled into groups according to the research questions. An unlimited amount of categories could be assigned to a text fragment. Therefore text fragments could have various categories attached to them. The transcripts were categorized by one researcher. In order to ensure the reliability of the established category system, a second researcher analyzed parts of the transcripts again. The two analyses were compared and the category system was revised where necessary.

3 Results

3.1 Expectations from sustainable aquaculture

In the discussions participants mentioned that sustainable aquaculture should be a natural way of production. Participants expected a natural and esthetical surrounding, which would also please a layperson's eye. Additionally, sustainable aquaculture should respect and actively support nature conservation, for example by rearing fish for release to the wild. Fish feed was expected to be sustainable and species-appropriate. Some participants judged the use of fish meal and fish oil as unsustainable and occasionally associated it with cannibalism. Several participants also feared that feeding animal products to fish might promote the development of similar illnesses to bovine spongiform encephalopathy (BSE) in fish. All in all, the longing for authenticity and naturalness was present through all the group sessions: *"Fish from aquaculture is not like the original fish. Its feed, its behavior and its whole life is different."* (F2L2) – *"Therefore farmed fish does not have the right taste. Nature creates taste"* (F3L2). This longing shows that consumers are afraid of a nonnatural food production because they fear for their personal health (see also Schlag, 2010). "Unnatural" practices are only accepted if they serve consumers' well-being (Macnaghten, 2004). Furthermore, idealizing nature helps people to deal with their fast and complex everyday lives (Macnaghten, 2004).

Another criterion for sustainable aquaculture was fish welfare. Therefore, *"[...] the exploitation of fish [...]"* (HH2 M2) should be avoided in sustainable aquaculture. The animals should be allowed to grow up in their natural rhythm, for example without the influence of growth promoting hormones. A farmed fish's life should be free of stress and pain. A species-appropriate design of the sites, like sand on the ground to allow dabbling or sufficient space for each fish, was demanded by some participants: *"Fish should have enough space to roam freely and not be penned up like chickens"* (HH2 M2). The majority of participants expected sustainable fish farms to be small to medium sized. Big dimensions were mostly associated with industrial livestock farming: not desirable for and contradictory to sustainable aquaculture. A part of the participants assumed that fish would taste better if it was reared in accordance to its natural requirements. Hence, they perceived fish

welfare as an indication of quality (see also Solgaard, Yang, 2011). Hughner et al. (2007) came to a similar conclusion for animal welfare in relation to organic food.

The use of drugs in fish farming was a highly discussed subject in the focus groups. Some participants were unaware of the fact that farmed fish is treated with medicine if necessary. The use of medication contradicted their image of fish as a natural and healthy product. Altogether, the utilization of drugs, hormones and other artificial additives was linked with health risks for consumers as well as the environment. Thus, most of the participants expected sustainable aquaculture to restrain from drug usage as far as possible and to work without artificial additives and hormones (see also Aarset et al., 2004): *“I don't want drugs in my food, if I need drugs, I visit a doctor”* (H1 M1).

Most of the participants also expected sustainable aquaculture to respect the environment. A sustainable fish farm should be adjusted as far as possible to the needs of the surrounding ecosystem. Some participants even conjectured that sustainable aquaculture implements the cradle-to-grave approach, which considers the environmental impact of a product during its complete life cycle. All in all, the production should be in line with demand and avoid surplus. The demand for an environmentally friendly sustainable aquaculture underlines the high awareness of German consumers towards environmental concerns found by DG Mare (2008).

A further aspect of sustainable aquaculture was geographical origin. Some participants argued in favor of European products instead of products from overseas. They assumed that food monitoring was more rigid in Europe than in non-European states, even though their trust in European control bodies was affected by recent food scandals. The participants especially doubted the quality of aquaculture products from Asian countries. Referring to negative media coverage some participants stated that they worried about the supposedly excessive use of antibiotics and unhygienic conditions in Asian fish farms: *“If you see those reports from Asia: So many of these dirty, overcrowded ponds and antibiotics by the bucket – that just does not work for me”* (HH1 F2).

Moreover, some of the participants stated that the energy balance of local and European products might be better than of those from other continents. In this context the transport distance was an important indicator. Participants associated longer distances with higher environmental impact. Conversely, shorter transport routes were connected with a better environmental balance and higher freshness. Geographical origin was also combined with economic benefits. Some participants especially approved of German aquaculture products, as they wanted to support the local economy. Others in turn found that the aquaculture sector in other countries would also be worthy of support as long as good working conditions exist. Apart from that, some participants assumed local products to be sustainable if those originated from native fish species. They reasoned that the rearing of foreign fish could threaten the ecological balance. Some participants also conjectured that the farming of subtropical and tropical fish species in Germany might be very energy intensive and therefore unsustainable. All in all, in agreement with Claret et al. (2012), we found that consumers perceive geographical origin as a quality indicator.

Even though the moderator of the focus groups did not explicitly mention organic aquaculture, the subject was brought up by participants in each discussion. Organic aquaculture had mostly a positive image amongst them. A lot of the participants even perceived organic aquaculture as the ideal aquaculture practice. Thus, some participants expected sustainable aquaculture to follow organic standards. The characteristics participants ascribed to organic aquaculture mostly conformed to current organic aquaculture practice. Obviously, the participants inferred from their knowledge of other organic food production on organic fish production. Participants imagined organic fish farming as natural combining eco-friendliness with fish welfare: *“[...] organic, the fish is happy [...]”* (HH2F2). Other traits of organic aquaculture mentioned by participants were the exclusive breeding of native fish species and the renunciation of drug usage, especially antibiotics. Some participants referred to organic aquaculture as a practice that is eco-friendly in a holistic manner. Furthermore it was interpreted by several of the participants to be more traditional, meaning less industrialized.

Altogether, a large part of the participants did not clearly distinguish between sustainable and organic aquaculture. Some of them mixed the two terms and used them synonymously. Whereas, sustainability was a more or less vague term with an unclear definition for most of the consumers, organic was, on the other hand, a fixed term familiar to the consumers. Some of the organic consumers participating knew that a regulatory framework defining organic exists. Overall, the groups of organic and conventional consumers hardly differed in their perception and knowledge of sustainable and organic aquaculture. As suggested by Aarset et al. (2004) the term organic was used by some participants as a heuristic for naturalness.

3.2 Attitudes towards production methods

During the roundtable discussions the participants were informed about three production methods used in German aquaculture (see Fig. 1) and asked about their attitudes towards the presented systems. Many participants were familiar with earth ponds and flow-through systems while closed recirculation systems (RAS) were mostly unknown. Earth ponds were often regarded as the most desirable of the three production methods presented: *“To me, the earth pond appears to be the most consumer-friendly and fish-friendly as well as the most natural, likable and eco-friendly method”* (S1 F2). Fish farmed in earth ponds were put on a level with “happy” free-range chickens from organic farms. From the point of view of most of the participants the naturalness of earth ponds outweighed their low control degree in comparison to more highly engineered systems. Participants inferred from the low stocking rate in earth ponds a low disease pressure. This argument led to the conclusion that drugs are rarely needed in this system which in turn indicated for some participants that fish from earth ponds would bear no threat to the health of consumers.

In favor of earth ponds and flow-through systems participants pointed out that the fish is kept outdoors. Thus the fish *“[...] get fresh air [...]”* (L2 F1). Participants also approved the lower stocking rates in earth ponds and flow-through systems in contrast to those in RAS. Nonetheless, some participants were skeptical about the high stocking rates in flow-through systems. They were concerned about the stress level of the fish and their options to behave appropriately for their species. Apart from that, participants criticized the lower control degree in flow-through systems compared to RAS. Flow-through systems were regarded as close to nature if the vicinity of the sites was vegetated. Without vegetation the approval for this production method was lower. The participants perceived flow-through systems as an intermediate stage between earth ponds and RAS. Flow-through systems appeared to be more highly engineered than earth ponds while being simultaneously closer to nature than RAS. In sum, most of the participants approved of flow-through systems as long as common aquaculture standards are maintained.

Many of the participants perceived RAS as the most industrialized and most unnatural method of all presented. They often described it as deterrent. The sustainability of RAS was a subject of much controversy. Some participants perceived this production method to be sustainable because of shorter transportation distances between producer and consumer compared to fish products from the tropics and subtropics. Additionally, they stated that farming tropical and subtropical fish species in Germany helps to protect those wildlife stocks. Apart from that, some participants appreciated that RAS increase the variety of fish species produced in close proximity to the consumer. Several participants were also pleased by the high control degree in RAS, amongst others, because these regulated conditions usually result in no drug usage at all. Accordingly, some participants perceived RAS as the most hygienic method of all and thus as the healthiest one for consumers. Others doubted this statement. To them it seemed very unlikely that such a highly engineered system might have a lower disease pressure than those systems closer to nature.

A large part of the participants believed RAS to be artificial and unnatural: *“Like a factory – you put fish in and get a ready to eat filet out”* (L1 F2). This conception disconcerted some of them. Participants also often associated RAS with “mass animal husbandry”. Fish welfare was heavily doubted in these systems. Apart from that, this production method was criticized for its high energy demand. Altogether, many participants judged RAS to be neither sustainable nor organic, while others adopted a more balanced view. They argued, for example, that these systems could be sustainable if they use renewable energy. However, the focus groups revealed a mainly skeptical and negative attitude towards RAS. Likely ecological advantages with respect to nutrient run-offs were outweighed by the lack of naturalness and the assumed deficiencies in fish welfare. RAS were a novelty to most of the participants. Some were unaware that these systems already operate in Germany. Many participants were alienated by this method. The high technical level of RAS contravened the participants longing for naturalness. Consumers tend to equate the industrialized food production with unnaturalness (Schlag, Ystgaard, 2013).

3.3 Awareness of sustainability labels

Even though sustainable fish products are sold by all major food retailers in Germany most of the participants were unaware of sustainability labels on aquaculture products: the majority did not recognize any of the presented labels from fish products. The participants discussed which label they used and trusted in general. In this context, the best-known labels were the organic ones. Especially organic consumers stated to know the organic labels from other food. The only sustainability fish label participants mentioned frequently and without assistance was the Marine Stewardship Council label (MSC), which only refers to fish captured in the wild. This shows that a part of the participants had difficulties differentiating between wild and farmed fish. Fish is still

often perceived as a non-domesticated animal, which is caught rather than farmed (Macnaghten, 2004; Schlag, Ystgaard, 2013).

Several of the participants mentioned that they never before looked consciously for a sustainability label on fish products. Others said that they trust their retailer or fishmonger and therefore did not look for labels: *“I assume that fish offered in a wholefood shop is always organic. I would not look for a label there”* (S1F1). In agreement with findings of Verbeke et al. (2008), some participants underlined that looking for labels is too time consuming. Nonetheless, a part of the participants approved labels as a supplemental quality indication. Some participants, especially those consuming organic products, were convinced that organic products have higher, if not the highest, and more rigid standards than conventional products. Accordingly, they trusted organic labels the most.

However, several of the participants criticized labels in general. The information value of labels and their credibility were contested. Some of them mistrusted the certification processes and the compliance of the certified products to the specific standards. A general skepticism towards the food industry could be observed. Various participants pointed out that they do not know enough about labels to find them helpful in their purchase decision. Some participants perceived the multiplicity of labels as “information overload” (see also Hwang, Lin, 1999). Consequently, consumers ignore available information or become insecure in their purchase decision (Altintzoglou et al., 2010). The lack of knowledge about labels also results in the fact that labels are of limited help in indicating the intrinsic product quality (Verbeke et al., 2008). Hence, some participants remarked a need for better access to relevant information about labels. One solution offered to increase the knowledge was the development of an “app” giving elementary information about each label present on the German market. Meanwhile, other participants favored a unification of the labels instead of increasing the information overload by adding more information. They underlined that one label for sustainable aquaculture would be sufficient. Some consumers of organic products challenged the need for a sustainable aquaculture label in addition to the organic ones.

3.4 Information needs

In line with similar research (e.g., Aarset et al., 2004; Vanhonacker et al., 2011 and Pieniak et al., 2013), the focus groups revealed low knowledge among the participants concerning aquaculture in general. A lot of the participants were, for example, unaware that fish is increasingly produced in farms. This limited knowledge resulted in a romanticized and misleading image of aquaculture. According to our own findings as well as the research by Aarset et al. (2004), O’Dierno et al. (2006) and Ystgaard and Schlag (2013), consumers inferred their understanding of aquaculture to a large extent from their knowledge of terrestrial animal husbandry. Consequently, they also tended to transfer their concerns about modern agriculture onto aquaculture.

On the one hand, some participants were aware of their knowledge gap and called for more transparency and information in general concerning aquaculture. Several participating consumers asked for standardized and comprehensible information on the package. Additional, more detailed information should be provided via Internet links or leaflets at the retailer (see also Pieniak et al., 2013). On the other hand, some participants were not interested in additional information at all. They did not wish to know more about fish farming because they feared that more information might be confusing because of an already existing “information overload”: *“I don’t want to be talked to death by the package. If there is too much information, the frozen fish will melt before I was able to read everything”* (S1F1). Furthermore some participants stated that the available information is mostly incomprehensible or, rather demands too much involvement in order to understand it (see also Pieniak et al., 2007). Mirroring the results of Verbeke et al. (2008) several participants also feared that knowing more about aquaculture might cause them to stop consuming fish. Some participants also raised concerns over the information value and validity of the information given on the package.

All in all, the lack of knowledge about aquaculture did not result in an increased information demand. Apparently, the information needs of the participants were limited (see also Pieniak et al., 2007). Most mainly wanted to be assured that fish produces are healthy and tasty (see also Pieniak et al., 2013). Additionally, many participants demanded that the offered products comply with their expectations of animal welfare and environmental protection. However, they did not always want to judge the compliance to these expectations by themselves. Instead, the majority wished that they could rely on the information given by the producers. Therefore, an honest, transparent and trustworthy communication was expected from the producers. The information offered should be adjusted to the needs of different consumer groups and their horizon of experience in order to reach consumers (see also Verbeke et al., 2008; Verbeke et al., 2007b).

4 Conclusions

The focus groups revealed that consumers often had little knowledge about aquaculture, which resulted in a low awareness about potential negative implications of the sector and a misleading image of aquaculture. As a result of their longing for naturalness and authenticity participants mainly approved of production methods close to nature like earth ponds and flow-through systems (if surrounding is vegetated) while simultaneously refusing more highly engineered systems like closed recirculation systems (RAS). The expectations participants had from sustainable aquaculture were mostly inferred from their understanding of sustainable and organic agriculture. Yet, a large part of the participants perceived no need for additional information. Therefore, communicating sustainable aquaculture to consumers is a difficult task. The question how to provide information for those consumers asking for without confusing those not demanding further information remains.

Our recommendation is that consumer communication should include affective and moral aspects that are based on reliable facts. For example storytelling as well as pictures of the respective farm of origin might help consumers in their purchase decision. However, pictures of more highly engineered systems like RAS had a rather deterrent effect on most of the participants. Consumers still need to get used to those systems. Only rational arguments like the energy balance of a particular aquaculture type will not be enough to convince consumers of sustainable aquaculture. Participants judged aquaculture according to their own moral standards and idealistic ideas, which were sometimes beyond rational arguments. Furthermore, the communication as well as the sustainable aquaculture practice should consider consumers' expectations of sustainable aquaculture. Information provided should be comprehensible, reliable and adjusted to the needs of different consumer groups. So far labels appear to be of little help to consumers in distinguishing sustainable aquaculture products from conventional ones. According to our results, participants who were interested in sustainability issues seem to prefer organic aquaculture products or produces from sustainable fisheries. For less involved consumers other product attributes like freshness and quality tended to be of higher importance in the purchase decision. Additional labels for 'just' sustainable aquaculture products might only confuse consumers as they had difficulties in differentiating between organic and sustainable practices as well as between fish captured in the wild and farmed fish. In sum, the development of a higher priced market segment for sustainable aquaculture products from Germany beside organic ones will be challenging. The market niche for sustainable aquaculture products appears to be already occupied by organic ones.

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