

Media representation of salmon aquaculture in France

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ABSTRACT

France is the second largest importer of salmon in Europe, and salmon is the second-most consumed fish. For a production country like Norway, French public perception is of high economic importance, because consumers' perceptions can directly influence their behaviours. This study reviews four French newspapers and two magazines over a 10-year period to examine how farmed salmon has been portrayed in the media. The most frequent topics covered in the French media are related to economy, health and environment. Compared to other countries, the French media pays more attention to health. The results also show that most articles about farmed salmon were negative, especially those regarding health. The reputation of salmon as a healthy food is thus jeopardised. Norwegian salmon and the industry are framed more negatively by the media in France than other countries, and this could negatively affect consumer behaviour towards Norwegian salmon.

1. Introduction

The salmon aquaculture industry has experienced fast growth since the 1970s. Over the years, salmon has become an affordable product for mass consumption (Asche et al., 1999). Today, Norway is the world's largest producer, providing around 1.2 M t/year (Statistisk sentralbyrå, 2018). France is one of Norway's largest single markets for salmon, importing 121,373 t in 2020 (Norwegian Seafood Council, 2020). Salmon is consumed mostly fresh or smoked (France AgriMer, 2018) and is the second-most consumed species after tuna (Norwegian Seafood Council, 2016). Thus, French consumer perception and preferences are important to the Norwegian salmon sector (Rickertsen et al., 2017).

As salmon aquaculture has developed, there has been increasing media coverage debating the merits of salmon farming in both production countries and importing countries. In Norway for instance, salmon has been a recurrent subject of debate regarding both environmental and health impacts within the aquaculture industry (Burridge et al., 2010; Olsen and Osmundsen, 2017; Osmundsen and Olsen, 2017; Read and Fernandes, 2003). In the debate on aquaculture, diverse actors, such as environmentalists, public agencies, industrial firms and interest organisations, have been active with varying agendas (Höjjer et al., 2006). By disseminating information to the public, the media shapes perceptions. This could be either positive or negative for the reputation of salmon products (Höjjer et al., 2006; Olsen and Osmundsen, 2017; Osmundsen and Olsen, 2017; Schlag, 2011).

The ongoing debate about salmon aquaculture is not only limited to

production countries. However, in the literature, studies have focused on the media coverage of salmon farming in producing countries such as the USA (Amberg and Hall, 2008; Rickard et al., 2016), Norway (Olsen and Osmundsen, 2017; Osmundsen and Olsen, 2017; Schlag, 2011) and the UK (Höjjer et al., 2006; Schlag, 2011), whereas only a few studies have focused on importing countries (Feucht and Zander, 2017; Höjjer et al., 2006; Schlag, 2011). Despite being one of the biggest salmon markets, there is no history of literature¹ focusing on media coverage of farmed salmon in France. Thus, this study aims to reveal how farmed salmon is presented by the French media over a 10-year period, discussing how media coverage can affect public perception of farmed salmon.

This article is divided into the following sections. Section 2 presents a theoretical background regarding the impact of the media on public perception. Section 3 presents the method used in this study. Section 4 presents and discusses the results and offers an overview of the different topics covered by the French media regarding salmon. Finally, in Section 5, final comments are addressed.

2. Theoretical background

The media provides information and helps the public to understand and interpret what is happening in the world (de Vreese, 2005). But the media also influences their audience's attitudes and perceptions of the outside world. Three media effects theories are commonly used to study the effect of media on their audience: agenda-setting, priming and

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¹ In Höjjer et al. (2006), France is among 14 countries covered over a period of 2 weeks.

framing.

Developed by [McCombs and Shaw \(1972\)](#), agenda-setting theory suggests that there is a relationship between the priority issues of the mass media and the priority issues of the public. According to [McCombs and Shaw \(1972\)](#), when collecting information on the world outside our family, neighbourhood and workplace, people deal with a second-hand reality created by journalists and the media. However, due to time and space constraints, only a few topics get the attention of the mass media and are considered as newsworthy ([McCombs and Shaw, 1972](#)). Then, gradually, the prominent issues in the media usually become prominent in public opinion.

Priming is generally accepted as a consequence of agenda setting and is therefore generally included as a second level of agenda-setting framework ([Carroll, 2004](#); [McCombs, 2002](#)). Priming focuses on the media influence on how people think about a specific topic ([Miller and Krosnick, 2000](#)). Moreover, in some cases media coverage can affect people's behaviour ([McCombs, 2005](#)).

Contrary to agenda setting and priming, framing involves how the issues are treated in the media ([Cappella and Jamieson, 1997](#)). The framing approach indicates that the accentuation of certain considerations in a media report can influence individuals to focus on those considerations ([Druckman James, 2001](#)). [Shaw et al. \(1997\)](#) suggested that framing can be considered as an extension of agenda setting since alternative media messages can trigger very different concerns in the audience, which in turn could affect audience attitude or behaviour.

After experiencing steady popularisation among researchers, limitations and criticism regarding the theory have started to appear. The criticism has focused especially on the process and environment problem. The process problem is about the assumption of whether the agenda-setting process is the result of time and space limitations. But the agenda-setting process is also likely to include judgements and interferences regarding which issue to cover ([Takeshita, 2006](#)). The environment problem has underlined the development of new sources of information such as social media and online media and their impact on agenda setting. The influence of traditional media (newspapers, TV and radio) is declining as people's source of information is becoming increasingly fragmented ([Takeshita, 2006](#)). Moreover, social media plays an increasingly important role in disseminating news to the public and might also influence how traditional media select and frame their stories ([Borah, 2016](#)).

Today, food-related risks seem to be a popular topic covered by the media. According to [Höijer et al. \(2006\)](#), the media can affect consumption habits, because they contribute to building food fears among consumers by underlining apparently dramatic and urgent threats to human health. According to [Deephouse \(2000\)](#), the mass media shares information and presents a reputational assessment to the public. Therefore, the media can positively or negatively influence reputation. Moreover, studies have shown that, regardless of the negative or positive position, intense media coverage has a significant negative effect on target firms ([Carroll and McCombs, 2003](#)). In this context, agenda setting and framing appear to be relevant theories for understanding how the mass media can influence the public image of salmon ([Carroll and McCombs, 2003](#); [McCombs, 2002](#)).

3. Method

This study is based on a content analysis of the French written press. Content analysis is a method that analyses written, verbal or visual media ([Elo and Kyngäs, 2008](#)). It is a systematic way to collect, categorise and describe qualitative data ([Downe-Wamboldt, 1992](#); [Elo and Kyngäs, 2008](#); [Sandelowski, 1995](#)). This method allows transparency and is replicable. A coding technique is used to convert a large amount of data (e.g., press articles) into a condensed and descriptive data set. However, content analysis remains a subject of interpretation. Indeed, the author has often faced interpretative choices during the phases of research ([Elo and Kyngäs, 2008](#); [Graneheim and Lundman, 2004](#); [Hsieh](#)

[and Shannon, 2005](#)).

The data collection and coding system used for this study is inspired by [Olsen and Osmundsen \(2017\)](#), who used a qualitative content-analysis process. The similarities will allow a better comparison of the representation of salmon aquaculture between the French and the Norwegian printed-press reports. Adaptive changes have been made to the data organisation for clarity.

3.1. Data collection

Data was collected from four French newspapers (*Le Monde*, *Le Figaro*, *Libération*, *Les Echos*) and two women's magazines (*Madame Figaro* and *Femme actuelle*). The selection is justified by the need to cover a large public venue with diversity. Each of the selected media products offers a different editorial line. *Le Monde* is a non-specialised newspaper that declares a nonpartisan line. *Le Figaro* is a right-wing newspaper with a liberal approach regarding economic issues. However, it adopts a conservative line on social questions. *Libération* is a left-wing newspaper with progressive views on social issues. Finally, *Les Echos* is a specialised newspaper covering economic, industrial and stock-exchange news. Designed for a female readership, *Madame le Figaro* and *Femme actuelle* enjoy great popularity in France. They cover themes such as health, nutrition and cooking.

Following the same method of data collection as [Schlag \(2011\)](#), a first selection was made by separately searching in each newspaper's search engine for the following keywords: 'saumon' (salmon), 'saumon d'élevage' (farmed salmon), 'aquaculture' and 'poisson d'élevage' (farmed fish). A time restriction was set for a publication period of 10 years, from 1 January 2008 until 18 August 2018.

Because the search yielded many irrelevant news articles, a relevancy check was conducted by removing articles focusing on a topic other than salmon aquaculture that mentioned the keywords without giving any further context (e.g., recipes). From the different sources, 134 relevant news items were selected for further analysis.

3.2. Organising phase: Data processing

First, we downloaded and encoded each article title, source and date of publication, entering the information into a Microsoft Excel document. Second, authors were categorised as journalists, interest organisations, industrial representatives, governments etc. Article length was categorised as short, medium or long. Third, we applied a reading process for analysis and coding. The reading focused on narrative and topic. This perspective allowed us to see if the article focused on salmon farming from an international, national or regional perspective.

Using ethnographic coding analysis ([Altheide, 1987](#)), a coding system emerged from readings and helped us define the media's representation of farmed salmon in France. For practical reasons, only one theme was attributed to each article, even if many could have been considered. The theme, the main topics, arguments and discourse were highlighted for each.

Articles were categorised in relation to their positions on farmed salmon and the industry. Based on the general narrative and the arguments used in the texts, each article was given a number from 1 to 5, where 1 corresponds to an explicitly positive position, and 5 corresponds to an explicitly negative position. The ratings of 2 and 4 correspond to implicitly positive and negative positions, respectively, and 3 corresponds to neutral.

4. Findings and discussion

On average, there were 13 articles about farmed salmon published per year. In terms of newspaper coverage, *Le Monde* had the most articles about salmon (41), followed by *Les Echos* (36), *Le Figaro* (36) and *Libération* (13) ([Table 1](#)). The topic had considerably lower coverage in the two women's magazines, *Madame Figaro* (6) and *Femme actuelle* (2)

Table 1

Newspaper summary.

Newspapers	Editorial line	Distribution of the newspaper in 2017	Total articles 2008–2018	Corporate or independently owned
<i>Le Monde</i>	Centre	284,738	40	Independent
<i>Le Figaro</i>	Right	307,912	34	Corporate: Dassault
<i>Libération</i>	Left	75,275	13	Independent
<i>Les Echos</i>	Right	121,378	38	Corporate: LVMH

Table 2

Women's magazine summary.

Women's magazine	Target public	Distribution of the magazine in 2017	Total articles 2008–2018	Corporate or independently owned
<i>Madame le Figaro</i>	Upper class	388,502	7	Corporate: Groupe Dassault
<i>Femme actuelle</i>	All public	580,284	2	Corporate: Prisma Media

(Table 2). There were no strong observable differences among the different editorials. With 134 articles from four different newspapers and two magazines, salmon farming has been relatively less covered by the French media in comparison to other topics and other countries. Genetically modified organisms (GMOs), for example, have been the subject of 515 articles in *Le Monde* between 1996 and 1999 (Sato, 2013). Compared to other countries, salmon aquaculture has been more covered in Norway. Olsen and Osmundsen (2017) listed a total of 273 articles in Norway over a 3-year period, using the same keywords. A different position on the salmon aquaculture value chain (producer vs. importer) could explain the difference between coverage between France and Norway. In Norway, salmon aquaculture constitutes the second largest industry, and the Norwegian press is concerned about the impacts of salmon aquaculture on their society (Schlag, 2011). Like France, in Germany, salmon aquaculture has received less media attention than in the two countries producing the farmed fish (i.e. UK and Norway) (Schlag, 2011).

Five themes emerged from the written press: technology, the economy, the environment, health and politics. The economy was the most covered theme, with 56 articles. Health was second with 37 articles, the environment had 28, technology had 10 and politics had three (Fig. 1). In centrist and right-wing editorials, the economic issue was the most covered.

Most newspaper articles provided negative coverage. In total, 63 of the articles were framed negatively towards the salmon and fish-farming industries, 53 were neutral and 18 were positive, as shown in Fig. 2. Of the three most covered themes, the economy was the least negatively covered. Most of those articles were neutral. Articles regarding health and the environment painted a negative picture of farmed salmon. The following section further analyses the content of each theme.

4.1. Economic coverage

In France, like in Norway (Olsen and Osmundsen, 2017), the economy was the most covered topic. However, there was a difference in the content of coverage between countries. Firstly, the French press logically had more focus on the smoked salmon industry, as this represents an important economic sector. Hence, the media focused mostly on salmon supply and demand. Salmon is often presented as the most consumed fish in Europe, and French consumers are described as being fond of smoked salmon, especially during Christmas holidays. According to *Le Monde* (2016), 92% of the French population eat salmon, whereas 72% consider smoked salmon as an essential part of Christmas and New-Year's dinners. The media often underline that France has the highest

consumption of wild and farmed smoked salmon and is the second biggest producer of smoked salmon in Europe.² The media frequently associate the French industry with positive elements and emphasise the long tradition of smoking salmon in France, describing it as a culinary heritage.

Secondly, compared to Olsen and Osmundsen (2017), a difference in the positions of the articles was observed, as coverage was neutral or negative. The articles showed a trend which associated the salmon farming industry with more negative elements. For example, the French smoked salmon sector was presented as the most severely hit by rising prices³ and was portrayed as suffering, while the Norwegian producers enjoyed massive profits. The company Marine Harvest (now Mowi) was often used when comparing Norwegian and French industries.

The big winner, benefiting of this situation, is the Norwegian company Marine Harvest, the world's number one salmon producer. In 2017, its sales increased by 4% to 3.64 billion euros, even though production volumes fell under the pressure of sea lice. Its appetite is undeniable, as it has taken over a Canadian competitor, Northern Harvest.⁴

'Matière premières le saumon dréfraye la chronique', *Le Monde*, 2018.

This speculation on salmon makes at least someone happy: the Norwegian group Marine Harvest. The Norwegian giant and world leader is swimming in the cash. ... The French manufacturer of smoked salmon fears a financial suffocation.

'Le Saumon attire l'oseille', *Le Monde*, 2016.

The media also covered conflicts between retailers and processors. Currently, prices are negotiated once a year. However, the price fluctuation of raw material makes the situation very difficult for the French smokers, because their profit margins can easily decrease. The retailers are described as having the upper hand when negotiating prices. In reality, they want to keep prices stable and are reluctant to renegotiate when raw-material prices increase.

Retailers turn a deaf ear and do not intend to accept tariff increases.

'Les industriels des produits de la mer souffrent de la parité euro-dollar', *Les Echos*, 2015.

The survival of the sector (the French salmon smokers) is today closely linked to the possibility for each manufacturer to renegotiate quickly with the retailers, the cost increases of their raw materials in sales prices to its customers.

'Risque de pénurie de saumon cet été', *Le Figaro*, 2016, cited by de La Chesnais, 2016.

Retailers, always on the lookout to renegotiate prices, already press manufacturers.

('Matières premières : le cours du saumon à contre-courant', *Le Monde*, 2017, cited by Girard, 2017).

Consumers are also affected by increases in the price of salmon. According to *Le Figaro*, French consumers were dissatisfied with salmon because of price increases. Fresh salmon purchasing decreased 25% between March 2013 and March 2014. Smoked salmon decreased 12%. One year later, *Le Figaro* (2015) described an increase in fish consumption of 1% after the salmon price dropped by 3%, indicating that

² Including big French companies like Labeyrie, MerAlliance, Delpeyrat and Intermarché.

³ During price negotiations, the retailers have the position of power and prevent abrupt increases in the final price, despite strong increases of the raw product.

⁴ All translations by the author.

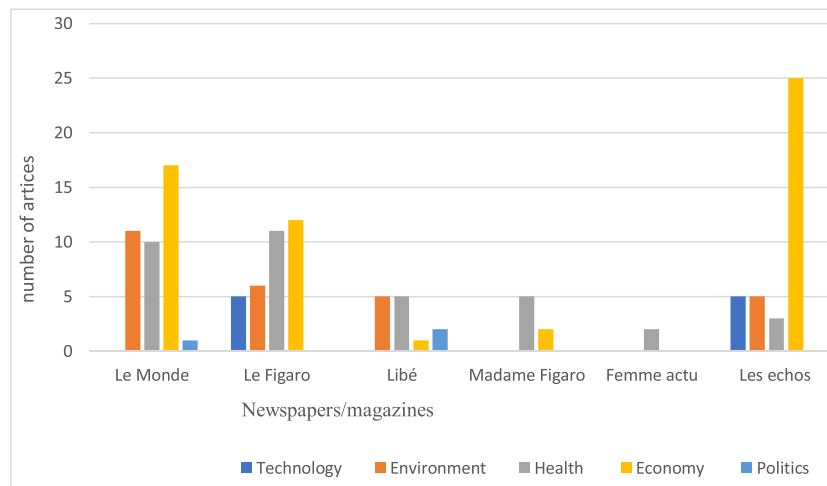


Fig. 1. News topics, by category.

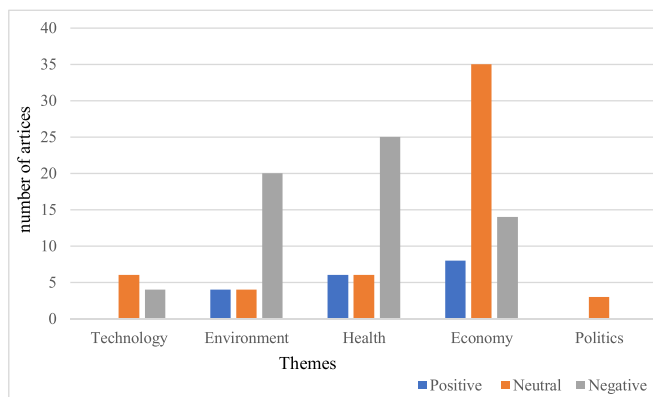


Fig. 2. Distribution and representational stance of articles, by topic.

consumption was strongly related to price fluctuation.

4.2. Health coverage

The health perspective was the second-most covered theme in the French media (37 articles). This result differs from results of a recent study in Norway (Olsen and Osmundsen, 2017), where health was the fifth-most covered topic. Like other countries studied by Schlag (2011) (the UK and Germany), the French media focused on the risk of consuming farmed salmon.

During this 10-year period, there was a twofold increase in media coverage of health (see Fig. 3). The more positive articles were more ‘seasonal’, typically published before Christmas about the health

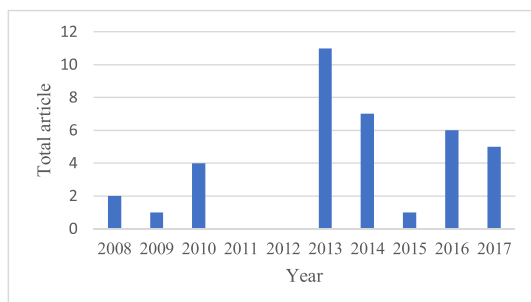


Fig. 3. Media coverage of the health theme, by year.

qualities of salmon (e.g., rich in omega 3). We distinguished two spikes of negative media coverage regarding salmon in 2013–2014 and 2016–2017. Before 2013, negative media coverage was about the development of genetically modified salmon in Canada and the USA in 2010. Whereas the production of genetically modified salmon was authorised only in those countries, the topic received attention because French society is largely opposed to genetically modified foods.

The first spike of explicitly negative reporting related to the production of salmon in Europe came in 2013. Following the documentary *Envoyé Spécial*, in November 2013, a drastic increase in articles was seen over a year. The documentary described the Norwegian industry as a ‘secret and closed world’ and suggested that salmon was ‘the most toxic food in the world’. This popular documentary triggered public opinion on the use of pesticides and antibiotics by aquaculture as well as the presence of pollutants (e.g. polychlorinated biphenyls, mercury and arsenic). Shortly after the diffusion of the documentary, the arguments used by the documentary made the headlines:

Le Monde (2013): ‘Pesticides, dioxins ... Norwegian farms in the hot seat’.

Le Monde (2013): ‘Red alert on salmon’.

Le Figaro (2014): ‘Not everything is good in salmon’.

It is interesting to note that the media mostly attributed these bad practices to Norwegian aquaculture, whereas other producing countries were not mentioned in most articles.

During this 2-year period, the press took a more nuanced view than did *Envoyé Spécial*, where very limited space was given for the salmon industry to defend its position. No representative of the salmon industry was interviewed or involved in the debate. Only two articles stand out from the main narrative during this period. The first article was published in *Les Echos*, written by a representative of the Norwegian Seafood Council. The author accused the media of disinformation and underlined that Norway followed regulations set by the European Union. The second article was published in *Libération*, highlighting that salmon was a healthy food according to experts.

Following the same pattern, the second spike of negative media coverage was due to another documentary. In December 2016, ‘The secrets of farmed salmon’ aired on France 3, which then released a programme, *Thalassa*,⁵ drawing a critical portrait of farmed salmon production and the perceived health benefits. Contrary to the *Envoyé Spécial*, the narrative was moderate, and the reporter underlined efforts

⁵ Monthly TV magazine focusing on the sea.

made by the salmon industry to reduce the proportion of toxic materials. However, the main conclusion was that organic salmon was more contaminated by toxic materials than the non-organic salmon. Again, the information made the headlines:

Le Figaro (2016) 'Organic salmon more toxic than non-organic'.

Le Figaro (2016) 'Fresh non-organic salmon less contaminated?'.

Libération (2016) 'Fresh non-organic salmon less contaminated than before'.

Femme Actuelle (2016) 'Organic salmon more polluted than we think'.

Suspicion towards farmed salmon seem to have been anchored in French media editorials even in 2017, where farmed salmon was described as 'one of the foods we should not eat to save our planet' by the women's magazine, *Madame Figaro*. The author compared farmed salmon from Norway to wild salmon from the Baltic Sea (one of the most polluted seas in the world).

In Europe, the majority of salmon marked comes from Norway, Scotland or Ireland. Farmed salmon from Ireland comes from organic farms where the quality of the water is controlled, the same is not true for farmed salmon from the Baltic or Norway.

'Comment bien choisir son saumon fumé pour les fêtes?', *Madame Figaro*, 2017.

Moreover, Irish salmon was described as the best quality salmon raised in pure and fresh water, as opposed to Norwegian salmon.

The latter (Norwegian salmon), already far from growing in the least polluted sea of the globe in the wild, accumulates toxic substances in captivity which are discharged into the basins, both dangerous for health and the environment. Therefore, when we know Norway is the world's largest producer of smoked salmon, and that the French consume 122,000 tons per year, there is enough to worry.

'Comment bien choisir son saumon fumé pour les fêtes?', *Madame Figaro*, 2017.

4.3. Environmental coverage

There were 27 articles that focused on the environmental effects of salmon aquaculture. The results confirmed that environmental issues regarding salmon aquaculture also made the news, as with other countries (Amberg and Hall, 2008; Höijer et al., 2006; Olsen and Osmundsen, 2017; Schlag, 2011). However, the topic got much less coverage than in producing countries such as Norway. This can be explained by the fact that France is not directly affected by the environmental issues of salmon farming.

Regarding the French media coverage, a small difference between newspapers can be underlined. *Le Monde* and *Libération* mainly focused on the indirect impact of salmon aquaculture, whereas *Le Figaro* and *Les Echos* specifically emphasised the direct impact of salmon farming on the environment.

4.3.1. Indirect impact of salmon farming

In 2010, salmon farming gained coverage from *Le Monde* and *Libération*, because, for the first time, half of the fish eaten in the world came from aquaculture. With its rapid development, the two newspapers expressed concern about the indirect impact of industrial aquaculture on the environment. Hence, the editorials highlighted the negative impact of salmon feed on fish stocks. They underlined the dramatic effect of harvesting small fish for fish meal and oil used in feed for farmed fish. The fish-meal fishery was criticised for practices that would have dire consequences on the marine ecosystem and for presenting a serious threat to the food security of the coastal populations of poor countries.

These fisheries were also described as non-transparent, especially the non-EU fleet (i.e., Russia and China). The media concluded that although aquaculture was supposed to increase the production of fish, paradoxically, it has been the source of overfishing.

4.3.2. Direct impact of salmon farming

The French media are concerned about the expansion of salmon farming, because the production methods are often criticised for their direct environmental impact, which can be attributed to the intensive nature of salmon farming. The issues of salmon escapees and the potential negative impact on wild salmon stocks are the most cited issues in the French media. Concerns about the effects of escaped farmed salmon include competition and genetic pollution of wild salmon, i.e. the reduction of the genetic pool by cross-breeding.

The French media have concentrated on Chilean production, where the use of antibiotics is described as extensive, which could lead to antibiotic resistance in fish and other organisms. However, media articles underlined that antibiotics have been almost abandoned because of the development of vaccines in Norway.

Moreover, salmon aquaculture is also criticised for its sea-lice outbreaks. Studies have shown that sea lice occur in areas with a high concentration of salmon farms. According to *Le Figaro*, when salmon escape, sea lice become a major environmental problem. To a lesser degree, organic waste is also mentioned among the environmental issues related to the salmon industry as being responsible for most of the pollution around fish farms.

4.4. Technological and political coverage

The French media coverage of salmon aquaculture has focused less on technological development of the industry (10 articles). Most articles focused on the development of genetically modified salmon, paying great attention to the GMO topic. Two articles focused on the development of insect meal as a new source of protein and oil for aquaculture, needed to replace the controversial fish meal.

Finally, only three articles covered political issues related to salmon aquaculture. These articles dealt with Norwegian salmon being subject to boycott because of political tension between the countries. Two articles covered the diplomatic crisis between China and Norway following the awarding of the Nobel Peace Prize in 2010 to Chinese political dissident Liu Xiaobo, which had repercussions for Norwegian salmon exports.

Another article covered the Russian embargo on Norwegian salmon announced in retaliation against the European and Norwegian sanctions over Russia's annexation of Crimea. Because Norway could no longer export salmon to Russia, *Libération* underlined that other countries, like the Faeroe Islands, could take advantage of this situation to gain position in the Russian market.

4.5. Potential impact on people's perception of salmon

Regarding health and environment topics, the prominence of negative media coverage could have an impact on people's perception of salmon. According to Olsen and Osmundsen (2017), media representation of aquaculture could affect people's perceptions. In Norway, for example, intense coverage on the issues of sea lice and escapees has increased the general awareness of the negative environmental impacts of salmon aquaculture. Increased media attention is believed to have influenced public opinion and policymakers in favour of limiting the growth of the aquaculture industry in Norway (Ellis and Tiller, 2019; Hersoug, 2015; Olsen and Osmundsen, 2017).

The negative media coverage may also have negatively influenced how people think about farmed salmon in France. According to Van Woerkum and Van Lieshout (2007), consumers generally trust the food they buy. However, negative media coverage can cause consumer distrust. Media reports covering the potential health and environmental

dangers have amplified risk perception associated with farmed salmon consumption (Kaperson and Kasperson, 1996; Schlag, 2011). The study by Olsen and Osmundsen (2017) showed that news emphasising negative information has a more persuasive impact than positive framing. Therefore, it can be supposed that the focus on environmental and health risks has tarnished the health and environmental image of salmon. For example, regarding health, salmon is commonly seen as a healthy source of protein and rich in omega 3, but the media coverage on contaminated farmed salmon may jeopardise this image. Hence, more negative perception of salmon could have an impact on consumers' intention to buy salmon because perceived nutritional value is an important factor for French consumers when selecting food (Hoefkens et al., 2011).

Regarding the technological coverage, the media could provide a confusing representation of the development of salmon aquaculture. On the one hand, the media has described the positive development of improving salmon aquaculture by developing more sustainable and natural feed made of insects. On the other hand, the focus on the development of GMO salmon could damage public perception.

Finally, the temporal effects of negative coverage are little known, but according to Højjer et al. (2006, p.276), when the media alarm is reduced, 'the public discussion fades away, risk consciousness dissolves and previous habits are re-activated'. Thus, whereas the impact of negative media coverage can have a durable effect on consumer perception, it also has important short-term effects. Nonetheless, it appears to have limited long-term effects on consumption (McCluskey et al., 2016).

5. Conclusion

With 134 articles over a 10-year period, the different issues regarding salmon farming are certainly not people's main concerns. But the coverage has surely raised audience awareness on some economic, health, environmental, technological and political issues. The results showed that most of the collected articles gave the audience a negative representation of salmon aquaculture. These results are in line with previous studies indicating that dominant information relayed by the media regarding aquaculture is generally negative (Højjer et al., 2006; Olsen and Osmundsen, 2017; Osmundsen and Olsen, 2017; Schlag, 2011).

Based on media effects theory, it is likely that the prominence of negative news regarding salmon aquaculture has influenced public beliefs and cognition. However, future studies should investigate the long- and short-term consequences of negative coverage on consumers' attitudes and behaviour towards farmed salmon.

This study looked at press media representation of salmon aquaculture, as according to Schlag (2011), most people get their information about aquaculture from the media. Today, however, people's source of information has become increasingly fragmented with the development of digital news and the existence of social media such as Twitter and Facebook. Further research on the influence of social media on consumers' representation of salmon is needed. This study discussed but did not measure the possible impact of negative media coverage of salmon aquaculture in France. Further research should attempt to measure the effect of this type of media agenda on consumer behaviour.

Declaration of Competing Interest

The author declare that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- Altheide, D.L., 1987. Reflections: ethnographic content analysis. *Qual. Sociol.* 10 (1), 65–77. <https://doi.org/10.1007/BF00988269>.
- Amberg, S.M., Hall, T.E., 2008. Communicating risks and benefits of aquaculture: a content analysis of US newsprint representations of farmed salmon. *J. World Aquacult. Soc.* 39 (2), 143–157. <https://doi.org/10.1111/j.1749-7345.2008.00160.x>.
- Asche, F., Guttormsen, A.G., Tveterås, R., 1999. Environmental problems, productivity and innovations in Norwegian salmon aquaculture. *Aquac. Econ. Manag.* 3 (1), 19–29. <https://doi.org/10.1080/13657309909380230>.
- Borah, P., 2016. Media effects theory. *Int. Encycl. Polit. Commun.* (October), 1–12. <https://doi.org/10.1002/9781118541555.wbiepc156>.
- Burridge, L., Weis, J.S., Cabello, F., Pizarro, J., Bostick, K., 2010. Chemical use in salmon aquaculture: a review of current practices and possible environmental effects. *Aquaculture* 306 (1–4), 7–23. <https://doi.org/10.1016/j.aquaculture.2010.05.020>.
- Cappella, J.N., Jamieson, K.H., 1997. *Spiral of Cynicism: The Press and the Public Good*. Oxford University Press.
- Carroll, C.E., 2004. *How the Mass Media Influence Perceptions of Corporate Reputation: Exploring Agenda-Setting Effects within Business News Coverage* (Doctoral Dissertation).
- Carroll, C.E., McCombs, M., 2003. Agenda-setting effects of business news on the public's images and opinions about major corporations. *Corp. Reput. Rev.* 6 (1), 36–46. <https://doi.org/10.1057/palgrave.crr.1540188>.
- de La Chesnais, E., 2016. *Le Saumon Conforte sa Première Place de Poisson Frais Préféré des Français*. *Le Figaro*. [This should have the Date (Month and Date) of Publication, which should Follow the Year, e.g., "de La Chesnais, E. (2016, 22 March). *Le Saumon*. ..."].
- de Vreese, C.H., 2005. News framing: theory and typology. *Inform. Des. J. Doc. Des.* 13 (1), 135–143. <https://doi.org/10.14429/djlit.37.2.10392>.
- Deephouse, D.L., 2000. Media reputation as a strategic resource: an integration of mass communication and resource-based theories. *J. Manag.* 26 (6), 1091–1112. <https://doi.org/10.1177/014920630002600602>.
- Downe-Wamboldt, B., 1992. Content analysis: method, applications, and issues. *Health Care Women Int.* 13 (3), 313–321. <https://doi.org/10.1080/07399339209516006>.
- Druckman James, N., 2001. The implications of framing effects for citizen competence. *Polit. Behav.* 23 (3), 225–256. <http://www.ingentaconnect.com/content/klu/pobe/2001/00000023/00000003/00369814>.
- Ellis, J., Tiller, R., 2019. Conceptualizing future scenarios of integrated multi-trophic aquaculture (IMTA) in the Norwegian salmon industry. *Mar. Policy* 104, 198–209. <https://doi.org/10.1016/j.marpol.2019.02.049>.
- Elo, S., Kyngäs, H., 2008. The qualitative content analysis process. *J. Adv. Nurs.* 62 (1), 107–115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>.
- Feucht, Y., Zander, K., 2017. Aquaculture in the German print media. *Aquac. Int.* 25 (1), 177–195. <https://doi.org/10.1007/s10499-016-0021-1>.
- France AgriMer, 2018. *Les Filières Pêches et Aquaculture Bilan 2017*.
- Girard, L., 2017. *Matières Premières: le Cours du Saumon à Contre-Courant*. *Le Monde*, 12 December.
- Graneheim, U., Lundman, B., 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ. Today* 24 (2), 105–112. <https://doi.org/10.1016/j.nedt.2003.10.001>.
- Hersoug, B., 2015. The greening of Norwegian salmon production. *Marit. Stud.* 14 (1), 16. <https://doi.org/10.1186/s40152-015-0034-9>.
- Hoefkens, C., Verbeke, W., Van Camp, J., 2011. European consumers' perceived importance of qualifying and disqualifying nutrients in food choices. *Food Qual. Prefer.* 22 (6), 550–558. <https://doi.org/10.1016/j.foodqual.2011.03.002>.
- Højjer, B., Lidskog, R., Thornberg, L., 2006. News media and food scares: the case of contaminated salmon. *Environ. Sci.* 3 (4), 273–288. <https://doi.org/10.1080/15693430601049645>.
- Hsieh, H.-F., Shannon, S.E., 2005. Three approaches to qualitative content analysis. *Qual. Health Res.* 15 (9), 1277–1288. <https://doi.org/10.1177/1049732305276687>.
- Kaperson, R.E., Kasperson, J.X., 1996. The social amplification and attenuation of risk. *Ann. Am. Acad. Polit. Soc. Sci.* 545 (1), 95–105. <https://doi.org/10.1177/0002716296545001010>.
- McCluskey, J.J., Kalaitzandonakes, N., Swinnen, J.F.M., 2016. Media coverage, public perceptions, and consumer behavior: insights from new food technologies. *Ann. Rev. Resour. Econ.* 8, 467–486. <https://doi.org/10.1146/annurev-resource-100913-012630>.
- McCombs, M., 2002. The agenda-setting role of the mass media in the shaping of public opinion. In: *Mass Media Economics 2002 Conference*, London School of Economics. <https://doi.org/10.13245/j.hust.15S1016>.
- McCombs, M., 2005. A look at agenda-setting: past, present and future. *Journal. Stud.* 6 (4), 543–557. <https://doi.org/10.1080/14616700500250438>.
- McCombs, M.E., Shaw, D.L., 1972. The agenda-setting function of mass media. *Public Opin. Q.* 36 (2), 176. <https://doi.org/10.1086/267990>.
- Miller, J.M., Krosnick, J.A., 2000. News media impact on the ingredients of presidential evaluations: politically knowledgeable citizens are guided by a trusted source. *Am. J. Polit. Sci.* 44 (2), 301. <https://doi.org/10.2307/2669312>.
- Norwegian Seafood Council, 2016. *Seafood Study 2016 Insights and Outlook: The French and Seafood*. <http://www.poissons-de-norvege.fr>.
- Norwegian Seafood Council, 2020. *Norwegian Exports to France*.
- Olsen, M.S., Osmundsen, T.C., 2017. Media framing of aquaculture. *Mar. Policy* 76 (November 2016), 19–27. <https://doi.org/10.1016/j.marpol.2016.11.013>.
- Osmundsen, T.C., Olsen, M.S., 2017. The imperishable controversy over aquaculture. *Mar. Policy* 76 (November 2016), 136–142. <https://doi.org/10.1016/j.marpol.2016.11.022>.

- Read, P., Fernandes, T., 2003. Management of environmental impacts of marine aquaculture in Europe. *Aquaculture* 226 (1–4), 139–163. [https://doi.org/10.1016/S0044-8486\(03\)00474-5](https://doi.org/10.1016/S0044-8486(03)00474-5).
- Rickard, L.N., Feldpausch-parker, A.M., Boyd, A.D., Feldpausch-parker, A.M., 2016. Of sea lice and superfood: a comparison of regional and national news. *Media Cover. Aquacult.* 1 (December), 1–13. <https://doi.org/10.3389/fcomm.2016.00014>.
- Rickertsen, K., Alanes, F., Combris, P., Enderli, G., Issanchou, S., Shogren, J.F., 2017. French consumers' attitudes and preferences toward wild and farmed fish. *Mar. Resour. Econ.* 32 (1), 59–81. <https://doi.org/10.1086/689202>.
- Sandelowski, M., 1995. Qualitative analysis: what it is and how to begin. *Res. Nurs. Health* 18 (4), 371–375. <https://doi.org/10.1002/nur.4770180411>.
- Sato, K., 2013. Genetically modified food in France: symbolic transformation and the policy paradigm shift. *Theory Soc.* 42 (5), 477–507. <https://doi.org/10.1007/s11186-013-9198-8>.
- Schlag, A.K., 2011. Aquaculture in Europe: media representations as a proxy for public opinion. *Int. J. Fish. Aquac.* 3 (8), 158–165. <http://www.academicjournals.org/journal/IJFA/article-abstract/B2A9BEC40383>.
- Shaw, D.L., Weaver, D.H., McCombs, M.E., 1997. *Communication and Democracy: Exploring the Intellectual Frontiers in Agenda-Setting Theory*. Psychology Press.
- Statistisk sentralbyrå, 2018. *Aquaculture Statistisk*. <https://www.ssb.no/en/fiskeoppdrett/>.
- Takeshita, T., 2006. Current critical problems in agenda-setting research. *Int. J. Public Opin. Res.* 18 (3), 275–296. <https://doi.org/10.1093/ijpor/edh104>.
- Van Woerkum, C.M.J., Van Lieshout, I.M., 2007. Reputation management in agro-food industries: safety first. *Br. Food J.* 109 (5), 355–366. <https://doi.org/10.1108/00070700710746777>.