

Consumer response to Genetically Modified Salmon: A study on benefit importance in the adoption process

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Abstract

Genetic modification (GM) can provide benefits for consumers, producers, and the environment; however, general opposition towards the use of GM in food continues, especially GM-animals. This opposition seems to be a consequence of the lack of perceived consumer benefits.

This research investigates the role clearly stated consumer benefits may play in the adoption process of GM-salmon. AquaBounty Technologies have developed a transgenic salmon, which is likely to be available for consumption in the next couple of years. Their technology enables the GM-salmon to grow twice as fast as conventional salmon year round, thereby decreasing the production cycles and feed usage. These advantages will presumably lead to a lower market price for the GM-salmon. The benefit one product holds over another is seen as its relative advantage; the benefits used in this study are a price advantage and increased nutritional values.

To study the effect of benefits on consumer acceptance, best-worst scaling was used to gather stated preferences (SP), i.e. intentions, while a field choice experiment was used to gather revealed preferences (RP), i.e. actual purchasing behaviour. These methods were chosen due to the hypothetical nature of SP; the field choice experiment could validate the results from best-worst scaling. Therefore, this methodology sets out to test the validity of best-worst scaling and to examine whether consumers acted as they intended since consumers do not always act as they say they will when it comes to adopting an innovation. Additionally, a food neophobia scale (FNS) was included to measure the effect consumers' preference for novel foods may have on their willingness to try GM-salmon.

A fish shop in Norway provided the venue for gathering SPs through a questionnaire and RPs by placing salmon mislabelled as GM on sale alongside conventional salmon. The price benefit was varied by + 15% and – 15% relative to the median price of salmon (118 NOK a kg), and the nutritional benefit was stated as double omega 3 values. The four different types of salmon on display in the field choice experiment or presented in the best-worst scaling were as follows: Conventional Atlantic salmon, Atlantic salmon with double omega 3, Atlantic GM-salmon, and Atlantic GM-salmon with double omega 3.

The results were analysed using a Maximum Likelihood Estimation (MLE), thus creating representative market shares from both methods for each salmon variation. These market shares showed a clear preference for conventional Atlantic salmon compared to GM salmon;

however with the added benefit of double omega 3 and a price advantage, GM-salmon showed a substantial increase in market share. In addition, consumers with less neophobic traits, and therefore greater willingness to accept novel foods, were more accepting of GM-salmon. Therefore, consumers' willingness to accept novel foods is associated with a willingness to accept GM-salmon. In conclusion, best-worst scaling showed similar results as did the field choice experiment, thus stated preferences matched revealed preferences rather well; consumer acceptance of GM-salmon is highly dependent on perceived consumer benefits; without them this product will be "dead in the water" in the Norwegian market.

Keywords: Genetically modified food, stated preferences, revealed preferences, diffusion of innovations, benefits

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Abbreviations and Acronyms

Atlantic GM: Genetically Modified Atlantic Salmon

Atlantic GM2O3: Genetically Modified Atlantic salmon with double omega 3 values

Atlantic2O3: Atlantic salmon with double omega 3 values

BW: Best Worst (mentioned in regard to best-worst scaling)

C.B.D.M.: Cue-Based Decision Making

CE: Choice Experiment or Discrete Choice Experiment

CV: Contingent Valuation

CVM: Contingent Valuation Method

DC: Dichotomous Choice

EU: European Union

FMCG: Fast Moving Consumer Goods

FNS: Food Neophobia Scale

FNTS: Food Neophobia Technology Scale

GE: Genetically Engineered

GM: Genetically Modified or Genetic Modification

GMO: Genetically Modified Organism

MLE: Maximum Likelihood Estimation

MNL: Multinomial Logit

NOK: Norwegian Kroner

NZD: New Zealand Dollars

RP: Revealed Preferences

RUT: Random Utility Theory

SD: Standard Deviation

SE: Standard Error

SP: Stated Preferences

T.P.B.: Theory of Planned Behaviour

U.S.: United States

WTA: Willingness to Accept

WTC: Willingness to Consume

WTP: Willingness to Pay

WTT: Willingness to Try

1.0 Introduction

1.1 Context

Ever since the first genetically modified (GM) product got commercialized, namely human insulin produced in *E.coli* (Ullrich et al., 1985), the use of GM in medicine has fostered little public concern, while its use in food production has fostered opposition and concern amongst the public (Bredahl, Grunert, & Frewer, 1998). GM-food is cheaper to produce, offers environmental benefits and can give increased nutritional benefits to consumers, but still it creates uncertainty and scepticism in the minds of consumers (Grunert et al., 2001). GM-crops have reduced the use of pesticides by 293 million kg and therefore reduced the negative environmental impact herbicides and insecticides have by 17.1% (measured by the Environmental Impact Quotient) (Brookes & Barfoot, 2011, p. 34). It still does not seem to create the equivalent of the Green Revolution¹ or the “Blue Revolution”², as several GM-innovations are approved but not available, as retailers think customers will not purchase such products (Aerni, Scholderer, & Ermen, 2011). This scepticism and concern has been shown to vary depending on the type of product that is genetically modified; microorganisms and plants create less concern and negative attitudes than the potential prospect of using GM in animals (Grunert et al., 2001; Sparks et al., 1994).

At the present time (2015) there are over 7 billion people in this world and around 805 million people do not have enough food on their plate (World Food Programme, 2015). Over the last 50 years the proportion of people starving has decreased due to an increase in food production as a result of the Green Revolution, even though the population has doubled. This population growth is likely to continue and by 2050 we are expected to reach 9 billion. Undoubtedly, this will put even more pressure on the world’s food supply (Godfray et al., 2010) and therefore

¹ “The development of modern or high-yielding crop varieties (MVs) for developing countries began in a concerted fashion in the late 1950s. In the mid- 1960s, scientists developed MVs of rice and wheat that were subsequently released for farmers in Latin America and Asia. The success of these MVs was characterized as a Green Revolution” (Evenson & Gollin, 2003).

² “Analogous to the Green Revolution” (Aerni, 2004, p. 329)

more people will starve. New technological advances within the food industry are needed to both preserve the planet and feed the growing population of today. The aquaculture industry especially is in need of using technological advances to progress sustainably as almost all fisheries are used and most of them are overexploited (Godfray et al., 2010). Aquaculture is the fastest growing industry producing animal food products and is in need of a “Blue Revolution” in order to meet the increasing demand of seafood (Aerni, 2004). In the words of the late Norman Borlaug, Nobel Peace Prize winner and the father of the Green Revolution: “I am confident that the Earth can provide food for as many as ten billion people – six times the number who lived when I was born – if, and this is a big if, the world’s societies support a steady stream of both conventional and biotechnology research and political policymakers stay attuned to the needs of rural development”³.

One of the solutions to reducing the pressure on overexploited fisheries is the use of gene-technology, but due to insufficient public investments within biotechnology and genetic modification, developments within this industry have been restrained (Francis, 2008). New technology is available for use within genetic modification of food products, but due to European legislation the implementation of new technology in society is being halted, not only in Europe, but also in countries in desperate need of new technology to feed the poor (Giddings, Potrykus, Ammann, & Fedoroff, 2012). The future of new technological developments rests in the hands of society and these hands must adopt new technology in order for them to succeed (Gupta, Fischer, & Frewer, 2011). So far biotechnological innovations in agriculture have provided the world with benefits, such as economic growth, less environmental impact, healthier products and direct consumer benefits, but the technology has more potential to deliver greater benefits to society (Giddings & Chassy, 2009).

1.2 Environment

Prior research has shown Norwegians to hold highly negative views towards GM (Chern et al, 2003; Grimsrud et al, 2004; Grunert et al., 2000) and is therefore considered to be a relevant country to undertake this research in, especially due to the country’s strong position within aquaculture and salmon-farming. Norway exported salmon worth 43.9 billion NOK in 2014 (Norwegian Seafood Council, 2015) and produces the largest amount of farmed Atlantic salmon in the world (Cermaq, 2014). This makes Norway arguably the most suitable country

³ScienceHeroes 2010

in which to test the research questions that drive this thesis. Additionally, I am a Norwegian citizen and have contacts within the seafood industry, which has enabled this research to be undertaken at a fish shop and therefore extract valid results from a real-market context in terms of consumer preferences for GM-salmon.

1.3. Research Gap

Until now there has been no animal-derived food product anywhere close to reaching the market, but AquaBounty's transgenic salmon is close to becoming a reality in society and the marketplace, perhaps during 2016. It will be the first animal available for human consumption that has been created using genetic engineering; however very little is known about how consumers will react to such products in the supermarket.

There have been several studies that have looked at consumer attitudes and adoption intentions towards GM-foods (e.g. Bredahl, 1999; Chern, Rickertsen, Tsuboi, & Fu, 2003; Gaskell et al., 2010; Grimsrud, McCluskey, Loureiro, & Wahl, 2004), and GM-animal products have gained universal negative reaction in surveys on consumer opinion (Grunert et al., 2001; Sparks et al., 1994). However, no one has studied both stated intentions and actual revealed behaviour in regards to animal-derived GM-food products, such as salmon. It is possible that the benefits related to GM-salmon (e.g. fewer resources used in production and less environmental harm than farmed salmon – because they will be raised on land rather than in sea cages) are not enough to affect consumers in their purchasing decision process as these benefits might be seen as more beneficial to producers than to end-consumers. Will more consumer related benefits, such as a lower price and increased nutritional values, overcome consumers' negative associations with GM-foods and impact their adoption process? Findings from Gaskell et al. (2004) and Knight, Mather, Holdsworth, and Ermen (2007) support this theory that the presence of a consumer benefit might cause GM-foods to be accepted to a greater extent than previously assumed. There are very few studies that have researched the role of consumer benefits in the context of GM-foods, and especially not when using a real purchasing situation with an animal-derived GM-product.

This research therefore sets out to gain an understanding of (1) how consumers will react to GM-salmon, likely to be the first genetically engineered animal food product that will be available for consumption; (2) What role consumer benefits may have in speeding adoption of GM animal products by providing relative advantage (Rogers 2003); (3) How people's

willingness to try novel foods may affect the adoption process of GM-salmon. This research therefore sets out to answer the following research questions:

- *What effect will the presence of benefits to consumers have in the adoption process of GM-salmon?*
- *To what extent do stated preferences match revealed preferences in regard to consumer adoption of GM-salmon?*
- *Does underlying fear of new foods (as identified by the psychological construct 'food neophobia'), have any impact on consumer adoption of GM-salmon?*

1.4 Theoretical Framework

In order to relate the current research to existing knowledge and theories on the adoption process of new products, Rogers' Diffusion of Innovations (2003) will provide a theoretical framework for this study. Research looking at consumer attitudes and behaviour towards GM-food will be discussed in the light of this framework, as well as implications that this research may have in regard to the adoption of GM-salmon.

1.4.1 The Diffusion of Innovations

Everett M. Rogers' seminal work, "The Diffusion of Innovations" (2003), was based on observations made by Ryan and Gross (1943) regarding adoption of hybrid corn by farmers in the US state of Iowa. Rogers' theory has inspired a vast amount of literature building on his work, covering all manner of innovations and their adoption by both producers and consumers. This theory is one of the most cited works on Google Scholar, currently running at more than 60,000 citations (62,527), more than twice as many as Darwin's "Origin of Species"! The controversy surrounding GM-foods has been explained in terms of Rogers' theory (Mather et al., 2011) which provides a good framework to understand how GM-foods can possibly be adopted, or rejected, by consumers.

Diffusion is defined by Rogers (2003) as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). Furthermore, he describes five main characteristics an innovation might hold that will affect its adoption rate. *Relative advantage* is the benefit or characteristic that a product or

service has that makes it superior to other products. The most important advantage is that people believe that it is advantageous to them, not that it holds several tangible benefits over other similar products. *Compatibility* refers to the characteristics of an innovation that are in line with the values and norms within the society it will be adopted in. These norms can hinder certain innovations from being adopted and therefore hinder change. Higher compatibility leads to a faster rate of adoption. *Complexity* refers to how difficult an innovation is to use in the minds of the end-user and how easily (or not) they understand the innovation itself. Lower complexity will lead to a faster rate of adoption. *Trialability* concerns how easy it is to try out the innovation; innovations that are easy and safe to try, will lead to less uncertainty and therefore a faster adoption rate. The last characteristic of an innovation is its *observability*, which refers to how easy it is to see what results or consequences adopting the innovation will have.

1.5 AquaBounty's Transgenic Salmon

The aim of this research project is to investigate the role that clearly stated consumer benefits may play in the adoption process in regard to an animal-derived GM food product, namely AquaBounty transgenic salmon. AquaBounty Technologies is one of the leading actors within Salmon-biotechnology and research, and have since 1989 studied transgenic salmon and growth possibilities in that area. In 2010 the US Food and Drug Administration (FDA) concluded that the transgenic salmon had no negative effects on the environment and was safe for consumption. Two years ago (2013) AquaBounty were granted authorization by Environment Canada to start producing salmon eggs for sale in the market (AquaBounty Technologies, 2015).

AquaBounty's molecular modification, which revolves around adding a gene from the Chinook salmon and DNA-fragments from the ocean pout, enables their salmon to grow twice as fast as conventional salmon, which results in decreased production cycles and increased productivity. Additionally, the shorter production cycle decreases the amount of feed required by 25 % (Tibbetts et al., 2013). The DNA-fragments from the ocean pout are so-called 'anti-freeze' genes which enables growth hormones to function year round (Bremer, Millar, Wright, & Kaiser, 2014), thus AquaBounty salmon can reach marketable size in about half the usual time and create a continuous supply of salmon (Fletcher, Shears, Yaskowiak, King, & Goddard, 2005). Their product is produced in land-based tanks, posing no threat in regards to escaped salmon, feed pollution in the sea or effects from the use of antibiotics or drugs, which

are some of the main downsides to farmed salmon, especially in Norway. Farmed salmon reproducing in rivers is also a problem in Norway as it harms the wild population of salmon, trout and char. As all of AquaBounty's transgenic salmon are female and sterile, this potential risk is eliminated.

Nevertheless, GM-food products seem to provoke a lot of negative attitudes in today's society, regardless of its potential benefits, as will be discussed in the following literature review. An example of these negative attitudes can be seen in the first major news story concerning AquaBounty's GM-salmon in Norway, where it got the headline "Frankenfish"⁴. Whether or not GM-salmon can move away from this nickname and negative attitudes that might exist in people's minds, remains to be seen.

1.6 Methodology

This research uses a quantitative approach to meet the objectives of the study, using an experimental design. The design consists of two main methods within discrete choice modeling, namely best-worst scaling and a field choice experiment. Additionally, a Food Neophobia Scale (FNS) was added to investigate what effect consumers' willingness to try novel foods has on the adoption of GM-salmon.

1.7 Structure of the research

This first chapter has covered the context in which this research will be conducted, including the product in focus, and defines a research gap. Further, Diffusion of Innovations has been introduced as a theoretical framework to help understand the diffusion of GM-foods and thus give implications applicable in marketing science.

The following chapter will review current literature on the subject of GM-foods. It will start with a focus on the benefits and risks associated with GM-foods, discussing how this can affect attitudes and consumer behaviour. The second section of the literature review discusses consumer knowledge and fundamental attitudes and values that might affect their adoption or rejection of GM-foods. This will highlight how negative consumer attitudes towards gene technology, and terminology associated with it, can result in aversion towards GM-foods, thus slowing down the rate of diffusion. The literature review will further discuss research on consumers' willingness to pay for and accept GM-foods, and the possible variance in results obtained from such studies. This will hopefully show the strength of the method chosen for

⁴ Svendsby & Haugan 2013

this research. This chapter will end with a conceptual framework that shows how the four hypotheses underlying this research were derived.

The third chapter discusses the methodology used in this research to test the research hypotheses. It will start with the purpose of this study, as well as the basis for ethical approval and justification for the methodology chosen. This methodology will then be further explained, discussing the strengths of it compared to other similar methods of research. Consumer evaluation literature will then be discussed, with an additional focus on the evaluation of innovations, such as GM-salmon.

The fourth chapter will discuss the research approach, explaining the procedures used for data gathering and how these measurements are made. Some challenges experienced during this research will then be outlined, together with a description of the sample used.

The fifth chapter will discuss the data analyses carried out and the overall results from the field choice experiment, best-worst scaling and the Food Neophobia Scale (FNS).

The last chapter will then discuss how the results of this study correlate with the four hypotheses. This chapter will end with conclusions from the research and implications for AquaBounty and marketers, in addition to limitations and suggestions for further research within the domain of consumer adoption and attitudes towards GM-foods.

2.0 Literature Review

2.1 Public Response to Genetically Modified Food

Genetically modified products provide several benefits for consumers as well as organizations, both financially and environmentally, and are considered by experts to be just as safe, if not safer, than non-GM products (Bredahl, 1999; König, Kleter, Hammes, Knudsen, & Kuiper, 2004).

The birth of genetic engineering (GE) started with Berg, Cohen and Boyer's (Cohen, Chang, Boyer, & Helling, 1973) work on creating recombinant DNA-molecules and thus the first GE-organism was created. Boyer further collaborated with other scientists to develop the first commercialized GM-product, namely human insulin (Ullrich et al., 1985), which has brought enormous benefits to Type 1 diabetics worldwide. A few years later the first GM-food product was ready for human consumption, a cheese made with recombinant chymosin (Flamm, 1991). Since then, the great majority of the world's cheeses have been produced using recombinant chymosin instead of rennin extracted from new-born calf stomachs (Demain & Vaishnav, 2009). In the mid-90s the genetically engineered soybean, glyphosate-tolerant soybean — often called Roundup Ready — got introduced (Padgett et al., 1995), which gave farmers improved weed control as they could spray weed over the soy crops without them dying, and at the same time getting rid of weeds. Bt-corn, or maize, also reached the market in the mid-90s and is genetically modified to resist and kill pest insects (Saxena, Flores, & Stotzky, 1999).

The Research Directorate of the EU summarized 81 scientific studies on the safety of GM, and found none of them to show any evidence of harm (Paarlberg, 2006). The Royal Society of Medicine (Key, Ma, & Drake, 2008) supports this by arguing that “Foods derived from GM crops have been consumed by hundreds of millions of people across the world for more than 15 years, with no reported ill effects” (p. 292). In Europe, the adoption rate of GM-foods has been much slower than in other parts of the world, regardless of numerous safety assessments providing evidence for the safety of the technology (König et al., 2004). This

slow adoption rate is seen as a result of the vast opposition towards GM-foods in Europe (Key et al., 2008).

Organizations within the biotechnology section see GM-food holding several benefits, such as low costs, increased functionality and better quality (Gaskell et al., 2004). These expert opinions are not shared by the general public as they show an overwhelming negativity and uncertainty towards GM-products, especially GM-foods (Bredahl, 1999; Gaskell et al., 2004; Gaskell et al., 2010). Findings from Gaskell et al. (2004) show that around 10200 respondents (60 %) of their sample of 17000 respondents from 17 different European countries see no benefits with GM.

While the use of gene technology in the development of medicine and other health care products has fostered a positive response amongst the public, the same cannot be said for its use in food products (Bredahl, Grunert, & Frewer, 1998). Given this negative perception of GM used in food production, a vast amount of literature has arisen during the last 25 years or so, setting out to discover what influences and determines public acceptance and rejection of GM-food. Some of this literature will now be discussed and was chosen based on its influence on marketing science and relevance in the light of the focus of this study.

2.2 Benefit and risk perception

The benefits and risks associated with an innovation are mentioned by Rogers (2003) as being important in the decision process. In this process the consumer seeks and processes information for the purpose of becoming more certain about the potential benefits and risks (advantages and disadvantages) associated with the innovation. As an innovation needs to have benefits that exceed those currently available in that category, an innovation lacking superior benefits is close to being an oxymoron (Gaskell et al., 2004), as it does not hold the main characteristic of an innovation.

Kahneman's (2011) book, "Thinking, Fast and Slow", explores the way two different systems control the way we as human beings think and how impressions can affect our behaviour and way of thinking. System one is the fast thinking system, where little effort is needed, such as looking at a picture of a screaming woman and therefore noticing that she looks mad. System two is the slow thinking system, where a lot of effort and concentration is needed, such as figuring out what the answer to 17×24 is. Both systems work together in which system one creates options for system two, such as 'impressions, intuitions, intentions and feelings' (p. 24). If approved by system two, these feelings become beliefs and then turn into action.

Kahneman (2011) states that “a risk-averse decision maker will choose a sure thing that is less than expected value, in effect paying premium to avoid the uncertainty’ (p. 273). Consumers who are hesitant towards GM-food due to their feelings established via system one and two, might chose a regular non-GM product to avoid the risk of the uncertain.

Most people in today’s society evaluate risk based on their intuition, called their risk perception, and it is therefore important for institutions involved in the promotion of new technology to understand what creates these perceptions and how people evaluate risk (Slovic, 1987). Rogers (2003) also mentions the importance of taking consumers’ perception into account and not just focusing on the experts’ perception of the innovation in order to avoid the pro-innovation bias⁵. After all, consumers are the ones deciding on the future of innovations.

Studies of risk and benefits associated with hazards have revealed that there is an inverse relationship, i.e. more benefits equals less risk, and more risk equals less benefit (Alhakami & Slovic, 1994; Starr, 1969). This relationship has been shown to be reliant on affect, meaning perceptions of risk and benefit are affected by how people feel about a technology; this implies that if people feel good about it, benefits are considered to be greater than risk, and vice versa (Slovic & Peters, 2006). The inverse relationship between risk and benefits described is called the ‘affect heuristic’ and has been shown to be used as a judgment method when evaluating risk, including when people have little time to make their judgement (Finucane, Alhakami, Slovic, & Johnson, 2000), as is the case in purchasing decisions of fast moving consumer goods (FMCG). The ‘affect heuristic’, a mental shortcut, can influence Kahneman’s (2011) fast ‘system 1’ mentioned. In the context of risk, the affect heuristic is beneficial to as “using an overall, readily available affective impression can be easier and more efficient than weighing the pros and cons of various reasons or retrieving examples from memory, especially when the required judgement or decision is complex or mental resources are limited” (Slovic, Finucane, Peters, & MacGregor, 2002, p. 332). Slovic (1987) identified two judgement-dimensions, namely “unknown risk” and “dread risk”, in which the latter is claimed to be the most substantial factor explaining perceived risk (Townsend & Campbell, 2004). Unknown risk refers to the degree to which hazards are seen as new and unknown,

⁵ “The pro-innovation bias is the implication in diffusion research that an innovation should be diffused and adopted by all members of a social system, that it should be diffused more rapidly, and that the innovation should be neither re-invented nor rejected” (Rogers, 2003, p. 106).

while dread risk refers to the absence of control and potential fatal or catastrophic consequences (Slovic, 1987).

The vast majority of opposition towards GM is seen as a consequence of the misinterpretation of risks involved in the technology (Mather et al., 2011), while others say it is the lack of benefits in the mind of the consumer that causes the opposition (Gaskell et al., 2004). Risk is an accepted consequence when it comes to using medicine for example, while consuming GM-foods is not needed to survive, thus risk is not accepted as there is not any risk in rejecting such products (Mielby, Sandoe, & Larssen, 2012a). Consumers seem to accept more risk if it is on a voluntarily basis, such as smoking cigarettes, while they accept less risk from activities they do not seem to have voluntarily control over, such as pesticides used in food products (Knight et al., 2007).

If consumers fail to see the benefit of a product, the product is not considered an innovation, which impacts the adoption process negatively, and if the risk perception is high, why consume it? In conclusion, as consumers' perception forms their evaluation of risk, they will perceive an innovation as less desirable if it holds more risks than benefits. As GM-food in general holds more objective benefits than risks, it becomes clear that it is their misinterpretation of risk that creates their negative associations with the technology. Thus, information can be a key aspect in creating more positive attitudes towards GM-foods. However, to quote from Gaskell et al's (2004) paper called GM Foods and the Misperception of Risk perception; "...the absence of perceived benefits from GM foods and crops calls into question the relevance of risk communication strategies for bringing about change in public opinion" (p. 185).

2.2.1 Benefit and Risk information

According to Rogers (2003), uncertainty is an outcome of lack of information and therefore providing information can affect the level of uncertainty when an individual has a choice between several alternatives. It is at this level, when consumers are gathering information about an innovation, that they can make a decision in regards to accepting or rejecting the product.

In the earlier days of GM-food technology, products were considered to hold only risks and no tangible benefits for consumers and the environment, while institutions involved in the production were left with all the advantages (Scholderer & Frewer, 2003). To deal with this misperception of benefits and risks in the context of GM-food, it was assumed that if people

understood the benefits similarly to how experts understand them, the result would be acceptance, based on the ‘deficit model’⁶ (Scholderer & Frewer, 2003).

However, the deficit model has its critics who claim that the model does not take different fundamental values (see section 2.3.3) into consideration, and that people vary in their level of risk-tolerance (Hansen, Holm, Frewer, Robinson, & Sandøe, 2003).

Nevertheless, information given about risks and benefits has been proven to affect people’s perceptions (Finucane et al., 2000; Slovic & Peters, 2006), i.e. giving information about benefits of GM-technology can give people a perception of less risk and increase their willingness to consume (WTC) GM-foods (Chern et al., 2003). More information given can therefore increase the level of acceptance as consumers may feel more in control (Boccaletti & Moro, 2000) and therefore decrease their risk perception (Moon & Balasubramanian, 2003). Both stated benefits and perceived risk is shown to have an effect in the acceptance of GM-foods and consumers’ WTC (Onyango, 2004).

However, GM-foods with several benefits does not necessarily mean they will be automatically accepted by consumers, as other factors, such as trust in those giving out information and prior attitudes, impacts consumer acceptance of GM-food (Frewer, Scholderer, & Bredahl, 2003; Lusk et al, 2004) . A good example of how these two factors can impact consumers’ attitudes towards GM-foods, were found in a study by Aerni et al. (2011). The authors used a sample, in Switzerland, with supposedly little knowledge about GM-foods due to an overall ban of GMOs⁷ at the time of their study, which caused their sample to rely on information given from organizations and ‘hearsay’ (p. 830). From the sample, people tended to trust products sold by local people, as it called for a transparent sale, gave them freedom to choose between products themselves, and gave them the opportunity to support local producers instead of industrial ones. This is an example of trust leading to positive attitudes towards GM-foods. In conclusion, the results from Aerni et al’s (2011) study gave evidence towards an overall negative attitude toward GMOs in Switzerland due to lack of information and experience with the technology, but showed more positive attitudes when GM-products were sold with more transparency, thus giving them the option to choose freely.

⁶ “The model refers to technocratic elites who adopted the perspective that the public was in some way ignorant of the scientific “truth” about risk and probability and deemed it desirable to rectify the knowledge gap between the originators of scientific information and its recipients” (Scholderer & Frewer, 2003, p. 126).

⁷ Genetically Modified Organism

It should also be noted that the way benefits are communicated is an important factor for consumer acceptance of GM-foods, as the way people perceive benefits have been shown to affect acceptance of GM-foods (Bredahl, 2001). In this regard, Lahteenmaki et al. (2002) examined how consumers would behave when faced with real product alternatives, with the presence and absence of a health benefit. Their study showed that consumers' negative attitude towards GM-foods did not lead to rejection if they were faced with the real product. Both taste and health benefits had a strong impact on consumer acceptance of GM-foods, regardless of attitude. These findings imply that the way benefits are communicated can impact consumer acceptance of GM-foods, in addition to supporting the importance of non-hypothetical research methods to elicit valid results.

Fortin and Renton (2003) further examined if the presence of added benefits had an impact on consumer acceptance of GM-foods, and found the potential benefit of an 'increased shelf life' had no positive effect on consumer acceptance towards GM-foods (p. 56). The authors suggested that further studies should examine relevant benefits and which trade-offs these benefits uncover. In line with this suggestion, the present study sets out to measure what effect a lower price and double omega 3 values can have on consumer acceptance of GM-salmon, across two different research methods (stated and revealed preferences). It will test whether, in a population with an overall negative attitude towards GM-foods, such products can still be accepted when presented with associated benefits. Thus, this research can test whether consumer attitudes towards GM-foods are a valid indicator of acceptance and actual choice behaviour.

2.2.2 Trust and its impact on benefits and risks

When giving out information about risks, trust, often referred to as credibility, has been shown to be an influencing factor in risk perception (Frewer et al., 1996a; Siegrist, 1999) in addition to being a factor that creates opposition towards GM (Hoban, Woodrum, & Czaja, 1992). Trust can be defined as "the perceived credibility and benevolence of a target of trust (Doney & Cannon, 1997, p. 36).

A person negative towards GM will be less likely to trust someone giving out information about the benefits of their products, while a person with a more positive attitude towards GM, will be more likely to trust such an information source (Frewer et al., 2003).

Due to the lack of knowledge among some individuals and groups within society about GM and the risks and benefits associated with it, people seem to rely on the opinions of experts

and similar sources of information, which makes it hard to accurately process the information received as experts may have differing opinions (Siegrist & Cvetkovich, 2000; Sjöberg, 1998). Due to this lack of knowledge, social trust is used to find those experts who consumers feel they can trust and are in line with their own beliefs (Siegrist & Cvetkovich, 2000). New technology makes it hard, if not impossible, to base judgement on past experience with the activity, and therefore people have to be dependent on experts in whom they can trust in evaluation of risk and benefits (Siegrist, 1999). Social trust is therefore seen as an impacting factor on people's judgement of the risks and benefits of GM (Connor & Siegrist, 2010; Siegrist, 2000).

In order to convince consumers by giving them the right information the source needs to be credible in the mind of the consumer, as he or she receives mixed messages from sources often competing against each other (Huffman, Rousu, Shogren, & Tegene, 2004), such as the media, institutions, experts and opposition. The mass media has reinforced the public's fear of GM-foods (see "Frankenfish") and consequently consumers with fear have more negative attitudes towards GM-foods (Laros & Steenkamp, 2004).

The trust in these sources of communication has been shown to be influential in consumers' perception of risk and therefore perception and acceptance of novel technologies (Eiser, Miles, & Frewer, 2002; Frewer, Howard, Hedderley, & Shepherd, 1999). Trust in institutions affiliated with GM-technology affects benefits in a positive manner and risks in a negative manner, and therefore trust influences consumer acceptance of GM-foods (Siegrist, 2000).

Further comparison with Roger's seminal work (2003) on diffusion of innovations can be made with homophily and heterophily as a basis for explaining the importance of the relationship between people creating the message, and people receiving it. One way of looking at the communication between experts and lay people, is that lay people will trust experts with similar beliefs to their own, as mentioned by Siegrist and Cvetkovich (2000). This is in line with the homophily communication exchange. The other type of relationship can be between heterophily individuals, i.e. experts and lay people with different beliefs, where communication travels vertically.

Regardless of who delivers information, people seem to judge this information based on their prior beliefs through different biases. Siegrist and Cvetkovich (2001) found people to trust negative information to a higher degree than positive information, the so-called "negativity bias" (p. 206). White, Pahl, Buehner, and Haye (2003) examined other explanations for this

negativity bias, and found support for the “confirmatory bias”, i.e. people with prior negative attitudes will trust negative messages more than people with prior positive attitudes (p. 721), in addition to support for the negativity bias. Poortinga and Pidgeon (2004) studied trust in the context of the “Asymmetry Principle” coined by Slovic (1993), which is based on “the fact that trust is easier to destroy than to create reflects certain fundamental mechanisms of human psychology” (p. 677). The authors found support for this principle as “more negative events decreased than increased trust in regulation of GM food” (p. 1484). They also found support for the negativity bias, as people with neither a negative or positive attitude were more affected by negative information than positive.

2.2.3 Summary of perception, information and trusts’ impact on benefits and risk

When seeking information about the advantages and disadvantages of new products, consumers make up their mind based on their own intuition and perception. If they perceive a new technology to bring risk to themselves and society, they will evaluate the disadvantages as greater than the advantages, regardless of whether or not this is a correct perception. Consequently, GM-foods have been viewed by the public as holding more risk than benefits. It is especially this lack of perceived benefits that has created negative associations with gene technology. It seems people misinterpret the risks involved and therefore evaluate the technology negatively.

As consumers seek information about a product prior to purchase, the information given is important in order to change GM’s bad reputation as it can reduce uncertainty and create a better perception of the technology. Animal-derived GM-food products are not available in the market in Norway today, thus it is important to create trust as consumers have no past experience to rely on. Therefore, revealed consumer behaviour and intention towards GM-salmon will give implications of benefit-importance in the adoption process of GM-foods.

Knowledge, fundamental values and attitudes will be discussed in section 2.3. These can be important aspects to discuss in order to understand how consumers get to their decision stage in Rogers’ (2003) Diffusion of Innovations. How does their knowledge about a product, and consequently their attitudes, impact the decision making process? And do values impact this process and shape consumers’ attitudes?

2.3 Knowledge and Attitudes

Findings from Gupta et al's (2011) review of socio-psychological determinants in the context of acceptance of novel technologies states that knowledge is one of the six main determinants of public acceptance. Knowledge is also the first step described in Rogers' (2003) innovation-decision process, namely the stage when people first acquire knowledge about the technology and its function. It is at this stage the product is by some definitions an innovation as people hold little knowledge about the product. It is not the fact that people have little knowledge about a product or service that makes it an innovation, but it is the fact that they did not know it existed. A toaster is not an innovation for people who have heard of it or used it, but it is for people who have not, regardless of when it first got introduced. Individuals gather knowledge through different sources and interpret them differently, and they most often attend to and interpret communication through these sources based on their own attitudes and beliefs, called selective exposure and perception (Rogers, 2003).

Some studies provide evidence towards more knowledge being a determinant of more worry about GM, hence influencing benefit and risk perceptions negatively (Gaskell et al., 2010). In the same study the majority of respondents in Europe stated that they did not find GM-food safe regardless of their level of knowledge, implying that knowledge may not be a variable explaining risk perceptions to a great extent and therefore not be a determinant of acceptance. Providing people with more information, i.e. increasing their level of knowledge, has been shown to be ineffective as their prior attitudes and beliefs are seen to be a stronger determinant of behaviour (Bredahl, 2001; Noussair, Robin, & Ruffieux, 2004).

2.3.1 Attitudes towards GM-foods

Attitudes in the mind of the consumers towards GM-food are said to be formed on the basis of fundamental values instead of knowledge about the technology (Bredahl, 2001). However, knowledge takes several forms, such as subjective and objective, where the relationship between subjective knowledge and values is strong in the context of shaping attitudes (Costa-Font, Gil, & Traill, 2008).

The degree to which knowledge impacts consumer perception and acceptance of GM-food varies across studies, with some showing little effect of knowledge on acceptance (e.g. Bredahl, 2001), while others show a substantial effect of knowledge (e.g. Baker & Burnham, 2001; Lusk et al., 2004). One reason for this might be that knowledge is seen as uni-dimensional, while it should be measured separately based on different kinds of knowledge

(House et al., 2005). Measuring knowledge by including subjective and objective knowledge in one measure, might give unfavourable answers as it gives no implications towards what kind of knowledge affects acceptance.

As subjective knowledge is closely linked with values, and therefore affects attitudes as “values are predetermined knowledge” (Costa-Font et al., 2008, p. 208), fundamental values and attitudes can be said to affect consumer acceptance towards GM-food.

2.3.2 Attitudes, Intentions and Behaviour

There is an overall theme throughout this literature review that concerns consumers’ attitude towards GM-foods and what might affect that attitude, thus leading to acceptance or rejection. It therefore seems highly relevant to discuss attitude, intentions and behaviour literature, to gain an understanding about human behaviour in the market.

Both the theory of reasoned action (Fishbein & Ajzen, 1975) and its extension, the theory of planned behaviour (Ajzen, 1991), have enabled researchers to foresee behaviour based on the relationship between attitudes and intentions in the context of adoption of innovations (Mather et al., 2011) and are hugely cited in the marketing field. However, the correlation between attitudes and intentions leading to purchasing behaviour is not as straight forward as the theory of planned behaviour (T.P.B.) postulates. Hamlin (2010) criticises the position of the T.P.B. used in food research by challenging its main assumption; “multidimensional attitudes reported by T.P.B. research are linked to similar cognitive multidimensional evaluations that are created at the point of sale when evaluations and decisions are actually made” (Hamlin, 2010, p. 90). This is a challenge to the relationship between attitude and purchase-intentions, one of the premises of the T.P.B, a challenge that introduces a new model, Cue-Based Decision Making (C.B.D.M.), which accommodates shopping patterns of the ‘uninvolved food consumer’ (p. 89). Hamlin (2010) used several experimental methods to test the validity of the postulated relationship between attitudes towards ‘abstracted’ cues and assessments of products having the same cues in a non-abstracted ‘contextual’ form (p.90). An example of such a cue could be country of origin vs the product evaluation of wine, and animal of origin vs the evaluation of meat products etc. The experiments showed the predictive validity of the T.P.B. to be flawed when used to “describe low involvement decision situations that are driven by unstructured knowledge at the Point of Sale” (p. 92). The T.P.B. does not take into consideration the environment these decisions are made in, nor the different kinds of products that are evaluated in just a few seconds (FMCG). It can

therefore be argued that there is a weak correlation between intention and actual behaviour within low-involvement decision making, which contradicts the T.P.B.

However, it can possibly be argued that when consumers are making purchasing decisions in regard to GM food products, the fact that they are GM raises the salience of the means of production to a level that results in such products being subject to high involvement processes.

2.3.3 Fundamental values and attitudes

As mentioned earlier, the deficit model builds upon a lack of knowledge being influential in consumers' risk perception of GM-food and therefore more information should close this gap in knowledge. Slovic's (1987) psychometric paradigm in risk perception in relation to hazards, also mentioned earlier, takes into account how risks are judged by lay people as an important determinant in understanding consumer perceptions of risk instead of filling knowledge gaps as a solution to consumer acceptance.

Bredahl (2001) found that fundamental attitudes formed consumers' benefit and risk perception and that these attitudes, especially attitudes concerning nature, technology, food neophobia and alienation from the marketplace, influenced the acceptance of GM-food.

Attitudes towards nature and technology form risk perception associated with GM based on the notion that the technology is seen as "tampering with nature" or "playing God" (Frewer & Shepherd, 1995). This fundamental value that one should not tamper with nature seems to be expressed through attitudes towards different applications of GM, as the technology is seen as more acceptable to use within medicine, plants and microorganisms, than animals (Frewer, Hedderley, Howard, & Shepherd, 1997a; Nayga, Fisher, & Onyango, 2006; Sparks et al., 1994). These negative attitudes towards GM-food products are said to be formed from the top down (Grunert, Bredahl, & Scholderer, 2003), i.e. general attitudes and values impact the evaluation and creation of attitudes to new technology and products.

In Grunert et al's (2001) research on consumer perceptions of GM-food, people rated GM-salmon poorly based on what was modified, i.e. the use of animal material, and especially the risk of GM-salmon being a risk to the eco-system. Additionally, negative implications of faster growth caused participants to rate GM-salmon negatively. These ratings can be traced back to the fundamental values of not messing with nature that people may have. Additionally, other findings suggest that consumers put lower values on GM-products made

from animals, such as meat, than non-meat products, such as oil, which decreases their WTP for animal-GM products (Lusk, Jamal, Kurlander, Roucan, & Taulman, 2005). The authors therefore suggest that "...the so-called "second generation" of biotechnology might be more warmly received by the public than the "first-generation" (p. 38).

Food neophobia, hesitancy to try new food, is one of the top-down attitudes that make people perceive GM-food as something affiliated with risk (Grunert et al., 2003). Neophobics, people that show hesitancy to trying new food, and neophilics, people positive towards new food products, hold two different types of attitudes that impact their willingness to try new and unfamiliar foods (Raudenbush & Frank, 1999). Research within food neophobia has shown similar trends to research measuring people's acceptance of GM-food based on the distance dimension (Grunert et al., 2001), in which people seem to show more neophobic tendencies towards animal products than towards plants (Tuorila, Lähteenmäki, Pohjalainen, & Lotti, 2001).

Another general attitude found to impact people's risk and benefit perception is *alienation from the marketplace* (Bredahl, 2001). This attitude revolves around people's trust in the marketplace and the benefits actors within it bring to consumers (Grunert, 2002), where alienation happens based on 'feelings of separation from the norms and values of the marketplace' (Allison, 1978, p. 6). This feeling of separation evolves especially when the marketplace becomes too technical and as a result, people feel alienated from it (Chen & Li, 2007).

Considering GM-food technology can be seen as highly technical for people in the market, alienation can occur and therefore affect consumers' perception of risk and benefits (e.g. Bredahl, 2001). Rogers (2003) considers products that are too complex to have a slow rate of adoption as they are too difficult to understand, which might be the case for GM-food. Complexity therefore seems to both affect the rate of adoption and the evaluation of risks and benefits, negatively.

2.3.4 Summary of literature regarding knowledge and attitudes towards GM-food

The relationship between GM and people's knowledge level seems ambivalent. Even though there is a lot of information out there putting GM in a good light, consumers with a substantial amount of knowledge about GM still may evaluate it negatively. Knowledge is therefore not a determinant of acceptance, but rather a vessel that keeps information stored. Information gets

evaluated based on fundamental values and norms of society, and therefore GM is evaluated negatively.

The vast amount of opposition towards GM might be a consequence of fundamental attitudes influencing how information is stored. The main examples of these fundamental attitudes are attitudes concerning nature, technology, food neophobia and alienation from the marketplace.

The general value of not tampering with nature seems to create more negative evaluations of animal-derived GM-food products than plant-derived GM-food products and lower willingness to pay. In the same manner, people hesitate to try animal-derived GM-foods, except cheese, where few know that a GM enzyme is commonly used in its production, while they have no trouble using medicine created using GM. GM-foods seem to be too complex to comprehend in the marketplace, and therefore negative attitudes might occur. If an innovation is too complex, people might be hesitant to adopt it.

In section 2.4, studies investigating the monetary value consumers put on products will be discussed in the light of GM-foods. As my research will look into the role price plays, in addition to attributes, in consumer behaviour, looking into earlier research measuring similar values can give guidance regarding what to expect in the current research.

2.4 GM-food Valuation

Several studies have looked into consumers' willingness to pay (WTP) and willingness to accept (WTA) GM-products (Boccaletti & Moro, 2000; De Steur et al., 2010). Well over 100 WTP-estimates have been collected over the last 15 years or so, and this is one of the most researched topics within agricultural economics (Colson & Rousu, 2013). The main difference between these two measures is that WTP is the amount a respondent is willing to pay for an item, while WTA is the amount a respondent is willing to sell his or her item for. Over the years WTA has been shown to be much higher than WTP, and both measures seem to elicit high price premiums due to hypothetical research methods and weak samples (Horowitz & McConnell, 2002). This observation is supported by a meta-analysis of GM-food valuation studies done by Lusk et al. (2005), who found that in relation to measured premiums for non-GM food: 1) real premiums are lower than hypothetical premiums; 2) WTA measures elicit higher premiums than WTP measures; 3) in-person valuation-methods elicited lower premiums than methods done via mail or telephone. The authors sum up their findings in regard to consumer valuations methods, by stating that "It seems appropriate to suggest that non-hypothetical valuations should be preferred over hypothetical..." (p. 41).

A meta-analysis of willingness to pay/accept studies (Costa-font et al., 2008) found that regardless of the technique used to analyse consumers' WTP/WTA, respondents will always choose non-GM food until they have to pay a premium for the products. Additionally, the authors found substantial differences between countries, especially between Americans and Europeans, as Americans were found to be more positive towards GM-foods than Europeans.

In Chern et al's (2003) multiple-country assessment of Norway, Japan, Taiwan and USA, Norwegians were found to be the most sceptical towards GM-food. More than 80 % of the Norwegian sample would choose non-GM salmon over GM/GM-fed salmon, whereas around 60-68 % of the American sample favoured non-GM salmon over GM/GM-fed salmon. The Norwegians were also willing to pay a higher premium than the Americans for non-GM salmon, 67 % over the amount requested for GM-salmon in the Norwegian sample and 53 % in the American sample.

Similarly, Grimsrud et al. (2004) found that among a sample of 381 Norwegians, a discount of 37 – 63 % on GM-bread would be needed in order for them to choose GM-bread over regular bread. However, it should be mentioned that based on the high GDP in Norway and the low price for bread, these results may not be comparable with research using higher priced items, such as salmon. Consumers might need more benefits in order to choose a GM-product that is considered cheap in its regular form, while more expensive products could require fewer benefits for consumers to choose the GM-option. On the other hand, GM-salmon, a more expensive product than bread, might also go against fundamental values and attitudes held by consumers and therefore cause rejection regardless of benefits, such as price.

A thorough review by Colson and Rousu (2013) summarizes the most supported, and perhaps relevant, unresolved issues concerning consumer preference towards GM-foods. They found WTP-estimates to vary due to “different methods used by researchers to collect data (surveys vs. experiments), different products under consideration (i.e. type of GM), and different participants (e.g. Europeans vs Americans)” (p. 6). The current research utilizes both hypothetical and non-hypothetical research methods amongst a sample from a country that is reputed to be highly negative towards GM. Therefore the results can give indications in regard to whether Norwegians really are as negative towards GM as prior research suggests (Chern et al., 2003; Grimsrud et al., 2004).

In closure, WTA and WTP measurements do not seem to give results reflecting consumers' actual buying behaviour and therefore GM-foods might have gotten a reputation that does not

reflect the truth. Whether this truth is better or worse than measured through WTA and WTP, remains to be seen.

2.4.1 Summary GM-food valuation

There has been a substantial variance in results when studying consumers' willingness to pay (WTP) and willingness to accept (WTA) GM-products. Regardless of method used, respondents seem to choose non-GM foods until they have to pay a high price for them compared to GM-products. In order to extract valid results to measure consumers' real WTP/WTA, a method measuring consumers' stated and revealed price preferences for GM-food is needed. This can provide implications for adoption behaviour in the future, as well as the validity of WTP/WTA measurements.

It is very rare for researchers to measure actual purchase behaviour in a real market rather than just relying on stated purchase intentions. Powell, Blaine, Morris, and Wilson (2003) measured consumers' purchasing preferences for genetically engineered (GE) BT sweet-corn compared to regular sweet corn and found that more people bought GE-corn compared to regular sweet corn. The data also suggested that perceived benefits and trust positively impacted the acceptance of GE-corn. Mather et al's (2011) comparison of revealed preferences (RP) and stated preferences (SP) in regard to organic, ordinary and GM fruit, found that the RP for GM-fruit increased when it had a clear consumer benefit (spray-free), as well as a lower price. The SPs gathered in the same study showed less acceptance towards GM-fruit perhaps due to social desirability, and therefore SP-methods may give an unrealistic portrayal of the way consumers will act in the marketplace.

2.5 Conceptual Framework

In order to produce data that can either support or refute evidence in the literature discussed in this chapter, a set of testable hypotheses will now be derived.

1. The role of benefits

Benefits seem to play an important role in the acceptance of GM-foods, and are often researched across different methods of study. Modification is associated with something being changed for the better, enhancing the performance of whatever it may be, making it superior. The public do not see benefits being greater than risk and the absence of clearly stated benefits seem to be GM-foods' 'Achilles heel' (Gaskell et al., 2004, p. 193). In this regard, several studies have researched the effect benefits have on consumer acceptance of GM-foods

in which results suggest that attached benefits, such as health benefits and increased nutritional values (Bredahl, 1999; Kuznesof & Ritson, 1996), less pesticides (Chern et al., 2003), better taste (Lähteenmäki et al., 2002), benefits to the environment and the world (Lusk et al., 2004) and the absence of chemical sprays and a lower price (Knight et al., 2007; Mather et al., 2011), can change the value people put on GM-foods, thus leading to increased acceptance.

Bredahl (1999) tested consumer reaction to the concept of genetically modified yoghurt containing no fat and a smoother texture, and GM beer having less environmental impact and a lower price. These benefits were “highly appreciated” (p. 352) and especially relevant consumer benefits that reduced the level of risk associated with the GM-product. The absence of consumer benefits is seen as one of the reasons for the consumer resistance towards GM-foods, according to Burton and Pearse (2002), who found nutritional and health benefits to increase market acceptance of GM-beer. In Chern et al.’s (2003) study on WTP and consumer acceptance of GM vegetable oil, tofu, and salmon in Norway, Japan, Taiwan and the US, clearly stated benefits, in this case reduced use of pesticides, increased the level of acceptance. Additionally, Norwegians (relevant to this study) were more willing to purchase GM-foods if the item had increased nutritional values, demonstrating the importance of tangible health benefits. Consumer health benefits, like increased nutritional values, have previously been studied and found to have a positive impact on consumer acceptance of GM-food (Frewer, Howard, Hedderley, & Shepherd, 1997b; Lähteenmäki et al., 2002), unlike benefits to the producer (e.g. Burton & Pearse, 2002).

Fortin and Renton (2003) found that a longer shelf life for GM bread and milk did not have any positive affect on consumer acceptance, as it might seem unnatural, i.e. having a reverse effect. Fortin and Renton’s work confirmed earlier research of Frewer, Howard, and Shepherd (1996b) who found that health benefits had a greater impact than a lower price and/or an increased shelf life. They argue that “likelihood of purchase of genetically engineered products may be linked to the perceived ‘naturalness’ of the products; “If food produced by genetic engineering is seen to be ‘unnatural’ by the public, consumer acceptance may be low” (p. 66).

These findings are in line with Roger’s (2003) ‘relative advantage’ as a characteristic that increases the rate of innovation adoption. He states that “It does not matter so much whether an innovation has a great deal of ‘objective advantage’. What does matter is whether an individual perceives the innovation as advantageous” (p. 15). Thus, the degree to which

consumers evaluate benefits as advantageous to themselves can increase the acceptance of GM-foods.

Due to overall negative attitude towards GM-foods, especially in Europe (Gaskell et al., 2006; Grimsrud et al., 2004), and the claimed effect of clearly stated consumer benefits on increasing consumer acceptance (e.g. Knight et al., 2007), the following hypothesis is proposed:

H1 - *Clearly stated consumer benefits will lead to greater acceptability of genetically modified salmon in Norway*

2. Hypothetical Bias

Even though SP techniques are often used to measure consumer behaviour, some literature in the context of GM-food valuation and acceptance, and in other areas, provides evidence for SP choice experiments not reflecting actual purchase behaviour in the real market. List and Gallet (2001) did a meta-analysis on actual and hypothetical stated values and found respondents to exaggerate on their preferences in a hypothetical environment. Lusk et al. (2005) found similar results in their meta-analysis of GM-food valuation studies, where non-hypothetical valuation tasks elicited premiums for GM-food 40 % lower than hypothetical tasks, and they argue for non-hypothetical methods to be preferred over hypothetical ones. In their particular study, non-hypothetical valuation describes a research method that is done in a real situation, mainly auctions, which can be argued to not reflect a real purchasing situation as auctions are not a common way to purchase food, while hypothetical valuation describes a method that is done in a hypothetical situation, mainly conjoint choice/ranking, payment card and various different dichotomous choice (DC) methods.

Colson and Rousu (2013) also found several drawbacks in regard to measuring consumer perception and WTP for GM-foods, and focused especially on its hypothetical nature to be its biggest shortcoming, and argued for the use of more research in actual markets to better reveal consumer preferences for GM-foods. This 'hypothetical bias' seems to be one of the main arguments against SP elicitation methods, in which respondents overstate or understate, depending on the circumstances, their WTP and therefore it can affect the validity of the results gathered (Murphy, Allen, Stevens, & Weatherhead, 2005). This overstatement-effect is said to exist due to the absence of economic commitment (Murphy & Stevens, 2004). The only study to my knowledge that has studied both SP and RP in the context of GM-foods is Mather et al. (2011), where results indicated a more negative attitude towards GM-foods in

the discrete choice experiment (SP) than in the field choice experiments (RP), further indicating the need for validation and improvement of stated preferences techniques to predict actual market behaviour.

Due to the substantial amount of literature casting doubt on the validity of SP-measurements and the use of such methods in GM literature, the following hypothesis is proposed:

H2 - Stated preference measures will fail to provide an accurate measure of consumer behaviour regarding GM food in a real market situation

3. Alternative Methods for Measuring Stated Preferences

As mentioned, SP-techniques are often used in GM-food literature and over 100 estimations in the past 15 years or so have focused on consumer value-estimation of GM-foods (Colson & Rousu, 2013). Willingness to accept (WTA) and willingness to pay (WTP) are the main methods used in this context, and often obtained via stated preference (SP) techniques. Hypothetical SPs have been found to be reflected in RPs for WTP (Loureiro, McCluskey, & Mittelhammer, 2003) and are often utilized when studying consumer acceptance of GM-foods. There are many different SP-techniques used to gather consumers' WTP for GM-products, and some of the main ones will now be discussed.

A method frequently used when measuring WTP is a dichotomous choice (DC) version of contingent valuation. McCluskey, Grimsrud, Ouchi, and Wahl (2003) used a semi double-bounded DC method in which respondents were asked if they were willing to buy GM-noodles offered at the same price as regular noodles, and then a follow up question, if the respondent answered no, asking if they would buy it based on a proposed discount, set at one of the following levels: 5%, 10%, 25%, 40%, or 50%. In a single-bounded DC, only one question is asked. McCluskey et al. (2003) argue that a semi-double-bounded model better fits in when products are offered with a cost-reduction as an attribute. Grimsrud et al. (2004) utilized the same DC method and found their sample of Norwegians to need a discount of nearly 50 % on average in order to buy GM-bread. However, as this thesis sets out to measure trade-offs between different product attributes, a choice method that can measure consumer responses towards several attributes is needed.

One popular method for eliciting WTP-estimates for products with different attributes (benefits) is conjoint choice analysis, or discrete choice experiments (CE). Lusk, Roosen, and Fox (2003) used a CE mail survey asking respondents what type of steak they preferred based

on different price variations, attributes and the presence or absence of GM-corn used in feed in Europe and the US. Results showed that Europeans were more resistant towards GM than Americans, and the authors claim CE to be a valid measurement due to its root in random utility theory RUT, which predicates that the chance of a consumer choosing one product over another is based on the utility of that product in comparison to the utility of the other products available (Morrison, Blamey, Bennett, & Louviere, 1997), and its ability to extract trade-offs amongst several attributes. Burton, Rigby, Young, and James (2001) studied consumer WTP to avoid GM-foods and they also argue for the ability of CE to break down the research item into separate attributes (trade-offs) and therefore enabling analysis of these attributes and its impact on consumer preferences.

Best-worst Scaling is a discrete choice method developed by Louviere and Woodworth (1991) due to the limitations of other scaling methods, such as the restricted number of stimuli one can use and the demand for incomplete block designs (Finn & Louviere, 1992) in which the block size is not big enough for the number of items in the design. Best-worst scaling works around these limitations by asking respondents to choose their most preferred (best) and least preferred (worst) item amongst several items on a continuum of preference, giving the researcher more information than only best or worst questions (Flynn, Louviere, Peters, & Coast, 2007), and enabling him/her to create individual-level scales (Finn & Louviere, 1992). It is also seen as easy to undertake for respondents, an easy way of gathering extensive information about respondents' ranking preferences and a method that takes advantage of the way people naturally choose between several items far apart (Marley & Louviere, 2005). Lastly, but perhaps most importantly due to the focus on benefits in this study, best-worst scaling forces respondents to make trade-offs between benefits and therefore reveal the degree of importance of each benefit (Cohen, 2003).

Mielby, Edelenbos, and Thybo (2012b) examined the use of best-worst scaling, ratings and a real choice task to predict adolescents' choice of snacks. After completing best-worst scaling and the rating task, participants were followed to another location and asked to choose between the 21 snack alternatives described earlier. The results showed best-worst scaling to be a good predictor of real food choices. However, as the participants were asked on a piece of paper which product they would choose in the real choice task, with snacks on display, it can be argued that the real choice task did not reflect a real choice situation, especially due to the lack of economic commitment.

Louviere, Lings, Islam, Gudergan, and Flynn (2013) compared results from a best-worst method and RPs where they asked respondents to state one destination that they were most likely to visit (best) and one they were least likely to visit (worst) in 10 sets with three destinations in each set. To compare this best-worst method with RP, they asked the respondents to state how many times they had visited these locations during the prior year. The results suggested that the best-worst measures were comparable to the RP gathered, thus predicting real behaviour well.

Best-worst scaling has never been used when studying stated consumer preferences for GM-foods, and it therefore seems valuable to use as a research method due to its strength in measuring the importance of attributes across several items. Therefore, the following hypothesis is proposed:

H3 - Stated preferences measured using best-worst scaling will provide an accurate measure of consumer purchasing behaviour regarding genetically modified food in a real market situation

4. Food neophobia

There is evidence for consumer attitudes being an impacting factor on consumer acceptance of GM-foods (e.g. Bredahl, 2001). The attitude a person has in regard to an innovation forms his or her evaluation through the innovation-decision process and is "...an object that predisposes his or her actions" (Rogers, 2003, p. 175). One of these predispositions that form attitudes can be people's tendency to avoid new and novel foods, their 'Food Neophobia'.

The Food Neophobia Scale (FNS) was developed by Pliner and Hobden (1992) due to its potential usefulness to "conceptualize neophobia as a personality trait, a continuum along which people can be located in terms of their stable propensity to approach or avoid novel foods" (p. 107). People with high levels of food neophobia, termed neophobics, are hesitant to trying novel foods, while people with low levels, termed neophilics, are more willing to try novel foods (Raudenbush & Frank, 1999). Thus, the scale has fairly often been used to measure WTT and attitudes towards GM-foods.

Using means-end chain theory⁸ for studying consumers' cognitions towards GM-foods, Bredahl (1999) found that food neophobia may affect the creation of attitudes and therefore

⁸ ...a way to position products by associating means (the physical aspects of products) with advertising that seeks to tie the consumption of products to the achievement of desired ends (valued states) (Gutman, 1982, p. 60)

influence the acceptance of GM-foods. Two years later, Bredahl (2001) studied consumer attitudes and its effect on purchase intentions towards GM-foods, using, amongst other attitude measurements, selected items from the FNS. She found risk and benefits associated with GM to be highly affected by level of food neophobia amongst consumers.

Tuorila et al. (2001) examined food neophobia amongst the Finns using an altered version of the original FNS that reduced the cognitive complexity for respondents. Results showed that food neophobia reduced WTT several novel foods, including GM-tomatoes.

GM-salmon is undoubtedly a novel food product as it has not been available for consumption and therefore consumers cannot base their rating on prior experience. Based on the assumption that consumers' fundamental values and attitudes, e.g. food neophobia, can affect their preferences for novel foods like GM-salmon, the following hypothesis is proposed:

H4 – People with low food neophobia express increased willingness to try GM-salmon

3.0 Methodology

3.1 Introduction

The second chapter discussed relevant literature and outlined a conceptual framework that was derived from that literature. This chapter begins with a purpose statement explaining the goals of this research, as well as information regarding the ethical aspect of this study. A justification section then follows, along with two more explanatory sections on justification of methods used.

In this thesis, a quantitative approach is used to gather data to test the proposed hypotheses, consisting of two different methods of study. Best-worst scaling has been utilized to extract stated preferences from respondents, while a Field Choice Modeling Experiment was set up to extract revealed preferences from a different sample of respondents, but in an identical shopping situation. Additionally, a food neophobia scale was used to study the relationship between this psychological construct and stated consumer responses to GM-food.

3.2 Purpose

The purpose of this study is to determine: **(a)** what effect will the presence of clearly stated benefits have on the adoption process of GM-salmon?; **(b)** to what extent do stated preferences match revealed preferences about consumer adoption of GM-salmon?, and **(c)** whether the underlying fear of new foods has any impact on consumer adoption of GM-salmon?

3.3 Ethical approval

This research was granted approval by the University of Otago Human Ethics Committee following a Category A application (see appendix A for more information). Therefore this study was conducted according to the guidelines set by the Human Ethics Committee at the University of Otago. In particular, respondents were guaranteed confidentiality and anonymity. In addition, the Ethics Committee approved the element of deception that is inherent in the experimental design for the RP study. Respondents were made aware of the

deception, and were given an apology and explanation of the nature of the experiment before money changed hands.

3.4 Justification of Methodology

Literature regarding consumer acceptance and attitudes towards GM-food mainly shows a negative tendency towards purchasing such products, and GM-foods seem undesirable to consumers, especially in Europe (Bredahl, 1999; Gaskell et al., 2010; Grunert et al., 2003). Most research on these topics adopts a survey or focus group approach to measuring attitudes, and consumer valuation studies on WTP/WTA are often hypothetical ones (Lusk et al., 2005). In contrast, I have used best-worst scaling to retrieve likely purchasing behaviour (stated preferences) and a field choice modeling experiment to retrieve actual purchasing behaviour (revealed preferences) of GM-food products; thus, this research can give valuable results in regards to whether attitudes and intentions are a direct antecedent of purchase behaviour when faced with a price advantage and/or added benefit. Additionally, consumer attitudes towards novel foods have been found to affect preferences for GM-foods (Bredahl, 2001). It can therefore be valuable to include a scale that sets out to gather information about consumers' preferences for novel foods, and see if it has an impact on consumer choices of GM-salmon.

In the following section I discuss the use of stated and revealed preference in earlier research, including research regarding GM-foods. Additionally, consumer evaluation will be discussed based on the possibility of customers evaluating GM-salmon differently than conventional salmon.

3.5 Comparing Stated Preference and Revealed Preference Models of Choice Behaviour

3.5.1 Discrete Choice Modeling

Both methods used in this study are so-called choice modeling methods. Models of choice are often used to investigate the trade-off ratios between new attributes for products or services, either existing ones or new ones, in order to predict what demand it can have in the future (Ben-Akiva et al., 1994). It is therefore very useful to adopt a choice modeling strategy to investigate attitudes towards GM-foods, as the different options respondents have to choose from in each set can represent the 'trade off' sacrifice that they may encounter in real life purchasing decisions. The main foundation of choice modeling is that respondents do not rate

each option they are presented with based on how much they like it; they are merely asked or presented with a situation where they are to choose what option they prefer the most (Burton et al., 2001). Consequently, the trade-off elements are extracted for analysis.

Discrete choice models can be utilized in several different contexts and within its field of use the multinomial logit model is often the most preferred model (Hausman & McFadden, 1984). The model is especially popular within econometrics, enabling estimation of the willingness to pay (WTP) for certain attributes of a product (Mather et al., 2011).

Choice modeling is based on RUT, mentioned earlier, which predicates that the chance of a consumer choosing one product over another is based on the utility of that product in comparison to the utility of the other products available (Morrison et al., 1997). Hence, the greater the perceived utility of a product, the greater the probability there is for a consumer to choose that product over a set of other products (Adamowicz & Boxall, 2001). According to Severin, Louviere, and Finn (2001) RUT creates an opportunity to “test and compare models estimated from a wide variety of preference data sources, pool different sources and rescale them to lie on a common utility scale” (p. 198). In the case of GM-food, the theory does not take into consideration the potential discrepancy between intention (SP) and actual purchase behaviour (RP), as consumers might overlook their intended behaviour based on their values and norms of society when faced with a price advantage or added benefit to themselves, i.e. revealing their true preference.

3.5.2 Stated preferences

Stated preference (SP) methodologies are often used in marketing research and have similar traits to the contingent valuation (CV) method, often called CVM, a method commonly used to elicit consumers' willingness to pay (WTP) (Chern et al., 2003). WTP is defined as the level of price where consumers become diffident in regards to buying the product or not buying it, whereas the definition of WTP for an attribute of a product is the divergence in WTP for a product with the attribute and one without it (Olesen, Alfnes, Røra, & Kolstad, 2010). In CVM using dichotomous choice (DC), respondents are asked if they are willing to pay a certain amount for the product in question in a contingent market, using yes or no questions (Boyle, 1990). This method has grown on the claim of being ‘incentive-compatible’, i.e. respondents will answer the DC questions in the same manner they would answer the same question asking for a real purchasing commitment and therefore the method supposedly elicits real WTP (Cummings, Harrison, & Rutström, 1995).

Although it has been often used, some questions have been raised about the validity of CVM, whether this method can successfully reflect actual behaviour in a real purchasing environment. Bishop and Heberlein (1986) argue that CVM measures attitudes instead of “willingness” and is therefore not a measurement that can be used to reflect real buying behaviour. The authors further argue that the correlation between attitudes and behaviour has been shown to be weak, and therefore one should be careful about making the direct assumption that what people say they will do reflects their behaviour in a real situation. Based on this premise, it can be argued that using CVM when measuring consumers’ WTP for GM-foods, the result could be negative in regard to GM, as most research shows negative attitudes towards GM-food products. Cummings et al. (1995) support Bishop and Heberlein’s (1986) argument, as they found hypothetical CVM to give false WTP estimates, although this work did not involve GM-foods. Cummings et al. (1995) used household goods to reach this conclusion, namely an electric juice-maker, chocolate truffles, and a calculator. A possible explanation could be that participants in such studies have no incentive to make a decision in the same manner they would in a real market situation, in addition to the environment not holding the same characteristics as consumers find in the marketplace (Keane, 1997). CV methods are often criticized based on this so-called hypothetical bias, where respondents may exaggerate or underestimate the price they are willing to pay (Haghiri, Hobbs, & McNamara, 2009). Murphy et al.’s (2005) meta-analysis of hypothetical bias in stated preference valuation found hypothetical biases to affect results and argues that “a choice-based elicitation mechanism is important in reducing bias” (p. 313).

Consequently a substantial amount of research has studied convergent validity by comparing estimates from both SP and RP data and criterion validity by comparing hypothetical results with actual results in a simulated setting (Ready, Epp, & Delavan, 2005). Additionally, CV has also been criticized for suffering from social desirability bias, which revolves around respondents trying to portray themselves in the best manner possible when being questioned, i.e. giving answers that seem socially desirable (Olesen et al., 2010).

In contrast to Bishop and Heberlein (1986), Kealy, Montgomery, and Dovidio (1990) argue that CVM extracts behavioural intentions instead of attitudes and found the correlation between intention and behaviour to be higher than between attitudes and behaviour. Nevertheless, if behavioural intentions are better predictors of behaviour than are attitudes, consumers’ negative attitudes towards GM-food might not be predictors of behaviour and

therefore a measurement of SP validated by RP can give important indications regarding likely acceptance or rejection of GM-food.

Due to the limitations and criticism of the CVM, new and refined SP-techniques have been developed, one of which is the choice modeling method, described as holding several advantages and being able to identify effects and therefore forecast potential future market obstacles (McFadden, 2001).

3.5.3 Best-Worst Scaling

Best-worst scaling, often called maximum difference scaling or maxdiff, is a discrete choice method created by Louviere and Woodworth (1991) in which respondents are asked to choose between three or more options based on what objects they 'feel exhibit the largest perceptual difference on an underlying continuum of interest (Finn & Louviere, 1992, p. 13). In this research the underlying continuum is 'degree of preference', i.e. what respondents prefer the most and what they prefer the least.

According to Marley and Louviere (2005), best-worst measurements hold several advantages compared to more common choice tasks, such as: 1) being an easy way of gathering a vast amount of information about how respondents rank items through subsets of items; 2) benefitting from a respondent's natural tendency to choose between options far apart; and 3) the fact that the method is fairly easy to undertake for participants.

Best-worst scaling is said to be developed from paired comparison methods and this development added the opportunity to compare more than two pairs of items based not only on the best item of the two, but also the worst item within several pairs (Jaeger, Jørgensen, Aaslyng, & Bredie, 2008). It also allowed the use of an endless number of stimuli, unlike paired comparisons, and removed the possibility of deficient block designs (Finn & Louviere, 1992).

Furthermore, rating questions have a tendency to give each item in the scale high ratings of importance, while by using best-worst scaling the level of importance of each item is shown more clearly with a larger difference (Cohen, 2003). For example, if respondents are asked to rate several products on a 7-point scale, they have the option to rate every option similarly as they might like all products, while by using best-worst measurements respondents are forced to state which product they like the most (and least), hence portraying their most preferred (and least preferred) product within each subset.

Additionally, best-worst scaling has been shown to be a strong method for measuring the importance of benefits (Cohen, 2003). Considering benefits, or relative advantage, has a major effect on the rate of adoption of new products (Rogers, 2003) and is likely to be a significant contributor to the adoption or rejection of GM-foods (Chern et al., 2003; Gaskell et al., 2004), using best-worst scaling could provide important indications regarding the role benefits play in public perception of GM-foods, here the benefit being a price advantage and increased omega 3 fatty acid levels.

On the other hand, the best-worst scaling method only gives answers in regard to the stated preferences (SP) of those undertaking the survey, which might not reflect their true adoption behaviour in a real purchasing situation of an innovation. In a similar vein, Arts et al. (2011) found that consumers' purchase intentions differ from actual consumer purchase behaviour. It is therefore valuable to include a field choice experiment to see if stated preferences from one sample on consumers match the actual purchasing preferences (RP) from another matched sample. Results will also enable evaluation of best-worst scalings' ability to produce SPs that are close to RPs, and therefore produce further evidence for or against the validity of best-worst scaling.

3.6 Revealed Preferences

Even though SP-techniques have been modified to improve validity, they can never be 100 % valid due to their hypothetical nature. The use of revealed preference (RP) techniques therefore sets out to test SP for validity and consistency under the premise that RP measures are true (Park, Bowker, & Leeworthy, 2002). The use of these two techniques can therefore be used to check for convergent validity (Whitehead, 2006) and give the researcher the opportunity to reduce multicollinearity and get a broader range for the data retrieved (Cunha-e-Sá, Ducla-Soares, Nunes, & Polomé, 2004), in addition to modeling new items with unexplored attributes (Adamowicz, Louviere, & Williams, 1994; Adamowicz, Swait, Boxall, Louviere, & Williams, 1997).

As mentioned earlier, RP-methods are used, but far too rarely, to validate and strengthen SP-methods as they reveal consumers' true preference in a genuine purchasing situation; therefore 'equality' in WTP measurements will strengthen the implications for policymakers (Whitehead, 2006). Using field choice experiments as an RP-method are said to be "powerful complements to laboratory experiments", such as SP-methods (Bishop & Heberlein, 1986, p. 124), but are seldom used due to the huge effort required. Such an experiment is built on the

fact that consumers have choices to make in a real purchasing situation where the main attributes of products are presented and therefore consumers can make trade-offs between these attributes and ‘derive utility’ from them (Gracia, Loureiro, & Nayga, 2009, p. 465). This notion of utility maximization by adding the utilities from separate attributes of a product instead of the products as a whole, was created by Lancaster (1966), hence consumers “minimize the cost of goods while maximizing their utility through the selection of a preferred mix of characteristics” (Hobbs, Sanderson, & Haghiri, 2006, p. 271).

In choice experiments eliciting RP of consumers using real money transactions, it is possible to avoid the biases mentioned as consumers’ choices will affect how much they spend and therefore portray them as they would be in a real purchasing situation with no social desirability attached to their choice (Olesen et al., 2010).

Although most people do not attend auctions regularly, experimental auctions are often used to determine consumers’ WTP, especially towards GM-food products (e.g. Noussair et al., 2004; Lusk et al., 2004). In contrast, by using a field choice experiment it is possible to replicate a real choice situation which people encounter almost every day, making it a highly relevant and ‘incentive-compatible’ method to research consumers’ real WTP (Olesen et al., 2010, p. 223). In the words of Everett M. Rogers (2003); “Potential adopters of a new idea are aided in evaluating an innovation if they are able to observe it in use under conditions similar to their own” (p. 389). This is one of the strengths of revealed preference techniques — putting the innovation in the environment it will be in, not just on paper.

Bohm (1972) was the first to compare hypothetical and actual values, and his seminal paper found participants’ WTP to be lower in hypothetical (CV) payments than in real payments, though none of the methods used gave WTP estimates that deviated from each other by much.

Wardman (1988) used the combination of SP and RP estimates to check for validity in regards to using SP-results in analysing train travel behaviour. He found travellers SP to be relatively similar to true preferences (RP). Ben-Akiva and Morikawa (1990) presented a real future transportation blueprint to participants in their study and asked them how they would behave in regards to new changes, collecting SPs. They also did a post change survey, asking about how they have behaved in regards to the new changes in transportation. The results indicated that the combination of both methods increased the validity of the parameter estimates and that the SPs were an overstatement compared to the actual behaviour (RP). According to Hensher and Bradley (1993), SP and RP have potential weaknesses and strengths when

measured separately, while the “joint utilisation of both data should enrich the modelling activity and further our understanding of choice behaviour” (p. 140). The authors found SP data to enrich the lack of depth in the RP data that revolved around options not available in the present. It should be noted that in the current research, the RP-data will be used to validate and enrich the SP data, not the other way around. This is mainly due to making products available to consumers, e.g. offering GM-salmon in a real purchasing situation. Therefore, the SP-data, derived from measuring the SPs in regards to the exact same types of salmon, will be validated by the real choice data extracted from RPs. SP data can be a valuable measurement to use when measuring hypothetical choice of future behaviour with products not available, such as measuring the future demand for electric vehicles (Ben-Akiva et al., 1994). This assumption will be tested using the combination of SPs of future products, and the RPs of those exact (albeit fictionally labelled) same products.

Adamowicz et al. (1994) examined SP and RP discrete choice models in the context of a recreational site, where they offered the same trade-offs to all respondents in both methods, in line with random utility theory (RUT). Their multinomial logit analysis found preferences to be similar across both models and therefore the SP enhanced the validity of the RP-model. These findings were replicated by Adamowicz et al. (1997), who further found that RP-SP models were paramount, compared to individual RP models.

Knight et al. (2007) and Mather et al. (2011) add to the compendium of knowledge in the area by undertaking an extremely rare comparison of SP and RP in the context of GM-foods. The authors in both studies used a similar experimental design and procedure as is used in this study in the context of GM-foods. Knight et al. (2007) studied RP and found that a proportion of consumers would choose GM-foods if they had a lower price than similar non-GM products, in addition to a consumer benefit. Thus, some consumers will choose GM-foods in order to maximize their utility. Mather et al. (2011) compared consumers’ SP and RP in regards to GM-foods with stated benefits. The authors found a substantial variance in results when comparing the two methods. Consumers seemed to be affected by social desirability when answering SP questions as the results were much more negative towards GM than those from the RP field choice experiment. Implications of their study are that SPs can give a false impression regarding how negative consumers will be towards adopting GM-food; this highlights the need for clearly stated consumer benefits in association with GM-foods.

3.7 Consumer evaluation

Looking into literature using RP or SP techniques it becomes clear that consumers involved in research, and in real purchasing decisions, evaluate products differently and therefore different results are achieved. The results from Mather et al's (2012) research supports this notion in the context of GM-foods, and highlights the importance of comparing SP and RP to achieve valid results. Thus it only seems reasonable to discuss consumer evaluation theory in order to predict possible results. Additionally, creating an understanding for the possible variance in results from the two preference methods used in this study can be valuable for further discussion.

Unsurprisingly, we as consumers tend to choose products that contain attributes and qualities that we prefer and disregard products without such qualities, but that simple way of thinking does not often show how we reach our conclusion and evaluate products altogether (Cohen, 1982). Within consumer behaviour and cognitive psychology, "schemas" are often used to explain consumer evaluation and information-processing and are defined as "an internal structure, developed through experience with the world, which organizes incoming information relative to previous experience" (Mandler & Parker, 1976, p. 39). From a consumer behavioural point of view, a schema is developed through experience and therefore expectations about a product fitting a product category, where this category is based on a certain standard category member. Sujan (1985) argues that product categories hold one of two types of products; exemplars, which are familiar products, and prototypes, which are a vague impression of the characteristics associated with the main products in that category. Exemplars are said to be the products or events that create the category itself, while prototypes are evaluated and categorized based on similarities to a 'prototypical' portrayal of the main category (Cohen, 1982).

If we compare these two different product types and evaluation processes with the two different preference techniques in this study, a variance in results could be expected. In the revealed preference technique (field choice experiment) consumers will be presented with four types of Atlantic salmon, and therefore the four types are expected to be evaluated based on the exemplars in that category, salmon and/or fish in general. Evaluations in the stated preference technique (best-worst scaling) could be expected to occur based on the prototypes of that category as there is no GM-salmon available in the market, hence respondents will have no reference to base their evaluation on.

This evaluation process will determine if the product falls out of the different schemas for that category, i.e. if it is congruent or incongruent with the category it is evaluated within. Congruity with a category is based on prior experiences that relate that product to a certain category, while incongruity could lead to using a new schema to evaluate a product or if there is no assimilation with a category, a negative evaluation will most likely occur (Mandler, 1981). Thus it can be expected that SPs might produce more negative results toward GM-salmon than RPs, as GM-salmon might exhibit extreme incongruity and therefore negative evaluations will take place. When consumers find a product to be extremely incongruent, it can only be resolved if the entire schema is redefined (Meyers-Levy & Tybout, 1989), i.e. creating or expanding the schema for salmon and/or fish. However, in the field choice experiment a mild incongruity might occur as consumers are able to evaluate the products on offer based on exemplars. Therefore moderate incongruity could produce a positive response, as Mandler (1981) argues; “If the existing schema can incorporate the new information without any major structural changes (e.g., when a new instance of a generic concept is assimilated), I would expect that there would be little disruption and – usually – a positive evaluative state” (p. 22).

Additionally, Meyers-Levy and Tybout (1989) argue that moderate incongruity, the most preferable level of incongruity, can occur with the use of a high price to show quality or a low price to show good value, thus leading to positive evaluations of the products. Therefore it seems reasonable to believe that GM-salmon could be evaluated positively from the field choice experiment when presented as really expensive or really cheap. For the best/worst scaling technique, the same results are not expected as respondents will have no incentive to choose a product based on its monetary value. As mentioned by Mather et al. (2011) respondents seem to answer SP-surveys in the context of GM based on social desirability; what puts them in the best possible light according to society’s norms and expectations. Noussair et al. (2004) make an interesting reflection in their study that looks at the degree to which real purchasing decisions are influenced by GMO in food; “Surveys place respondents in the role of citizens, who make judgements from society’s point of view, rather than consumers, who make actual purchase decisions” (p. 103).

Hence, misleading results from the best-worst (SP) method may be expected, strengthening the importance of validating the results using a field choice experiment (RP).

3.8 Consumer Evaluation of Innovations

To end this section on consumer evaluation it seems highly relevant to discuss it in the light of Roger's (2003) theory on diffusion of innovations, as consumers' evaluation plays a vital role in their adoption behaviour of innovations. In around 1954, Everett M. Rogers started his diffusion research based on the work done by Ryan and Gross (1943), who discovered that farmers refused to adopt new technology even though it could potentially be profitable to them. Their study demonstrated that "diffusion is fundamentally a social process" (Rogers, 2003, p. 35) as farmers were affected by innovators who had adopted hybrid corn at an early stage. Since very few consumers are so-called innovators, people with a high interest for new ideas (Rogers, 2003), GM-salmon could be seen as too incongruent to most people and therefore a slow adoption process could occur as GM-salmon falls out of their schema. Consumers will not be affected by others as the product is not available in the market and has not been adopted by anyone at this time.

Therefore, consumers may be more dependent on evaluating an innovation based on their respective schema. For an innovation, the equivalent to a schema is Rogers' (2003) technological clusters. These clusters contain one or more characteristics of a technology that makes them connected, thus forming a cluster. The boundaries of clusters can be difficult to see for consumers, and producers, and therefore an innovation may be evaluated outside of the intended cluster. For example, GM-salmon could possibly be evaluated along the lines of cloning, as it is seen as tampering with nature. This could cause more negative attitudes than if consumers evaluate GM-salmon in a cluster with fish or other types of salmon.

Rogers' (2003) main characteristics of innovations evaluated by consumers, as mentioned earlier, affects the adoption rate and evaluation of them. *The relative advantage* of a new product is in essence its advantage over other similar products in the same category. This advantage consists of several factors such as price, social factors, convenience and satisfaction. For a prototypical evaluation in schema theory, i.e. to what extent the product matches other products in that category, what relative advantage will GM-salmon have compared to conventional farmed salmon? There should not be any advantages in terms of social factors and convenience, while it might have an advantage over farmed salmon in terms of a lower price and the added benefit (satisfaction) of extra Omega3. These advantages could cause GM-salmon to be evaluated as mildly incongruent. *Compatibility* is the characteristic of an innovation that makes it consistent with the norms and values of society. As GM-foods

seem to be inconsistent with society's norms and values (e.g. Bredahl, 2001), a slower adoption rate can occur. GM-foods can seem incompatible based on schema theory, causing incongruity and therefore a slower adoption rate. If a product is too incongruent, consumers will evaluate it negatively. Both theories focus on too much incongruity affecting rejection. In a similar manner, Rogers' (2003) third attribute of an innovation, *complexity*, can cause similar results. If a product is too complex to understand, the adoption rate is slowed down.

The last two characteristics of an innovation, *trialability* and *observability*, are maybe not directly linked to schema theory, but are good examples of the advantages of RP-techniques. According to Rogers (2003), the easier it is for consumers to both try and observe an innovation, the faster the adoption rate will be. Consumers taking part in the field choice experiment in this study will, based on the labelling done, have the opportunity to try GM-salmon and see it for themselves. Thus, consumers might be expected to choose GM-salmon to a greater extent than the best-worst scaling method predicts.

Further, the transition from gaining knowledge about an innovation to adoption and confirmation is termed the innovation decision process by Rogers (2003). During the persuasion stage of this process, relative advantage, compatibility and complexity, are key aspects. Much like evaluation based schema theory, which forms evaluations based on past experiences with categories or that category schema (Fiske, 1982), consumers at the persuasion stage evaluate products based on their current situation. Additionally, in the persuasion stage, consumers often weigh up the advantages and disadvantages of an innovation before making their decision (Rogers, 2003). This is consistent with the piecemeal-based evaluation process in which people evaluate products attribute by attribute (Sujan, 1985).

3.9 Food Neophobia Scale

The Food Neophobia Scale (FNS), developed by Pliner and Hobden (1992), has been utilized in GM-food studies (Scholderer & Frewer, 2003) and neophobia has been deemed to affect attitudes towards GM-foods (Bredahl, 2001). The original scale contained 10 items in relation to people's attitudes towards new and novel foods and is seen as a valid scale for predicting behaviour towards novel foods (Pliner & Hobden, 1992).

Scholderer and Frewer (2003) assessed food neophobia as a prior attitude and studied if it caused participants to reject novel food on a general basis, instead of GM-foods exclusively. The results demonstrate attitudes to be planted in pre-existing structures of fundamental

attitude, accessed from informational cues given. Bäckström, Pirttilä-Backman, and Tuorila (2004) studied willingness to try (WTT) new foods, including GM-foods, and found neophobia to have a correlation with the dimension “unnecessary and artificial nature of new foods” (p. 80), not with peoples’ WTT. Grunert et al. (2003) found food neophobia to have a significant effect on the extent to which consumers view GM-foods as risky.

Siegrist (2008) claims food neophobia to only be weakly correlated with the way people perceive new food technologies. Cox and Evans (2008) developed a similar scale to the FNS to deal with such weak correlations, namely the Food Neophobia Technology Scale (FNNTS). They found this scale to be a better measurement for WTT food created from novel technologies, than the FNS. This scale might therefore seem like a better scale to use than the FNS. However, the FNNTS has certain limitations, as follows:

1. Several of the items used were unnecessarily framed as double-negatives, i.e. not and never. These items have the lowest factor loadings and the highest uncertainty.
2. The article states that ‘new food technologies are something I am uncertain about’ loads onto the ‘food technologies are unnecessary’ factor, not the ‘risk’ factor.
3. The second item on the scale is logically loaded onto the last dimension – information/media, but is listed as loading on the first item; new food technologies are unnecessary.
4. The second item; ‘society should not rely on technologies to solve its food problems’ – should have ‘food’ before ‘technologies’ – otherwise open to very different interpretations – as reflected by the higher SE/SD and lower loading.
5. It is a multidimensional construct – the authors admit 4 dimensions – unnecessary, risk, healthy and media, but the last 2 are measured by 2 and 1 item respectively. It is poor practice to rely less than 3 items to measure an underlying latent trait or dimension.

Taken together, some validated improvements would be desirable before deploying the FNNTS. Therefore, Tuorila et al’s (2001) 7-item version of the FNS will be used as it will reduce the level of cognitive complexity for respondents and has been shown to be a valid measure of consumer attitudes to novel foods and GM-foods in particular.

3.10 Summary Methodology

Due to the overall negative preferences found in literature on consumer acceptance of GM-foods utilizing hypothetical research methods, both SPs and RPs methods will be used in the

current research. The use of these two methods will enable a comparison of hypothetical and actual choice behaviour, in addition to accounting for the possibility of consumers evaluating GM-foods differently across these two research methods.

The next chapter will explain in depth how the methods discussed in this chapter were designed and how they were used to retrieve data for analysis. The arrangement of raw data will be explained, in addition to how the data was analysed.

4.0 The approach

4.1 Introduction

This thesis used a field choice-modeling experiment to elicit revealed preferences (RP) of consumers in a real time purchasing situation using four types of salmon. They were labelled as follows: “Atlantic salmon”, “Atlantic Salmon with double omega 3 values”, “Atlantic GM salmon” and “Atlantic GM salmon with double omega 3 values”. In addition, a best-worst scaling method was used to reveal the stated preferences (SP) of respondents leaving or entering a local fish shop, using a written questionnaire. Within that questionnaire, a FNS was added to study what effect peoples’ level of neophobia might have on their best-worst scaling responses. This chapter will explain how these methods of study were conducted.

4.2 Measuring Stated Preferences

The two experiments reported in this thesis were conducted at a fish shop in the outskirts of Bodo, Norway.

In order to determine stated preferences, respondents were recruited before and/or after they had bought salmon or other kinds of seafood. The fish shop was used as a venue on the basis of getting responses from people eating fish on a fairly regular basis. Handing out questionnaires to people without knowing their preference for fish and seafood could have given invalid results and harmed the basis for comparison across the two methods of research. Conducting studies on valuation is argued to produce more valid results when done in a store setting, as consumers give significantly lower WTP-estimates and is in fact the same environment as they would normally make purchasing decisions (Lusk & Fox, 2003; Lusk et al., 2005).

The respondents were handed a questionnaire which included both the best-worst scale and the FNS, and offered an incentive, in this case chocolate, to increase the response rate from consumers at the location. The questionnaire had six of the same best-worst questions with a different composition of alternatives on each question, as is shown in the table below (see

appendix B for a full questionnaire). Ninety eight usable responses were gathered during the research period, providing a total of 1176 best-worst consumer decisions for analysis. Of those 98 respondents, 49 were male and 49 were female (!) with an average age of 43. Males had an average age of 46, while females had an average age of 41. Therefore, age and especially gender was evenly distributed throughout the SP-results.

The alternatives and price levels used in this study were the same as I would use in the RP-study. The table below shows how a balanced incomplete block design using the full 12 factorial design combinations was used for best-worst scaling. For example, in question one, consumers were asked to indicate which of the following alternatives they preferred the most and which they preferred the least; Atlantic GM-salmon (median price + 15; 136 NOK a kg), Atlantic GM Atlantic salmon with double omega 3 (median price - 15 % and median price; 100 and 118 NOK a kg), and Atlantic salmon with double omega 3 (median price; 118 NOK a kg).

Question	Atlantic GM	Atlantic	Atlantic GM 2X Omega3	Atlantic 2X Omega3
1	Median price +15%		Median price – 15% and Median price	Median price
2	Median price – 15%, Median price and Median price +15%	Median price -15%		
3		Median price	Median price	Median price +15% and Median price - 15%
4	Median price -15%	Median price +15%		Median price and Median price +15%
5		Median price -15% and Median price +15%	Median price +15%	Median price -15%
6	Median price	Median price	Median price -15% and Median price +15 %	

Table 1 - Balanced incomplete block design showing price variations and salmon options for the best-worst task

4.3 Measuring level of Food Neophobia

The 7-item Food-Neophobia scale created by Tuorila et al. (2001) was used to gather data regarding consumers' level of food neophobia — a measurement for attitudes towards novel

foods (see appendix B). The scale was added in the best-worst scaling (SP) and included the following statements with which respondents had to state their level of agreement:

1. I am constantly sampling new and different foods.
2. I don't trust new foods.
3. I like foods from different countries.
4. Ethnic foods look too weird to eat.
5. At dinner parties I will try a new food.
6. I am afraid to eat things I have never had before.
7. I like to try new ethnic restaurants.

4.4 Measuring Revealed Preferences

A field choice experiment was used to determine revealed preferences among consumers out to buy salmon. The same fish shop used in the first experiment was used as a venue for the second. The original plan was to create a separate salmon stall in order to create a distance from other consumers buying different products and prevent queuing from happening. In this strategy the original fish counter would be used to sell only ordinary farmed salmon. After completing the stated preference research, I got offered a job at the fish shop which enabled me to sell salmon based solely on the design created for RP. No other fresh salmon products were available. If other employees got consumers that wanted salmon, they shifted them over to me as I had the most knowledge about the products on display, especially GM-salmon.

Farmed salmon labelled Atlantic salmon and farmed salmon labelled Atlantic Salmon Genetically Modified were offered to consumers at different prices using a fractional factorial design. This design can be seen in table two below. In addition, the different types of salmon had the added benefit of an increased Omega3 level in accordance with the research design. Therefore, customers were exposed to four different product alternatives at all times: Atlantic salmon, Genetically Modified Atlantic salmon (AtlanticGM), Genetically Modified Atlantic salmon with double omega3 values (AtlanticGM2O3), and Atlantic salmon with double omega3 values (Atlantic2O3).

It was decided to vary these four salmon alternatives across three different prices per kg levels: 100 NOK, 118 NOK, and 136 NOK. The price of 118 NOK (around 20 NZD) was the standard price the fish shop offered for fresh salmon, a price they had not changed during the course of 2014. This was therefore chosen as the average price, with an increase or decrease

of 18 NOK to that price in order to measure the effect price, in itself a consumer benefit, had on consumer behaviour.

Referring back to the study done by Grimsrud et al. (2004), who found that a sample of Norwegians would need between 37 – 63 % in discount to choose GM-bread over regular bread, it can be argued that the 15 % discount used in this research is not sufficient. I justify my choice of a 15 % discount on the following basis; (1) Salmon is an expensive product and therefore a much higher discount than 15 % may not reflect a real purchasing situation; (2)

The market price AquaBounty’s salmon will be sold for is unknown, thus it seems reasonable to not exaggerate in regards to a lower price; (3) The fish shop management were kind enough to cover the financial expenditure of giving participants in my study a lower price on salmon. It therefore seemed unreasonable to give consumers more than 15 % discount. It would not be possible for me to cover a higher discount myself; (4) If I had presented a 40 % discount for example, the word might have gotten around that the fish shop had really cheap salmon and harmed the validity of my research. It could have been harmed as people who normally would not purchase salmon could be convinced due to the extremely low price and therefore the data gathered would be based on a sample with a possible low preference for salmon originally.

Run	Atlantic GM	Atlantic	Atlantic GM203	Atlantic203
1	Median price -15%	Median price	Median price	Median price -15%
2	Median price +15%	Median price	Median price -15%	Median price
3	Median price +15%	Median price +15%	Median price +15%	Median price -15%
4	Median price -15%	Median price -15%	Median price +15%	Median price
5	Median price	Median price +15%	Median price	Median price
6	Median price -15%	Median price +15%	Median price -15%	Median price +15%
7	Median price +15%	Median price -15%	Median price	Median price +15%
8	Median price	Median price	Median price +15%	Median price +15%
9	Median price	Median price -15%	Median price -15%	Median price -15%

Table 2 - Fractional factorial design showing price variations and salmon options

Each design set in this experiment was originally planned to be changed nine times every 50 customers, but due to a lower response rate than expected, only the first design set got 50 responses. The remaining eight got 20 on each set.

Once customers had made their choice, but before any transactions took place, they were informed that this was a university experiment with ethical approval and that all products were in fact ordinary farmed salmon. The purpose of this research and the nature of the experiment was explained to all respondents, either verbally or shown on an information sheet in order to avoid queuing or contamination of subjects from overhearing explanations. To compensate customers for their troubles and avoid damaging the reputation of the fish shop, they got offered fresh salmon for the lowest price in the research design, 100 NOK a kg.

In addition, respondents were asked to indicate why they chose the option they did. This response was recorded in connection with each choice made (table 7). The field choice experiment gathered 206 choices made by customers. Of those responses, 100 were male and 124 were female, with an approximate average age of 47.

4.5 Protocol

One of the guiding principles often used in both these types of experiments is to try and keep both descriptions and the availability and salience of any packaging information as close as possible to what firms would reasonably be expected to apply and to what customers might expect. This will sometimes be specific to a selling situation. For instance, in a situation like the RP-choice experiment, a real purchasing situation, where there is no specific origin or other traceability information provided, then the same level of information should be provided in the SP-choice experiment (e.g. not provide any additional information in printed form).

However, it became clear that customers often had a brief conversation with the individual selling fish, which later on turned out to be me, about the origin and the quality of the fish etc. Therefore, it was decided to create a written protocol that included answers I would use to potential questions, in both methods of study. This protocol was used very often and the most frequently asked questions, and answers, are provided below:

Q1. Atlantic salmon - is it wild? - All the salmon on offer are farmed. This is standard in Norway these days.

Q2. Atlantic (GM) salmon - is it safe to eat? - It has been thoroughly tested by the US FDA and has been proven safe to eat. The other salmon has not been so thoroughly tested.

Q3. How does the omega 3 get doubled in the (non-GM) salmon? A special feed for the salmon doubles the omega 3.

Q4. How does the omega 3 get doubled in the GM salmon? It is doubled via gene editing to increase the stores of omega 3 in the salmon.

Q5. What is GM-salmon? – GM-salmon is developed in Canada. Genes from another type of salmon, Chinook salmon, along with DNA-fragments from the ocean pout, are added in the eggs of conventional Atlantic salmon, enabling it to grow about twice as fast as conventional Atlantic salmon. These salmon are all held at land-based farming facilities.

4.6 Research challenge

The two research designs described were not the first ones I started off this research project with. The first designs had wild salmon as an option along with the others described due to the belief that wild salmon was available at most fish shops; this turned out not to be the case. In the design development phase I had been in contact with representatives at the fish shop and got the impression that they had wild salmon on a weekly basis. This misunderstanding caused me to go through with the best-worst questionnaire and gather over 100 responses with wild salmon included in the design. After looking through responses and looking at the dominant effect wild salmon had on the other products in the design, it was decided to remove wild-caught salmon as an option as it completely dominated the results.

It became clear, due to the rarity of wild-caught salmon, that a great majority of consumers wanted this product regardless of price. Therefore, including it in the design would inhibit me from creating a real purchasing situation, one of the premises of RP-methods. Hence the two different research methods could not be compared if I were to remove wild-caught salmon only from the RP-method. It is important that both experimental designs for data collection are as similar as possible. Thus, the completed stated preference research had to be re-done with an updated design, without wild-caught salmon as an option. This change set the research back a few weeks, but I consider it to be a valuable experience and a way progress is made. As Thomas Edison put it; "I have not failed - I have just found 10,000 ways that won't work"!

Another challenge faced was the slow response rate during the RP-study, which caused each design set (runs) to be smaller than planned. One possible reason for the low salmon sale during the RP-research could be that the research was conducted during the lead-up to the

Christmas season (November and early December). It started off at a fairly good rate but then declined when people started buying more smoked and salted products. These products are highly popular in the Christmas season and therefore salmon sales declined. After doing an analysis of the study with 20 responses on each design set, it became clear that 20 on each would be sufficient as more answers would not change the result of the study.

4.7 The Sample

As mentioned, all respondents/participants were recruited at a fish shop in Bodø, Norway. This establishment, BoFisk, has got two shops in the city; one in the outskirts and one in the city centre. These are the only fish and seafood shops in the city. The venue in the outskirts of town attracts a varied consumer demographic due to its placement in a family oriented area and was therefore chosen as the best venue for both research methods. Still, a fairly high average age was anticipated after talks with the management.

Data was collected from September to early December 2014. Participants were predominantly Norwegian from the ages of 18 to 75. The SP-research gathered 98 responses from 49 males and 49 females, while the RP-research gathered 206 responses from 100 females and 124 males (these uneven numbers will be discussed in the next chapter). The mean age of SP respondents was 43, while the mean estimated age of RP participants was 47.

4.8 Summary

This research uses both a field choice experiment to gather revealed preferences and best-worst scaling to gather stated preferences of consumers in regards to GM-salmon with different benefit and price variations. A local fish shop was used in both methods of study and resulted in 98 SP responses and 206 RP responses. The results of these responses will be outlined in the next chapter.

5.0 Data analysis and findings

5.1 Introduction

Chapter four discussed the methodology used in this study to gather data for analysis. This current chapter will present and analyse the findings from these methods of study. It will begin with two main explanatory sections on the results from the field choice experiment and best-worst scaling. These results will then be compared and discussed. The main goal is to introduce these findings in order to build a foundation for comparison of the methods used. The chapter will end with the result in regard to the FNS. The findings presented in this chapter will be discussed in the context of literature in chapter six and in accordance with the hypotheses.

5.2 Results: Revealed Preferences

To analyse the RP-data gathered, a maximum likelihood estimation method was used for this research. The mathematical formulae for market shares were extracted using the multinomial logit equation provided in figure one below (adopted from Mather et al., 2011). This method found conventional Atlantic salmon to be the most preferred option on an overall basis, as expected. Although consumers most often bought regular Atlantic salmon, price variations and especially the presence of an additional product benefit, impacted consumer choices and increased the market share of GM-salmon.

$$\hat{M}s_{jk} = \frac{e^{\hat{\alpha}_j + \hat{\beta}_j x_{jk}}}{\sum_i e^{\hat{\alpha}_i + \hat{\beta}_i x_{ik}}} \text{ where}$$

i is the index over all the alternative salmon variants, varying from 1 to 4.

j is the index for the j th. alternative for which the market share is to be calculated.

k is the index over the three pricing scenarios varying from 1 to 3.

Each scenario is defined by a vector of 3 given prices for each of the four alternative salmon variants.

M^*_{sjk} is the estimated market share for the j th. alternative of salmon variant for the k th. scenario.

$\hat{\alpha}_j$ is the salmon variant intercept estimate for the j th. (ith.) alternative, or salmon variant,

$\hat{\beta}_j$ is the price sensitivity parameter estimate for the j th. (ith.) alternative or salmon variant,

x_{jk} is the level of price, in currency units, for the j th. (ith.) alternative or salmon variant, defining part of the k th. scenario.

Figure 1 - Multinomial logit equation

To better describe how these variations impacted consumer choices, the different price and benefit scenarios will now be outlined. These scenarios are created as indications on how benefits (discounted price and increased omega3 fatty acids) seem to affect consumer preferences, and are therefore argued to be the most relevant scenarios for marketing science. The same scenario variations will be used for the best-worst scale results in the next main section as well.

5.2.1 Scenario One

When all products are offered at the same (average market) price, conventional Atlantic salmon gained the largest market share (67%) while Atlantic salmon with double omega 3 gained a 25% share. GM salmon gained a zero market share but the addition of the consumer benefit of double omega 3 raised the market share for the GM salmon to 7%.

Scenario One	AtlanticGM	Atlantic	AtlanticGM2O3	Atlantic2O3	Total
Price profile	118 NOK	118 NOK	118 NOK	118 NOK	
Utility	-6,59778	-1,58228	-3,77487	-2,55706	
Value	0,001363391	0,20550601	0,022940073	0,077532351	0,307342
Share	0 %	67 %	7 %	25 %	

Table 3 - Market shares for Scenario One RP

5.2.2 Scenario Two

In scenario two, Atlantic GM-salmon and Atlantic GM-salmon with double omega 3 were both offered at a 15% discount, whereas Atlantic salmon with double omega 3 was offered at a 15% premium. Conventional Atlantic salmon at average market price was preferred the most, with a market share of 70 %, and Atlantic GM-salmon 15 % below market price the least, with only 1 % market share. Interestingly, when GM-salmon has the benefit of double omega 3 values and a lower price, its market share rises to 12 %. Atlantic salmon with double omega 3 values is preferred second to conventional Atlantic salmon when at a price premium, with a market share of 18 %.

Scenario Two	AtlanticGM	Atlantic	AtlanticGM2O3	Atlantic2O3	Total
Price profile	100 NOK	118 NOK	100 NOK	136 NOK	
Utility	-6,20772	-1,58228	-3,38481	-2,94712	
Value	0,002013824	0,20550601	0,03388408	0,052490662	0,293895
Share	1 %	70 %	12 %	18 %	

Table 4 - Market shares for Scenario Two RP

In this scenario both Atlantic GM-salmon and Atlantic GM-salmon with double omega 3 are offered at a lower price than the other two salmon-alternatives. It is expected that this scenario will best replicate a market situation as Atlantic GM-salmon will presumably have a lower price than regular farmed salmon. The expected lower price level is due to the faster growth rate of AquaBounty's GM-salmon and the ability it has to grow all year round due to the promotor gene from the ocean pout, which leads to better feed utilization. Combined, these two inter-related advantages should result in a lower production costs for the company, thus a lower market price is expected to benefit the consumer.

Atlantic GM-salmon without a clear product benefit is shown to be “dead in the water”, with a market share of only 1 %, even when it is 15 % cheaper than conventional Atlantic salmon. However, addition of the consumer benefit of double omega3 increased the market share twelve-fold, despite the obvious resistance to the GM concept.

5.2.3 Scenario Three

When offered at a 27% lower price than regular salmon, the Atlantic GM salmon gained 1% market share while the Atlantic GM-salmon with double omega 3 market share rose to 15%. Despite the price premium, conventional Atlantic salmon had the highest market share (61%) and Atlantic salmon with double omega 3 had the second highest (23%).

In this scenario it is evident that Atlantic GM-salmon with double omega 3 gains its highest market share (15 %) when offered at a 27 % lower price (100 NOK) than the price of conventional Atlantic salmon and Atlantic salmon with double omega 3 (136 NOK). This emphasises the importance of a lower price being a determinant for acceptance of GM-salmon. The price difference does not seem to have any effect on GM-salmon without the consumer benefit of double omega 3. This further supports the results from scenario two, indicating that the presence of a consumer benefit can help increase the market share and is therefore essential if GM-salmon is ever to be accepted.

Scenario	AtlanticGM	Atlantic	AtlanticGM2O3	Atlantic2O3	Total
Three					
Price profile	100 NOK	136 NOK	100 NOK	136 NOK	
Utility	-6,20772	-1,97234	-3,38481	-2,94712	
Value	0,002013824	0,13913091	0,03388408	0,052490662	0,227519
Share	1 %	61 %	15 %	23 %	

Table 5 - Market shares for Scenario Three RP

5.2.4 Scenario four

Conventional Atlantic salmon gained an all-time high market share when offered at 100 NOK per kg (77 %), while Atlantic salmon with double omega 3 gained an all-time low market share of 13 % when offered at the same time at a price premium (136 NOK). Atlantic GM-salmon with double omega 3 gained a market share of 9 %, while Atlantic GM-salmon's market share was only 1 % when offered at 100 NOK per kg.

Scenario Four	AtlanticGM	Atlantic	AtlanticGM2O3	Atlantic2O3	Total
Price profile	100 NOK	100 NOK	100 NOK	136 NOK	
Utility	-6,20772	-1,19222	-3,38481	-2,94712	
Value	0,002013824	0,30354664	0,03388408	0,052490662	0,391935
Share	1 %	77 %	9 %	13 %	

Table 6 - Market shares for Scenario Four RP

5.2.5 Effect of Omega3 and price variations

Results show that GM-salmon is totally avoided by consumers without any benefits attached to the product. The market shares obtained were from 0 – 1 % for the GM-salmon alternative, but when the consumer benefit of double omega 3 values, along with a lower price, are added to the product description, the market share increases to an average 10 % depending on the price variations. GM-salmon with double omega 3 achieves its highest market share when offered at a lower price than conventional Atlantic salmon — a 15 % market share. This implies that the acceptance of GM-salmon is dependent on the product exhibiting a “relative advantage” compared to the other conventional salmon alternatives, as Rogers’ “Diffusion of Innovations” (2003) would predict.

5.2.6 Gender differences

The RP-method gathered 206 choices from 100 females and 124 males. As some customers bought fish as a pair, these are counted as one choice but divided amongst the two gender categories, e.g. if one pair bought GM-salmon with double omega 3, that choice was recorded as ‘male and female 50 +’ and then separated as one male choosing GM-salmon with double omega 3 and one female choosing the same item. Thus, the research gathered a total of 224 responses. People often bought in pairs, but the level of involvement from both sides varied. If one of the members of a pair took control and did not confer with the other member when choosing among the salmon alternatives, the choice was recorded as chosen by one person. If the pair discussed and reached a choice amongst each other, the choice was recorded as one choice made by two people. Therefore, the numbers might appear to not add up.

The same number of males and females chose GM-salmon with double omega 3 as their preferred option, eight of each gender. In addition, more females chose Atlantic salmon with double omega 3 as their preferred option, 31 females to 26 men. Males chose the conventional

Atlantic salmon as the best option more often than the females, 89 males and 61 females. It should be mentioned that the only person that chose GM-salmon without added benefits, was a male.

Nevertheless, these variances in the results from the RP-study show a fairly similar pattern regardless of gender; respondents chose regular salmon the most, but with the added consumer benefit of double omega 3 and a lower price, both conventional Atlantic salmon and GM-salmon will gain a higher market share than without the presence of these benefits.

5.2.7 Age differences

It was decided to not gather any personal information, besides gender, about the respondents during the RP-research method due to time constraint issues, such as queuing and the need to avoid upsetting customers with intrusive questions. The approximate age of the participants was estimated in decades at the point-of-sale. Estimates were made based on a 10 year age range, e.g. 40 +, 50 +, 60 +, thus the results should be reasonably close to the real age of the participants.

Based on these estimates, the average age of the respondents participating in the RP-research was 47 years. The age-distribution was estimated to be fairly equal between men and women throughout the research.

Males who chose the GM-salmon with double omega 3 option had an average age of 38, while females who chose the same option had an average age of 41.

Similarly, males had a younger average age when choosing Atlantic salmon with double omega 3, 38, compared to females, 45.

The average age of males who chose Atlantic salmon was 51 and the average age of females who chose Atlantic salmon was 47.

Those above the average age have chosen conventional Atlantic salmon the most, while those below average age have chosen it to a lesser degree. It therefore seems that age is an impacting factor in regard to acceptance of GM-salmon as younger individuals seem to be more receptive towards GM-foods, especially with associated benefits, while older individuals seem to be more inclined to stick with what they are used to.

5.3 What impacted consumer choices?

In addition to offering these four kinds of salmon at different benefit and price variations, consumers who had bought salmon were asked to verbally indicate why they had chosen the type of salmon they did. Answers were recorded next to their choice in that particular design run. These answers were coded and categorized using an inductive approach, following the 6-stage process created by Braun and Clarke (2006). This process will now be described, in addition to a discussion on how these comment-themes reflect consumer behaviour in the RP-experiment, i.e. why people made the choice they did. Examples of these explanations are given in table 8. All relevant comments are provided, but as some respondents gave unfinished comments or no comment at all, these are discarded from the table and not used in the qualitative analysis. Some comments appear several times as they fit in several themes.

5.3.1 Thematic content analysis

The comments provided by consumers who had bought salmon in line with the RP-technique used, gave this study another element to discuss consumer acceptance and rejection of GM-foods. For this data to be used to complement the quantitative data from the RP-research, it was coded and divided into themes. The 6-stage approach outlined by Braun and Clarke (2006) was used to identify and analyse patterns in the comments.

Stage 1: Getting to know the data

The first stage of the thematic analysis revolved around getting to know the data at hand. As I undertook the research myself, I knew the overarching theme of the comments provided and had attached each comment to the choice that the customer had made, i.e. the choice made and the reason behind that choice were linked together. Therefore, stage one went by fairly quickly.

Stage 2: Creating basic codes

In the second stage codes were derived from the comments. I started this process by gathering all comments made for each individual salmon option. For example, I combined all comments given by customers who had chosen conventional Atlantic salmon for each design run. I then proceeded to create codes for the overarching theme of these comments for each design run for each salmon option, as can be seen in the appendix. Further, these codes were combined for each individual salmon option and the ones that appeared more than once were combined.

After completing this process for each type of salmon, all codes were compared on one sheet of paper. At this stage, I had 20 different codes (appendix C).

Stage 3: Themes

In stage three the codes created in stage two were used to derive themes based on relevance and meaning. I ended up creating eight overarching themes from the 20 initial codes, and six minor sub-themes.

Stage 4: Reviewing themes

Stage four revolved around ensuring that the themes I had were distinctive and could not be collapsed into fewer themes. Even though some of my themes had similar elements, e.g. price benefit and health benefit, these were still considered to be better discussed separately. At this stage, I considered my thematic map to be good enough to be compared with the rest of the results.

Stage 5: Naming themes

Naming the themes I had extracted from all comments was very straight forward and I focused on naming them in a way that captured the essence of the codes each theme contained. The following 8 themes will now be discussed, in addition to a few mentionable sub-themes:

1. Healthy product
2. Habit — used to
3. Lack of trust
4. Lack of knowledge
5. Negative attitudes towards GM/farmed-salmon
6. Natural product
7. Price sensitive
8. Joint decision

Stage 6: Story of the data

The last stage is creating the narrative derived from the data, thus transferring the intricate story of the data in an understandable way to the reader. This step created the next section.

5.3.2 Healthy product

Due to the presence of the ‘double omega 3’ benefit, choosing the healthiest product was often described as a reason for customers’ choice amongst the four salmon options. This reasoning was most often used when customers had chosen the Atlantic salmon with double omega 3 values option. “Omega 3 is the healthier alternative”; “I wanted the healthiest”; and “It’s healthier, so why not?” are all examples of those choices. Although to a lesser degree, customers also chose the GM-salmon with double omega 3 values, with the reasoning of it being a healthier option. This choice was not affected by a lower price than the other omega 3 options, as one might anticipate. Only one person stated that price AND omega 3 affected their choice when buying the GM-salmon with double omega 3 option; “I chose it due to omega 3 and a lower price”. Customers who chose Atlantic salmon with double omega 3 focused a lot more on both benefits; “Healthy and cheap”.

The respondents who made these comments all seemed positive towards omega 3 and considered it to be a product benefit. Several other customers did not see omega 3 as a product benefit; “You get omega 3 through pills, no need for extra in the fish”; “Get enough omega 3 through regular salmon” and did not seem to be positive towards paying more for double omega 3 values; “Cheaper, don’t need more omega 3”; “I focused on price, not in need for more omega 3”. These customers chose the regular salmon option.

We had not anticipated that people might be negative about more omega 3 and discard it as a product benefit, which was why we had chosen it in the first place. This might be a mixture of people actually negative towards omega 3, negative towards tampering with nature and people using it as a reason for choosing the cheapest product, i.e. not prepared to pay more for double omega 3 values. Obviously, this is just speculation.

It can also be the case that, even though consumers are more aware of health and nutritional products than before and use it as cues in their buying behaviour (Lappalainen, Kearney, & Gibney, 1998), health benefits are valued to a lesser extent in the context of GM (Lähteenmäki et al., 2002).

5.3.3 Habit — used to

It became apparent early in the RP-research that some customers reasoned their choice of conventional Atlantic salmon with wanting the ‘regular/usual’ product; “I just wanted the usual”; “I wanted regular salmon, nothing else”; “Wanted the usual stuff”. Customers not

deviating from their original plan of buying farmed salmon and not being impacted by new products were an expected outcome. As Atlantic salmon was by far the most preferred option, wanting the usual therefore became the most used reasoning behind consumer choices.

5.3.4 Lack of trust

Trust has been shown to affect the perception of risk (Frewer et al., 1996a; Siegrist, 1999) and to be an impacting factor in people's judgement of risk and benefits associated with GM (Siegrist, 2000; Connor & Siegrist, 2010). The element of trust was often used as a reason for not choosing GM-salmon, whether directly used as a reason: "I don't trust GM-products"; "I don't trust GM-products, looks too strange"; or indirectly: "Sceptical towards GM-foods"; "I didn't believe in the advantages with GM-salmon". Customers did not trust the product itself and did therefore not believe in the potential benefits associated with GM-salmon.

5.3.5 Lack of Knowledge

Similarly to trust, the amount of knowledge consumers have has been shown to affect the benefits and risks consumers associate with GM (Gaskell et al., 2010). A majority of customers seem to discard GM-alternatives based on their lack of knowledge about such products; "Didn't know anything about GM-salmon, that's why I chose regular"; "Sceptical about GM-salmon, don't have enough knowledge on the matter". Even though they are a clear minority, two people mentioned their extensive knowledge about GM to be a determinant of acceptance; "I know a lot about GM (student), and I'm very negative towards the farmed salmon industry". This individual was negative towards the farmed salmon industry due to its negative impact on the environment through feed-pollution and the negative effect escaped salmon have on the surroundings. He therefore chose GM-salmon as a result of his knowledge and attitude towards farmed salmon. The other individual commented that he "Chose it (GM-salmon with double omega 3 values) due to my knowledge (student in Bioscience)". After talks with this individual, it became clear that he studied bioscience at the University in Bodo and therefore had a lot of knowledge about both the farmed salmon industry and genetic engineering. It should therefore be mentioned that the amount of knowledge these two individuals had seems to have affected their choice of GM-salmon.

5.3.6 Negative attitude towards GM/Farmed-salmon

Strong negative attitudes towards GM-salmon were anticipated, as past research has shown (e.g. Bredahl, 2001), especially when it involves 'tampering with nature' (Frewer &

Shepherd, 1995). Some of the comments were pretty straight forward; “GM is just a joke”; “Didn’t want GM-bullshit”, while others seemed to be afraid of what the technology might cause; “GM-salmon is scary”; “Afraid of everything GM”; “GM sounded creepy”. “Too Americanized”, “I don’t trust the Americans”.

5.3.7 Natural product

Others had a negative attitude towards GM-salmon due to its ‘unnaturalness’ and wanted the most natural product possible; “Wanted the closest to wild salmon”; “Wanted the most natural product, straight from the sea”; “Farmed salmon is bad enough”. As some comments show, but also based on talking with customers throughout both research methods used, there seem to be highly negative attitudes towards farmed salmon as well. Since wild salmon is not generally available in the marketplace, consumers in Norway do not have that much choice when buying salmon. After a while, farmed salmon has become the standard product within the category ‘salmon’. It seems GM-salmon is a ‘bit further’ from wild salmon than farmed salmon, and therefore more negative attitudes arise due to its perceived unnaturalness.

5.3.8 Price sensitive

The consumer benefit of a lower price was often mentioned as a reason for consumer choices in all four categories of salmon, especially people choosing Atlantic salmon with double omega 3; “Chose it due to the low price”; chose it because of more omega 3 and over GM because of price”.

It was expected that some might choose the more expensive product due to a sign of higher quality, but this did not seem to be the case based on the comments gathered.

5.3.9 Joint decision

Some consumers entered the fish shop together and others were buying for more than just themselves: “I don’t think my wife would approve of GM-salmon”; “Knew too little about GM-salmon – I’m buying for others in my family as well”. This implies that the decision is not theirs to take or they are uncertain about what others in their family or at the dinner table will say about their decision. Although few mentioned it as a reason, it could be argued that people who buy only for themselves are more likely to try new products than people who buy for several at a time; “Just for me – cheap and healthy”.

Surprisingly, some customers chose GM-salmon with double omega 3 with people in mind when they made their decision; “Get the kids to eat healthier”; “We’ll see what the old man says to me buying GM-salmon”.

5.3.10 Interesting comments and sub-themes

An often used but insufficient comment made when asked about why they chose what they did, was; “I don’t know”. It is perfectly normal, and one might think it can have something to do with people being negative towards GM based on their fundamental attitudes, as one customer mentioned; “I’m unconsciously against GM”.

Interestingly, some customers based their choice on how they thought the fish pieces looked in the counter; “Thought the fish looked better”; “Looked better, more firm”. These comments were made in relation to the Atlantic salmon with double omega 3 option, which might imply that they thought the added omega 3 made it look healthier, supporting the findings from Knight et al. (2007).

A handful of customers mentioned that the actual name of the fish, Genetically Modified Salmon, made them discard it as an option; “GM sounded sloppy”; “GM sounded creepy”; “GM sounded weird to eat”. The terminology used within biotechnology and its effect on consumer perception has been studied, but it is a bit out of the scope of this study. It is still worth mentioning that the actual terminology used can impact consumer perception of genetically modified salmon.

Table 7 - Consumer comments about choices made

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Healthy Product	<p>“You get Omega3 through pills, no need for extra in the fish.”</p> <p>“Get enough Omega3 elsewhere.”</p> <p>“Cheaper, don’t need more Omega3.”</p> <p>“No need for more Omega3.”</p> <p>“Is it good with more Omega3?”</p> <p>“Don’t care about more Omega3.”</p> <p>“Get enough Omega3 through regular salmon.”</p> <p>“I focused on price, not in need for more Omega3.”</p> <p>“Cheap, don’t care about Omega3 or GM.”</p> <p>“I get enough Omega3. Don’t believe that it has more Omega3. Did you ask the fish?”</p> <p>“Don’t see the advantage, get enough Omega3 anyways.”</p>	<p>“Omega3 is a healthier alternative.”</p> <p>“Healthier product.”</p> <p>“It’s healthier.”</p> <p>“Chose it because of more Omega3.”</p> <p>“Looked healthier.”</p> <p>“Sceptic to GM, chose it because of more Omega3.”</p> <p>“I chose the healthiest option.”</p> <p>“Healthier than usual.”</p> <p>“Healthy and Cheap.”</p> <p>“Omega3 is good!”</p> <p>“Just for me, cheap and healthy.”</p> <p>“Cheapest and healthiest.”</p> <p>“The healthy alternative. GM doesn’t sound good.”</p> <p>“Cheap and healthy.”</p> <p>“I wanted the healthiest.”</p> <p>“It is cheap and healthy.”</p> <p>“I want more Omega 3.”</p> <p>“More Omega3 means healthier.”</p> <p>“Wanted to try one of those with more Omega3.”</p> <p>“The healthiest, not tampered with.”</p>		<p>“More Omega3 is healthier.”</p> <p>“Get the kids to eat healthier.”</p> <p>“Healthier to eat.”</p> <p>“It’s healthy anyway, price more important”</p> <p>“Omega3 is good, the salmon looks better.”</p> <p>“I chose it due to more Omega3 and a low price.”</p> <p>“I wanted the healthiest possible.”</p>

(continued)

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Healthy Product		<p>“I wanted the healthiest.”</p> <p>“It was the healthier option.”</p> <p>“It’s healthier, why not?”</p> <p>“Cheap and healthy. I don’t like GM.”</p> <p>“Cheap and Healthy.”</p> <p>“I don’t trust GM. Healthy is good.”</p> <p>“Only chose it because of extra Omega3.”</p> <p>“Double Omega3 is good for my health.”</p> <p>“Don’t buy salmon often, therefore I prefer double Omega3.”</p> <p>“Healthy”</p> <p>“Wanted more Omega3.”</p> <p>“Try something healthier! I weren’t going to get salmon really.”</p> <p>“More Omega3.”</p> <p>“Double Omega3, it’s healthier.”</p> <p>“I wanted healthier, it’s the weekend!”</p> <p>“Healthier.”</p> <p>“Healthier, so why not.”</p> <p>“Omega3 is important, quality over price.”</p>		

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Habit/used to	<p>“I just wanted the usual”*</p> <p>“I am used to the regular.”</p> <p>“Wanted the safe alternative.”</p> <p>“Wanted nothing else.”</p> <p>“Buying for my mom, she likes what she’s used to.”</p> <p>“Used to it I guess.”</p> <p>“I just wanted regular salmon.”</p> <p>“Because I knew what I would get.”</p> <p>“Old habit.”</p> <p>“I wanted the usual. GM sounded bad.”</p> <p>“I have children, so I wanted something I’m used to.”</p> <p>“No particular reason, I just chose it.”</p> <p>“We wanted something we were used to, GM is just a joke.”</p> <p>“I wanted regular salmon, nothing else.”</p> <p>“Don’t care for GM, salmon is salmon.”</p> <p>“I wanted usual, and it was cheap as well.”</p> <p>“Wanted the usual stuff.”</p>	<p>“Wanted regular”</p>		

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Lack of Trust	<p>“I don’t trust GM-products.”</p> <p>“Unsure about using GM-salmon when cooking sushi.”</p> <p>“I don’t want to gamble on something new.”</p> <p>“I don’t trust GM-products, looks too strange.”</p> <p>“I chose the secure option.”</p> <p>“Having a dinner party, wanted something I’m sure of.”</p> <p>“Sceptical towards GM.”</p> <p>“I didn’t believe in the advantages with GM-salmon.”</p> <p>“I didn’t want GM-bullshit.”</p> <p>“I don’t trust the Americans and their GM. Wanted the most natural.”</p> <p>“GM-salmon sounded creepy.”</p> <p>“Thought it sounded weird to eat.”</p>	<p>“Sceptical towards GM-foods.”</p> <p>“GM didn’t sound good.”</p> <p>“I don’t trust GM, but healthy is good.”</p>		

Table 7 - (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Lack of knowledge	<p>“Unsure about using GM-salmon for sushi.”</p> <p>“Wanted the safe alternative.”</p> <p>“Didn’t know anything about GM-salmon, that’s why I chose regular.”</p> <p>“Didn’t want to gamble on something new.”</p> <p>“I know what I will get.”</p> <p>“Used to it, don’t know much about GM-salmon.”</p> <p>“Chose the secure option.”</p> <p>“Afraid of everything GM.”</p> <p>“GM sounded bad.”</p> <p>“Had small kids, wanted something I’m used to.”</p> <p>“Having a dinner party, wanted something I’m sure of.”**</p> <p>“Didn’t know anything at all about GM-salmon.”</p> <p>“GM-salmon sounded weird, too Americanised.”</p>	<p>GM - Don’t know anything about it.”</p> <p>“Sceptical towards GM-salmon – don’t have enough knowledge on the matter.”</p> <p>After explaining a lot to this individual; “alright, I’ll try one of those with Omega3.”</p>	<p>“I know a lot about GM (student), and I’m very negative towards the farmed salmon industry.”</p>	<p>Discussed a lot with this individual. Student in Bioscience. “Chose it due to my knowledge.”</p>

(continued)

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Lack of knowledge	<p>“GM-salmon sounded creepy.”</p> <p>“Know too little about GM – buying for others in my family as well.”</p> <p>“Because it’s not GM – sounds more natural.”</p> <p>“Unsure about GM.”</p> <p>“Thought it sounded weird to eat.”</p>			
Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Negative attitude	<p>“GM led me to choosing farmed salmon.”</p> <p>“GM-salmon is scary.”</p> <p>“Unconsciously against GM.”</p> <p>“Don’t like GM, too weird.”</p> <p>“Afraid of everything GM.”</p> <p>“GM-salmon wasn’t even an option.”</p> <p>“Negative towards GM.”</p> <p>“Wanted what we are used to – GM is just a joke.</p> <p>“I don’t trust the Americans and their GM”</p>	<p>“Omega3 is the healthier alternative, and I don’t approve of GM.”</p> <p>“Healthy and cheap, negative towards farming.”</p>	<p>“I know a lot about GM (student), and I’m very negative towards the farmed salmon industry.”</p>	<p>“Highly negative towards sea based salmon-farming.”</p> <p>Had a lot of knowledge.</p>

(continued)

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Negative attitude	<p>“Negative towards farming.” (chose it anyway) “I’m negative towards GM – Get enough Omega3 through pills, no need for extra in fish.” “Too Americanised.” “No I don’t want any of that, it’s no good.” “Didn’t want GM-bullshit.” “GM sounded creepy.” “Because it’s not GM – sounds more natural.” “Don’t care for GM – salmon is salmon.” “Thought it sounded weird to eat.” “I don’t like GM.”</p>			

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Natural Product	<p>“Unsure about using GM-salmon for sushi.”</p> <p>“Wanted the closest to wild salmon.”</p> <p>“Wanted the safe alternative.”</p> <p>“GM is scary. Farmed salmon got corn in their diet.”</p> <p>“Wanted the most natural product, straight from the sea.”</p> <p>“Wanted wild salmon really.”</p> <p>“You get Omega3 through pills – no need for extra in fish.”</p> <p>“Regular salmon for dinner – better day before when we could buy wild salmon.”</p> <p>“Farmed salmon is bad enough.”</p> <p>“Thought it sounded weird to eat.”</p>	<p>“Wanted the healthiest – not tampered with.”</p>		

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Price	<p>“Not used to saving money on a cheap product.”</p> <p>“We are only two – price doesn’t matter.”</p> <p>“Cheap – get enough Omega3 elsewhere.”</p> <p>“Cheaper – don’t need more Omega3.”</p> <p>“Cheap, wanted usual.”</p> <p>“Focused on low price and it not being GM.”</p> <p>“Price plays a role, a small one.”</p> <p>“Focused in price, not in need of more Omega3.”</p> <p>“Cheap – don’t care about Omega3 or GM.”</p>	<p>“Chose it due to the low price.”</p> <p>“Chose it because of more Omega3 – Chose it over GM because of price.”</p> <p>“Thought the fish looked healthier. Price and Omega3 were important.”</p> <p>“Chose the cheapest product.”</p> <p>“Healthy and cheap, negative towards farming.”</p> <p>“Just for me, cheap and healthy.”</p> <p>“Cheapest and healthiest.”</p> <p>“I’m a student; don’t have a lot of money to choose the more expensive products. Cheap and healthy!”</p> <p>“Cheap and healthy – don’t like GM.”</p> <p>“Wanted the cheapest, as long as they tasted the same.”</p> <p>“Well, it’s cheaper.”</p>	<p>“Cheap product” (student)</p>	<p>“Price affected my choice. It’s healthy anyway so Omega3 didn’t really affect my choice.”</p> <p>“Wanted the cheapest.”</p> <p>“Chose it due to Omega3 and low price.”</p> <p>“Wanted the cheapest.” (student)</p> <p>“Why are the prices different?”</p> <p>“Focused on price – we’ll see what the old man says to me buying GM-salmon.”</p>

(continued)

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Price		<p>“Double Omega3, good for my health. I don’t buy salmon very often, so I don’t care about the price.”</p> <p>“Try something healthier – not much price difference anyway.”</p> <p>“More Omega3 – not much difference in price really.”</p> <p>“Omega3 is important – quality over price.”</p>		
Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Joint decision	<p>“Used to it – buying salmon for a dinner party.”</p> <p>“Bought it for my mother – she likes what she’s used to.”</p> <p>“Expecting guests.”</p> <p>“I don’t think my wife would approve of GM-salmon.”</p> <p>“Having a dinner party – wanted something I’m sure of.”</p> <p>“Having a dinner party – wanted the usual.”</p> <p>“Buying for my mother (she was there) – she is sceptical, I’m not.”</p> <p>“Knew too little about GM-salmon – buying for other people in my family as well.”</p> <p>“Have small kids – wanted something I’m used to.”</p>	<p>“Just for me – cheap and healthy.”</p>		<p>“Get the kids to eat healthier.”</p> <p>“Focused on price – we’ll see what the old man says to me buying GM-salmon.”</p>

Table 7 – (continued)

Salmon Chosen	Conventional Atlantic salmon	Atlantic salmon with double omega 3	GM-salmon	GM-salmon with double omega 3
Other comments	“Unconsciously against GM.” “Wanted the one that sounded firm – Gm sounded sloppy.” “GM sounded creepy.” “GM sounded weird to eat.” “Too Americanised.” “I don’t trust the Americans.”	“Thought the fish looked better.” “Looked better – more firm.”		

5.4 Results Stated Preferences

The best-worst scaling results gathered from the SP-study were analysed using maximum likelihood estimation and enabled me to assess the information found in the data set. These estimates show a clear ‘best’ preference for conventional Atlantic salmon on an overall basis, where the conventional Atlantic salmon offered at a median price -15% (100 NOK) collected the most ‘best’ responses. At the other end of the scale, Atlantic GM-salmon collected the most ‘worst’ responses on an overall basis, with Atlantic GM-salmon with double omega 3 at median price +15% being labelled as the ‘worst’ option. These results are shown below.

Parameter	Parameter Estimate	Standard error	Chi-Square	Pr > ChiSq	Label
X1	1,88272	0,11298	277,7194	<.0001	Atlantic – 100 NOK
X2	1,62849	0,1117	212,5665	<.0001	Atlantic – 118 NOK
X3	1,28234	0,10947	137,2196	<.0001	Atlantic2O3– 118 NOK
X4	1,16356	0,12619	85,0241	<.0001	Atlantic2O3 – 100 NOK
X5	0,44834	0,1328	11,3976	0,0007	Atlantic – 136 NOK
X6	0,21998	0,14109	2,431	0,119	AtlanticGM2O3 – 100 NOK
X7	-0,23895	0,147	2,6425	0,104	AtlanticGM – 118 NOK
X8	-0,74061	0,11973	38,2603	<.0001	Atlantic2O3 – 136 NOK
X9	-0,82154	0,12306	44,5702	<.0001	AtlanticGM – 100 NOK
X10	-0,92223	0,12382	55,4758	<.0001	AtlanticGM2O3 – 118 NOK
X11	-1,76201	0,10936	259,6146	<.0001	AtlanticGM – 136 NOK
X12	-1,99777	0,11079	325,1524	<.0001	AtlanticGM2O3 – 136 NOK

Table 8 - Analysis of Maximum Likelihood Estimates for best-worst scale positions

The parameter estimates in the table indicate the relative frequency of a ‘best’ choice with a reference point of 0. If the parameter estimates are positive, i.e. over 0, that product was chosen as the best option more often than it was chosen as the worst option. If the parameter estimates are negative, i.e. below 0, that product was chosen as the worst option more often than it was chosen as the best option. Nevertheless, if the estimated utility for one alternative is higher than the estimated utility for another product, there is a higher choice probability for the product with a higher estimate, regardless of the reference point being 0.

The results from the best-worst scale will now be discussed based on four different scenarios. SP-estimates are a reflection of best only choices, while SP-BW-estimates are a reflection on both “bestness” and “worstness” of the choices made. These results only differ by 2% on an overall basis, but a notable variance is experienced in scenario one. Therefore, the discussion of results gathered from SPs will be based on SP-estimates, with the exception of scenario one below.

5.4.1. Scenario One

In scenario one, all choices are based on the premise of all salmon variants being offered at the same average market price (118 NOK). The best only results (SP) show a clear preference for conventional Atlantic salmon (66 %), while around 1/3 of the respondents prefer the added consumer benefit of double omega 3 to their choice of Atlantic salmon (31 %). GM-salmon is the least preferred product at this price variation with 1 % market share, while GM-salmon with double omega 3 is preferred by 2 % of the respondents. Atlantic GM-salmon with or without double omega 3, gains a low market share at this price variation.

The combined estimation of “bestness” and “worstness” results show similar market shares as SPs for conventional Atlantic salmon, with (36 %) or without (52 %) double omega 3 fatty acids. The apparent difference in market share between Atlantic GM-salmon (8%) and Atlantic salmon with double omega 3 (4%) is not statistically significantly different.

Scenario	AtlanticGM	Atlantic	AtlanticGMO3	Atlantic2O3	Total
One					
SP					
Price profile	118 NOK	118 NOK	118 NOK	118 NOK	
Utility	-0,45665	3,42935	0	2,67085	
Value	0,633401992	30,85658	1	14,4522484	46,94223
Share	1 %	66 %	2 %	31 %	
SP-BW					
Price profile	118 NOK	118 NOK	118 NOK	118 NOK	
Utility	-0,23895	1,62849	-0,92223	1,28234	
Value	0,7874543	5,09617	0,397631334	3,6050657	9,886325
Share	8 %	52 %	4 %	36 %	

Table 9 - Market shares for Scenario One SP and SP-BW

5.4.2 Scenario Two

In the second scenario, both Atlantic GM-salmon and Atlantic GM-salmon with double omega 3 are offered at a median price of -15 % (100 NOK), while conventional Atlantic salmon is offered at the median price (118 NOK) and Atlantic salmon with double omega 3 is offered at the median price +15 % (136 NOK). Conventional Atlantic salmon still has the largest market share at this price variation (71 %), while Atlantic GM-salmon with double omega 3 is preferred second, with a market share of 13 %. Atlantic GM-salmon gains 6 % in market share compared to the last scenario, thus ending up at a 7 % market share. Atlantic salmon with double omega 3 loses 22 % in market share compared to the last scenario ending up at 9 %.

The SP-results are quite clear; with the attached benefits of a lower price and double omega 3, Atlantic GM-salmon gains a substantial market share, while Atlantic salmon with double omega 3 loses a substantial amount at a higher price variation. Additionally, Atlantic GM-salmon on its own also gains a higher market share (6 %) when offered at a lower price. These results show a clear variation in preferences when the two Atlantic GM-salmon alternatives are offered at a lower price than the conventional salmon alternatives, especially in regard to Atlantic GM-salmon with double omega 3. This indicates that both the price and omega 3 benefits are influencing factors in consumer preferences for Atlantic GM-salmon, especially when they are combined as benefits for one product.

Scenario	AtlanticGM	Atlantic	AtlanticGMO3	Atlantic203	Total
Two					
SP					
Price profile	100 NOK	118 NOK	100 NOK	136 NOK	
Utility	1,14683	3,42935	1,71929	1,33767	
Value	3,14819729	30,85658	5,580564856	3,81015549	43,39549709
Share	7 %	71 %	13 %	9 %	

Table 10 - Market shares for Scenario Two SP

5.4.3 Scenario Three

In scenario three, both Atlantic GM-salmon and Atlantic GM-salmon with double omega 3 are offered at the median price –15 % (100 NOK), while conventional Atlantic salmon and Atlantic salmon with double omega 3 are offered at the median price +15 % (136 NOK). Thus, in this scenario the price difference between GM and non-GM salmon is 27 %. Conventional Atlantic salmon is still the most preferred item, but ends up at its lowest market share throughout all four scenarios (50 %). Consequently, Atlantic GM-salmon with double omega 3 gains its highest market share with 22 %, as does Atlantic GM-salmon, with a 13 % market share. Atlantic salmon with double omega 3 at a premium price ends up with 15 % market share.

Conventional Atlantic salmon drops 21 % in market shares compared to scenario two, and consequently all the other three salmon options gain a substantial market share at this price variation. These SP-results further indicate that lower prices, along with a consumer benefit, are impacting factors on stated consumer preferences for GM-salmon.

Scenario	AtlanticGM	Atlantic	AtlanticGMO3	Atlantic203	Total
Three					
SP					
Price profile	100 NOK	136 NOK	100 NOK	136 NOK	
Utility	1,14683	2,51805	1,71929	1,33767	
Value	3,14819729	12,40438	5,580564856	3,81015549	24,94330215
Share	13 %	50 %	22 %	15 %	

Table 11 - Market shares for Scenario Three SP

5.4.4 Scenario Four

In the last scenario, Atlantic salmon with double omega 3 is offered at the median price +15 % (136 NOK), while the remaining three salmon options are offered at the median price -15 % (100 NOK). These market shares show that more respondents prefer Atlantic GM-salmon with double omega 3 (11 %) at 100 NOK per kg, than Atlantic salmon with double omega 3 (7 %) at 136 NOK a kg. This pattern is evident for these two options in all scenarios where Atlantic GM-salmon with double omega 3 is offered at a lower price than Atlantic salmon with double omega 3 (e.g. scenario 2, 3 and 4). In scenario one, where Atlantic salmon with double omega 3 and Atlantic GM-salmon with double omega 3 are offered at the median price, the former gets a market share of 31 %, while the latter gets a market share of 2 %. Hence, price is shown to substantially affect consumer preferences for GM-salmon based on SPs.

Scenario	AtlanticGM	Atlantic	AtlanticGMO3	Atlantic2O3	Total
Four					
SP					
Price profile	100 NOK	100 NOK	100 NOK	136 NOK	
Utility	1,14683	3,68962	1,71929	1,33767	
Value	3,14819729	40,02963	5,580564856	3,81015549	52,56855044
Share	6 %	76 %	11 %	7 %	

Table 12 - Market shares for Scenario Four SP

5.5 Difference in preferences between RP and SP

The following section will discuss to what degree SPs gathered from best-worst scaling match the actual choice behaviour gathered from the field choice experiment. This comparison is done based on the assumption that: “consumers who “talk the talk” in surveys do not always “walk the walk” when it comes to innovation adoption” (Arts et al., 2011, p. 134). The following discussion is based on estimated market shares for both methods. The estimated shares for RPs are a direct reflection of consumer choices of four types of salmon made in a real purchasing situation. The estimated shares for SPs are created from the data gathered from best-worst scaling and discussed under the assumption that what respondents rated as their best product, is in fact the product they would have chosen in a real purchasing situation,

thus potentially being more comparable with the results from the RP-method. The SP percentages are estimated based just on the best choice in the best-worst scale, while the SP BW percentages are based on both best and worst scale position estimates. It was decided to include both estimates in order to add to the body of literature on discrete choice and best-worst scaling models.

5.5.1 Comparing estimated market shares

This comparison of multinomial logit (MNL) model parameters from both the SP-data and the RP-data is dependent on accounting for possible variance differences in the error components (Mather et al., 2011). These parameter differences arise across both SPs and RPs due to these error differences and therefore the data sets from both measurements should provide comparable preference results IF the variance is accounted for (Severin et al., 2001; Mather et al., 2011). When this scale factor is factored out, it enables a comparison between the two methods of study, which is provided below.

5.5.2 Scenario One

In the first scenario (Table 13) all variants of salmon are offered at the median price. Conventional Atlantic salmon is shown to be the most preferred product when all options are offered at the same price in both methods, while Atlantic GM-salmon is the least preferred product. Atlantic GM-salmon got a relatively high market share in the best-worst scale (8 %) compared to RP (0 %). Due to this variance in results between all three estimates of preference, it should be mentioned, again, that the 8 % figure derived from SP BW are relative ratings based on the “bestness” and “worstness” of the results. Therefore, ratings from the SP BW do not reflect whether respondents would have actually chosen it. Thus, the SP market share estimates, based on the results from best choices, would appear to be a more accurate reflection of actual choice, because it creates market shares of the best choices made, i.e. what people supposedly would have chosen.

Percentage Market Shares Scenario One				
Research Method	AtlanticGM 118 NOK	Atlantic 118 NOK	AtlanticGM203 118 NOK	Atlantic203 118 NOK
SP	1 %	66 %	2 %	31 %
SP BW	8 %	52 %	4 %	36 %
RP	0 %	67 %	7 %	25 %

Table 13 - Market shares for Scenario One RP and SP

In this scenario the most notable difference is a greater preference for Atlantic GM-salmon with double omega 3 when offered as a real product alternative (7 %) than in the hypothetical survey (2 %). Respondents have a slightly higher preference for double omega 3 attached to Atlantic salmon based on SPs (31 %), compared to RPs of the same product (25 %).

5.5.3 Scenario Two

In scenario two, (table 14) both Atlantic GM-salmon and Atlantic GM-salmon with double omega 3 are offered at the median price – 15% (100 NOK), while conventional Atlantic salmon is offered at the median price (118 NOK) and Atlantic salmon with double omega 3 is offered at the median + 15% (136 NOK). While conventional Atlantic salmon is still the most preferred product option with a 70 % market share, Atlantic GM-salmon is more preferred based on SPs (7 %) than on RPs (1 %). Similarly, Atlantic salmon with double omega 3 gains a higher market share based on RP (18 %) than on the results from SPs (9 %). Atlantic GM-salmon is still the least preferred product option in all methods. Interestingly, twice as many people were actually prepared to pay a premium for Atlantic salmon with double omega 3 (RP), compared to the what the sample said in the best-worst scale measurement (SP).

Percentage Market Shares Scenario Two				
Research Method	AtlanticGM 100 NOK	Atlantic 118 NOK	AtlanticGM2O3 100 NOK	Atlantic2O3 136 NOK
SP	7 %	71 %	13 %	9 %
SP BW	6 %	70 %	17 %	7 %
RP	1 %	70 %	12 %	18 %

Table 14 - Market shares for Scenario Two SP and RP

5.5.4 Scenario Three

In the third scenario (table 15) both Atlantic GM-salmon and Atlantic GM-salmon with double omega 3 are offered at the median price – 15%, while conventional Atlantic salmon and Atlantic salmon with double omega 3 are offered at the median price + 15%. This scenario is created to reflect the largest price difference between GM and non-GM salmon, thus seeing the effect of price as a consumer benefit.

Atlantic GM-salmon gains a market share of 13 % in the SP, while it still remains at a low 1 % in the RP. Atlantic GM-salmon with double omega 3 reaches a 22 % market share in the SP, while it gets a 15 % market share based on RPs. Atlantic salmon is still the most preferred product, but loses some percentage based on the price variations, especially based on SPs.

Results indicate that Atlantic GM-salmon is stated to be preferred to a higher degree than is revealed, with a revealed market share of 1 % compared to a stated market share of 13 %. The product benefit of double omega 3 raised the market share of Atlantic GM-salmon from 1 % to 15 % based on RPs, and from 13 % to 22 % based on SPs. Added benefits of a lower price and omega 3 therefore can be said to be impacting consumer preferences for Atlantic GM-salmon. A lower price is not enough for people to accept Atlantic GM-salmon on the other hand, as double omega 3 fatty acids seems to be crucial for acceptance according to real choices.

Percentage Market Shares Scenario Three				
Research Method	AtlanticGM 100 NOK	Atlantic 136 NOK	AtlanticGM2O3 100 NOK	Atlantic2O3 136 NOK
SP	13 %	50 %	22 %	15 %
SP BW	12 %	42 %	33 %	13 %
RP	1 %	61 %	15 %	23 %

Table 15 - Market shares for Scenario Three RP and SP

5.5.5 Scenario Four

In the final scenario, Atlantic salmon with double omega 3 is offered at the median price + 15% (136 NOK), while the other three salmon variants are offered at the median price – 15% (100 NOK). Conventional Atlantic salmon gathers an average market share of 75 %, while Atlantic GM-salmon is the least preferred option. This scenario shows a similar trend to the last three scenarios described; Atlantic GM-salmon is preferred to a greater extent in SPs than RPs, and Atlantic salmon with double omega 3 is preferred to a greater extent in RPs than SPs. This is apparent in scenario two, three and four, which is evidence of the substantial effect price and double omega 3 has on consumer preferences in both methods of study.

Percentage Market Shares Scenario Four				
Research Method	AtlanticGM 100 NOK	Atlantic 100 NOK	AtlanticGM2O3 100 NOK	Atlantic2O3 136 NOK
SP	6 %	76 %	11 %	7 %
SP BW	5 %	75 %	14 %	5 %
RP	1 %	77 %	9 %	13 %

Table 16 - Market shares for Scenario Four RP and SP

5.6 Compared market share summary

Originally it was expected that the results from the SP-research method might give misleading results in the light of GM, which would be apparent based on the results gathered from RPs. This seems to be the case based on the comparison done, but in an unexpected direction. The occasional high SP predicted shares for discounted and average priced Atlantic GM-salmon would seem to indicate that SP-results are slightly off when compared to RP, but in the opposite direction of what was anticipated based on the apparent negative attitude towards GM-foods.

As can be seen based on the compared market share scenarios described, Atlantic GM-salmon gained an overall RP market share of 0.75 % at the different price variations, while it got an average market share of 6.75 % based on SP-estimates (these percentages are created as an indication of the difference in all scenarios combined, and do not reflect the real market share percentages). Atlantic GM-salmon's market share was close to 0 % at all four RP-scenarios, while it varied from a low 1 % to a high 13 % in the SP-scenarios. This indicates that more people stated Atlantic GM-salmon to be the "best" option, based on the assumption that best-estimates are a reflection of actual choice, than people who actually bought Atlantic GM-salmon.

Nevertheless, the differences in results from best-worst scaling compared to RPs are not substantial; they provide an overall good estimate of the RP results, which will be discussed further in the next main chapter.

5.7 FNS-Results

The food neophobia scale (FNS) set out to measure consumer attitudes and thus willingness to try (WTT) novel foods, such as GM-salmon. The overall concept of the FNS is to locate people on an interval scale of neophobia, at the extremes of the scale: those who express unwillingness to try novel food are neophobics, while those who express willingness to try novel food are neophilics. Results from the FNS can give implications towards the degree of WTT novel foods of the sample used in the SP-research, thus testing if food neophobia impacts peoples stated preference for GM-foods. These results will now be outlined.

5.7.1 FNS Best/Worst scores

The model below portrays both the best-worst preference results described earlier, in addition to these results based on respondents with a high standardised score on the FNS (+ 1). In effect they model two populations – one with the average distribution of FNS, the other with a high score on the FNS (a high score on the FNS equates to low neophobia). When some alternatives increase in ranking on the FNS BW ranked list compared to the original which ignored food neophobia, this means they are much more preferred by those with high FNS-scores.

As can be seen in the table below which gives an overview over all twelve price, benefit and product variations, some items have an improved rank on the FNS BW scale. The most notable improvement rankings are marked in green.

Most notably, Atlantic GM-salmon with double omega 3 (136 NOK), Atlantic GM-salmon (136 NOK), Atlantic salmon with double omega 3 (136 NOK), Atlantic GM-salmon (118 NOK), and Atlantic salmon with double omega 3 (118 NOK) have gotten the most improved ranks, by 5, 6, 5, 5, and 2 ranks respectively.

In the context of GM, this indicates that people with neophilic traits, i.e. a score of +1, are more willing to try Atlantic GM-salmon than people with neophobic traits. This indication is based on the results showing that Atlantic GM-salmon with double omega 3 (136 NOK), Atlantic GM-salmon (136 NOK) and Atlantic GM-salmon (118 NOK) have been chosen as the best option more often than the worst option by respondents that are less neophobic (+1 on the FNS), compared to respondents with a 0 on the FNS, i.e. not neophobic nor neophilic.

BW-FNS: Low Food Neophobia	BW-results
X9 Atlantic salmon with double omega 3 (118 NOK)	X6 Conventional Atlantic salmon (100 NOK)
X3 GM-salmon (118 NOK)	X1 Conventional Atlantic salmon (118 NOK)
X11 Atlantic salmon with double omega 3 (136 NOK)	X9 Atlantic salmon with double omega 3 (118 NOK)
X1 Conventional Atlantic salmon (118 NOK)	X8 Atlantic salmon with double omega 3 (100 NOK)
X4 GM-salmon (136 NOK)	X7 Conventional Atlantic salmon (136 NOK)
X6 Conventional Atlantic salmon (100 NOK)	X10 GM-salmon with double omega 3 (100 NOK)
X5 GM-salmon with double omega 3 (136 NOK)	X3 GM-salmon (118 NOK)
X8 Atlantic salmon with double omega 3 (100 NOK)	X11 Atlantic salmon with double omega 3 (136 NOK)
X2 GM-salmon (100 NOK)	X2 GM-salmon (100 NOK)
X12 GM-salmon with double omega 3 (118 NOK)	X12 GM-salmon with double omega 3 (118 NOK)
X7 Conventional Atlantic salmon (136 NOK)	X4 GM-salmon (136 NOK)
X10 GM-salmon with double omega 3 (100 NOK)	X5 GM-salmon with double omega 3 (136 NOK)

Table 17 - Compared BW FNS and BW ranks

6.0 Discussion and Conclusions

6.1 Introduction

Chapter five examined to what degree clearly stated consumer benefits impact the acceptance of GM-salmon across two methods of study: Stated Preferences (SP) gathered through best-worst scaling, and Revealed Preferences (RP) gathered through a field choice experiment. These two research methods are rarely used in the context of studying consumer attitudes to and acceptance of GM-foods, and have never been used in combination previously. By undertaking both methods with similar designs to investigate the effect consumer benefits may have on the adoption of GM-salmon, this thesis provides valuable insights into the validity of best-worst scaling SP-methods and the importance of relative advantage in adoption of innovative GM foods.

In addition, the psychological construct of food neophobia, i.e. people's values and attitudes towards novel foods, was shown to have an impact on consumer preferences for GM-foods. The impact of food neophobia can give guidance for further research regarding attitudes towards GM-foods.

This chapter will utilize these findings to address the hypotheses derived from the previous chapters:

H1 - *Clearly stated consumer benefits will lead to greater acceptability of genetically modified salmon in Norway*

H2 - *Stated preference measures will fail to provide an accurate measure of consumer behaviour regarding genetically modified food in a real market situation*

H3 - *Stated preferences measured using best-worst scaling will provide an accurate measure of consumer purchasing behaviour regarding genetically modified food in a real market situation*

H4 - *People with low food neophobia express increased willingness to try GM-salmon*

6.2 Hypothesis 1 – Impact of benefits on acceptability

The overarching hypothesis of this research entails measuring the effect that clearly stated consumer benefits have on the acceptance of GM-salmon; *H1 - Clearly stated consumer benefits will lead to greater acceptability of genetically modified salmon in Norway.* It is overarching due to the fact that both the best-worst scaling and field choice experiment measure stated and revealed preferences respectively towards GM-salmon across different combinations of benefits: price and double omega 3 values.

The most important factor in this research, as can be seen in the first section of the conceptual framework (section 2.5) and throughout the majority of chapter 2 (literature review), is the role of benefits in determining consumer acceptance of GM-foods. This synergy between the benefits of GM-foods and consumer preferences has drawn extensive attention in prior GM literature (e.g. Bredahl, 1999; Chern et al., 2003; Fortin & Renton, 2003; Gaskell et al., 2004; Mather et al., 2011). However, this is the first study to measure the impact of consumer benefits on acceptance of a GM animal product, which prior research has shown to be viewed more negatively than GM non-animal products (Nayga et al., 2006).

6.2.1 Price and Nutritional Benefit

In the case of AquaBounty's GM-salmon, a lower market price can be expected due to improved feed utilization and faster growth. The benefit of a lower price is often found to be a reason for choosing GM-foods over other similar alternatives, and can thus be seen as one of GM-foods' relative advantages.

For example, Noussair et al. (2004) found that a high percentage of consumers were willing to purchase GM-foods provided they were discounted sufficiently. This research provides similar results in terms of price affecting acceptance. The price benefit is not enough to increase acceptance by much, but when bundled with a product benefit, a substantial proportion of consumers are willing to try the GM option, supporting the results of Knight et al. (2007).

The field choice experiment revealed Atlantic GM-salmon to be 'dead in the water' without the presence of a consumer benefit and a price advantage. Based on the four market price scenarios described in table 3 – 6, Atlantic GM-salmon got a market share between 0 – 1 %. Only one person bought salmon when under the impression that it was GM with the only benefit being a price advantage (100 NOK). Thus, a 27 % discount is insufficient to overcome

the resistance to Atlantic GM-salmon. Results from the best-worst scaling show a similar trend based on the same market scenarios as in the RP, but with a slight overestimation of people's willingness to actually choose Atlantic GM-salmon with a reduced price. The market shares for Atlantic GM-salmon varied from a low 1 % to a high 13 % across the four scenarios, but still replicate the estimates gathered from RPs rather well.

With the consumer health benefit on the other hand, Atlantic GM-salmon got increased market shares, with or without a price advantage. Based on the RP-estimated market shares in scenario one (table 3), in which all products were offered at the same median price, Atlantic GM-salmon gained a 7 % market share with double omega 3 compared to 0 % without it. Coupled with a 27 % discount compared to the price of conventional Atlantic salmon and Atlantic salmon with double omega 3 (table 5), Atlantic GM-salmon with double omega 3 got its highest market share of 15 % in the revealed preference choice experiment. In the same scenario (table 11) based on SP-estimated market shares, Atlantic GM-salmon only gained 1 % coupled with omega 3, but when a price reduction and double omega 3 are added in the product description, the market share rises to 22 %.

These implications are in line with several studies on health and nutritional benefits in the context of GM-foods, such as Frewer et al. (1997b) who found these benefits to increase willingness to accept GM-foods, whereas benefits accruing solely to the manufacturer/producer did not. Similarly, Lähteenmäki et al. (2002) discovered health benefits to be positively perceived when attached to GM-foods, and Chern et al. (2003) found the willingness to purchase GM-foods to increase among Norwegians when they had increased nutritional values.

Some comments gathered through the field choice experiment (table 7) indicated no positive effect of the attached nutritional benefit (e.g. 'You get omega 3 through pills, no need for extra in fish', 'Get enough omega 3 elsewhere'; 'Cheap, don't care about omega 3 or GM') and therefore consumers were not affected enough to choose the GM-salmon with double omega 3. These comments indicate that consumer benefits of GM-foods have to be relevant to consumers, in line with the findings of Fortin and Renton (2003) where increased shelf life had no positive effect on consumer acceptance of GM-foods.

In contrast, the majority of comments made by those who chose Atlantic salmon with double omega 3 (e.g. 'Chose it because of more omega 3', 'Sceptical about GM, chose it because of omega 3', 'Omega 3 is good!') shows that increased nutritional values are desired benefits

among a substantial proportion of consumers. These results indicate that nutritional values are benefits that should increase the acceptance of GM-foods, given that they are coupled with a price advantage, which the increased market share of GM-salmon with double omega 3 compared to GM-salmon alone indicates.

The results gathered in terms of the importance of benefits in this study, seem to answer the unresolved issue proposed by Burton and Pearse (2002) in their study on consumer attitudes towards GM-foods to some degree: “An unresolved question is whether concerns about first-generation GM products would be moderated by market exposure. If this were the case, there would be significant benefits for those striving for market acceptance to develop products with direct nutritional or health benefits to consumers, as opposed to some unspecified price advantage” (p. 54).

Market exposure of GM-salmon through the field choice experiment and WTP through best-worst scaling, indicates that a consumer benefit bundled with a price advantage can increase the acceptance of GM-foods quite substantially, thus supporting *H1*.

6.3 Hypothesis 2 and 3 – Validity of Stated Preferences

Hypothesis two postulated that: *Stated preference measures will fail to provide an accurate measure of consumer behaviour regarding genetically modified food in a real market situation.* This hypothesis was derived from conflicting results about the validity of stated preference (SP) methods and the extensive use of such methods in literature concerning preferences and acceptance towards GM-foods. Contingent valuation methods (CVM) are often utilized to determine consumers’ WTP for GM-foods (e.g. Chern et al., 2003) under the assumption that respondents are answering hypothetical questions in the same way they would answer the same questions when asked to make a real financial commitment (Cummings et al., 1995). SP-techniques, such as CVM and discrete choice experiments (CE), have been criticized based on several limitations, such as measuring attitudes instead of behaviour (Bishop & Heberlein, 1986), social desirability bias (Olesen et al., 2010) and hypothetical bias (Murphy et al., 2005; Colson & Rousu, 2013).

Best-worst scaling (Louviere & Woodworth, 1991) revolves around asking participants to identify their most preferred (best) and least preferred (worst) option on a continuum of preference, thus forcing participants to make trade-offs between attributes and ultimately reveal their true preference between items. Best-worst scaling is found to be a “superior

method of collecting preferences than ratings” (Cohen, 2003, p. 8) and reflects revealed preferences well, therefore predicting real purchasing behaviour (Louviere et al., 2013).

Due to the claimed advantages of best-worst scaling and its absence in GM literature, this method was utilized to measure consumers’ stated preferences for GM-salmon and the importance of attached consumer benefits for innovation adoption, thus leading to *H3 - Stated preferences measured using best-worst scaling will provide an accurate measure of consumer purchasing behaviour regarding genetically modified food in a real market situation*

6.3.1 Stated and Revealed Preferences for GM-salmon

The overall results from both best-worst scaling (SP) and the field choice experiment (RP) showed similar preferences for GM-salmon across different combinations of benefits. When comparing scenario one, all products offered at a median price, from both methods of study (table 13), the achieved market shares for all types of salmon are strongly correlated. GM-salmon attract essentially no market share in both methods, while GM-salmon with double omega 3 is slightly more preferred based on RP than on SP, 7 % and 2 % respectively. In scenario two there is a slight overstatement of the SP for GM-salmon (7 %) compared to the RP for GM-salmon (1 %), while GM-salmon with double omega 3 gathers similar market shares with either of the two methods. The same pattern is evident in scenario three, where the SP-estimated market share is 13 % and the RP market share is 1 %, and in scenario four, where GM-salmon gathers a stated market share of 6 % and a revealed market share of 1 %.

As the market share estimates indicate, results from best-worst scaling provides a very good estimate of likely RP on an overall basis, despite the apparent overstatement of preference for GM-salmon. Both RP and SP show a clear preference for conventional Atlantic salmon, while GM-salmon is the least preferred option amongst respondents. When GM-salmon has the benefit of double omega 3 and a reduced price (27 % discount) on the other hand, it gains a 15 % market share based on RPs and a 22 % market share based on SPs.

The slight overstatement in regard to GM-salmon in scenarios two, three and four (table 14 – 16) show that respondents are more positive towards GM-salmon based on SPs than they are based on RPs. These results are different to the findings from Mather et al. (2011) who found spray-free GM fruit to be preferred to a greater extent based on RP, than they were based on SP. One reason for this variance in results between two similar studies measuring the importance of benefits in regards to different GM-foods based on SPs and RPs, can be the fact that the products used are completely different, as Mather et al. (2011) used different kinds of

fruit, one of them being GM, while this research used different kinds of salmon, one of them GM. Additionally, the variance in results can be due to the use of best-worst scaling in the present study, which is completely different to the SP method used by Mather et al. (2011). They asked respondents what they would choose between several items, and therefore social desirability could be a factor that affected their results, as “social desirability can lead consumers to feel that it is somehow unethical to purchase foods that “society” frowns upon” (Mather et al., 2011, p. 2). In the best-worst scale used in the current research, respondents are asked which option seems to be the best and which seems to be the worst to them, therefore reducing the possibility of a social desirability bias.

Negative attitudes towards GM are seen to be stronger towards GM-products using animals than plants (Frewer et al., 1997a) and these negative attitudes are embedded in fundamental attitudes towards nature and technology and therefore forming people’s benefit and risk perception (Bredahl, 2001). The technology is seen as something tampering with nature (Frewer & Shepherd, 1995) and animals products developed from GM have therefore been shown to produce lower WTP-estimates (Lusk et al., 2005). As a result of this “tampering”, consumer acceptance of GM-foods seems restrained as consumers may perceive it as something unnatural (Mielby et al., 2012a), which some of the comments gathered from the field choice experiment show (e.g. “Wanted the most natural”; “Wanted the closest to farmed salmon”, “Farmed salmon is bad enough”).

Thus, the results indicating a slightly more negative evaluation of GM-salmon based on RP can be results of fundamental differences in the way consumers react towards a GM animal product compared to plants, where this negative evaluation is strengthened in a real purchasing situation. These results can therefore also explain the differences in compared preferences between this study and Mather et al’s (2011) study, which utilized GM-fruit.

On the other hand, these variances in results compared to Mather et al’s (2011) results could perhaps be explained by best-worst scaling being a superior method to SP choice experiments, and therefore extracting results closer to RPs, as Mather et al. (2011) experienced wide divergence between SPs and RPs. One of the most important advantages of best-worst scaling is that it enables the researcher to gather information about both the best and the worst ranked option amongst several options, thus gathering an increased level of information about consumer preferences (Louviere et al., 2013). This advantage can bring SPs gathered through best-worst scaling closer to RPs.

Even though SPs deviated slightly in favour of GM-salmon compared to RPs towards GM-salmon, the results from SPs are very close in broad terms to results from RPs, thus refuting *H2* and therefore acknowledging the validity of best-worst scaling, thus supporting *H3*. SPs have succeeded in providing fairly accurate results when measuring consumer behaviour regarding GM-foods in a real market situation, mainly due to best-worst scaling's superior ability to derive approximate preferences.

6.4 Hypothesis 4 – Food Neophobia

Just like attitude towards nature and technology, food neophobia is shown to negatively affect acceptance of GM food (Bredahl, 2001) and decrease WTT GM-foods, especially GM-foods of animal origin (Tuorila et al., 2001). Due to the proposed effect of food neophobia on acceptance of GM-food of animal origin, the Food Neophobia Scale (Pliner & Hobden, 1992) seems relevant to use to measure consumers' WTT novel foods in the context of GM-salmon, thus creating *H4 - People with low food neophobia express increased willingness to try GM-salmon*

The results provided in table 17 show a comparison of the results from best-worst estimates versus the same best-worst estimates calculated from respondents with a high standardised score on the FNS (+ 1). Estimates reveal an increased preference for GM-salmon with double omega 3 (136 NOK) and GM-salmon (136 NOK and 118 NOK) amongst those respondents with neophilic traits, i.e. people with a preference for novel foods. In essence, this mean that those who chose GM-salmon as their best option show relatively high neophilic traits, compared to those who chose conventional Atlantic salmon as their best option, as they show more neophobic traits. These results support the findings from Tuorila et al. (2001) in which neophobic people show a reluctance to try GM-foods, especially GM-foods involving animals.

These food neophobia scores indicate that people with neophilic traits express a greater willingness to try GM-salmon, thus supporting *H4*.

6.5 Conclusions

This study has discovered that consumer benefits, in particular a price advantage and increased amounts of omega 3 fatty acids, are important advantages that positively impact consumer adoption of GM-salmon. These findings suggest that for GM-salmon to achieve acceptance in the market, relevant consumer benefits need to be associated with the product

and clearly stated in the product description. Additionally, these findings are in alignment with classical economic theory that hypothesizes that consumers seek to maximize their utility (McFadden, 2000),

By utilizing a field choice experiment in a real purchasing situation to validate stated preferences gathered through best-worst scaling, this study further demonstrates best-worst scaling to be a valid measurement for predicting real purchasing behaviour.

Results show clear resistance to GM-salmon using both research methods, especially when consumer benefits are absent. A possible explanation for this aversion was found to be consumers' food neophobia. Neophilic consumers had a higher preference for GM-salmon than neophobic consumers, thus consumers' attitudes towards novel foods seem to impact their preferences for GM-salmon.

6.7 Contributions

The findings examined in this study contribute to literature in several ways. First, it determines that even though GM-salmon is not preferred by the majority of consumers, clear consumer benefits are vital for increasing the acceptance of GM-salmon. Without relative advantages GM-salmon will almost certainly fail to have a successful market entry. Second, it provides indications that best-worst scaling is a valid measure of consumer preferences for GM-foods, by validating it based on revealed preferences. It therefore contributes to literature by providing evidence for the importance of valid research methods to gather close approximations of consumer preferences for GM-foods. Third, it provides evidence for food neophobia being an impacting construct in consumer acceptance of GM-salmon.

6.8 Implications for Industry

As this research utilized a GM-food product that will most likely be available for consumption in the near future, the first set of implications will be directed at AquaBounty Technologies and other companies within genetic engineering.

The most relevant implication based on the findings from this study in regards to AquaBounty's transgenic salmon, is the importance of consumer benefits. Without a consumer benefit, GM-salmon is shown to be rejected by consumers and therefore AquaBounty should focus on promoting their products' tangible benefits to achieve a successful market entry. According to AquaBounty (2015), "increased growth rates, enhanced resistance to disease, better feed-conversion rates, manageable breeding cycles, and more

efficient use of aquatic production systems” are some of the main advantages with their technology. These advantages are more beneficial to the producers than the end-user and might therefore not affect the adoption rate positively. It is therefore important to carefully consider how these production benefits are conveyed to consumers if they are to impact adoption of GM-salmon. This requirement in general terms has been commented on previously by Frewer et al. (1997b) in regard to benefits of GM; “...how the benefit resulting from the production process is described is likely to be important in influencing consumer acceptance” (p. 278)

The implications for marketing are rather similar; clearly stated consumer benefits seem to evoke positive consumer product evaluations and should therefore be focused on as a product’s main relative advantage. This focus can increase market shares as consumers will choose the product with the greatest utility to themselves compared to other products. This is especially important in regard to socially-charged items, such as GM-foods, as benefits need to be considerably more advantageous compared to products in the same category for them to have an impact.

6.9 Implications in accordance with Diffusion of Innovations

The results gathered are easily explained in accordance with the theory of diffusion of innovations. Based on the rejection of GM-salmon without clearly stated consumer benefits and the increased market shares of GM-salmon with the presence of such benefits, the importance of an innovations’ *relative advantage* is clear. This relative advantage needs to be perceived as a relative advantage to end-users and not as a relative advantage for producers. AquaBounty’s technology might enable their transgenic salmon to be offered at a relatively low market price, but this price reduction is shown to be an insufficient benefit for increased acceptance of GM-salmon – at least in the Norwegian market. Therefore, providing the innovation with relevant consumer benefits will increase the rate of adoption.

Furthermore, the results from this study show GM-salmon to lack *compatibility* with consumers’ fundamental values and beliefs, as it is seen as something unnatural and is therefore largely rejected due to consumers’ neophobic traits. GM-salmon does not seem to resonate with people’s needs, but might appeal more with attached benefits in order to meet these needs to a greater extent.

Complexity also seems to hinder the adoption rate of GM-salmon, as it might be seen as too complex to understand and therefore seem scary (Mather et al., 2011). This is evident in some

of the comments gathered (“GM-salmon is scary”; “Afraid of everything GM”; “GM sounded creepy”). This uncertainty can be due to a lack of understanding about GM as information-gathering is a key process in the innovation decision process. It may seem like GM-salmon might be evaluated outside of its technological cluster, or schema, in some instances and therefore evaluated negatively due to its incongruity with the salmon category.

Trialability and *observability* were also reflected to some extent in the results, as some comments indicated that the appearance of salmon affected their revealed choice (e.g. “I don’t trust GM-products, looks too strange”; “Omega3 is good, the salmon looks better”). As the salmon used for the field choice experiment were all the same farmed salmon, some consumers might seem to expect GM-salmon to look different. The observability might benefit producers as it can defuse the “scariness” of GM, making it less complex. This implies that the appearance of GM-salmon compared to conventional salmon can affect the rate of adoption.

6.10 Research Limitations

Caution should be taken in generalising the results gathered in this study to other countries as they are seen to represent preferences towards GM-salmon only in Norway. This is especially important if generalisations are to be made across continents, as Europeans (Gaskell et al., 2010), and especially Norwegians (Grimsrud et al., 2004), have shown less acceptance than certain other countries towards GM-foods in earlier studies. Therefore, a change of context may give different results.

6.11 Further research

This study has revealed that consumer benefits are important for the acceptance of GM-salmon. Based on the result from this research, future research should do similar studies combining RP and SP in other countries. As previous research has shown Americans to be less negative towards GM-foods (e.g. Colson & Rousu, 2013), a study on the benefits importance in regards to GM-salmon should be conducted in the U.S. Results from such studies could give valuable implications for AquaBounty, considering they most likely will introduce their transgenic salmon to the U.S. market first – a market in which GM food products do not need to be labelled as genetically modified.

As several studies have cast doubt about the validity of SP-methods (e.g. Bishop & Heberlein, 1986; Cummings et al., 1995; Murphy et al., 2005), future research should use similar

research techniques and compare hypothetical and non-hypothetical research methods. SP-methods are often used in GM literature and therefore GM-foods might have gotten an undeserved reputation based on invalid results. This causes producers and marketers to rely on results which might not be reflected in the real market. By utilizing both SP and RP methods of study, results could lead to further validation of research methods, in addition to revealing consumers' true preferences towards GM-foods.

Best-worst scaling was found to be a valid method for measuring consumer preferences for GM-foods as the results matched RPs fairly well on an overall basis. Further research should use best-worst scaling in other contexts and across different product and benefit variations. Employing this method in further studies can improve its validity and further enhance its position as a superior SP-method.

A price advantage coupled with a nutritional benefit was found to impact consumer acceptance of GM-salmon. Other studies should look further into the role benefits play in the adoption process of GM-foods.

The comments provided are gathered after the sale has taken place and therefore it does not measure how consumers evaluate products and actually reach their conclusion at the point of sale. Further research should therefore take into consideration Hamlin's (2011) Cue-Based Decision Making model to further explore how consumers' level of knowledge affect their product evaluations in the context of GM-foods.

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Appendices

Appendix A: Ethical Approval



UNIVERSITY OF OTAGO HUMAN ETHICS COMMITTEE APPLICATION FORM: CATEGORY A

Form updated: June 2013

1. University of Otago staff member responsible for project:

Knight John Prof.

Mather Damien Dr.

2. Department/School:

Department of Marketing

3. Contact details of staff member responsible:

john.knight@otago.ac.nz

damien.mather@otago.ac.nz

vikra936@student.otago.ac.nz

4. Title of project:

Consumer adoption of Genetically Modified Foods: A study on benefit importance in the adoption process.

5. Indicate project type and names of other investigators and students:

Student Researchers **Names:** Rasmus Vikan

Level of Study (PhD, Masters, Hons):

Master of Commerce

6. Is this a repeated class teaching activity?

NO

7. Fast-Track procedure

Do you request fast-track consideration?

NO

8. When will recruitment and data collection commence?

Data collection will commence when the project is ethically approved as the venue for collection of data for the first part of the project is ready to be used.

When will data collection be completed?

Data collection will be completed when a big enough sample is gathered, hopefully in October 2014.

9. Funding of project

Is the project to be funded by an external grant?

NO

10. Brief description in lay terms of the purpose of the project:

The purpose of this project is to determine whether consumers do what they say they will in relation to the adoption of genetically modified salmon, and what effect will the presence of benefits, such as lower price and increased omega-3 fatty acid levels, have on their decision to purchase salmon. Results will give indications of likelihood of market acceptance of GM-salmon in the future and what role benefits play in the adoption process.

11. Aim and description of project

Aquabounty GM salmon have been engineered to contain an extra copy of the salmon growth hormone gene so that they grow twice as fast as conventional salmon. In the final stages of approval for human consumption, this will be the first GM animal given approval. What is not known is how consumers will view this novel food product. The aim of this project is to see how the presence of benefits affects consumers in their adoption process of GM-salmon. This research will determine if people who “talk the talk” will in fact “walk the walk” in regards to a socially charged issue, such as GM-salmon.

The research questions are as follows:

1. What effect will the presence of benefits have in the adoption process of GM-salmon?
2. To what extent do stated preferences match revealed preferences about consumer adoption of GM-salmon?
3. Does the level of food neophobia of participants affect adoption of GM-foods in any way?

This research can provide answers regarding likely consumer adoption of GM-salmon and the importance of consumer benefits this technology can provide. Consumers may on paper reject this technology, as prior research suggests, but when faced with a real purchasing decision, their true preference will appear. As a vast amount of literature on the acceptance of GM-foods utilizes surveys to extract attitudes regarding GM-foods, this research will use both stated and revealed preference methods to gather information about intended behaviour and actual behaviour.

12. Researcher/instructor experience and qualifications in this research area

Supervisor John Knight:

Professor John Knight has extensive research experience spanning more than three decades. Of particular relevance to this application, he has undertaken considerable research on the perception of genetically modified products, including choice modelling field studies in 6 countries to determine the willingness of consumers to choose GM products when there is a consumer benefit and/or a price benefit. These studies have led to publications in leading journals including: Nature Biotechnology, Journal of the Science of Food and Agriculture, Science Communication, together with numerous papers in marketing journals.

Supervisor Damien Mather:

Dr Damien Mather's research concerns three major fields of enquiry: a) strategy, policy and branding in international business, b) pricing and distribution, and c) business communications. His areas of expertise include advanced quantitative research methods and techniques, customer analytics and market research. He currently teaches MART306 Innovation & New Product Development, MART307 Marketing Research Methods and Postgraduate Module 14 Branding. He has worked closely with Professor Knight on joint studies of consumer reactions to GM products.

Student Researcher Rasmus Vikan:

Rasmus has completed a bachelor's degree in Export Marketing at the University of Nordland, in Bodoe, Norway. During this time he has had two internships at two different fish farming companies, Codfarmers and Mainstream Norway AS. Additionally, he wrote his bachelor thesis on developments within marketing of seafood in New Zealand during his internship at Southern Clams, a seafood fishery situated in Dunedin.

During his postgraduate diploma in commerce (PGDipCom) at the University of Otago last year, Rasmus gained valuable knowledge about market research and research methods.

13. Participants

13(a) Population from which participants are drawn:

This research will seek Norwegian participants that are buying or have bought seafood.

13(b) Inclusion and exclusion criteria:

This research will be seeking consumers buying food for their household, male or female 18 years of age or older.

13(c) Estimated number of participants:

The estimated number of participants will be dependent on the amount of traffic at the venues, where the minimum is approximately 450 respondents and the maximum is 1000 respondents.

13(d) Age range of participants:

As Rasmus will seek respondents buying food for their household, consumers under the age of 18 will not be recruited. There is not a maximum age limit to this research.

13(e) Method of recruitment:

For the first method, Best/Worst Scaling and Food Neophobia Scale, a newly opened fish shop will be used to recruit respondents. At this venue a stand will be put up at which Rasmus will stand and hand out questionnaires that respondents will fill out.

For the second method, Field Choice Experiment, the same fish shop or another suitable public venue will be used to gather respondents.

13(f) Specify and justify any payment or reward to be offered:

Respondents undertaking the questionnaire will be given an incentive to do so, either a food sample bought from the fish shop venue used in the research, or a spice that can be used in the cooking of seafood, also bought at the fish shop. As all respondents will be buying some kind of seafood, a product that can be used when cooking seafood will hopefully increase the response rate.

Participants in the field choice experiment will be given the chance to buy the product they had planned to buy at a discount, or get another incentive, such as a spice used for cooking seafood.

14. Methods and Procedures:

For the first research method a best-worst design will be used to gather the stated preferences of respondents. BW-scaling, often called maximum difference scaling or maxdiff, is a discrete choice method created by Louviere & Woodworth (1990) in which respondents are asked to choose between three or more options based on what objects they ‘feel exhibit the largest perceptual difference on an underlying continuum of interest (Finn & Louviere, 1992, p. 13). In this research the underlying continuum is ‘degree of preference’, i.e. what respondents prefer the most and what they prefer the least. The three options used are wild salmon, farmed salmon and genetically modified salmon. These three options will be varied across different price levels (high, medium, and low) using a block design, and the GM-salmon and Farmed-salmon will have the added benefit of an increased omega-3 level at different stages. Respondents will be asked to choose what option they prefer the most and the least.

Additionally, a Food Neophobia scale (FNS) will be administered to gather information about consumer attitudes towards novel foods. For this paper Tuorila et al’s (2001) 7-item version of the FNS will be used as it will reduce the level of cognitive complexity for respondents and has been shown to be a valid measure of consumer attitudes to novel foods and GM-foods in particular (Tuorila et al, 2001). Attached is an example of one Best-worst question and the FNS Rasmus will use (translated to English).

The second research method Rasmus will use is a field choice experiment to gather revealed preferences, also a discrete choice method. For this research he will set up a stand and sell farmed salmon, mislabelled as wild and genetically modified, in addition to farmed salmon. For this method the same levels of price and benefits as the BW-scale method will be used, using a similar design.

Consumers will be free to choose any salmon they want, but before money changes hands, Rasmus will explain to them that this is a university experiment, that are salmon on display is farmed salmon, and that they will get the option to buy this farmed salmon at a discounted price or get an incentive, as explained earlier. To reduce the risk of other respondents hearing what has been said about the purpose of the research, an information card that explains the research will be provided if there are a lot of consumers present at the same time.

15. Compliance with The Privacy Act 1993 and the Health Information Privacy Code 1994 imposes strict requirements concerning the collection, use and disclosure of personal information. The questions below allow the Committee to assess compliance.

15(a) Are you collecting and storing personal information (e.g.name, contact details, designation, position etc) directly from the individual concerned that could identify the individual?

NO

15(b) Are you collecting information about individuals from another source?

NO

15(c) Collecting Personal Information:

- Will you be collecting personal information (e.g. name, contact details, position, company, anything that could identify the individual)?

NO

- Will you inform participants of the purpose for which you are collecting the information and the uses you propose to make of it?

YES

- Will you inform participants of who will receive the information?

YES

- Will you inform participants of the consequences, if any, of not supplying the information?

YES

- Will you inform participants of their rights of access to and correction of personal information?

NO

Where the answer is YES, make sure the information is included in the Information Sheet for Participants.

If you are NOT informing them of the points above, please explain why:

Rasmus will not inform participant about the rights of access to and correction of personal information as he will not gather any personal information, just age and gender; this information will not be traceable to individuals as their names will not be recorded.

15(d) Outline your data storage, security procedures and length of time data will be kept:

Questionnaires and results from the field choice experiment will be held until they are analysed and written down, throughout 2014. As the research will be done in Norway, Rasmus Vikan will be storing the data in a safe location until the study is finished and the thesis is finalized. All data will then be sent to both supervisors, John Knight and Damien Mather.

15(e) Who will have access to personal information, under what conditions, and subject to what safeguards? If you are obtaining information from another source, include details of how this will be accessed and include written permission if appropriate. Will participants have access to the information they have provided?

Rasmus will not gather personal information traceable to individuals, but respondents are able to withdraw at any time.

15(f) Do you intend to publish any personal information they have provided?

N/A

15(g) Do you propose to collect demographic information to describe your sample? For example: gender, age, ethnicity, education level, etc.

Yes, age and gender.

15 (h) Have you, or will you, undertake Māori consultation? Choose one of the options below, and delete the option that does not apply:

NO If not, provide a brief outline of your reasons (e.g. the research is being undertaken overseas):

Rasmus is undertaking his study in Norway.

16. Does the research or teaching project involve any form of deception?

YES

If yes, explain all debriefing procedures:

The field choice experiment will involve a degree of deception as people will think they are going to purchase and have the choice between either wild, farmed or genetically modified salmon, while in fact all products are farmed salmon. Before money changes hands Rasmus will inform them that this is a university research experiment, in addition to giving them an information sheet explaining every aspect of it and a consent form.

Rasmus has applied to get ethical approval in Norway as well, but since he is not a student at a Norwegian university, this could not be obtained. Nevertheless, he has been sent their

guidelines for approving research and his research will not be in need of ethical approval as he will not gather any personal information. Attached you can find their (Norwegian Social Science Data Services) guidelines and demands for approving research in Norway, which shows that Rasmus's research is not in need of approval from a Norwegian organization.

17. Disclose and discuss any potential problems:

(For example: medical or legal problems, issues with disclosure, conflict of interest, safety of the researcher, etc. Note: if the student researcher will be travelling overseas to undertake the research, provide the details outlined at item 12 of the *Filling Out Your Human Ethics Application* document.

Overseas student research

Both the information sheet and consent form will be written in Norwegian, as Rasmus will be undertaking his research in Northern-Norway. They will convey the exact same message in Norwegian. As the field choice experiment will involve a degree of deception, it is not possible to hand out an information sheet before consumers make their choice. Information sheets and consent forms will be handed out after consumers have made their choice of salmon in the field choice experiment.

A risk assessment has been conducted between the supervisor and student regarding undertaking research in Norway, which is Rasmus's home country. There is no foreseen risk of travel. Rasmus will be staying at home with his parents. There is no foreseen civil unrest. Rasmus has access to the Norwegian health care system since he is a citizen.

There are no foreseen potential problems with liability for the University.

The risk rating for Norway is low.

Rasmus has a valid passport, necessary visas and all other relevant travel information, and in fact is already in Norway carrying out his preparatory literature review.

18. ***Applicant's Signature:**

Name (please print):

Date:

*The signatory should be the staff member detailed at Question 1.

19. **Departmental approval:** *I have read this application and believe it to be valid research and ethically sound. I approve the research design. The Research proposed in this application is compatible with the University of Otago policies and I give my consent for the application to be forwarded to the University of Otago Human Ethics Committee with my recommendation that it be approved.*

Signature of **Head of Department:

Name of HOD (please print):

Date:

**Where the Head of Department is also the Applicant, then an appropriate senior staff member must sign on behalf of the Department or School.





14/123

Academic Services
Manager, Academic Committees, Mr Gary Witte

1 August 2014

Professor J Knight
Department of Marketing
Division of Commerce
School of Business

Dear Professor Knight,

I am again writing to you concerning your proposal entitled "**Consumer Adoption of Genetically Modified Foods: A study on benefit importance in the adoption process**", Ethics Committee reference number **14/123**.

Thank you for your email of 31 July 2014 in response to the Committee. Thank you for confirming that no local permits are needed for the research, and for providing a confirmation letter from the fish shop owner that they are happy for this research to go ahead.

Thank you for clarifying your methodology, how participants will be debriefed and the intended sample size. In addition you have consulted Mark Borrie and have made arrangements for the safe storage of data at the University of Otago.

On the basis of this response, I am pleased to confirm that the proposal now has full ethical approval to proceed.

Approval is for up to three years from the date of this letter. If this project has not been completed within three years from the date of this letter, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

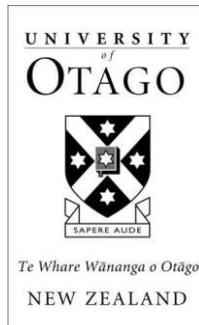
A handwritten signature in cursive that reads 'Gary Witte'.

Mr Gary Witte
Manager, Academic Committees
Tel: 479 8256
Email: gary.witte@otago.ac.nz

c.c. Assoc. Prof. R W Aitken Department of Marketing

Appendix B: Information Sheet and Consent Form for Participants

14/123
1 August 2014



Consumer adoption of Genetically Modified Foods: A study on benefit importance in the adoption process.

INFORMATION SHEET FOR PARTICIPANTS or PARENTS / GUARDIANS ETC.

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?

This project aims to explore consumer adoption of Genetically Modified (GM) Salmon and the role the direct consumer benefit of the product has in this process. GM-salmon is not far away from being a reality in the market and therefore it is valuable to do research on consumer reaction to GM-food. A lower price and increased nutritional values are benefits than can become associated with GM-salmon. One of the major aims of this research is to see how these benefits can affect the adoption of this innovation.

This research is part of my, Rasmus Vikan's, degree in Master of Commerce (MCom) at the University of Otago, Dunedin, New Zealand.

What Type of Participants are being sought?

Consumers buying salmon are the perfect participants for this project. For sample purposes, you must be 18 years or older to participate in this study. If you wish to purchase the salmon you have chosen, this can be done at a discounted price in order to compensate you for your troubles. If not, an incentive will be offered you.

If you would like a summary of the results of this study, you can either email Rasmus Vikan or Professor John Knight for more information. Contact details are provided below.

What will Participants be Asked to Do?

Should you agree to take part in this project, you will be asked to:

- State your gender and age
- Answer nine questions about what type of salmon at different price levels and with different benefits you prefer the most, and which one you prefer the least.
- State your level of agreement on seven statements in regards to trying novel foods
- This will only take you around 3 minutes to complete altogether

Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

What Data or Information will be Collected and What Use will be Made of it?

No personal information will be gathered than can directly link you to the research in question; it is completely anonymous. The data gathered will be used to analyse information in regards to how consumer benefits can affect consumers in the adoption process and if people act as intended when confronted with a real time purchasing decision. Results can be used to foresee the possible adoption pattern of GM-salmon and attitudes towards buying GM-food in general with certain consumer benefits.

The data collected will be securely stored in such a way that only those mentioned will be able to gain access to it. Data obtained as a result of the research will be retained for **at least 5 years** in secure storage.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity, as no personal information will be gathered.

After respondents have participated and left the venue, there will be no opportunity to withdraw data given, as this study gathers no information that is identifiable to particular individuals. Results will be discussed on an aggregate basis only.

Can Participants Change their Mind and Withdraw from the Project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:

Rasmus Vikan

and

Professor John Knight

Department of Marketing

Department of Marketing

University Telephone Number: 40495228

University Telephone Number: N/A

Email Address: vikra936@student.otago.ac.nz

Email Address: john.knight@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Consumer adoption of Genetically Modified Foods: A study on benefit importance in the adoption process.

**INFORMATION SHEET FOR
PARTICIPANTS or PARENTS / GUARDIANS ETC.**

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you and we thank you for considering our request.

What is the Aim of the Project?

This project aims to explore consumer adoption of Genetically Modified (GM) Salmon and the role the direct consumer benefit of the product has in this process. GM-salmon is not far away from being a reality in the market and therefore it is valuable to do research on consumer reaction to GM-food. A lower price and increased nutritional values are benefits than can become associated with GM-salmon. One of the major aims of this research is to see how these benefits can affect the adoption of this innovation.

This research is part of my, Rasmus Vikan's, degree in Master of Commerce (MCom) at the University of Otago, Dunedin, New Zealand.

What Type of Participants are being sought?

Consumers buying salmon of any kind have a preference for salmon and are the perfect participants for this project. For sample purposes, you must be 18 years or older to participate in this study. If you wish to purchase the salmon you have chosen, this can be done at a

discounted price in order to compensate you for your troubles. If not, an incentive will be offered you.

If you would like a summary of the results of this study, you can either email Rasmus Vikan or Professor John Knight for more information. Contact details are provided below.

What will Participants be Asked to Do?

If you have just been informed that the salmon you were going to buy is in fact farmed salmon, you have the option to:

- Say that you will not take part in this study and I will not record any of the information gathered from you
- Say that you will take part and get compensation for your troubles
- Say that you will take part and that you would like to buy the salmon at 10% discount compared to the regular price of farmed salmon on this day

Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

What Data or Information will be Collected and What Use will be Made of it?

No personal information will be gathered than can directly link you to the research in question; it is completely anonymous. The data gathered will be used to analyse information in regard to how consumer benefits can affect consumer reactions to a GM food product and if people act as intended when confronted with a real time purchasing decision. Result can be used to foresee the possible adoption pattern of GM-salmon and attitudes towards buying GM-food in general with certain consumer benefits.

The data collected will be securely stored in such a way that only those mentioned will be able to gain access to it. Data obtained as a result of the research will be retained for **at least 5 years** in secure storage.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve your anonymity, as no personal information will be gathered.

After respondents have participated and left the venue, there will be no opportunity to withdraw data given, as this study gathers no information that is identifiable to particular individuals. Results will be discussed on an aggregate basis only.

Can Participants Change their Mind and Withdraw from the Project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:

Rasmus Vikan

and

Professor John Knight

Department of Marketing

Department of Marketing

University Telephone Number: 40495228

University Telephone Number: N/A

Email Address: vikra936@student.otago.ac.nz

Email Address: john.knight@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Consumer adoption of Genetically Modified Foods: A study on benefit importance in the adoption process.

**CONSENT FORM FOR
PARTICIPANTS**

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:-

1. My participation in the project is entirely voluntary;
2. I am free to withdraw from the project at any time without any disadvantage;
3. Personal identifying information will not be collected for the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;
4. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity as no personal information will be gathered.

I agree to take part in this project.

.....
(Signature of participant)

.....
(Date)

.....
(Printed Name)

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph 03 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.



Appendix C: BW and FNS Questionnaire (Translated)

Best Worst Scaling

What gender are you?

- Male
 Female

What age are you?

- Under 18
 18 - 24
 25 - 34
 35 - 44
 45 - 54
 55 - 64
 65 - 74
 75 years or older

In the next section of the questionnaire you will be asked questions involving Genetically Modified (GM) Salmon. This type of salmon is farmed on-land and fed the same way as ocean farmed salmon. Imagine you are at a fish market stall, and you are considering buying one of the 4 types of salmon as described below on offer at the prices indicated. Please indicate with a tick or cross in the boxes provided, for each of the scenarios, which one alternative you prefer the most, and which one alternative you prefer the least.

1. Out of these 4 options, which one do you prefer the most and which one do you prefer the least?

	Atlantic Salmon with double Omega3 content (Genetically Modified) - 100 NOK a kg	Atlantic Salmon with double Omega3 content (Genetically modified) - 118 NOK a kg	Atlantic Salmon (Genetically modified) - 136 NOK a kg	Atlantic salmon with double Omega3 content - 118 NOK a kg
Most	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Least	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Out of these 4 options, which one do you prefer the most and which one do you prefer the least?

	Atlantic Salmon (Genetically Modified) - 100 NOK a kg	Atlantic Salmon - 100 NOK a kg	Atlantic Salmon (Genetically modified) - 118 NOK a kg	Atlantic Salmon (Genetically modified) - 136 NOK a kg
Most	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Least	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Out of these 4 options, which one do you prefer the most and which one do you prefer the least?

	Atlantic Salmon with double Omega3 content (Genetically Modified) - 118 NOK a kg	Atlantic Salmon with double Omega3 content - 136 NOK a kg	Atlantic Salmon with double Omega3 content - 100 NOK a kg	Atlantic Salmon - 118 NOK a kg
Most	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Least	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

In this section we are interested in your overall orientation to novel or new foods. Please answer the questions below by indicating, for each question, which category best matches your agreement with these statements. Thinking about food, and in particular trying new types of food, please tell us how much you agree or disagree with these following 7 statements:

	Strongly Disagree	Disagree	Disagree somewhat	Undecided	Agree somewhat	Agree	Strongly agree
1. I am constantly sampling new and different foods.	<input type="checkbox"/>						
2. I don't trust new foods.	<input type="checkbox"/>						
3. I like foods from different countries.	<input type="checkbox"/>						
4. Ethnic foods look too weird to eat.	<input type="checkbox"/>						
5. At dinner parties I will try a new food.	<input type="checkbox"/>						
6. I am afraid to eat things I have never had before.	<input type="checkbox"/>						
7. I like to try new ethnic restaurants.	<input type="checkbox"/>						

Thanks for that! Now is just a bit more of those questions you answered about purchasing salmon - nearly there!

Imagine you are at a fish market stall, and you are considering buying one of the 4 types of salmon as described below on offer at the prices indicated. Please indicate with a tick or cross in the boxes provided, for each of the scenarios, which one alternative you prefer the most, and which one alternative you prefer the least.

4. Out of these 4 options, which one do you prefer the most and which one do you prefer the least?

	Atlantic Salmon with double Omega3 content - 118 NOK a kg	Atlantic Salmon - 136 NOK a kg	Atlantic Salmon (Genetically modified) - 100 NOK a kg	Atlantic Salmon with double Omega3 content - 136 NOK a kg
Most	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Least	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Out of these 4 options, which one do you prefer the most and which one do you prefer the least?

	Atlantic Salmon - 100 NOK a kg	Atlantic Salmon with double Omega3 content - 100 NOK a kg	Atlantic Salmon with double Omega3 content (Genetically modified) - 136 NOK a kg	Atlantic Salmon - 136 NOK a kg
Most	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Least	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Out of these 4 options, which one do you prefer the most and which one do you prefer the least?

	Atlantic Salmon - 118 NOK a kg	Atlantic Salmon (Genetically modified) - 118 NOK a kg	Atlantic Salmon with double Omega3 content (Genetically modified) - 100 NOK a kg	Atlantic Salmon with double Omega3 content (Genetically modified) - 136 NOK a kg
Most	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Least	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Spørreundersøkelse - Matfobi

Was there anything about this survey that you found difficult to understand or respond to? If you have any comments at all about this survey, please enter them in the text box below:

Can I contact you if I have any follow-up questions? If Yes, please indicate your email address or phone-number below.

- No
- Yes

Appendix D: Thematic Content Analysis notes

All keywords are based on the combined answers from the entire RP-design (ex. Atlantic salmon design 1 through 9).

Chose Atlantic because:

1. Lack of trust
2. Wants usual → often said
3. Closest to wild
4. Safe
5. Lack of knowledge of GM
6. Negative towards gm
7. Expecting guests
8. Natural option
9. Few people so price doesn't matter
10. Enough Omega3 anyway
11. GM sounds weird/creepy
12. Farmed salmon bad enough
13. Low price
14. Sceptical towards gm
15. Because of others

Chose GM-Omega3 because:

16. Healthier
17. Try something new
18. Low price
19. Negative towards farmed
20. More Omega3 (same as healthier)
21. Had knowledge

Chose Atlantic-Omega3 because:

- 22. Healthier
- 23. 23.Low price
- 24. Lack of knowledge about GM
- 25. Looked better
- 26. More Omega3 (same as healthier)
- 27. Sceptical towards GM,
- 28. Lack of trust towards GM
- 29. Quality before price

Chose GM because:

- 30. Healthier
- 31. Negative towards farmed

Overarching themes – Why did you choose this product over the others?

Wants more Omega3

Chose the healthiest option

➔ **Healthy product (relevant for Omega3 choices)**

Wanted the usual (Often said)

➔ **Habit/used to (relevant for regular)**

Lack of trust

➔ **Trust (relevant for regular)**

Lack of knowledge

Wanted the safe option

GM sounds weird and/or creepy

Discarded it due to guests coming

➔ **Lack of knowledge (relevant for regular)**

Negative towards GM-products

Sceptical towards GM

Lack of trust

➔ **Negative attitude towards GM (relevant for regular)**

Discarded it due to guest coming

Wanted the natural option

Wanted closest to wild

Farmed salmon bad enough

➔ **Wants the most natural product (relevant for regular)**

Chose it due to low price

➔ **Price sensitive (relevant for the price benefit)**

Discarded it due to guests coming

Get kids to eat healthier (03 option, add comment)

➔ **Joint decision (relevant for regular)**

Themes with not enough data/relevance

➔ Not enough people for price to matter

➔ Wanted to try something new

➔ Enough knowledge

➔ Appearance

➔ Chose quality

➔ Negative about farmed salmon