



The Nordic Keyhole

– quantitative analysis of its use in product reformulation and development

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The Nordic Keyhole – quantitative analysis of its use in product reformulation and development

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Abstract

Front of pack nutrition label (FOPNL) could be used to guide consumers to healthier choices. FOPNL were therefore used as a tool for consumers to give guidelines in choosing healthy food. The FOPNL Nordic Keyhole has the criteria low amount of sugar, low amount of salt, low amount of fat, and high amount of dietary fiber and whole grain in food products. The overarching aim of the study was to investigate if and how food business operators use the Nordic Keyhole symbol as a guideline when producing healthy food. The used methods were a survey, discussion with food business operators and literature study. Identified challenges which the Swedish Food Agency has to work further with, were advertising. It is important for consumers that Nordic Keyhole products are appealing but remain healthy. It seems like the criteria salt, fat and whole grain have some issues depending on food category compared to the criterion sugar for which there were no issues mentioned. To be able to produce healthy products which consumer wants to buy, it is important for product developers to put focus on a packaging which looks healthy. Advantages and disadvantages were described for some FOPNL in Europe. Overall, all the respondents agree that they want to continue working with the Nordic Keyhole in Sweden. Finally, some positive aspects of the Nordic Keyhole were mentioned. More than half of the food producers label with the Nordic Keyhole. Food business operators generally have a positive attitude to the Nordic Keyhole.

Sammanfattning

En framsidmärkning på en förpackning (FOPNL) kan användas för att vägleda konsumenterna till hälsosammare val. FOPNL användes därför som ett verktyg för kunder för att tillhandahålla konsumentriktlinjer för val av hälsosam mat. Märkningen Nyckelhålet har kriterierna lågt innehåll av socker, salt, och fett, samt högt innehåll av kostfiber och fullkorn i livsmedelsprodukter. Det övergripande syftet med studien var att undersöka hur livsmedelsföretagare använder Nyckelhålet som en riktlinje vid produktion av hälsosam mat. Metoderna som användes var enkätundersökning, diskussion med livsmedelsföretagare och en litteraturstudie. Identifierade utmaningar som Livsmedelsverket behöver arbeta med ytterligare är reklam. Det är viktigt för konsumenterna att Nyckelhålet har tilltalande produkter som också är nyttiga. Det verkar som om kriterierna salt, fett och fullkorn är mer eller mindre problematiska beroende på livsmedelskategori, i jämförelse med kriteriet socker som det inte nämnts något problem för. För att producera hälsosamma produkter som konsumenten vill köpa är det viktigt för produktutvecklare att fokusera på en förpackning som ser hälsosam ut. Fördelar och nackdelar nämns för olika FOPNL i Europa, men totalt sett är alla respondenterna överens om att man vill fortsätta arbeta med Nyckelhålet i Sverige. Till sist nämndes några positiva aspekter med Nyckelhålet. Mer än hälften av livsmedelsproducenterna använder märkningen Nyckelhålet. Livsmedelsföretagare har i allmänhet en positiv inställning till Nyckelhålet.

Preface

The study was part of a collaboration between the Swedish Food Agency, and the department of molecular sciences, Swedish University of Agricultural Sciences (SLU).

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Table of contents

List of tables	9
List of figures	10
Abbreviations	12
1. Introduction	13
2. Background	14
2.1. <i>Information about the Nordic Keyhole</i>	14
2.1.1. The establisher of Nordic Keyhole	14
2.1.2. The Nordic Keyhole symbols collaboration.....	15
2.1.3. Consumers attitude of the Nordic Keyhole.....	15
2.1.4. Criteria for the Nordic Keyhole	15
2.2. <i>Consumers health</i>	17
2.3. <i>Food trends</i>	17
2.3.1. Free from additives	18
2.3.2. Vegetarian food	18
2.3.3. Sustainable food	18
2.4. <i>Nordic Keyhole relaunch</i>	18
2.4.1. Innovation process.....	19
2.4.2. The Swedish Food Federation manifesto goals	19
2.5. <i>European front of pack nutrition labels</i>	20
3. Method	21
3.1. <i>Survey</i>	21
3.2. <i>Discussions with food business operators</i>	21
4. Result & Discussion	23
4.1. <i>Attitudes towards the Nordic Keyhole</i>	23
4.2. <i>The Swedish Food Agency as a trademark owner</i>	24
4.3. <i>Advantages and challenges with the Nordic Keyhole</i>	25
4.4. <i>Nordic Keyhole labeled product development</i>	26
4.5. <i>Food groups and criteria for the Nordic Keyhole</i>	27
4.5.1. Challengers with criteria for the Nordic Keyhole	31
4.6. <i>General health</i>	36
4.6.1. The Nordic Keyhole with a focus on health benefits	37

4.7.	<i>Labeling in Europe</i>	38
4.7.1.	FOPNL in Europe	38
4.7.2.	Comparison between different labels in Europe	40
4.8.	<i>Limitations</i>	41
5.	Conclusion	42
	References	43
	Appendix 1	50
	Appendix 2	53
	Appendix 3	54

List of tables

Table 1. Food business operators' answers to the question: How do you experience the criteria in different food categories? The answer option for each food category is too strict, adequate level, could be even stricter, do not know and do not have the category	32
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List of figures

Figure 1. Food business operators' answer to the question: What is your attitude regarding the Nordic Keyhole label? The response rate was 100%.	23
Figure 2. Food business operators' answers to the question: To what extent do you use additives in the development of keyhole-labeled products? The response rate was 100%.....	27
Figure 3. Food business operators' answers to the question: For your existing products that meet the criteria for the Nordic keyhole, approximately what percentage do you estimate that you label with the Nordic keyhole? In the figure, the proportion (1-25% shown as blue, 26-50% shows as orange, 51-75% shows as grey and 76-100% shown as yellow) of the Nordic Keyhole products of existing products at food business operators' companies in different food categories is shown. The response rate was 86 %.....	28
Figure 4. Food business operators' answers to the question: Have the proportion of Nordic Keyhole-labeled products in your assortment changed in the last 24 months? The response rate was 86%.....	28
Figure 5. Food business operators' answers to the question: To what extent do you emanate from the Nordic Keyhole Criteria in product development? The response rate was 100%.....	29
Figure 6. Food business operators' answers to the question: Do you use the Nordic Keyhole Criteria when developing new products or modifying existing products? This figure shows in which food categories food business operators develop new Nordic Keyhole products. The stacks show the food business operators which use (blue), not use (orange) and do not have (grey) the category in the Nordic Keyhole in new product development.	30
Figure 7. Food business operators' answers to the question: How well do you know the criteria for the Nordic keyhole, in general? The response rate was 100%.....	31
Figure 8. Food business operators' answers to the question: In which of these categories does your company have products? Those who have products were included in the figure. Food business could answer more than one category	33
Figure 9. Food business operators' answers to the question: What are the biggest challenges for product development with a focus on health? The response rate was 100%.....	36
Figure 10. The Front of package nutrition label "Traffic light" used in UK. The figure shows an example for grilled burgers.	39

Figure 11. The Front of package nutrition label “Nutri-score” which is used in
France.40

Abbreviations

FOPNL	Front of pack nutrition label
FDA	The United States Food and Drug Administration
NFA	Nordic control projects
NNR	Nordic nutrition recommendations
LIVSFS	The Swedish Food Agency government assignment
WHO	World Health Organization

1. Introduction

According to Roodenburg et al. (2013), an “Overconsumption of energy dense, nutrient poor diets is one of the largest problems in modern society, resulting in an increasing prevalence of chronic, non-communicable diseases.” Actions are needed to decrease chronic diseases. e, g., obesity, cardiovascular diseases and cancer in the world. Therefore, World Health Organization (WHO) recommends lowering the amount of salt, sugar, saturated fatty acid and trans fatty acids (WHO 2018). Front of pack nutrition label (FOPNL) could be used to guide consumers to healthier choices (Vyth et al. 2010). FOPNL were therefore used as a tool to give consumers guidelines in choosing healthy food (WCRF 2019). Examples of labels in the world with the purpose to make a better world health are Nigerian Heart Foundation’s Heart Check, Chiles Warning labels and Sri Lankas Traffic light labeling system for beverages (WCRF 2019).

In Sweden, several FOPNL are used e.g., Fairtrade, Origin from Sweden, Krav and the Nordic Keyhole (Coop 2017). Fairtrade works for good agreements for employees (Fairtrade 2021). Origin from Sweden labels products that are environmentally friendly products locally produced in Sweden. The label “Krav” is inspired by the EU and do only label products which are organic (Swedish FAO Committee 2020). The Nordic Keyhole symbol is a nutrition claim which has the purpose to manage better health in Sweden and Scandinavia (WCRF 2019).

The Nordic Keyhole was established in the year of 1989 in Sweden (WCRF 2019). The Nordic Keyhole labels are used in Sweden as a recommendation to eat healthy food and make easy healthy choices as a consumer (The Swedish Food Agency government assignment (LIVSFS) 2005:9 2020).

The aim of the study was to investigate how food business operators use the Nordic Keyhole symbol as a guideline for healthy food. More specifically, the questions that will be asked in this report are:

- What is required for the food industry to manage a healthier food product development and food supply?
- How does the Swedish food industry use the Nordic Keyhole as a guideline for healthy food product development? Which problems are identified?
- Are there similar symbols in other countries in Europe? What are the criteria for those?
- Are there any differences between different food groups regarding if and how the Nordic Keyhole symbol is used?

2. Background

2.1. Information about the Nordic Keyhole

The Nordic Keyhole label is either green and white or black and white (WHO 2018). The Nordic Keyhole is free to use for the food industry. In 1989 there were 15 food groups that were allowed to be labeled with the Nordic Keyhole. In 2009 the number of food categories increased to 25. In 2015 a revision was made of food categories and criteria; in total, the number of food categories was thereafter 32 (LIVSFS 2005:9 2020).

The criteria to follow the Nordic Keyhole symbol as a food developer are:

- Low amount of sugar
- Low amount of salt
- Low amount of fat
- High amount of dietary fiber and whole grain

The criteria mentioned above are based on the Nordic nutrition recommendations (NNR) (LIVSFS 2005:9 2020).

Product developers need to follow different criteria for different food products when using the Nordic Keyhole symbol. For example, cheese with the Nordic Keyhole needs to consist of a maximum of 17 g fat/100 g product. Whole grain bread needs to consist of 30% whole grain measured of the dry matter (LIVSFS 2005:9 2020). In addition, unpacked foodstuff e.g., unprocessed meat, bread, fish, fruit and vegetables can be labeled/ marketed with the Nordic Keyhole as long as they fulfil the criteria (LIVSFS 2005:9 2020).

2.1.1. The establisher of Nordic Keyhole

In 1972, the Swedish Food Agency was founded, which is the establisher of the Nordic Keyhole. The Swedish Food Agency has the role to handle food issues in Sweden (The Swedish Food Agency, 2020a). The vision of the Swedish Food Agency (The Swedish Food Agency 2020b) is “to work towards the following goals: healthy dietary habits, safe foods and fair practices in the food trade. Our tools are regulations, recommendations and communication.” The Swedish Food Agency has a government assignment (2020-2025) aim to increase the

dissemination of information to consumers (Ministry of Trade and Industry 03245:2019).

2.1.2. The Nordic Keyhole symbols collaboration

Denmark and Norway started to collaborate with the Swedish Keyhole in 2009, and therefore criteria changes were made for the Nordic Keyhole. The changes were specific claims of whole grain in the cereal group, strengthened criteria for ready-to-eat meals, strengthened criteria for sugar and salt in some food groups and a new criterion for fish according to Coop (2017). In total, 2733 products were labeled with the Keyhole in 2017.

2.1.3. Consumers attitude of the Nordic Keyhole

A survey was made by The Swedish Food Agency (2021) to study customers' attitudes and knowledge about the Nordic Keyhole. Besides the Nordic Keyhole, the label Krav was most known among Swedish consumers. Nearly half of the respondents knew that the Swedish Food Agency was the owner of the Nordic Keyhole label. Half of the respondents thought it was easy to find products labeled with the Nordic Keyhole. The most common products to buy with the Nordic Keyhole were cereal products. The survey showed that the criteria less sugar, more whole grain and more fiber was associated with the Nordic Keyhole symbol. In the youngest age group knowledge, about the Nordic Keyhole was lower compared with older groups, but the young who knew about the label had a better attitude against the label compared with older groups (The Swedish Food Agency 2021).

2.1.4. Criteria for the Nordic Keyhole

The Keyhole criteria are based on NNR. According to NNR the following recommendations are to eat less sugar, less salt, better fat and more whole grain (The Swedish Food Agency 2012). Criteria and conditions for the Nordic Keyhole for different food categories can be found at LIVSFS 2005:9 (2020).

Sugar

Sugars are all monosaccharides and disaccharides which are present in food (EU-Regulation 1169/2011). According to the Keyhole regulation, added sugars are defined as "all mono- and disaccharides added during food production." Sugars which are found naturally in honey, juice, fruit juices and fruit concentrates are also covered in the definition of free or added sugars (LIVSFS 2005:9 2020). Examples of free sugars are the monosaccharides glucose, fructose and galactose, and the disaccharides sucrose, lactose, maltose and trehalose, which are added to "foods by manufacturers or consumers" (EFSA 2018).

Fat

The most common fat in food is triglycerides. The structure of fat is a number of triglycerides which are linked together. One triglyceride consists of three fatty acids linked to one glycerol. Fatty acids can be saturated, monounsaturated or

polyunsaturated. In saturated fatty acids, the carbon atoms have single bonds, while monounsaturated have one double bond between carbon atoms, and polyunsaturated fatty acids have two or more double bonds (Christian & Vaclavik 2014). Long saturated fat with fewer double bonds has a higher melting point and is often hard at room temperature compared to short unsaturated fat, which has more double bonds and therefore lower melting point and is liquid at room temperature (Liu & Binks 2020). The definition of trans fat according to EU-Regulation (1169/2011) is “fatty acids having at least one non-conjugated (i.e., separated by at least one methylene group) carbon-carbon double bond in trans position.” Trans-fat can be made naturally in the rumen by ruminants through hydrogenation, or through food production with hydrogenation (Trattner et al. 2014). Hydrogenation of unsaturated fat is a process with hydrogen and heat in order to make it more saturated. Saturated trans-fat in production gives properties e.g., better shelf life and desired texture. Consumption of trans-fat increases the risk of cardiovascular diseases (Trattner et al. 2014). There is a criterion of a maximum of 2% trans-fat when labeling with the Nordic Keyhole (LIVSFS 2005:9 2020).

Salt

The salt content of foods is calculated by the following formula: sodium content \times 2.5 (EU-Regulation 1169/2011). There are different kinds of salt. Table salt has the chemical name sodium chloride (Fellows 2017). Sodium chloride is used for adding flavor to food, but it is also used as a preservative through lowering the water activity (Ruiz-Alonzo et al. 2020). The water activity is lowered with help of an osmotic property occurring when adding salt (Cedenheim & Wessling 2013). Pasqualone et al. (2019) consider that for “bread, salt is an essential ingredient, being crucial for proper development of dough structure. The interaction of salt with flour components e.g., gluten is very important to form a high quality bread crumb.” Further, the dough strength becomes higher when adding salt comparing when not adding salt (Pasqualone et al. 2019). An increase of salt also gives an elastic dough (Youchev et al. 2017) and improves the sensory aspects as flavor (Manicini et al. 2020).

Whole grain and dietary fiber

The following are defined as cereals according to the Keyhole regulation: wheat, rye, oats, barley, corn, rice, millet, sorghum and other sorghum species (LIVSFS 2005:9 2020). The definition of whole grain according to LIVSFS 2005:9 (2020) is: “The whole kernel of cereals (endosperm, germ and bran); the kernel may be ground, crushed or similar, but the different components must be included in their original proportions for each cereal.” Whole grain products contain a high amount of dietary fiber, minerals and vitamins (The Swedish food Agency 2020b). In the outer layer of the kernel (bran and aleurone), there is a lot of dietary fiber, vitamins and minerals. Grinding, which includes removal of the outer layer, results in losses of nutrients from the outer layer, but some of the fiber is left in the inner parts of the kernels in the cell walls (Delcour & Hosney 2010). The definition of fiber according to EU-Regulation (1169/2011) is “carbohydrate polymers with at least three monomer units which are neither digested nor

absorbed in the human small intestine.” Dietary fiber can bind water thereby making the colon work faster and increasing the bulk of feces, resulting in a lower risk of constipation and colorectal cancer (Yang et al. 2020). Dietary fiber which is a part of the kernel and cereal bran lowers the risk of diabetes, high cholesterol and heart diseases (Christian & Vaclavik 2014).

2.2. Consumers health

The Nordic Keyhole could help consumers make healthier choices (Wang et al. 2016). Currently, nine of ten adults eat too little whole grain (The Swedish Food Agency 2020c). The Nordic nutrition recommendations recommended a daily intake of dietary fiber and whole grain of approximately 25-35 gram and 70-90 gram, respectively (The Swedish Food Agency 2012). Diets with high content of whole grain and fiber is associated with a lower risk of diseases e.g., diabetes, CVD, obesity and cancer (The Swedish Food Agency, 2012).

The recommendations according to NNR is that the intake of carbohydrates e.g., in vegetables, nuts and whole grain should be in the interval of 45-66 of the energy intakes to lower the risk of chronic diseases (The Swedish Food Agency 2012). Further, is the recommended intake of fruit and vegetables 500 gram (The Swedish Food Agency 2012). Currently, only two of ten adults eat 500 gram fruit and vegetables per day or more (The Swedish Food Agency 2020c). High consumption of fruit and vegetables improves people’s health (Hartwell et al. 2020).

Nordic nutrition recommendations are to eat maximum 10 gram of saturated fat and 6 gram salt per day (The Swedish Food Agency, 2012). Currently, four of ten adults eat too much salt (The Swedish Food Agency 2020c). According to Veronica Öhrvik (2021) “30 percent of respondents try to change their salt intake always or often and 27 percent try to change their salt intake from time to time.” People who eat a lot of sugar, saturated fat and salt seem to increase the risk for diseases e.g., cancer, diabetes, obesity and cardiovascular diseases (CVD). Furthermore, unhealthy food habits with an intake of food with low nutritional content can increase the risk for mental disease e, g., depression (Owens et al. 2020).

2.3. Food trends

According to a survey, the most important factors listed by consumers affecting their choices when they are buying food, is that the food is produced in Sweden and that it is healthy, tasty, priceworthy, sustainable, vegetarian and free from additives (The Swedish Food Agency 2020a).

2.3.1. Free from additives

Damodaran & Parkin (2017:804) states: “Generally, improved keeping quality, enhanced nutritional value, functional property provision and improvement, processing facilitation, and enhanced consumer acceptance are considered acceptable functions for food additives.” For a product to be labeled with the Nordic Keyhole it cannot contain any sweeteners (LIVSFS 2005:9 2020). One example of a sweetener is aspartame (Damodaran & Parkin 2017).

2.3.2. Vegetarian food

The vegetarian trend is huge. From 2017 to 2019 the number of Nordic Keyhole vegetarian products has increased from 15 000 to almost one million (The Swedish Food Agency 2020). “A diet consisting of plant-based, whole grains/fiber and protein is seen as the best for one's health” according to the consumer survey (Brödinstitutet 2020). Moreover, fat seems to be unhealthy according to customers in Sweden (Brödinstitutet 2020).

Results from an Axfood survey showed that the proportion of Swedish people eating vegetarian food 2-6 times/week was 29% in 2020, which is higher compared with five years earlier when it was 19% (Axfood 2020). Swedish consumers who do not eat vegetarian or vegan food at all have decreased from 21 to 12% from 1995 to 2020 (Axfood 2020).

2.3.3. Sustainable food

In 2015, agenda 2030 was formed to manage FN: s sustainable development global goals. To follow global goal number 13 (climate action), a sustainable food system is managed. For instance, different labels e.g., the Nordic Keyhole, Krav or “originating from Sweden” is a part of the sustainable food system as labels mentioned previously in the introduction (Swedish FAO Committee 2020).

2.4. Nordic Keyhole relaunch

To increase consumers' interest in the Nordic Keyhole, a relaunch was made of the Swedish Food Agency in the year 2020 called “*Do not change life.*” The relaunch has the aim to increase the interest in eating healthier without changing the whole lifestyle for the customers. The relaunch is focused on young adults, families with young children and people around 45-55 years old. “*Do not change life*” will be used in communication with social media (The Swedish Food Federation 2021). Currently, the Swedish Food Agency has 2 million SEK (year 2020-2025) from the Food Strategy Project by the Swedish government (The Swedish government, 2016/17:104). The Swedish Food Agency wants to increase the investment from 2 million to 5 million SEK due to the Nordic Keyhole relaunch. Currently, Norway's and Denmark's Food Agencies have approximately 4 million NOK and 3 million DKK to enhance the value of the

Nordic Keyhole (The Swedish Food Federation 2021). Healthy food product development

There is a handbook made by the Swedish Food Federation, which can be used as help for food product developers to learn more about the Nordic Keyhole labeling. In the handbook, there is information about how to handle the Nordic Keyhole symbol (The Swedish Food Federation 2020b).

2.4.1. Innovation process

Food product developers use a method called the innovation process when developing new food products. The process can last from 6 months to several years. The innovation process includes five different steps: idea generation, concept, development, launch and evaluation. Idea generation is the development of ideas, with help of trend reconnaissance. In the concept phase, the practical implementation of the idea is evaluated. One way to do this is with consumer tests. A consumer test is done to get information about if the consumer prefers the product (IPSOS 2015). During development, implementation of the idea is during launching packaging and distribution are considered. At last, the initial sale progress of the product is evaluated. ISOS is another method used to measure factors as trust and attitude of a trademark (IPSOS 2015). It is important to ensure that the developed product will be appreciated by consumers. Consumer tests are therefore performed to ensure that consumers prefer the product or how much the product is preferred (Gustafsson et al. 2014:189). Moreover, one can affect the product with “intrinsic (chemical and sensory properties) and modifying extrinsic (food packaging and other external information) food attributes that can influence purchasing decisions” (Bolha et al. 2021).

2.4.2. The Swedish Food Federation manifesto goals

The Swedish Food Federation is a Swedish non-profit industry association with the aim to represent Swedish food industries. As a member of The Swedish Food Federation, you aim to improve the health of the Swedish population. For instance, Norrmejerier is a member which has decreased the sugar content in their products, and the member Findus tries to develop more healthy food for older consumers.

The members of the Swedish Food Federation (2019), can follow the 5 food manifesto goals mention below to become more sustainable:

1. A fossil-free industry
2. Cut food waste
3. Packaging in recyclable materials
4. Good conditions in the supplier link
5. More efficient use of water

2.5. European front of pack nutrition labels

As mentioned above Sweden, Norway, Denmark and Iceland use the Nordic Keyhole and set up the rules for the Nordic Keyhole. Lithuania and North Macedonia are users of the Nordic Keyhole which means that these countries allow food producers to label products fulfilling the criteria with the Nordic Keyhole (LIVSFS 2005:9 2020). In Europe, many of the FOPNL are regulated, with help of the EU-Regulation (1924/2006) and EU-Regulation (1169/2011) (Kupirovič et al. 2020). FOPNL are founded to help consumers to make better healthy choices (Temple 2020).

Farm to fork is an EU food strategy created to make a change for a more sustainable EU. In this strategy, it is included to make a mandatory FOPNL for all members in the EU (European commission 2020).

FOPNL can be divided into two different systems, Nutrient specific systems and Summary indicator system. The definition of nutrient specific systems is that “nutrition information for one or more nutrients provides as guidance rather than specific facts” (WCRF 2019). Examples of labels in the category nutrient specific systems are warning labels e.g., Traffic light (WCRF 2019). The definition of a Summary indicator system is that it “Combines several criteria to establish one indication of the healthiness of a product and shows judgment or recommendation” (WCRF 2019). Examples of labels in the category summary indicator system are labels e.g., Nutri-score and health logos such as the Nordic Keyhole and heart symbol (WCRF 2019).

3. Method

This study was done from January to June 2021 in cooperation with the Swedish Food Agency.

It was decided to use surveys and discussions with food business operators as methods. Furthermore, a literature study was performed to compare the Nordic Keyhole with other health labels within Europe.

3.1. Survey

A questionnaire was prepared to investigate what food business operators think about the Nordic Keyhole and if the Nordic Keyhole is used as a guideline within the food industry. Furthermore, the aim of the survey was to get answers about what the food industry requires for healthier food product development and food supply. The survey was prepared in Esmaker which a survey program. This with help of the Swedish Food Agency and according to Esaiasson et al. (2017). The question from the survey can be observed in Appendix 2. The survey was sent out through the Swedish Food Agency. Contact information about Food business operators was given by *The Swedish Food retailer Federation*, *The Swedish Food Retailers Federation*, *LRF Milk*, and *Arla*. Food business operators from the 100 largest food industries (number of employees) were identified as the target group for the survey. Out of the 100 largest food business operators 53 were selected for the survey and invited to participate due these food business operators could produce products with the Nordic Keyhole. The online survey response rate was 40% (n=21). The answers were anonymous. Data collection was carried out between week 10 to 13 2021. Reminders were sent out three times during the period. The answers of the survey were analyzed using Esmaker.

3.2. Discussions with food business operators

Individual discussions were performed over Zoom with three food business operators which represented the food industry of trade, food producer company and wholesale company. The questions were designed as qualitative open-ended questions (See Appendix 1). Questions were prepared with help of the Swedish Food Agency and according to Trost (2005). The aim of the discussions was to get an understanding of the answers from the survey. The discussions were recorded and anonymous. Every discussion was a maximum 1 hour

long. Furthermore, the food business operators which were chosen to participate worked at food companies which develop food products within food groups represented in the survey. In the result, the quotes are Swedish and after an English translation in parenthesis. The results from the discussions were used to get a deeper understanding of the survey answers.

4. Result & Discussion

4.1. Attitudes towards the Nordic Keyhole

In total 100% of the participated food business operators knew about the Nordic Keyhole label. Regarding food business operators, nearly 3 out of 4 (71%) had a positive attitude towards the Nordic Keyhole. 5% of the food business operators were negative and 24% were neither or (Figure 1).

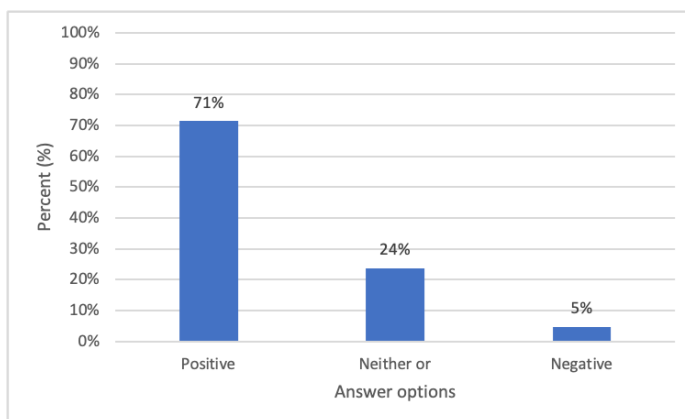


Figure 1. Food business operators' answer to the question: What is your attitude regarding the Nordic Keyhole label? The response rate was 100%.

In the discussions, all respondents were positive towards the Nordic Keyhole. Positive attributes mentioned were for example:

“Ett enkelt och bra sätt att producera hälsosamma produkter.” (A very simple way to produce good healthy products.)

“Är unikt.” (Being unique.)

However, limitations were mentioned as well. One respondent considers for example that *“Vissa kategorier blir så smala att dem blir lite tråkiga.” (Some categories become so narrow that they become a little boring.)*

4.2. The Swedish Food Agency as a trademark owner

In the survey the following question was asked: How active do you think the Swedish Food Agency is in developing the Nordic Keyhole in terms of: brand, communication, marketing and facilitate product development? 100% of the participants in the survey answered the question. Most food business operators answered not so active (42.9%), while 9.5% and 4.8% of the food business operators answered little active and very active, respectively.

Furthermore, the following open-ended question was asked: What are the most important efforts that the Swedish Food Agency should make with the Nordic Keyhole? Of the participated food business operators in the survey 90% (n=19) responded to the question and the following efforts by the Swedish food agency were suggested:

- Communication/education (42%)
- Regulation (33%)
- Advertising (9%)
- Follow trends (6%)
- Review the Nordic Keyhole in EU (3%)
- Innovation of the Nordic Keyhole (3%)

In the discussions, all respondents mention challenges for the Swedish Food Agency as a trademark owner. Some examples of challenges were:

Mer fokus behöver läggas på *“Marknadsföring.”* More focus needs to be put at (*Advertising.*)

“Att vara aktuell.” (*Be up to date.*)

En av respondenterna anser att *“Nyckelhålet har inte blivit så stort som man har hoppats. Människor vet om Nyckelhålet men, det är inte så viktigt.”* One respondent believes that (*The Nordic Keyhole has not really become such a huge thing that one can hope for. People know about it, but it is not so crucial for them (customers).*)

Further, it was discussed how the Swedish food industry uses the Nordic Keyhole as a guideline for healthy food product development and which problems they identify. It is clear that the food business operators who answered the survey did not consider the Swedish Food Agency highly active regarding brand, communication, marketing and facilitate product development (42%). Cedenheim & Wessling (2013) suggest that it is hard for the Nordic Keyhole to be seen through all media noise. Furthermore, the Nordic Keyhole is lacking resources for market and business conditions (IPSOS 2015). In addition, a higher presence of the Swedish Food Agency in public health discussions is desired (IPSOS 2015).

4.3. Advantages and challenges with the Nordic Keyhole

In the discussions, all respondents mentioned advantages with the Nordic Keyhole e.g.:

“Jag tror Nyckelhålet är ett enkelt sätt att göra ett enkelt (hälsosamt) val.” (I think the Nordic Keyhole is an easy way to make (healthy) choices.)

“Det är ett mervärde. Det vill säga något extra, som vi tillför för produkten som konsumenten enkelt kan se med hjälp av själva symbolen.” (The Nordic Keyhole is an added value. That is something extra we add to the product that the consumer can easily see with the help of the symbol itself.)

“Det är inte bara någon som kommit på nyckelhålmärkningen över en natt. Det är baserat på kostråd och de nordiska näringsrekommendationer.” (It's not just anyone who has come across the Nordic Keyhole labeling over a night. It is based on our dietary advice and the Nordic nutritional recommendations.)

However, there are also different concerns mentioned by the respondents: *“Jag hoppas Nyckelhålet kan användas mer och att man kommer värdera Nyckelhålet lite mer.” (I hope that it (The Nordic Keyhole) can be used more and that one may value the Nordic Keyhole a little more.)*

“Nyckelhålet kommer inte överst.” (The Keyhole does not come at the top.)

An aim of this thesis aimed to understand how the Swedish food industry uses the Nordic Keyhole as a guideline for healthy food product development and which problems are identified. Even if the Nordic Keyhole symbol is an added value, it's not at the top according to respondents. Berneús et al. (2003) agree with the respondents that the Nordic Keyhole gives an extra value. Chalupová et al. (2021) mention that “Food labels allow producers to promote the unique selling points of their products and help consumers buy products with value-adding qualities.” Vyth et al. (2010) mention that FOPNL can increase the chance for food industries to change their products to contain healthier compositions. On the other hand, it does not seem to be enough to have a FOPNL, it is also necessary to work actively and advertise FOPNL e.g., the Nordic Keyhole (Chalupová et al. 2021).

The control of the correct use of the Nordic Keyhole is part of the official control in Sweden, as the control of any other label on a foodstuff. The responsible control authority is most often a local municipality. In addition, the Swedish Food Agency also do national control projects and Nordic control projects (NFA) (The Swedish Food Agency 2007) However, one of the respondents thought that the control was almost non-existing and even if The Swedish Food Agency (2007) carry out national control of labeled products, the controls could occur more regularly to ensure that the Nordic Keyhole regulations are followed correctly.

4.4. Nordic Keyhole labeled product development

In the discussions with food business operators, appealing and tasty products were mentioned by all respondents as important factors during product development. However, for all the respondents making the products as healthy as possible was also important. Factors mentioned about product development were for example:

“Man, tänker mest på smak och preferenser.” (One thinks foremost of taste and preferences.)

“Det viktigaste för en produkt är att man ska möta kundens förväntan, så det känns som om produkten tilltalar så mycket så att kunden vill köpa produkten igen.” (The most important thing overall for a product is that it should meet the expectations for the consumer, so that they feel that this product appeals to me so much that I may want to buy it again.)

During product development, all respondents explained that they try to label the products with the Nordic Keyhole if possible. Factors that were mentioned by the respondents about product development regarding the Nordic Keyhole were:

“Om vi är i positionen att nästan möta kriterierna, då försöker vi möta kriterierna.” (If we are in a position to almost meet the criteria's, then we try to meet the criteria.)

En av respondenterna förklarade att *“Det är andra parametrar som är viktigare för kunden.”* One of the respondents explained that *(Other parameters are more important for consumers.)*

In Sweden, there is a negative attitude towards additives and sometimes it is suggested that healthy product development – as lower salt and sugar – result in more use of additives. However, in the survey, none of the respondents considered that additives were used to a greater amount (figure 2). Almost 1/5 of the participated in the survey (18%) considered that additives are added in less extent compared to other products. This might be because sweeteners are not allowed in Keyhole-labeled products or because the limitation of additives is desired by health-conscious consumers.

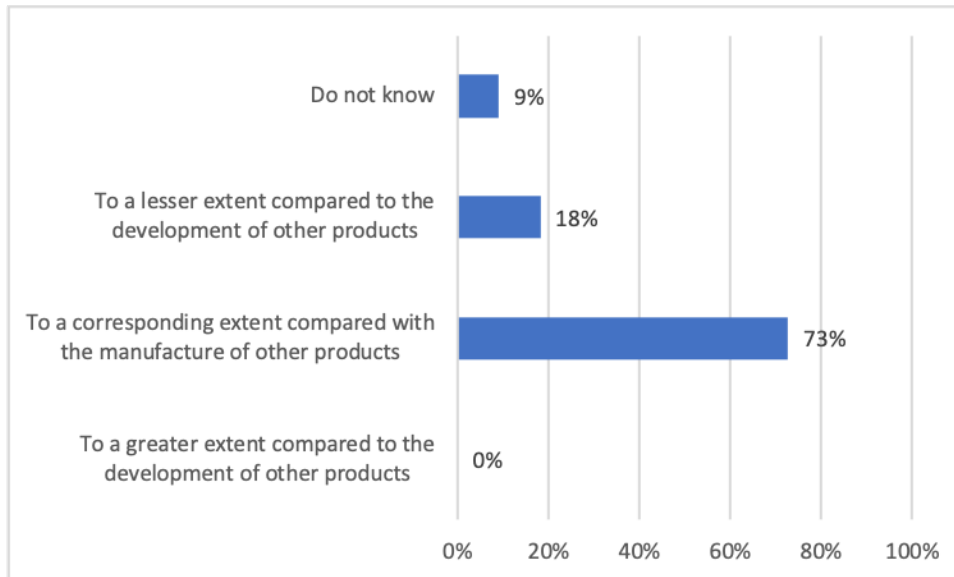


Figure 2. Food business operators' answers to the question: To what extent do you use additives in the development of keyhole-labeled products? The response rate was 100%.

Further, it was discussed what is required for the food industry to use the Nordic Keyhole as a guideline for healthy food product development, food supply and which problems that are identified. Bolha et al. (2021) mention that a food product should be healthy and still be appealing, which all the respondents have mentioned as well. Considering acceptance of reformulated food products Bolha et al. (2021) state that it is important for consumers with both health benefits and hedonic attributes in a product. Therefore, it is important to make a product appealing and healthy, and all respondents in the present study agreed on this. Dickinson & Kakoschke (2021) suggest that marketing could focus “on convincing consumers that healthy food is tasty, rather than convincing them to care more about health.” This is in agreement with what the respondents said about that product should be appealing, so the consumer wants to buy the product again.

4.5. Food groups and criteria for the Nordic Keyhole

Food companies having the category *flour, groat and rice* (75%) was labeled in high proportion with the Nordic Keyhole label. Food companies having the category *fats and oils* (57%) was labeled in low proportion (1-25%) with the Nordic Keyhole (Figure 3).

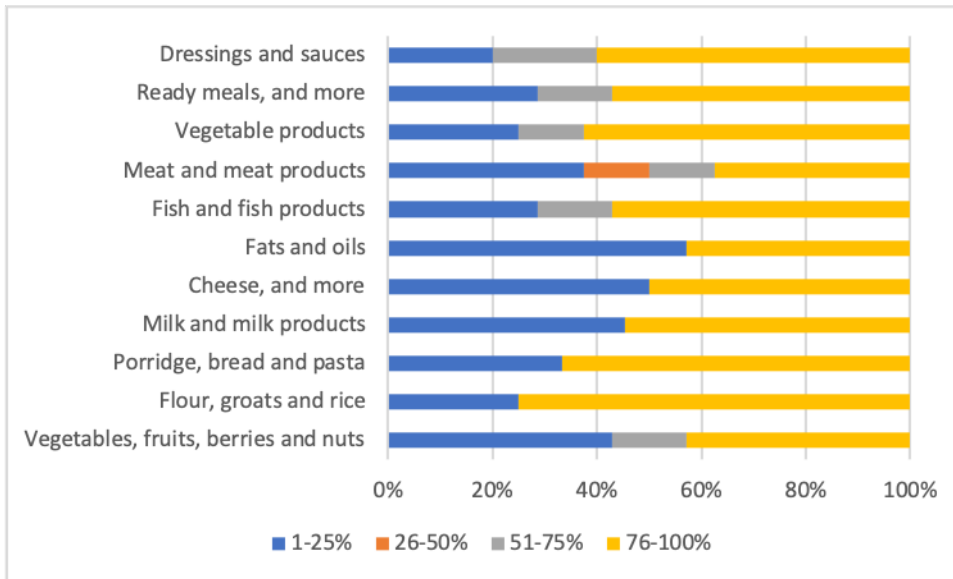


Figure 3. Food business operators’ answers to the question: For your existing products that meet the criteria for the Nordic keyhole, approximately what percentage do you estimate that you label with the Nordic keyhole? In the figure, the proportion (1-25% shown as blue, 26-50% shows as orange, 51-75% shows as grey and 76-100% shown as yellow) of the Nordic Keyhole products of existing products at food business operators’ companies in different food categories is shown. The response rate was 86 %.

Of those food business operators using the Keyhole, two out of three (67%) had not changed the proportion of Keyhole labeled products during the last 24 months (Figure 4). 11% had increased the number of Keyhole *labeled products* and explained that it was due to “the revision of criteria” and “interest of healthy products”.

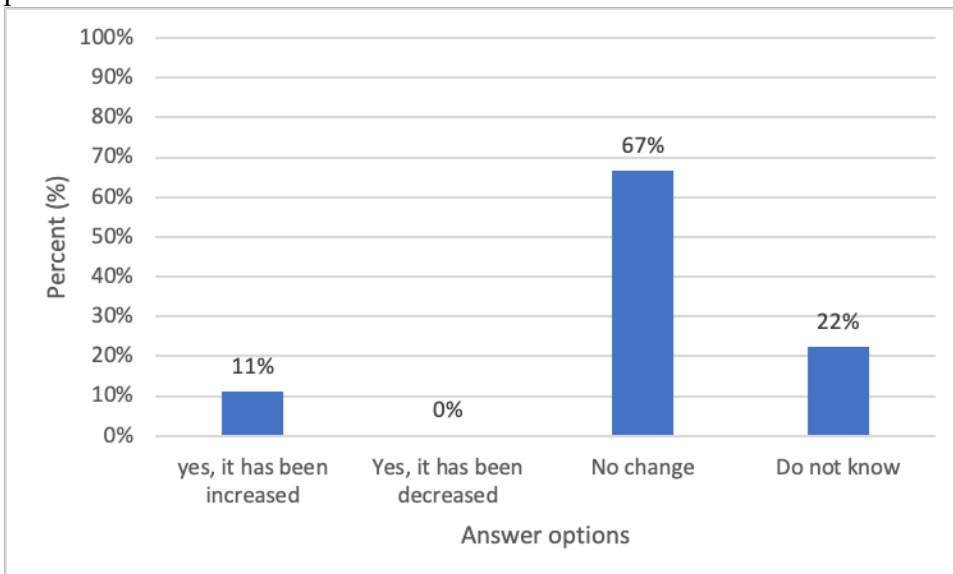


Figure 4. Food business operators’ answers to the question: Have the proportion of Nordic Keyhole-labeled products in your assortment changed in the last 24 months? The response rate was 86%.

Nearly half of the food business operators (48%) used the Nordic Keyhole criteria for product development on *1-50% of the assortment*. (Figure 5). Of those never using the Keyhole criteria for product development (38%) the reasons were:

- Do not think it matters to our target group
- Already using other labels
- It does not strengthen the brand
- Customers' demands
- Hard criteria
- Products are in the whole world
- Do not use the Nordic Keyhole
- There are more important parameters

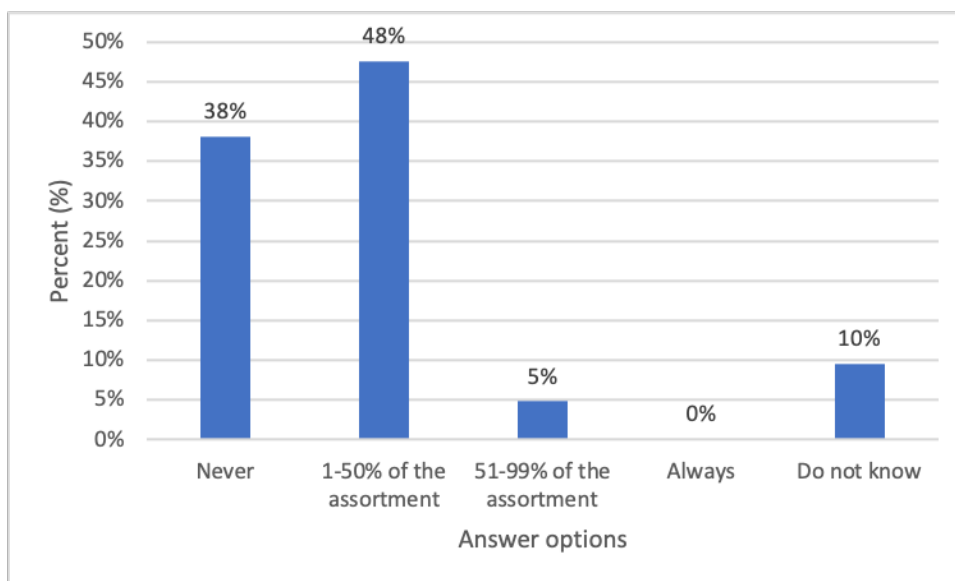


Figure 5. Food business operators' answers to the question: To what extent do you emanate from the Nordic Keyhole Criteria in product development? The response rate was 100%.

The companies using the Nordic Keyhole criteria during product development (53%) (Figure 5), estimated that they do not use the Nordic Keyhole for the products *dressing and sauces, ready meals, and more* and *vegetable products* (Figure 6).

The survey contained an open-ended question of whether it was harder for any food categories to fulfil the criteria. Food business operators answered yes for the following categories:

- Vegetarian products
- Ready meals
- Mixed vegetarian and meat products

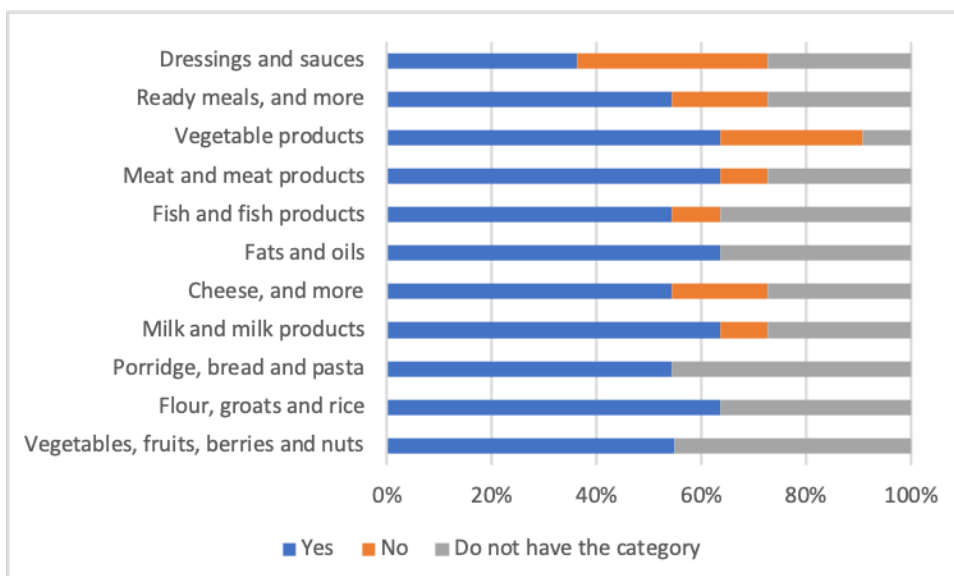


Figure 6. Food business operators' answers to the question: Do you use the Nordic Keyhole Criteria when developing new products or modifying existing products? This figure shows in which food categories food business operators develop new Nordic Keyhole products. The stacks show the food business operators which use (blue), not use (orange) and do not have (grey) the category in the Nordic Keyhole in new product development.

The discussions with the food business operators focused on specific food categories according to the text below.

Whole grain products

When asked about the whole grain criteria the respondents commented:

“Det är inte alltid vi klarar kriterierna, men då har vi det som en riktlinje istället.” (We do not always meet the criteria. But then we have had it as a guideline instead.)

En av fördelarna med *“Fullkornsflingor, är att de är som de är. De är ju bara en råvara så att säga.”* One of the advantages with *(Whole grain flakes, they are as they are. They are just a raw material, so to speak.)*

Charcuterie products

According to one of the respondents is salt a problem in charcuterie products. Salt är adderat för en *“Smak höjande effekt. Då försöker man balansera mängde nitrat och en sötare källa istället för salt.”* Salt is added due to a *(Taste-enhancing effect. Then you try to balance the amount of nitrite instead of salt to a sweeter source.)*

Vegetable food products, Vegetables and ready meals

According to the respondents the food categories plant-based food and ready meal are challenging. Factors mentioned about these food categories were:

“Komplexiteten ökar ju fler ingredienser och råvaror man har en produkt.” (The complexity increases with more ingredients and raw materials in a product.)

“Vegetariska färdigrätter i kombination med Nyckelhålet är en utmaning.” (Vegetarian ready-made food, in combination with the Nordic Keyhole is a challenge.)

En fördel med: “Frysta grönsaker där behöver man inte göra någonting. Det är bara att märka.” An advantage with: (Frozen vegetables you do not need to do anything. It's just to label.)

4.5.1. Challengers with criteria for the Nordic Keyhole

Nearly half of the respondents considered that they know the criteria of the Nordic Keyhole *well* (48%). About 1/3 (33%) and 1/5 (19%) responded *quite well* and *only a little*, respectively (Figure 7).

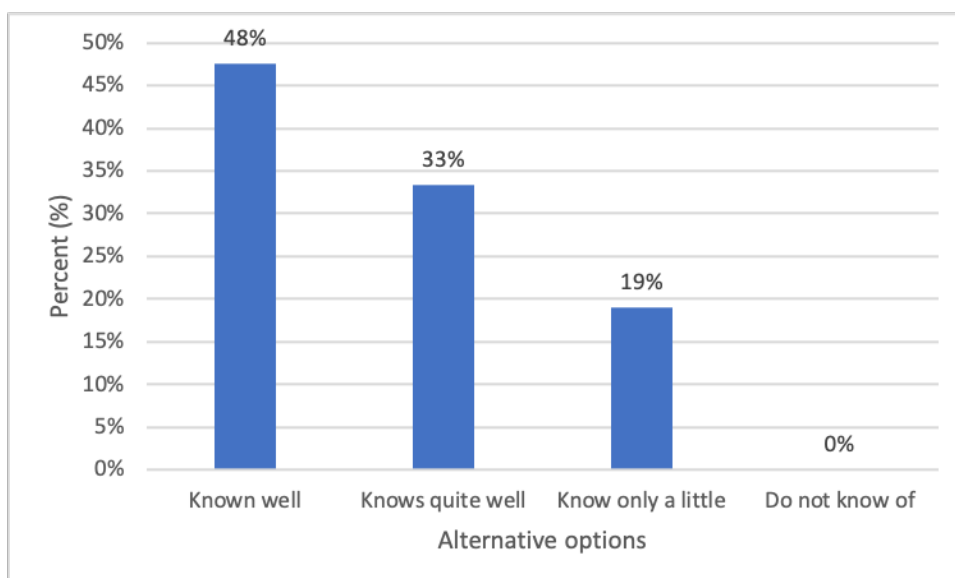


Figure 7. Food business operators' answers to the question: How well do you know the criteria for the Nordic keyhole, in general? The response rate was 100%.

For those food business operators that emanate from the Nordic Keyhole (Figure 6), one can observe their experience of the criteria for each food category in Table 1. For some food categories the criteria were considered too strict, this was in particular for *dressings and sauces* (27%), *vegetable products* (18%) and *porridge, bread and pasta* (18%). The option alternative that *could be even stricter* was only chosen for the food groups *meat and meat products* (9%) and *vegetable products* (9%) (Table 1).

Table 1. Food business operators' answers to the question: How do you experience the criteria in different food categories? The answer option for each food category is too strict, adequate level, could be even stricter, do not know and do not have the category

	Too strict	Adequate level	Could be even stricter	Do not know	Do not have the category
Vegetables, fruits, berries and nuts	0%	55%	0%	0%	46%
Flour, groats and rice	9%	55%	0%	0%	36%
Porridge, bread and pasta	18%	36%	0%	0%	46%
Milk and milk products	9%	64%	0%	0%	27%
Cheese, and more	9%	64%	0%	0%	27%
Fats and oils	9%	55%	0%	0%	36%
Fish and fish products	0%	64%	0%	0%	36%
Meat and meat products	9%	55%	9%	0%	27%
Vegetable products	18%	55%	9%	9%	9%
Ready meals, and more	9%	46%	0%	18%	27%
Dressings and sauces	27%	46%	0%	0%	27%

Salt and fat

In the discussions, all respondents considered the criteria for salt and fat being difficult to fulfil when labeling Nordic Keyhole products. The respondents commented for example:

”Det är svårt att ta bort fett och salt, då förlorar man smak.” (It is hard to remove fat and salt, since you lose taste.)

Whole grain

In the discussions, all respondents agree that the criteria could be hard to fulfil sometimes and sometimes easier, depending on the food category. For example, whole grain could be complicated:

Some positive examples mentioned about the criteria for whole grain were *“Jag tycker på något vis att det är enklare, jämfört med fett och salt.” (But I think it's somehow easier, compared with fat and salt.)*

Sugar

One of the respondents mentions that a trend right now is to not add sugar into the food. According to the respondents, the criterium for sugar is not a big problem. Examples of this were:

“Socker undviker kunder, så vi vill inte ha socker i våra produkter.” (Sugar is avoided by consumers, so we do not want sugar in our products.)

Limitations according to food categories

Food categories the participating food business operators were having products in is shown in Figure 8. Most food business operators which label some products with the Nordic Keyhole have products in the food category *milk and milk products* (52%). Companies having products in the food categories *cheese, and more* and *dressings and sauces* did not label any of their products within those categories with the Nordic Keyhole symbol.

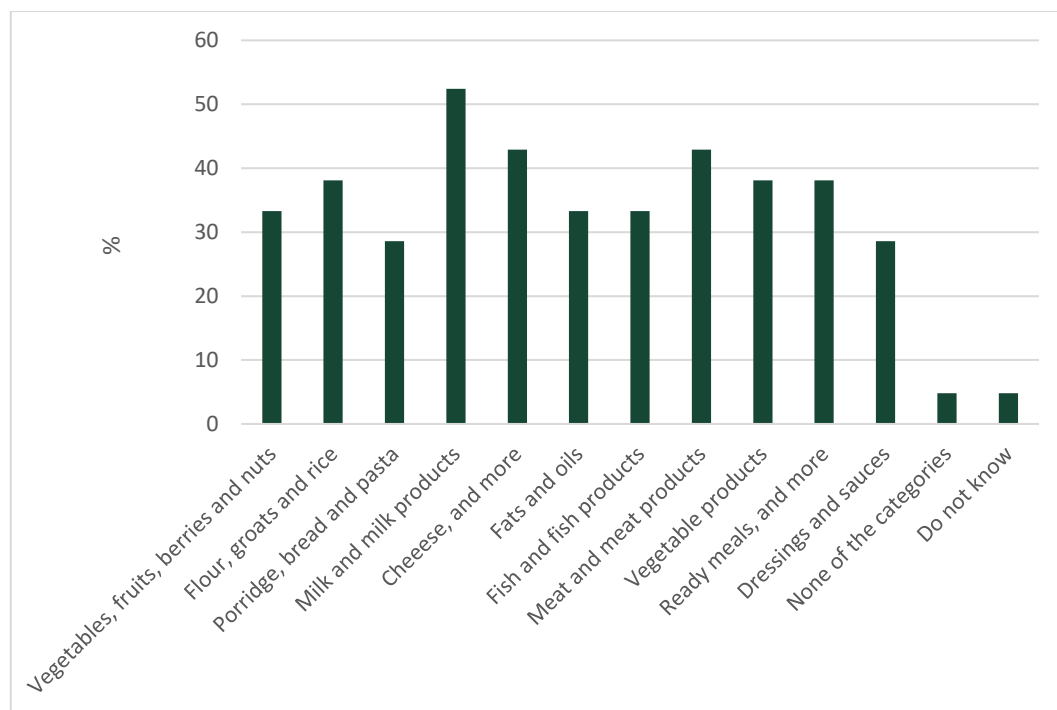


Figure 8. Food business operators' answers to the question: In which of these categories does your company have products? Those who have products were included in the figure. Food business could answer more than one category.

Further, it was discussed what is required for the food industry to use the Nordic Keyhole as a guideline for healthy food product development, food supply, differences in food groups and which problems identified problems. The food category *cheese, and more* are labeled with the Nordic Keyhole to less extent compared with other food categories e.g. *flour groat and rice* (Figure 3 & 6). This indicate that it could be a problem labeling with the Nordic Keyhole. Problems could for example be the high fat content. To be labeled with the Nordic Keyhole,

the maximum fat content is 17% and the maximum salt content is 1.6% of the product (LIVSFS 2005:9 2021). This could be hard to fulfil as cheeses contain a lot of fat and lowering the content will affect sensory aspects as flavor. Guan et al. (2021) confirm that cheese with low fat affects the flavor of the cheese. As the respondents mention, it does not matter if the product is healthier with a low-fat content if the cheese does not taste good.

The food category *dressing and sauces* is labeled with the Nordic Keyhole to less extent compared with other food categories e.g., *flour groat and rice* (Figure 3 and 6). One reason could be that there is a low consumer demand for healthy sauces. Therefore, there is no need for the food industry to produce healthy sauces. According to Ma & Boye (2013), reduced fat content in dressing and mayonnaise affects the texture, flavor and stability of emulsion products.

Both in the discussions and in the survey (open-ended questions), the food categories *vegetarian products*, *ready meals* and *mixed vegetarian and meat products* were identified as difficult to fulfil criteria for (Figure 6). The respondents mention that for complex products with more ingredients, it is harder to fulfil the criteria compared to the food categories mentioned above. In comparison, *milk and milk products* are easier due to few ingredients. Ready meals are often high in salt (Kim & Kim 2020) to enhance flavor and preservation (Guan et al. 2021). The salt criterion seems to be a problem for *charcuterie products* as well according to both the respondents and in the survey (figure 6). The problem is that consumers like products with a high salt level but the high salt levels are disadvantage for the health. To lower the salt content, nitrite needs to be added as well as a sweet ingredient to mask the nitrite flavor. It would be much easier to have salt instead of nitrite which gives flavor. Nitrite has unwanted health properties (Manicini et al. 2020).

On the other hand, for the food categories *vegetable products* and *meat and meat products* there are different opinions if the criteria are too strict or not (Table 1). The difference in opinion concerning *vegetable products* could be due to the huge vegetarian food trend according to the respondents and LIVSFS 2005:9 (2021). The big trend may lead to some food business operators thinking that it is important that *vegetable products* can be a part of the Nordic Keyhole and not lag behind. Furthermore, in table 1, it is seen that the food categories *dressing and sauces*, *vegetable products* and *porridge, bread and pasta* have too strict criteria, according to some food business operators. These three categories have been discussed above and the reason could be problems fulfilling the salt and fat criteria. The problem mentioned by the respondents about salt and fat is when you lower fat and salt, the product could be less appealing which is in agreement with (Manicini et al. 2020).

One of the trends right now, according to the respondents, is that sugar is outdated. Customers do not want to have sugar in their products (LIVSFS 2005:9 2021). Nothing was further mentioned about sugar. Both advantages and disadvantages were mentioned about the criterion whole grain. The respondents agree that for cereal products, the criterion for whole grain is difficult to fulfil. A

conclusion was therefore that the criterion for sugar is easier to fulfil compared to criteria for whole grain, fat and salt. Further, the criteria for fat and salt were the hardest to fulfil.

According to the survey, there has been an increase in the number of Nordic Keyhole products during the latest 24 months due to interest in healthy products and the revision of criteria (Figure 4). The interest in healthy products from the survey is in agreement with the respondents and (LIVSFS 2005:9 2021). Furthermore, this indicates that the revision of the Nordic Keyhole was an improvement, otherwise, there would have been a decrease in the number of Nordic Keyhole products instead. On the other hand, some improvements still need to be done to the Nordic Keyhole criteria when observing figure 5, as only 1-50% consider Nordic Keyhole criteria in their products at development, if one wants to a higher number of products labeled with the Nordic Keyhole. According to the open-ended questions, advertising of the Nordic Keyhole is necessary to change their customers demand, since the participants in the survey think it does not strengthen the brand and does not matter to the target group. One respondent mentioned that even tougher criteria are needed. It may be important to have tough criteria, forcing the food companies to develop new healthy products. On the other hand, if the criteria are too hard to fulfil, then the food company may not even try to label with the Nordic Keyhole if it is no demand from the customer even to label with the Nordic Keyhole.

In conclusion, it seems like that the food categories *cheese and more, dressing and sauces, meat and meat products, dressing and sauces, vegetable products and porridge, bread and pasta* have some issues compared with food categories e.g., *flour, oat and rice* and *milk and milk products* which seems to be simpler products with fewer ingredients. Moreover, it seems like that the criteria salt, fat and whole grain are more difficult to fulfil depending on which food category compared with. The criterion for sugar was not an issue.

4.6. General health

More than half of the respondents (52%) thought that the biggest challenge with a focus on health was consumer demand (Figure 9). From the alternative option *other* (33%), an open-ended question was given, and food business operators specified that it could be:

- Taste
- Sensory aspects
- Price
- Consumers prefer unhealthy products
- Consumers demand is there but is not followed

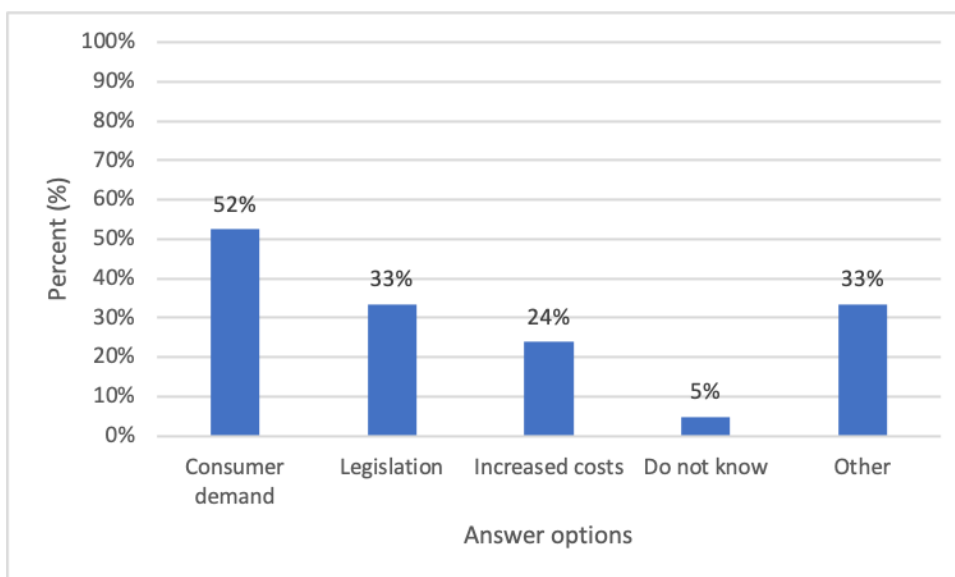


Figure 9. Food business operators' answers to the question: What are the biggest challenges for product development with a focus on health? The response rate was 100%.

In the discussion, all respondents agreed that it is good if a product is healthy and appealing. Furthermore, there are more factors than only health which matters, for example:

“Det är svårt att komma med något, som inte ser hälsosamt ut och säga att det är hälsosamt.” (*Credibility, it is difficult to come up with something that does not look healthy and say that it is healthy.*)

4.6.1. The Nordic Keyhole with a focus on health benefits

In the discussions, all respondents consider the Nordic Keyhole label an important tool for healthy product development. For example, they said:

“Jag tror det är viktigt för människor som specifikt är i en situation i livet där man måste ändra sin diet och behöver leta produkter. Då kan Nyckelhålet vara ett verktyg för att välja något som är lite bättre för hälsan.” (I think it adds that people who specifically get into a situation in life where you have to change your diet and need to look for products. Then the Nordic Keyhole can be a tool for choosing something that is a little better for health.) This is in agreement with Svederberg & Wedin (2011) who wrote in their report that consumers which has own health problems or health problems in their family put more effort in finding information on nutrition labels.

However, one of the respondents believe that price is most important for the consumers: *“Kundens efterfrågar hälsosamma produkter märkta med Nyckelhålet men när dem är i affären, är produkterna för dyra, och då vill kunderna inte köpa produkterna.” (Consumers demands are healthy products labeled with the Nordic Keyhole but once they come to the store, the products are too expensive, and customers do not buy them.)*

Further, it was discussed what is required for the food industry to produce healthy food products in general, how to use the Nordic Keyhole as a guideline for healthy food product development and whether any problems can be identified. According to Mørk et al. (2017), high educated persons from Denmark have better dietary patterns as they eat more fruit, vegetables and fish compared to low educated and in general, men’s dietary pattern is of lower nutritional quality than women. This indicates that individuals with high education have a better ability to buy healthy food products. In the study by Mørk et al. (2017), it was observed if it was possible to increase the knowledge of the Nordic Keyhole with a campaign aimed at people with lower educational levels. According to this study, it was possible to increase the knowledge with a campaign. This study is in agreement with the present survey where the respondents say that consumer likes products which in unhealthy according to the open-ended questions (figure 9). With more campaigns for the Nordic Keyhole, the interest in healthy Nordic Keyhole symbols could increase. Furthermore, two studies Mørk et al. (2015 and 2017) concluded that with help of advertising one can increase the intake of healthier food in a target consumer group such as males older than 35 years having a low education. Purpose of the study was to try to increase the knowledge of the Nordic Keyhole.

One of the respondents mentions the credibility of a product and the hardness to produce a product which is healthy and looks healthy aswell which is in agreement with the study Otterbring et al. (2020). The study showed that with help of their package design, could give the impression that the products are healthy. The conclusion of Otterbring et al. (2020) study was that FOPNL should be more visible than in the corner of a package if the producer’s goal was to sell healthy products. This is in agreement with what the respondents in the present

study were saying. On the other hand, a label in the corner of a product package can be helpful in stressful situations. As Wang et al. (2016) stated, FOPNL can help consumers make quick choices. Thus, a small label may be better than no label at all. Temple (2020) mentioned that FOPNL can help consumers make choices between healthy and less healthy food. Wang et al. (2016) and Temple (2020) are in agreement with the respondents in the present study who mention that FOPNL e.g., the Nordic Keyhole can be used as a tool for consumers to make a better healthy choice.

It is important that the products are to be appealing, tasty and have good sensory aspects according to figure 9 and the respondents, which is in agreement with Cedenheim & Wessling (2013).

A Norwegian study about the willingness to buy Nordic Keyhole products and furthermore the perception of taste and health according to the label was made by Wang et al. (2016). According to the study “Keyhole symbols increased health perception but did not affect the perception of taste or willingness to pay.” This is in agreement with figure 9 and all the respondents who mention that the consumer do have a demand of healthy products but are not willing to pay for more expensive products. On the other hand, the trend in Sweden to eat healthy is contradictory to the fact that statistics from the survey made of The Swedish Food Agency (2020a) showed that many people eat expensive fast food. This goes against the healthy trend and consumers low willingness to buy expensive food in grocery stores (Wang et al. 2016). According to Bolha et al. (2021), the most important factors for the consumers are taste, labelling and price. This is in agreement with The Swedish Food Federation (2020c).

4.7. Labeling in Europe

All FOPNL:s mentioned below have the aim to improve the health of the population in the respective country. Below, common labels used in Europe and criteria for the labels are described.

4.7.1. FOPNL in Europe

Choices Logo

Choices Logo is a FOPNL created in the Netherlands in 2006. The label has 27 food groups. Choices Logo are used in some of the European countries, e.g., Poland, Belgium and Czech Republic (WCRF 2019). Choices logos follow the EU regulation 1924/2006. Choices logo is divided in to two categories. The group *Basic products* (green) contain food group such as nuts, fruits and bread. The group *Non basic products* (blue) contain products such as sauces, snacks and beverages (Choices international foundation 2019). The aim with Choices logo is to reduce the amount of saturated fat, trans-fat, sugar and sodium in products, and to increase the fiber content in the 27 food groups (Van der Bend et al. 2020). For food categories in the group of *Non basic products* energy criterion are added

(Choices international foundation, 2019). All 27 food groups have different criteria depending on which food group it is. For example, the food groups *Meal sauces* can contain maximum 400 mg/100 gram fat of food product, while *dark sauces can contain maximum 3000mg/100 gram fat of product* (Choices international foundation 2019).

Heart symbol

In 2000, the Heart symbol was created by Finland based on the *Finnish nutrition recommendations* (Sydanmerkki, 2021). To label products with the heart symbol, the producer needs to apply for it. If using the heart symbol, one need to pay an annual fee (500 Euros per product). The criteria are made by an expert group which are inspired of organizations such as the United States Food and Drug Administration (FDA). It contains 9 food groups and subgroups, e.g., *milk and dairy products, meat and bread and cereal products*. The symbol is used for products fulfilling the criteria of high fat quality, low salt content, high fiber, and low sugar amount depending on which food group it is. For example, the subgroup *bread and cream* can maximum contain 20% saturated fat and 33% saturated fat of the total fat content, respectively (Sydanmerkki 2021).

Traffic light

The warning label Traffic light is a British labeling with three colors: Low amount and healthy (Green), average amount and a little healthy (orange) and high amount and unhealthy (red). The Traffic light can be used as a warning system for the customer. For example, when the label is red, you should not eat it if you want to have a healthy diet (Food Standards Agency 2020) Figure 10 shows an example of the Traffic light symbol for grilled burgers. The labeling is based on EU regulation 1924/2006. The criteria energy, fat, saturated fat, sugar and salt are measured for your daily recommended intake (Food Standards Agency 2020).

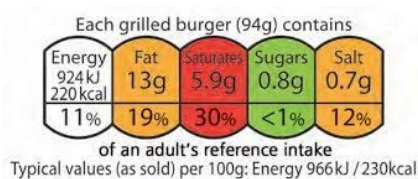


Figure 10. The Front of package nutrition label “Traffic light” used in UK. The figure shows an example for grilled burgers.

Nutri-score

The French Ministry of Health developed Nutri-score according to the European regulation (1169/2011) article 35 Santé publique France (2021). An algorithm is used taking into account energy, sugar, saturated fats, salt, fiber, protein, fruit, vegetables, nuts and rapeseed-, walnut-, and olive oil to calculate a nutritional value. This nutritional value is converted to letters and colors. A product with green color with the letter *A* is healthier compare with a product labeled with a red color with the letter *E* (Figure 11). Users of Nutri-score is Belgium and Germany (Scientific & Technical 2021).



Figure 11. The Front of package nutrition label “Nutri-score” which is used in France.

4.7.2. Comparison between different labels in Europe

In the discussions, all respondent agrees that the Nordic Keyhole is a good label to trust and use in Sweden. Positive values about the Nordic Keyhole mentioned were for example

“Nyckelhålet är välkänt i Sverige.” (The Nordic Keyhole is very well known in Sweden.)

“Jag fortsätter gärna med Nyckelhålet istället för stoppskyltar och trafikmärket.” (I would like to continue with the Nordic Keyhole instead of the stop signs or traffic light signs.)

The Nordic Keyhole, Choices Logo, the Heart symbol and Nutri-score are all nutrition claims in the summary indicator system. Summary indicator system gives nutrition information about a food product (WHO 2018). The difference between The Nordic Keyhole, Choices Logo and the Heart symbol compared to Nutri-score is that those use a letter system. Moreover, the Nordic Keyhole, Choices Logo and the Heart symbol follow different criteria. Egnell et al. (2019) mention that “the Nutri-Score demonstrated the highest overall performance in helping consumers rank the products according to their nutritional quality.” The respondent agrees partly with Egnell et al. (2019) since they think that the Nutri-score is easy to use for the customers but, it can easily happen that the label is inaccurate, when criterion such as whole grain content is not taken in account. This can be misleading for how nutrient rich products are.

If one compares the four labels included in the summary indicator system with the Traffic light, some differences can be found. The traffic light works as warning symbol and do not follow the same criteria as the Nordic Keyhole (WCRF 2019). A study of Temple (2019) performed to compare different FOPNL mention that warning labels were one of the most successful FOPNL e.g., the Traffic light. On the other, one of the respondents mentioned that they would rather continue with the Nordic Keyhole than change to the Traffic light. A disadvantage with the Traffic light according to Nutrition’s fact (2014) was that it can be hard as a consumer to choose if the product healthy when it is both high and low amounts of different criteria.

The FOPNL Nordic Keyhole and Heart symbol is similar in following criteria in different food categories to be labeled, according to the respondents. The

difference is that the food producer needs to pay a fee to label with the Heart symbol (Sydanmerkki, 2021), which is not the case for the Nordic Keyhole (LIVSFS 2005:9 2021). It is mentioned in Kinnunen (2001) that consumers seem to have greater trust in the heart symbol than the traffic light and nutri-score.

When comparing the Choices logo and the Nordic Keyhole both use different criteria in different food groups. Advantages and disadvantages can be found for all labels but overall, all the respondents agree that they want to continue working with the Nordic Keyhole in Sweden.

4.8. Limitations

The high percentage of the participants who answered that they are *positive to the Nordic keyhole*, shows that the food business operators which answered the survey have a positive attitude to the Nordic Keyhole. Furthermore, this may indicate that food business operators which have a negative attitude did not answer the survey which was seen in the low (5%) percent of a negative attitude against the Nordic Keyhole (Figure 1). It also indicates that food business operators which do not produce Nordic Keyhole products probably did not participate in the survey.

According to the results *porridge, bread and pasta* is labeled to a less extent compared to e.g., *milk and milk products* (Figure 6). This indicates a limitation, that a high proportion of e.g., dairy companies have answered the survey which could affect the result of the study.

According to Madarati (2020) the expected response rate for a survey should be approximately 50-60%. It is almost impossible to get a response rate over 50-60%. The response rates for Lupo et al. (2016) and Kettunen et al. (2017) were 10% and 25%, respectively. If comparing the response rate in this study (40%) with Lupo et al. (2016) and Kettunen et al. (2017), then this response rate is high. All respondents did know about the Nordic Keyhole and most of them used the label on at least a few of their products. Thereby it is likely that food producers which not using the Nordic Keyhole chose to not answer the survey. If not producing products with the Nordic Keyhole they may not see the reason to participate in the survey. For example, the survey was sent to some food companies e.g., Pepsico, Ewerman and Arvid Nordquist which probably did not produce Nordic Keyhole products.

5. Conclusion

A conclusion was drawn from identified problems/challenges which the Swedish Food Agency need to work further with. These problems were *advertising and communication/education*. The food categories *cheese and more, dressing and sauces, meat and meat products, vegetable products and porridge, bread and pasta* have some more issues compared with food categories such as *flour groat and rice* and *milk and milk products* which seems to be simpler products with fewer ingredients. Moreover, it seems like the criteria salt, fat and whole grain have some issues depending on food category, compared to the criterion sugar for which no issues were mentioned.

To produce healthy products which consumer wants to buy, product developers need to put focus on a packaging which looks healthy. Moreover, the consumer needs to have appealing and pricy worthy products which remain healthy. Advantages and disadvantages are mentioned about some FOPNL in Europe but overall, all the respondents agree that they want to continue work with the Nordic Keyhole in Sweden.

Finally, some positive aspects of the Nordic Keyhole are mentioned. More than half of the food producers participating in this survey, label with the Nordic Keyhole. Food categories such as *vegetables, fruits, berries and nuts & fish and fish products* are considered to have criteria which are simple to fulfil. Furthermore, the results from the survey and the discussions indicate that food business operators generally have a positive attitude to the Nordic Keyhole.

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Personal Communication

Veronica Öhrvik – The Swedish Food Agency

Respondents from food companies

Appendix 1

Discussion guide

Intro - 5 min, a total of 5 min – Explaining about the project

Background - about product developer - 5 min, a total of 10 min

- What is your education?
- What is your position in the business?
- What is included for information in your position?
- How long have you worked with this service?
- Have you had previous positions in the industry?
- How long have these previous positions and jobs lasted?

Background - the company - 5 min, a total of 15 min

- How many employees does the business have?
- Is the business both nationally and internationally?
- How many works with product development?
- How do you work within the company with product development?
- What food categories do you have products in?
- Which food categories are largest or important to the company?

Keyhole marked - companies that have keyhole-marked products - 20 min, a total of 35 min

Intro

- What is your attitude to the Keyhole label?

Company questions

- Do you have Nordic keyhole-labeled products?
- In which food categories do you have Nordic keyhole-labeled products?
- Feel free to give some examples of your Nordic keyhole-labeled products?
- Of those products that meet the criteria, what proportion is Nordic keyhole marked?
- Approximately, how many Nordic keyhole-labeled products would you say you have in total?
- How many new Nordic keyhole-labeled products have you developed in the last two years?
- Approximately how many new or reformulated products do you launch in one year and approximately how many do you remove from the market?
- How many products have you made changes or reformulated?
- How do you think when you reformulate existing products?

Product development

- How do you decide if a product should be Nordic keyhole marked?
- How does your process go about producing Nordic keyhole-labeled products?
- How has the Nordic keyhole affected your product development so far?
- How do you think the Nordic keyhole will affect your product development in the future?
- Do you target a special target group with your Nordic Keyhole-labeled products?
- What requirements should a product have in your opinion?
- Which criteria do you think are most difficult to follow in order to produce Nordic keyhole-labeled products? (salt, fat, sugar and whole grains).
- Do you think that there is a difference in how difficult it is to meet the criteria for different food groups?
- Could the criteria be easier to follow?
- Do you see that there are products that do not fit into existing food categories?

The Nordic keyhole as a guideline

- Are there products that are not Nordic keyhole marked but where you have used the Nordic keyhole as a guideline? Yes / No: Why did you make this choice?

Improvements to the Nordic keyhole

- Do you think that an improvement or change needs to be made to the Nordic keyhole?
- What are the most important efforts the Swedish Food Agency should make with the Nordic Keyhole?

Health - 5 min, a total of 40 min

- What are the biggest challenges for product development with a focus on health?
- How do you think a healthy product development could be facilitated?

Europe labels - 5 min, a total of 45 min

- Do you sell Nordic keyhole-labeled products internationally?
- Has the Nordic keyhole's Nordic co-operation affected your product development? If it affects you, then how?
- Do you know of any other health symbols from Europe?
- Are there any advantages and disadvantages of the keyhole compared to other health symbols in Europe

Trends - 5 min, 50 min in total (Skip due to lack of time)

- What trends are you seeing right now?
- What do you think about these trends?
- What upcoming trends do you see coming in the future?
- What do you think about these upcoming trends?
- Do you think that the keyhole would change to be able to keep up with trends?
Yes: If so how

Completion - 5 min, a total of 55 min

- What do you think is the most important thing to invest in in order to have a healthy food supply

Now we are almost ready, but before that I wonder about something you want to add, something you think we missed.

Thanks for the interview

Appendix 2

See survey questions and answers here:

<https://www.esmaker.net/analyze/Files/temp/251/966ac009-73f9-43b6-b87c-63622cc834ee/210514/s/b7a2647c5c6e/Enk%3%a4tomNyckelh%3%a5letsrollvidproduktutveckling.pdf>

Appendix 3

Popular Scientific Summary

Right now, in the world and in Sweden people have diseases due to an unhealthy lifestyle, such as cancer, diabetes, obesity. It is known that eating a lot of sugar, saturated fat and salt leads to an unhealthy lifestyle. For example, nine of ten adults eat too little whole grain. The World Health Organization which has the function to improve the health in the world recommends front of package nutrient label to decrease the risk of an unhealthy lifestyle and diseases. The Nordic Keyhole is one of those labels used in the Nordic countries, Lithuania and North Macedonia. The Nordic Keyhole could help consumers makes healthier choices. Producers who want to label with the Nordic Keyhole have to follow the criteria, which are a low amount of sugar, low amount of salt, low amount of fat and high amount of dietary fiber and whole grain. Consumers attitude about the Nordic Keyhole right now is that half of the respondents thought it was easy to find products labeled with the Nordic Keyhole. In the youngest age group knowledge, about the Nordic Keyhole was lower compared with older groups, but the young who knew about the label had a better attitude against the label compared with older groups.

This study aimed to find out how the food producers use the Nordic Keyhole symbol as a guideline for healthy food. This was investigated through a survey, discussions and a literature study.

The results showed that most of the food business operators that participated in the survey label their products with the Nordic Keyhole products. One conclusion of the study was that the authority Swedish Food Agency needs to put work on *advertising* and *communication/education*. Improved regular control of Nordic Keyhole is also needed. Therefore, it important that the Nordic Keyhole symbol is used for products that are is appealing, price worthy and healthy. Furthermore, it is important that the packaging looks healthy. The Nordic Keyhole contains different food categories. The food categories *cheese and more, dressing and sauces, meat and meat products, dressing and sauces, vegetable products* and *porridge, bread and pasta* have some problems compared with food categories such as *flour groat and rice* and *milk and milk products* which seems to be products with fewer ingredients which is easier to produce. The criteria salt, fat and whole grain have some problems depending on food category if comparing with the criterion sugar for which no problem was mentioned. Advantages and disadvantages are mentioned about some front of packaging nutrition labels (FOPNL) in Europe but overall, all the respondents agree that they want to continue working with the Nordic Keyhole in Sweden. Some positive aspects of the study were that more than half of the food producers label part of their products with the Nordic Keyhole. Food categories such as *vegetables, fruits, berries and nuts & fish and fish products* are considered to have criteria which are simple to fulfil. Food business operators do have a positive attitude about the Nordic Keyhole.