

brookies

Tired? Time for a Brookie!

Development of Innovative Future Food - 23552

DTU – Technical University of Denmark



Irene Gil - s200135, Usman Ghani Anwar - s190217, Viona Bernardi - s196258, Eli Chowdhury - s164553, Magnus Ørsted Jensen - s143760

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1. Company Description

Brøøkies Aps – « Tired? Time for a Brøøkie! »

Brøøkies Aps is a company founded in the suburbs of Copenhagen. We, the company founders, come from very different countries and cultures, but we all have noticed with concern that the problem of increasing child obesity has become a global reality. In the beginning of 2020, we read a research about Danish children in which it was found out that 89 % consumed too much saturated fat and 56 % consumed too much added sugar. As one of our members is a young mother, we were aware of the limitations of the actual food market in terms of healthy snacks for children, so we decided that we could put our knowledge in food technology into good use and create a snack that is as appealing for children as nutritious. This is how Brøøkies was created.

Our Mission:

“To give children a healthy and yet enjoyable snack option while taking care of the environment, meaning the production of a sustainable snack without the usage of sugar or sweetener, saturated fats and a high protein content through the reuse of functional byproducts from local resources (e.g. pomaces)”.

Product/ Service:

We will sell a sustainable sweet snack without saturated fats, no added sugar and sweeteners and with high protein content to mothers for their children. The sweet taste is obtained by using natural sweet ingredients. A key ingredient is apple pomace, a by-product of cider or juice production, which not only gives a sweet taste but also has a positive effect on the sustainability of our snack.

Our Objectives:

First year: We want to enter the Danish snack market with our product “Brøøkies” by selling it in full-service and convenience supermarkets from the Coop group and food health stores in Copenhagen.

Second year: We want to extend our net of sales to the rest of Denmark through Coop supermarkets.

Third year: We want to incorporate new by-products from the local production to our production chain, incrementing the variety of our products.

Our Vision:

- To be a leading company in the European snack market with a strong focus on sustainability and health
- To broaden our segment to different target groups.
- To expand the variation of Brøøkies by using different pomace, such as carrots, beetroot.

Success criteria:

1 YEAR: Our product is in 30 % of the food health stores and in 75% of Irma stores in Copenhagen through a contract with Coop group.

2 YEAR: National expansion through Coop group. Our product is sold in IRMA, Superbrugsen and Kvickly shops across Denmark. Factory upscaling.

3 YEAR: International expansion. Export of our product to Sweden, Norway and Switzerland. Increase of our product offer by two to four additional Brøøkies varieties.

Stakeholders:

The company was founded by five people and each person holds 20% share of the company

Irene Gil
(B.Sc Veterinary Science)



Usman Ghani Anwar
(B.Sc Biology)



Magnus Ørsted
(BEng Food Safety & Quality)



Viona Bernardi
(B.Sc Food Science)



Eli Chowdhury
(B.Sc General Engineering)

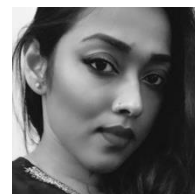




Figure 1: Competences of our team

The 5 founders of the company have a strong background related to food safety and production, quality management, and research and development. In contrast, there are business aspects that need to be covered, like sales, accounting, and legal advice. For the first two years the advisory board of 3 people will provide advisory support on legal issues, business solutions, and information for the accounting of the company.

Company Name: Brøøkies Asp

Company Structure: Public limited liability company (ApS)

Due to the company's size, it will be registered as an ApS (Anpartsselskab / private limited company) with the Danish Commerce and Companies Agency.

An ApS would be appropriate for our start-up because the initial capital required is significantly lower than it would be for an A/S (Aksjeselskab / limited company). An ApS is usually chosen for small and medium-sized companies that are funded by foreign investors. It is necessary that all shareholders provide at least 70.000 DKK as a deposit, in full, prior to company registration in Denmark.

Moreover, it is compulsory to have a registered or state-authorized accountant submit annual financial statements regarding the company and to deal with the appropriate bookkeeping in a Danish ApS for it to be verified (Company Formation Denmark, 2016).

Location: Copenhagen, Denmark

SWOT ANALYSIS

Table 1: SWOT analysis map

STRENGTHS	WEAKNESS
<ul style="list-style-type: none">- Apple pomace by-product is sustainable and cheap.- High nutritional value- No Food Additives used- Good taste- Competitive price	<ul style="list-style-type: none">- Bad reputation of children snacks- Unstable availability of raw material- Fast spoilage of some raw materials
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">- Growing market- Usage of different pomaces for new Brøøkies products- Working with Day – Cares and primary schools.- Our products follow the clean label trend	<ul style="list-style-type: none">- Cheaper products from competitors- Discovering alternatives for the usage of by-products- Established companies copy our product, selling it at a lower price- Change of our target groups attitude e.g. less health conscious

The most relevant strengths of our business come from the nutritional value and ingredient composition, and its competitive price.

The quick spoilage of apple pomace after the juice pressing can be a challenge, but it can be sorted with a well programmed collection of our raw material.

An increasing market in healthy and sustainable food can be considered as a promising opportunity for our business, but we have to be careful with volatile trends and with similar products from strong competitors.

2. Marketing plan:

As children from most of the Western countries, Danish children and adolescents have an increasing prevalence of being overweight. A study done in 2015 showed that 89% and 56 % of Danish children consume much more saturated fats and added sugar respectively than the food-based dietary guidelines and nutrient recommendations. Children in primary school often consume a snack brought from home before lunch. After school, most of the children attend an after-school care where an afternoon snack is served [1].

Concept Test

We want to produce a healthy and yet enjoyable snack option for children, that it is also sustainable and eco-friendly. In order to know if this could be an attractive premise for our potential target consumers, we created a short survey that covers the key-questions to assess the viability of our idea.

The results were promising, as they helped us to confirm that there is indeed a certain gap for improvement in the market of children snacks, and a genuine interest for a product with the characteristics of our product. Our previsions for a “fair” price were also correct. These results encourage us to follow with the development of our product.

Final consumer study

Danish children eat snacks like fruits, sandwiches, biscuits, dairy products, fast food and sweets. Their food preferences are influenced by the taste, smell, appearance and texture of the food. It has been found that the taste was the main reason for the snack choice. In general, children have higher preferences for sweet food compared to adults. A study showed that parents provide more often fruit as a snack, followed by cookies/biscuits and sweets, as children seem to prefer these groups of food products [2][3][4].

There is a strong association of snacks with food that is high in fat, salt, and especially in sugar, but not without reason. Although the market of sweet snacks is increasing the offer of healthier options, many of these incorporate artificial sweeteners or e-numbers to improve their organoleptic characteristics.

In a study, more than 72% of the parents disagreed with the statement that nonnutritive sweeteners (NNS) are safe. Among the Danish population, twice as many people thought that synthetic sweeteners were dangerous compared to those who disagreed or did not know. This raises the question of what parents think about food additives. Research shows that parents regard food additives as the most dangerous factor in the safety of their food. The Danish CONCEPTS survey found that two thirds of Danes consider it important that their food does not contain food additives. As our target group is part of the Danish population, they are very likely to have the same opinion[2][5][6].

A study on women with children highlighted the choice of snacking as being influenced by six categories. Mothers generally have more than one motivation when choosing a snack for the child. A few major reasons were healthiness, habits and influence by their children. The main reason was the healthiness of the snack. The assessment of the healthiness of a product is

frequently done by comparison with other products e.g. “I gave him a cookie which is better than a lollipop”[7]

Danish people are in general quite open to new products and brand loyalty can be achieved through good customer service and branding. 61% of the consumers are influenced by social media recommendations. The behavior in Denmark is increasingly adapting to environmentally friendly consumption but also to be health conscious [6]

Mothers shop more frequently in national and regional supermarkets than in specialized food stores. Mothers are still responsible for 85 % of the purchase decision, but in young families, parents often let their children make the decision about small spending.

In young families, in which the parent’s age ranges from 26 to 40, both progenitors work and take care of the house, leaving occasionally not enough time to prepare daily meals and shopping every day. These millennial parents spend a lot of time on social media, conceived not only as entertainment, but also as a source of information on different life topics and social networking. In the USA, a study showed that millennials show a low brand loyalty, it is likely that something is bought because it is a better deal. They are quite conscious about the price but also about the ingredient and nutrition of the food. Usually they check the product label or nutrition label before buying it.[8][9][10]

Competition Analysis

Nowadays, there is a big variety of high protein cookies in the market, with protein content from animal or vegetable sources. The usage of these proteins is quite balanced. Sugar or sweeteners (e.g. stevia, mannitol), stabilizers and preservatives are commonly used in these products. Muffins with a high protein content are rare and are mainly bought online. In order to claim high protein content, this must be a minimum of 20% of the total nutritional composition. As an example, "StudBites" and "Flapjacked" fulfill this requirement.

Concerning sugar alternatives, the Danish company "EASIS" sells sweet products without added sugar, including cookies. These products can be bought in Danish supermarkets. However, these products contain sweeteners. The "Kookie cat" replaces sugar with nectar, so it is questionable whether it can be considered as a product without added sugar. Another brand is "Rookies", which use dates and date syrup to sweeten. All these cookies have a low protein content, ranging between 5 - 8 %. In the case of muffins with no added sugar, sweeteners are typically used instead.

There are cookies and muffins with a high protein content on the market, targeting athletes and fitness enthusiasts, while we are targeting mothers and children. Sweeteners and other food

additives are often used in these products, which goes against the trend of clean labels. These products are mainly sold online on fitness websites. In Danish supermarkets mainly protein powders and bars with a high protein content can be purchased. This analysis shows a market gap for a snack for children with high protein content and no added sugar or sweetener.

Evaluation of the potential Market

When assessing our potential market, we used data published by Danmarks Nationalbank. The number of children in Denmark aged 3 - 10 years is 495,213 (2020, Q1) and 48,937 in Copenhagen (2020, Q1). This represents 8,5 % and 6,8 % respectively of the total population of each. They represent 36% of the children living at home. The minimum age of 3 years was chosen because children from this age onwards can attend kindergarten. The average Dane has an annual income of DKK 326,048 before tax. Middle level employees have a wage of 455,499 before tax, higher level employees have a wage of DKK 570,888.

In kindergarten and primary school, children bring snacks from home. Each year, children spend around 200 days of these in the kindergarten or school. This means that parents need to buy or prepare around 200 snacks per year. A study from the USA shows that one third of the snacks and sweets for children are sweet baked goods [11]. This would lead to a consumption of sweet baked goods once or twice a week. So, at least once a week, children could potentially bring Brøðkies as a snack. During our first year, our market will be limited to Copenhagen. We would have to produce 1,957,480 bags of Brøðkies (10 units per package) per year (163,123 per month) to satisfy this theoretical demand. For the second year, the production must be 19,808,520 Brøðkie bags per year (1,650,710 per month). Assuming that one package of brøðkies will be bought per week. The total market size of school snacks sold for children aged 3-10 years is 99,042,600 per year (8,253,550 per month). Brøðkies would therefore have a market share of 5 %.

Table 2: Potential of the market.

Children 3 – 10 years	495,213	
	Brøðkies	School Snacks
Production first year	1,441,284	
Production second year	1,980,852	99,042,600

The turnover of the snack market in Denmark is 822 million US dollars, and an annual growth rate of 5.4 % is expected for the period 2020 - 2025.

Marketing Strategy - Segmentation, targeting and positioning

Segmentation:

The potential customers of our product are parents with young children. Since more children live with single mothers than fathers, our potential customers are mothers [1]. Women with children can be divided by different criteria. We focus mainly on demographic characteristics and psychographic characteristics. The main criteria are income (medium – upper class vs. working class), age of children, family size and consciousness about nutrition and ecology.

Besides parents, children are also potential customers. Some studies show that they can influence what parents buy, and some children are given a weekly allowance for their own expenses. For the segmentation of these customers, the focus was only on the age.

Targeting:

13 % of Denmark's population are mothers with children living with them. 80% of the Danish population belongs to the middle class and 7% to the upper class. Most of the families with children have not more than two. 36% of children living at home are between 3 to 10 years old. There is potential growth due to increased consciousness about ecology and children obesity. This leads to more awareness of healthy and balanced nutrition for children.

Our investigation helped us to define our two target groups, that we decided to label as: the 'woke' mom and the 'hungry-after-class' kid.

1. The 'woke' mom

The 'woke' mom is a woman with one or two children, either single or married. One to two children, because in Denmark, the fertility rate is 1.7 children. Women over men because there are more single mothers than fathers. This woman belongs to the middle or upper class. She belongs to a household with a high income which can afford quality over quantity. She is interested in nutrition and ecology and obtains information about these topics from blogs or parent groups.

2. The 'hungry-after-class' kid

This group comprises children 10 years old or younger. Their teeth are still in transitioning, which favors their interest for soft textures and the concern of their parents about early tooth decay. During these young ages, they pay more attention to their parents and they are less influenced by trends. They choose food with 'the eyes', thus they are attracted by packaging with 'cartoon-like' things and colors.

Positioning:

Children's diet and obesity is a current problem. 89% and 56% of Danish children consume too much saturated fats and added sugar, respectively. Due to which one in five Danish children are overweight.

We offer a unique selling proposition with our Brøøkie as it is a combination of cookie and muffin with a high protein content, no saturated fats, and no sugar or sweeteners are added, the sweetness comes from the used ingredients. Besides the nutritional and organoleptic characteristics, it is an environmentally friendly product, inside and outside. The apple pomace ingredient, a by-product of cider and apple juice companies, which makes up 25% of the fruit, and the packaging, which is made from sustainable paper derived from forestry by-products.

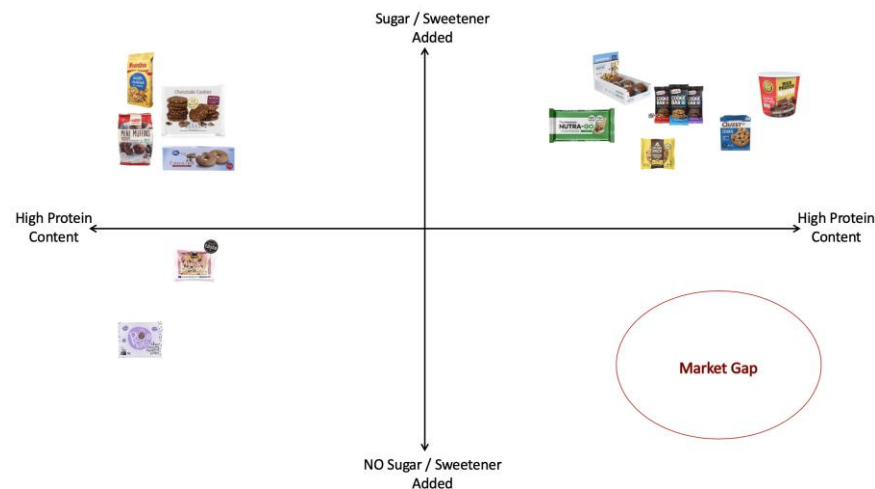


Figure 2: Positioning Map.

Our product has several advantages compared to our competitors. First, our product is sweet, as most of them, but the sweetness is achieved naturally by the ingredients used without the help of sugar or sweeteners. Proteins are vital for the growth and development of children. A study shows that one in seven children of school age does not reach the daily protein intake. Children

get 30% of their daily calories from snacks (Why is Protein Important for Kids' Growth?, 2018). Being labeled as high in protein, Brøøkies will help to ensure that these needs are met. Lastly, part of the value of our product lies in its sustainability, based on the use of local products (apples) and the reuse of byproducts from industry.

Marketing mix: precision and consistency

Product / Customer Value:

Brøøkies have a unique selling proposition: a combination of cookie and muffin with a high protein content, and no added sugar or sweeteners. Sustainability is an important value of our product and our company, which is also reflected in the packaging we use.

Price / Cost:

The price of Brøøkies is 116.67 DKK per kg. Muffins sold in Coop have a price of 177.78 DKK per kg. Also, it has a variety of 24 different cookies. From these 24 cookies, 13 have per kg a lower price than the Brøøkies, and 11 have a higher one.

Choosing the appropriate price for a product is never a trivial matter. First, we must consider that being a newly founded company, we must be competitive but also capable of covering our costs and generating profit. The price also has an influence on the perception of our product. By penetrating the market with a low price, consumers may think our product is of low quality. By using price skimming, the risk is of limiting the sales. Therefore, our product will have a neutral price. By selling Brøøkies at a price that corresponds to the average price of cookies, we will ensure that people still perceive them as a high qualitative product, but at an affordable price.

Place /Convenience:

Health food stores and big food retailers are our target. In the first phase after the establishment of the company, we will sell our product at 4 of the health food stores "Helsemin". From the major food retailers, we want to start a cooperation with Coop Danmark. In the initial phase we will sell Brøøkies at 4 Irma shops in Copenhagen. Coop Danmark is the biggest retailer of consumer goods in Denmark, with a market share of 40% and 1.4 million members. Coop Danmark operates the following stores: Kvikly, Brugsen, SuperBrugsen, Dagli' Brugsen, LokalBrugsen, Fakta, Irma. Coop Danmark and its subsidiaries have more than 36,000 employees and post a yearly turnover of 50 billion DKK.

We are planning for the second phase to expand to all Irma shops in Denmark. Next, other Coop Danmark shops like Kvikly would sell Brøøkies. Since our target customers are families, we will

first choose stores in areas where there is a high proportion of families. The municipality of Copenhagen has the highest family density in Denmark, and Østerbro and Amagar are specifically mentioned as neighborhoods with a high percentage of families. Therefore, Irma and Helsemin stores in these areas will be the first ones selling Brøøkies.

Promotion/Communication:

As our target group uses social media as a source of information, we want to gain brand awareness through cooperation with Influencers and Bloggers. Especially, because most of these influencers are also mothers who belong to our target group, and broadcast to more women of this category. We are already in contact with potential candidates who have the ideal audience and image to represent our brand to the fullest (e.g. triplets_of_copenhagen, nannapretzmann)

In order to boost in-store sales during the first year, our merchandising strategy is to set up tasting stands at Irma stores. This will draw the customers' attention to Brøøkies. The great taste of Brøøkies and their key quality will convince them to purchase them. "One bit is all it takes".

3. Technical study: formulation process and manufacturing diagram

The Brøøkie consists mainly of a mixture of Flour, Banana, Date paste, sunflower oil, apple sauce, apple pomace, pea concentrate and eggs. They take the form of a small muffin-like bun with little chunks of carob-based chocolate for added flavor and texture. About 30 grams per Brøøkie it is the perfect size to fit a child's small hand or an equally perfect bitesize for an adult on the go. Brøøkies have no added sugar and are low in saturated fats, they are nevertheless both sweet and creamy in their flavor with a strong aroma of apple, banana and vanilla. 10 Brøøkies are packaged in one biodegradable paper bag made from Kraft paper.

Description of the innovation technical stakes

We use resources and procedures already established for the use in foods, however, our innovation involves using ingredients commonly not mixed together. In addition, Brøøkies is also free from preservatives, additives and artificial sweeteners. The shortening effect necessary to limit gluten network formation is partly provided by applesauce, banana and apple pomace. Processed sugar is also necessary in sweet baked foods as it functions as a humectant during the baking process. We use dates instead of sugar for this moisturizing effect. It also allows us to make the claim of no added sugar in our product. Moreover, the use of dates is established in snack bars and Arabic sweets but its use in Western styled cookies or cakes is uncommon.

The results of the formulation process and/or the process development.

The Brøøkies recipe was formulated by looking through several well tested recipes for chocolate chip cookies and then modified to accompany the changes we wished to embody. In order to minimize the contents in saturated fats, butter was replaced with banana and sunflower oil, while we avoided the use of sugar added investing in natural sweetness from apples, dates, bananas and carob. Chocolate chips were likewise replaced with a carob substitute. After several attempts at balancing the recipe, we obtained a product which was radically different from the crunchy chocolate chip cookie; we created the soft and sweet Brøøkie.

Composition details, manufacturing diagram and technical characteristics.

The production (shown as a flow diagram in Appendix 2, figure 1) will take place largely hands on, with the solids: flour, salt, baking soda, and vegetable protein separate from the liquids: Dates, eggs, banana, apple sauce, oil and apple pomace in another. The dates will have to be pitted and macerated before this along with 15 % of the oil in order to get a smooth paste. Solids and liquids are then mixed together slowly to not overmix. In this step the carob chunks are also added. If it is possible to purchase the carob as chunks, then this is desirable to reduce manufacturing steps.

The Brøøkies will then be shaped via an extruder into a mini muffin tray, this will be done by hand in the first iteration of the production facilities. Then, they will then be placed in a batch oven and baked for 16 minutes at 175 g while the next batch of Brøøkies are filled into trays. The Brøøkies will be given an hour to cool before they are packed in paper bags, also done by hand, and placed in room temperature storage outside of direct sunlight.

Sensory analysis and validation of the product's microbiological quality (shelf life/use by date)

To determine Brøøkies shelf life we review similar products and estimated that the product is likely to have a shelf life of at least one week [12], given that it contains no preservatives and provided that it is kept in a closed airtight container. A minor test to preview the loss of quality of the bookies was performed. Three Brøøkies were placed in a sealed plastic bag and kept at room temperature for several days, being sampled to estimate the loss of quality. This test is not definitive as it has a much too small sample size and the sensory quality is only reviewed by a single person. The test only provides a small insight into the loss of quality.

After three days in a sealed container little to no loss of quality was detectable in the product neither was there any visual signs of mold or other decay. The product was sampled again after 7 days, with only minimal loss of quality, the product was drier and slightly harder but had no loss of flavor and showed no visible signs of decay. The product was sampled yet again after 12

days, this time showing more signs of dryness and staleness but had not lost any flavor and was still pleasant to eat. Likewise, the product showed no signs of mold or decay and had not visually changed. This indicated that the product could have a potentially longer shelf life than other baked goods but will need more testing to confirm it.

Packaging technical characteristics for product preservation.

Packaging of our product is done with Kraft paper which is convenient and sustainable. The sustainability of our packaging is detailed in section 6.

Convenient:

Convenience packages are designed to keep viewing convenience in distribution, display, sale, opening, re-closing, use, dispensing, and reuse. For-example a bag of cookies or bread is not opened only once, but is opened and closed many times, hence there must be a convenient way to reseal it once open. Unlike a can for a beverage which is designed to have all products consumed once the seal is opened, within a short timeframe. Many housewives or mums are observed to not use specific products because of inconveniences like this, despite knowing their low price or other benefits.

Nutritional value and health: justification

The use of butter or margarine and processed sugar in cookie production increases the empty calorie content of the product [13]. We have avoided the use of saturated lipids and processed sugar and instead have ingredients that are healthier and more natural. We also use pea protein concentrate which makes our brøðkies higher in nutritional value. For a claim to a high protein content we must make sure that at least 20 % of the energy content comes from protein. In table 4 the protein content of the product is listed as 16.7 g per 100 g. Likewise energy content is listed as 321 kcal. 20 percent of 321 is 64.2 kcal meaning that at least this amount of energy must come from protein. To calculate the amount of kcal derived from protein, multiply the content in grams by 4. This makes a total of 65.6 kcal derived from protein, thus the claim is valid [14], [15].

4. Technological study: manufacturing simulation at industrial scale

In this section we will cover the plans for upscaling the production of Brøøkies to a larger scale.

Identification of potential suppliers for industrial manufacturing:

The potential suppliers have been combined in section 5. All the potential suppliers are presented in table 3.

Implementation of the process at industrial scale: proposal of a manufacturing line

Within three years of selling the product, we plan to make the product available in stores all over Denmark, working with the supermarkets and health store chains which we already work with in the Copenhagen area. This means 230 Superbrugsen stores [16] , 76 Kvickly stores [17] and 80 Irma stores[18], 420 fakta stores[19] and the health stores of Helsemin[20], Helsam[21] and Ø-helse [22] which collectively have 57 stores. This adds up to 863 stores in total.

If we assume that each convenience store will be able to sell 20 bags of Brøøkies per week and that each health store will be able to sell 10 bags every week. We will need to produce at least 16,690 bags of Brøøkies every week, 166,900 individual Brøøkies since every bag contains 10 Brøøkies. If we account for a 5% loss due to general problems in the production or other unforeseen reason that number increases to 17,525 bags per week.

This means our daily production will need to meet a capacity of 2503.5 Brøøkies per day assuming a 7-day work week. Since about 30 grams of dough goes into making one brøøkie we will need to produce 75.1 kg of dough per day.

For this purpose, we will be devising a complete manufacturing plan and opening a factory. Production of baked goods on this scale will require a tunnel oven, several industrial mixers, shaping equipment and packaging and possibly a tunnel cooler as well as staff trained in operating this equipment, our revised manufacturing practices and hygiene standard. Upscaling will also require that new deals being negotiated over the import of raw materials.

Risk assessment: HACCP for the production process

One of our main concerns with using apple pomace is the production of hydrogen cyanide when apple seeds are crushed. This chemical is highly toxic even in small doses. However even in incredibly small doses this chemical is present in our product which makes the risk acceptable. Furthermore, due to other concerns of quality, as many apple seeds as possible will be removed from the pomace before usage which further reduces the risk. Finally, hydrogen cyanide becomes volatile at a temperature above 27 °C [23] which is well under the baking temperature of the product, which will further remove traces of the chemical. There is also a significant risk of mycotoxins forming in the product as a result of fungal growth, especially the apple pomace is at risk of this, but also wheat and bananas are a risk. This is combated by inspecting the raw materials for visible signs of fungal growth before use. Proper ventilation in storage areas will prevent buildup of moisture and combat fungal growth

Native microbiological hazards are not the biggest concern in this production but without good manufacturing practices and proper hygiene, cross contamination from the production staff is very likely. Especially after baking is it important to observe high standards of hygiene. Especially *Staphylococcus aureus* and *Listeria monocytogenes* are a risk since these are ubiquitous on many surfaces and on human skin. *Salmonella* is also a risk in this production since it contains eggs, however since Danish eggs are used, which has a low concentration of *Salmonella*, and since the product is heat treated, this risk is reduced significantly.

The biggest risk is the risk of stones and grit, which is very likely to find its way into raw materials such as wheat flour but can also be introduced from humans. This risk is combated by upholding good manufacturing practices when handling raw materials, and either sieving the product ourselves or requiring that the supplier can guarantee that the flour has been sieved. A matrix of the risk analysis is presented in appendix 2, table 1.

5. Regulatory study:

Regulations of the product

- **The name of the food:**

The name of our product is “Æble Brøðkies”. Since from Eu regulation on food names “A customary name will often say relatively little about the nature of the product but will be widely understood by consumers without them needing any further explanation”[24]. Whereas our product name “Æble Brøðkies” will say relatively little about the nature of our product. Therefore our product name will mostly fit as a customary name.

- **Quantity of ingredients:**

Table 3: Ingredients per 100 grams

Ingredients	Amount per 100 grams	Suppliers
Wheat flour	28.4	Valsemollen/Urtekram/REMA 1000
Baking Soda	0.9	Mamone
Pea Protein Concentrate	11.3	Helsmin/Emsland Group
Salt	0.4	REMA 1000
Sunflower Oil	9.5	REMA 1000
Banana	8.5	FairTrade
Applesauce	3.8	Urtekram
Dates	20.8	Ario Date Co
Carob chunks	2.8	Raw Foods Shop
Vanilla	0.1	FairTrade
Eggs	6.6	Danaegg
Apple Pomace	6.6	Rynkeby/Carlsberg

Product details

The net quantity of the Brøðkies will be 30 g per stk and 300 g per pack. Based on preliminary tests we estimate our products minimum best before date, to be 1 week after production provided they are kept in a sealed container and out of direct sunlight.

- Declaration as presented on the product.

Table 4: Danish declaration as presented on the product

Næringsindhold	pr. 100 g
Energi, kJ	1.345
Energi, kcal	321
Fedt, g	12,5
- heraf mættede fedtsyrer, g	1,9
Kulhydrat, g	41,1
- heraf sukkerarter, g	18,2
Kostfibre, g	2,8
Protein, g	16,7
Alkohol, g	0,0
Salt, g	0,6

- Ingredienser

Hvedemel; Dadler; Ærteprotein; Solsikkeolie; Banan; Æble; Æg; Æblesovs; **Chokolade*** (sukker, kakaosmør, kakaomasse, **sødmælkspulver**, **flødepulver**, vallepulver (a **mælk**), **mælkefedt**, emulgator (E322 af **soja**), antiklumpningsmiddel (E 170), vaniljearoma.); Bagepulver; Salt; Vanilje. Kan indeholde spor af byg, mandler hasselnødder og pekannødder. INDEHOLDER NATURLIGT FOREKOMMENDE SUKKER.

*The list of ingredients is currently based on the contents of the prototype, which contains chocolate rather than carob chunks. The prototype therefore does contain added sugar even though the real product will not.[25]

- **Actual regulation towards claims.**

We certify our claims according to the Nutrition Claims webpage on the European Commission website.

- We can claim our product has no added sugars because we add no additional mono- or disaccharides, or any other sweetening agents. However, sugars are naturally present in the food so the label will say that it contains naturally occurring sugars[14].
- We can claim our product is high in protein content because 20% of the energy is derived from proteins [14]
- We might be able to claim low saturated fat in the finished product, because carob contains less saturated fat than chocolate, but we cannot do so based on the prototype because the content is higher than 1.5 g per 100 grams [26]

6. Sustainable development aspects:

Sustainability of the ingredients

We use raw materials that have been minimally processed and have a low carbon and water footprint, therefore making it sustainable. We provide proof of our sustainability by comparing it with a similar product made with butter or margarine.

Our product emits an estimated 1.53 kg CO₂eq/kg product. A similar product made with butter and margarine emits 3.7 (142% more) and 1.7 (11% more) kg CO₂eq/kg product, respectively[27].

The raw materials we utilize have an estimated water footprint of 31.4 L water/kg product. Same product with butter and margarine uses 747 (2279% more) and 314 (900% more) L water/kg of product, respectively[27].

Some of our raw materials are imported from other countries. Bananas are imported from Spain, dates from Iran, vanilla from Madagascar, and carob from Spain. We have thus made a calculation of CO₂ emissions from international shipping of these ingredients from the respective countries to Denmark.

According to the OECD observer, the CO₂ emission of freight transport is 10-15g/tonne-km [28]. Calculating the distance from each country, we estimate that the emissions of our product due to shipping is 4.25 g CO₂eq/100g of Brøøkies.

By-product utilization:

In place of chocolate chunks we are using apple pomace and carob to provide texture and taste to Brøøkies. Apple pomace is a byproduct of the juice industry and industries have trouble disposing of apple pomace. So it is cheap and sustainable. Carob more is sustainable than chocolate as it has a smaller water footprint because it can be grown in arid climates [29]. And carob fruit has a lot of products, one of them being carob powder.

Sustainability of the production process

Our product requires minimal processing. The primary process step is mixing the ingredients which is done by dough mixers. There is also a heating process in an oven. The wet ingredients are stored in a refrigerator. The dry ingredients are stored in a cool, dry place. Except baking, all of these process steps require low energy and water.

Sustainability of the product packaging

We have decided to use kraft paper for our packaging. Kraft Paper is the one of the most extensively used packaging materials produced by sulfate treatment, because of light in weight, cheap in price and easily available. The use of kraft paper, instead of using wooden boxes, has reduced the weight of packaging materials on one hand and made safe and easy transportation on the other hand. Kraft paper is naturally biodegradable, like tree leaves, the paper breaks down into cellulose fibres naturally in just a few weeks and can be recycled naturally without any impacts on the environment or human health. Whenever it is possible to reuse the packaging. Paper bags meet most of the needs of consumers. 100% local and sustainable resources are used to produce natural kraft paper. By-products and waste are used to create paper pulp [30].

7. Financial study:

We have conducted a 100 day plan and a 5 year simulation. Our fiscal year starts June 2020.

100 day plan

The 100 day plan is of the beginning 3 months after founding the company. We register the company as a private limited company, rent a shared space in Kitchen Collective in Copenhagen and sign agreements with stores to sell our product. We secure supplies from companies and start production after one month of founding the company. We restock supplies and update our business plan according to sales after every 2 weeks. (pic in appendix)

The base price of one pack of 10 brøokies is DKK 12.36. We sell at a 160% profit ratio at 32.13. The MSRP is set at DKK 35. The price per kg of our packaged product is DKK 41.2. (Appx. 2, table 2)

5 years simulation

We increase production 30% YOY for FY1 and 2, 40% for FY3 and 25% for FY4 and 5. In FY1 and 2 we rent a space in Kitchen Collective for an annual cost of DKK 112,500. In FY3 we rent a bigger kitchen to increase production and to introduce new varieties of our product. Rent and deposit for FY3 is estimated to be DKK 350,000, 40% of which is the deposit. After FY3, our rent is estimated to be DKK 200,000. (Appx. 2, table 3)

Labor and employees

For FY1 we do not hire any employees and manage the responsibility of purchase of raw materials, production, quality management, marketing and sales between the founding members. In FY2 we add a marketing and sales manager, for FY3 we hire a financial manager and industrial technician, in FY4 we give ourselves a salary. In all years we manage quality and production consistency ourselves. (Appx. 2, tables 4)

Operating account

We begin with DKK 70,000 in our operating account. At the end of FY2 we have an operating account of DKK 400,000 which helps us transition from a shared space to a separately rented space.

50% of annual profit YOY is distributed among the stakeholders.

Project profitability towards investment

We invest 6% of annual revenue on marketing and 7.5% on research and development except for FY3 where we invest 80,000 DKK on purchase of equipment and machinery.

Business plan consistency

Our early phase business plan of the first 100 days differs from the forecasted 5 years. In the first 100 days we make 1700 Brøokies per day. We increase this amount every month depending on supply.

When it comes to YOY business consistency, we increase production a minimum of 25%. We also increased the salaries of the employees an estimated 10% for FY3 and 4 as we transition from a

start-up to a mid-sized company. After FY3 we invest about DKK 15,000 annually on equipment to help us maintain product consistency and quality.

After FY3 we also attempt to secure cheaper sources of raw materials.

8. General project consistency:

Technical feasibility at an industrial scale

At the startup of Brøøkies production all the manufacturing will take place in a rented commercial kitchen. This will make it possible to supply a small number of stores with Brøøkies to sell.

Brøøkies will be produced at a rate of 400 Brøøkies per batch, the oven capacity being the bottleneck of the production, and we will be producing 4 to 6 batches per day (depending on demand and oven capacity) and totaling of 1700 Brøøkies per day, enough to assemble 160 bags of bookies per day. If we account for a 5 percent loss doing production this will be 152 bags per day. Doing the early startup Brøøkies production will take place 3 days per week enough to supply 11 stores with on average 40 bags of Brøøkies to sell every three days.

Product characteristics suitability towards marketing stakes

Our product is a combination of cookie and a muffin, both popular snacks among children. The key-value of our product lies in its high protein content and the fact that no sugar or sweeteners are added. The sweetness is achieved with natural ingredients: dates, banana, applesauce and apple pomace. This premise differentiates us from most commercially available cookies and muffins, normally high in sugar (or use of sweeteners) and low in protein.

Innovation protection strategy

Our strategy to retain innovative advantage over competitors is done by not disclosing the amount of ingredients we use in our recipe. Our recipe remains a trade secret and we do not file any IPs as competitors may get ideas from our recipe.

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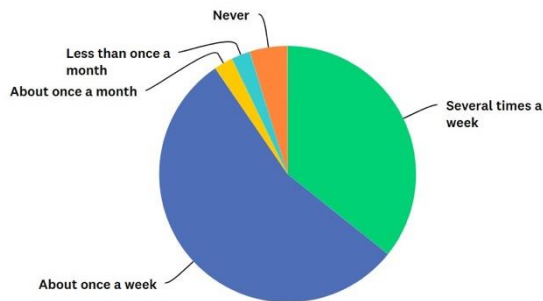
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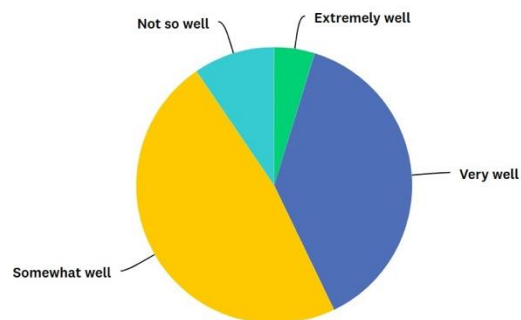
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Appendix 1

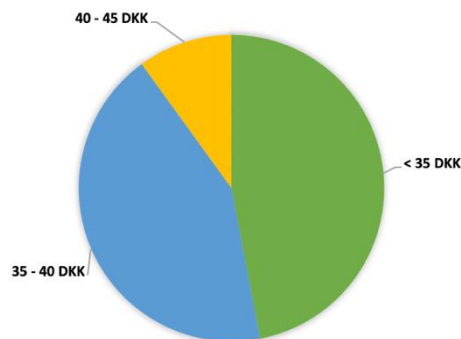
How often do you purchase snacks for your children?



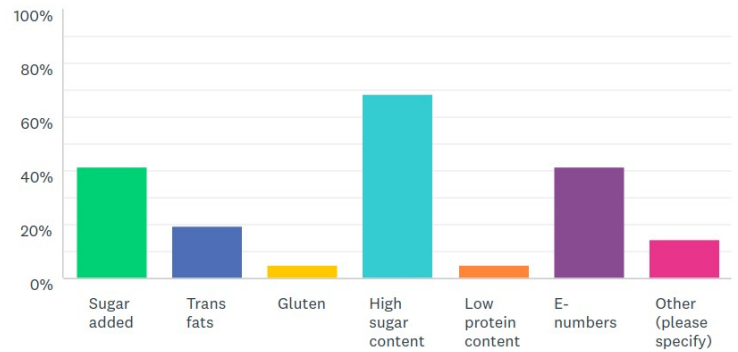
How well do current products on the market meet your needs?



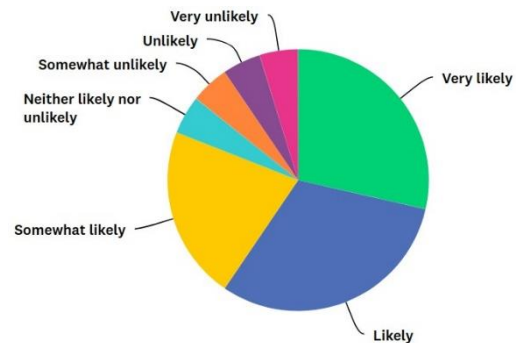
Based on the previous description, how much would you find reasonable to pay for a product of these characteristics? (Prize for a bag of 10 units).



What do you tend to avoid when buying snacks for children?



Based on the previous description, and not taking into account the prize, how likely would you buy this snack for your children?



Appendix 2

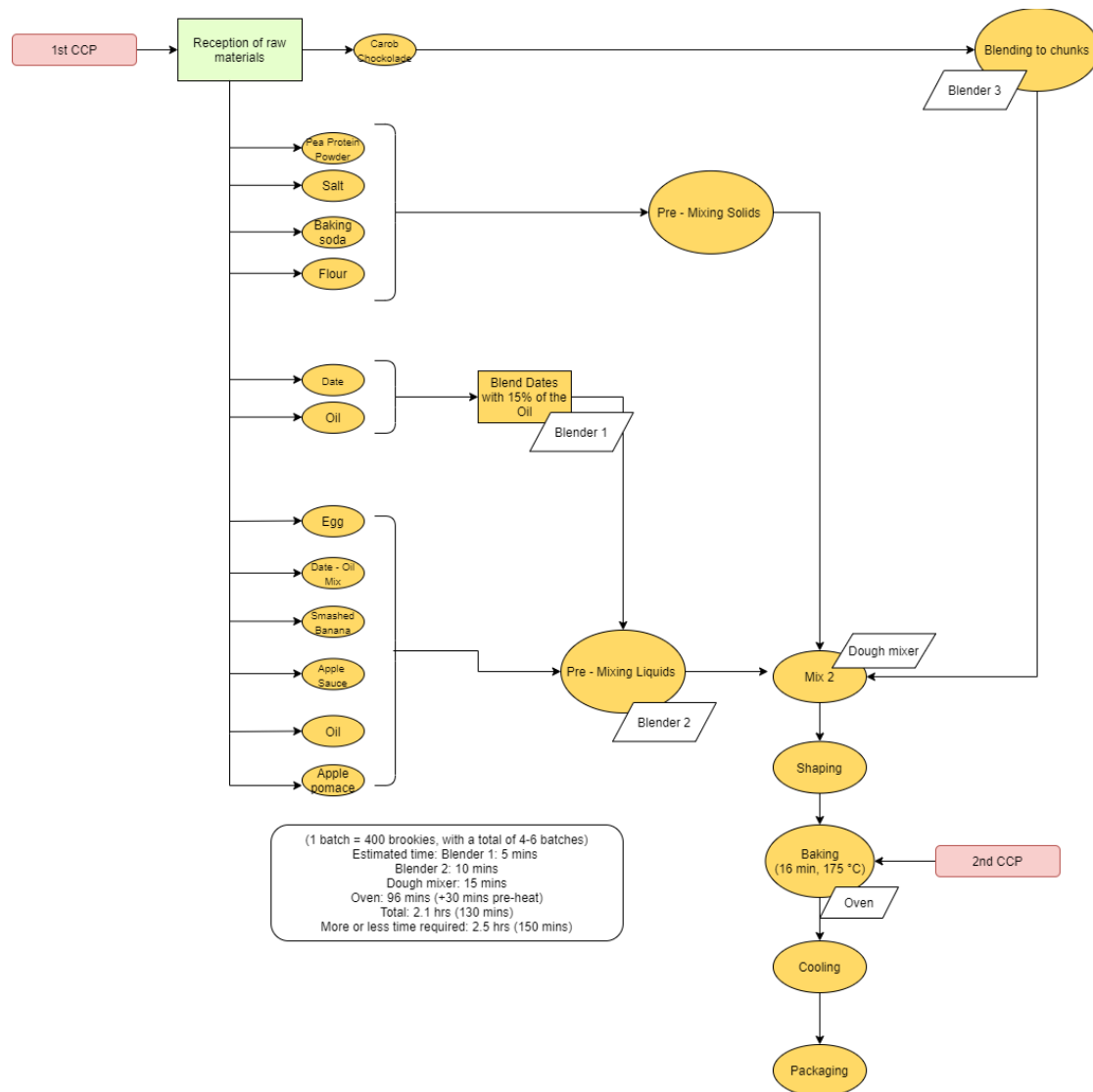


Figure 1: Manufacturing diagram for early stage production.

Table 1. Hazard analysis of Brøøkies production.

Hazard	Damage	Reason	Impact	Probability	Risk	Action
Chemical						
Hydrogen Cyanide	Cyanide Poisoning, death	Seeds from apple pomace	3	1	3	Baking will vaporize the chemical
Pesticide Residue	Long term damage to kidney and liver	Wheat, apples and bananas	3	1	3	Following national and EU legislation, washing of apples
Mycotoxins	Carcinogens and possible kidney damage	Wheat, apples and bananas	3	2	6	Inspection of raw materials and proper ventilation
Heavy Metals	Long term damage to liver, kidney and brain	Cadmium and lead from polluted soil	3	1	3	Following national and EU legislation
Microbiological						

<i>Staphylococcus aureus</i>	Vomiting and diarrhea	Contamination from equipment and humans	2	2	4	Good manufacturing practices and proper hygiene
<i>Listeria monocytogenes</i>	Listeriosis	Contamination from equipment and humans	2	2	4	Good manufacturing practices and proper hygiene
<i>Bacillus cereus</i>	Vomiting and diarrhea	Contamination from soil or humans	2	1	2	Good manufacturing practices and proper hygiene
V-TEC	Diarrhea, hemorrhage and possible kidney failure	Eggs and Contamination from humans	2	1	2	Proper baking temperatures, Good manufacturing practices and proper hygiene
<i>Salmonella</i>	Salmonellosis	Eggs and Contamination from humans	2	2	4	Proper baking temperatures, Good manufacturing practices and proper hygiene

<i>Campylobacter</i>	Vomiting, fever, cramps and diarrhea	Contamination from soil or humans	2	1	2	Good manufacturing practices and proper hygiene
<i>Clostridium Perfringens</i>	Fever, vomiting and diarrhea	Contamination from soil or humans	2	1	2	Good manufacturing practices and proper hygiene
Norovirus	Fever, vomiting and diarrhea	Contamination from humans	2	1	2	Good manufacturing practices and proper hygiene
Physical						
Stones and grit	Physical damage	Soil and ground contamination	2	3	6	Proper inspection of raw materials and good manufacturing practices.
Broken plastic, metal and glass	Physical damage	Broken machinery	3	2	6	Good manufacturing practices, inspection of machinery and metal detectors.

Appendix 3

Table 2. Income statement (For FY1)

Final cost of brookie/100g	DKK	3.66	
Cost of 120g	DKK	4.40	
Cost of 1 brookie (1 is 30 g)	DKK	1.10	
Amount of brookies/day		1700	
Cost of raw materials	DKK	467,022	<i>Cost of 1 brookie x amount/day x working days/y</i>
Working days / year		250	
Cost of one unit	DKK	12.36	<i>1 pack contains 10 brookies</i>
Cost of one package + labelling	DKK	1.37	100 mini bags 117.35 Kr, 20 feet of roll 73 Kr.
Units/day		170	
Units/year		42500	
Sales price of one unit	DKK	32.13	<i>The profit ratio is set at 160% of base price</i>
MSRP	DKK	35.00	<i>Manufacturer's Suggested Retail Price</i>
Sales	DKK	1,365,643.12	
Amount of goods sold		12750	kg
Mass of one unit		0.3	kg
Price / kg	DKK	41.20	

Table 3 (a). 5 year simulation of the income statement

Income Statement												
Fiscal Year	2020		2021		2022		2023		2024		2025	
Revenue	DKK	1,365,643	DKK	1,775,336	DKK	2,485,470	DKK	3,355,385	DKK	4,194,231	DKK	5,242,789
<i>Cost of Goods Sold:</i>												
Raw materials	DKK	467,022	DKK	607,129	DKK	819,624	DKK	1,065,512	DKK	1,310,579	DKK	1,572,695
Direct labor expense	DKK	-	DKK	270,000	DKK	630,000	DKK	693,000	DKK	813,000	DKK	813,000
<i>Cost of Goods Sold</i>	DKK	467,022	DKK	877,129	DKK	1,449,624	DKK	1,758,512	DKK	2,286,065	DKK	2,971,884
Gross Profit	DKK	898,621	DKK	898,207	DKK	1,035,846	DKK	1,596,874	DKK	2,075,936	DKK	2,698,716
Gross margin %	DKK	2	DKK	2	DKK	2	DKK	2	DKK	3	DKK	4
<i>Operating costs:</i>												
Salaries (other than direct labor)	DKK	-	DKK	280,000	DKK	308,000	DKK	671,800	DKK	1,299,650	DKK	1,299,650
Rent expenses	DKK	112,500	DKK	112,500	DKK	343,758	DKK	193,758	DKK	193,758	DKK	193,758
Administrative Costs and Auditing	DKK	48,706	DKK	8,306	DKK	8,306	DKK	8,306	DKK	8,306	DKK	8,306
Marketing	DKK	53,917	DKK	53,892	DKK	62,151	DKK	95,812	DKK	124,556	DKK	161,923
Logistics and Distribution	DKK	32,032	DKK	32,032	DKK	41,642	DKK	54,134	DKK	70,374	DKK	91,487
Research & Development	DKK	44,931	DKK	44,910	DKK	-	DKK	95,812	DKK	124,556	DKK	161,923
Electricity and heating	DKK	-	DKK	-	DKK	-	DKK	97,466	DKK	107,213	DKK	112,086
Equipment***	DKK	-	DKK	-	DKK	80,000	DKK	20,000	DKK	15,000	DKK	15,000
Other Operating costs	DKK	3,000	DKK	3,150	DKK	3,308	DKK	3,638	DKK	4,075	DKK	5,297
<i>Total Operating costs</i>	DKK	295,087	DKK	534,791	DKK	847,164	DKK	1,240,728	DKK	1,947,489	DKK	2,049,430
VAT (25%)	DKK	150,884	DKK	90,854	DKK	47,170	DKK	89,036	DKK	(9,831)	DKK	55,369
<i>Net income (loss)</i>	DKK	603,534	DKK	363,416	DKK	188,682	DKK	356,146	DKK	(39,322)	DKK	221,474
<i>Income after tax</i>	DKK	452,651	DKK	272,562	DKK	141,511	DKK	267,109	DKK	(29,492)	DKK	166,106
<i>Income distributed among shareholders (55%)</i>	DKK	248,958	DKK	149,909	DKK	77,831	DKK	146,910	DKK	(16,220)	DKK	91,358
Operating account	DKK	273,693	DKK	396,346	DKK	460,026	DKK	580,225	DKK	566,954	DKK	641,701
Inventory					DKK	80,000	DKK	100,000	DKK	115,000	DKK	130,000

Table 3 (c). Break Even Point

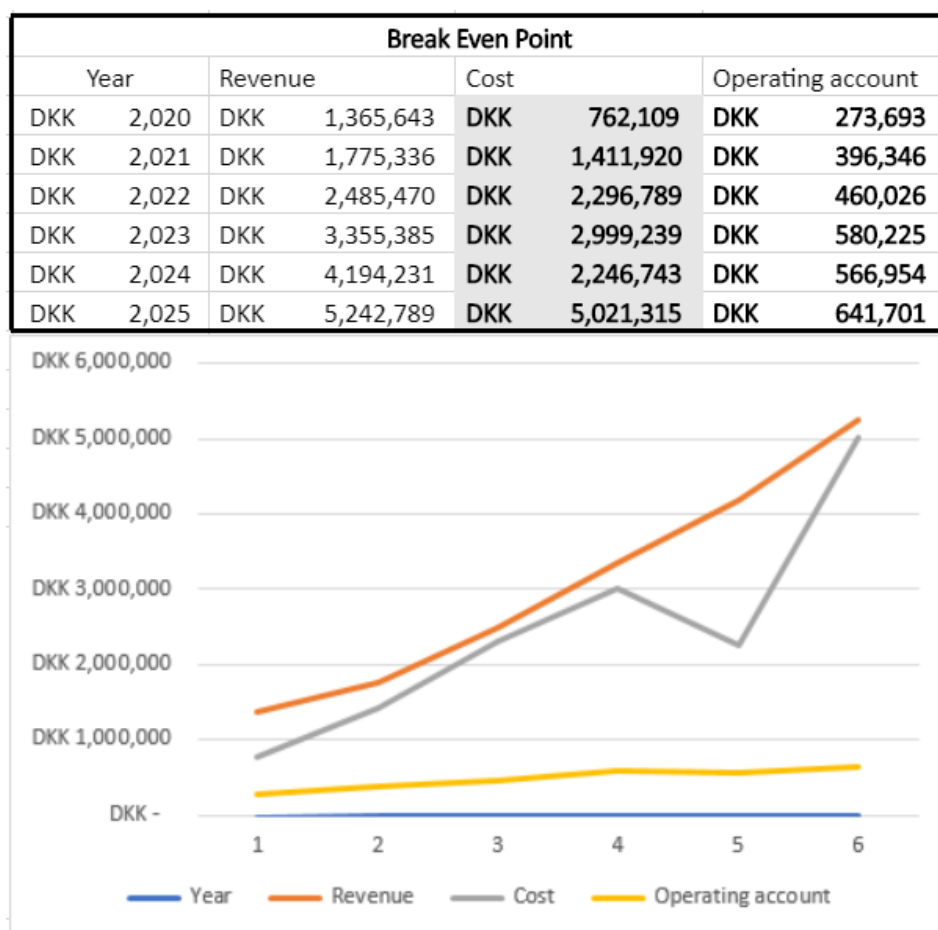


Table 3 (b). Administrative costs

Administrative Costs			
Registration as limited liability company	DKK	40,000	One time
Company register	DKK	400	one time
Tax services	DKK	220	monthly
	DKK	2,640	annually
Microsoft Office and Email Server	DKK	79	per user
	DKK	5,666	per month/year/6 users

Table 4 (a). Expenses

Personal Planning							
	Annual Costs						
Job Description	2020	2021	2022	2023	2024	2025	
Number of Employees	0	3	3	4	10	10	
Founder 1					DKK 120,000.00	DKK 120,000.00	
Founder 2					DKK 120,000.00	DKK 120,000.00	
Founder 3					DKK 120,000.00	DKK 120,000.00	
Founder 4					DKK 120,000.00	DKK 120,000.00	
Founder 5					DKK 120,000.00	DKK 120,000.00	
Head of Production					DKK 120,000.00	DKK 120,000.00	
CFO				DKK 333,000.00	DKK 349,650.00	DKK 349,650.00	
Head of Marketing		DKK 280,000.00	DKK 308,000.00	DKK 338,800.00	DKK 350,000.00	DKK 350,000.00	
Sales Manager		DKK 270,000.00	DKK 297,000.00	DKK 326,700.00	DKK 326,700.00	DKK 326,700.00	
Industrial technician			DKK 333,000.00	DKK 366,300.00	DKK 366,300.00	DKK 366,300.00	
Sum	DKK -	DKK 550,000.00	DKK 938,000.00	DKK 1,364,800.00	DKK 2,112,650.00	DKK 2,112,650.00	
Direct labor	DKK -	DKK 270,000.00	DKK 630,000.00	DKK 693,000.00	DKK 813,000.00	DKK 813,000.00	
Salaries	DKK -	DKK 280,000.00	DKK 308,000.00	DKK 671,800.00	DKK 1,299,650.00	DKK 1,299,650.00	

Table 4 (b). Expenses

Direct labor costs	Salary	Monthly wages
Head of Production	DKK 380,000.00	DKK 31,666.67
Sales Manager	DKK 300,000.00	DKK 25,000.00
Industrial technican	DKK 370,000.00	DKK 30,833.33
Sales and Marketing		
CFO	DKK 370,000.00	DKK 30,833.33
Head of Marketing	DKK 350,000.00	DKK 29,166.67

Table 5. Rent calculation

Rent		Rent in Kitchen Collective (for FY 1 and 2)
Area	173 m2	Membership/year DKK 1,500.00
Deposit	DKK 150,000.0	Hourly rate DKK 150.00
Annual rent	DKK 184,243.0	Hours used per day 3
Annual operational cost	DKK 9,515.0	Working Days / year 250
Total area costs (for FY 3)	DKK 343,758.0	Hours/days/year 750
Total area costs (after FY 3)	DKK 193,758.0	Annual rent DKK 112,500.00
		Monthly rent DKK 9,375.00