

# Mapping trends and tensions in the marketing of plant-based meats

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What current trends and tensions exist in the plant-based meat market, globally and in Norway? What are the key products and how are they being marketed towards Norwegian consumers?

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## **1. Introduction**

### **1.1. The problems with meat overconsumption**

Global meat production and consumption has been on the rise, to the detriment of food systems, animals, as well as planetary and human health. Meat production is projected to almost double by 2050 in order to meet growing global demand (Good Food Institute 2022b). Consumers, governments, and food producers are becoming increasingly aware of the negative environmental, health-related, and animal welfare impacts of meat overproduction and overconsumption, leading to dietary shifts towards meat reduction and increased willingness to incorporate more plant-based products into diets. At the same time, the latest innovations in food technology have contributed to a new generation of plant-based meat (PBM) analogs on the market, designed to mimic conventional meat and marketed towards the growing group of consumers wishing to reduce their meat consumption. PBM startups have emerged with the aim to disrupt the status quo and pave the way for a plant-based revolution (Sexton, Garnett, and Lorimer 2019, 59). In response to rising market demand, even meat companies are expanding their range of offerings to include plant-based meat options. Yet challenges and barriers remain in the adoption of plant-based meat products. Studies reveal that conventional meat consumption continues to increase despite a growing variety of alternative products on the market and rise in flexitarian consumers. This report investigates research on the plant-based meat industry to uncover trends and tensions that are slowing the industry's expansion, as well as how current PBM marketing approaches react to these trends and tensions. The report then narrows its focus to Norway, an affluent country with a rich agricultural history placing animal products at the center of the diet, to examine how plant-based meat products are marketed.

### **1.2. The rise of plant-based meat**

Alternative proteins have been around since the 1900s, in the forms of soy- and wheat-based products like tofu, tempeh, and seitan. In the Western world, these products typically only replaced meat for a small population of consumers, namely vegans and vegetarians. However, thanks to innovations in processing technology, novel forms of alternative proteins, referred to in the literature as the 'next generation' of alternative meat, 'Meat 2.0', 'new meatways' (Kanerva 2021), and 'meat analogs', are products that highly resemble the meat products that they aim to replace. These products aim to be meat-like not only in taste but also in structure, texture, appearance,

smell, and mouthfeel, among other properties. Achieving these extremely meat-like properties requires more processing than is used for the more traditional meat alternatives like tofu, though the processing level varies depending on the end product. Product categories that are both popular with consumers and more easily processed to mimic meat, such as burgers and minces, have dominated the plant-based meat market. Notably, the best-selling PBM products globally are Beyond Meat's Beyond Burger and Impossible Foods' Impossible Burger (Zhao et al. 2023). The industry continues to innovate, expanding into new product markets like seafood, steak, eggs, and dairy. According to the Good Food Institute's latest State of the Industry report (2022b, 95), the plant-based meat industry is predicted to grow, albeit more slowly than previous years due to taste parity and price parity gaps between plant-based meat and conventional meat products. Despite the slower growth, further innovation and product development are expected. Generational trends also favor the rise of plant-based meat. Still, challenges persist, which will be explored below.

### 1.3. Aims and objectives

The overall aim of this report is to shed light on the trends and tensions currently present within the global plant-based meat industry, as well as on how these tensions are grappled with and reconciled in the marketing of products to consumers in the Norwegian context. The objectives are (1) to review relevant literature focused on plant-based meat in a global context in order to present prominent discourses and debates, and (2) to map key products in the plant-based meat landscape in the Norwegian context. Results are relevant to research activities in the INCLUDE and sustainable consumption and energy equity research groups at the Centre for Development and the Environment (SUM). The results can also be useful to other researchers focused on topics related to alternative protein, as well as sustainable food production and consumption.

### 1.4. Outline

This report is divided into five chapters.

- Chapter 2 provides an overview of findings from a literature review of the plant-based meat market. The first section outlines concepts that are crucial to understanding the current trends and tensions in the plant-based meat industry, while the second delves into key focus areas of the literature.

- Chapter 3 presents a comprehensive mapping of the plant-based meat product offerings in Norway supermarkets and online grocery retailers. It discusses how the products are marketed, particularly in the wording on product packaging.
- Chapter 4 discusses trends and tensions in the marketing of plant-based meats in a Norwegian context based on findings from the literature review and product mapping.
- Chapter 5 summarizes key takeaways, discusses implications of the findings, and suggests areas for future research.

## **2. Literature review**

### **2.1. Conceptual overview**

This section aims to provide an overview of several key concepts mentioned in the report, particularly those that appeared frequently in the literature reviewed and that are relevant for the discussion around trends and tensions in the marketing of plant-based meat.

#### **2.1.1. Alternative protein**

Alternative protein is a broad category that refers to protein sources that do not come from animal products. It includes plant-based meat (the subject of this report), lab-grown meat, insect-based meat, and others (Sexton, Garnett, and Lorimer 2019). Exploring methods for procuring protein from alternative sources has been undertaken by researchers, governments, and corporations for a multitude of purposes, including reducing environmental impacts of agriculture to reach climate agreement targets (Smetana et al. 2023; Bryant 2022), promoting better health outcomes (Bryant 2022; Crimarco et al. 2020), improving animal welfare, and responding to consumer demand as the world changes (Bloomberg 2021; Good Food Institute 2023). For many consumers, environmental sustainability is becoming more important (Aasen et al. 2022). Shifting attitudes increasingly influence how people shop and eat, making room for alternative proteins in the food industry (Bryant and Sanctorem 2021).

#### **2.1.2. Hybrid/blended meat products**

Hybrid meat products combine a mix of animal and plant proteins. They are also sometimes referred to as blended meat products, such as Tyson Foods' product "The Blend" (a beef and plant-based burger) (Hill 2021). Tyson, Purdue, and other conventional meat industry giants have invested in hybrid products as a strategy to break into the nascent alternative protein industry and capture consumers who are increasingly interested in reducing their meat intake, but do not necessarily want to give up meat entirely. These hybrid products require strategic market positioning to be successful. Some companies have found success with targeting parents who aim to incorporate more vegetables in their children's favorite foods—like chicken nuggets—without sacrificing taste or quality (Good Food Institute 2022b, 28).

In addition to referring to a mix of conventional meat with plants, the term hybrid meat can also be applied to the result of different alternative protein innovations, like the Impossible Burger which mixes plant-based meat with ingredients created by precision fermentation, or to new products on the horizon which use cultivated fat as an ingredient in otherwise plant-based products (Good Food Institute 2023, 12). These new hybrids “leverage the best components of plant-based, fermentation, and cultivated technologies to improve taste, texture, and cost. The relative affordability of plantbased products makes them particularly suitable to combine with the functionality of fermentation and cultivated technologies” (ibid, 12).

### 2.1.3. Plant-based meat alternatives

Plant-based meat alternatives (abbreviated as plant-based meat or PBM in this report) are processed food products designed to replace, and in many cases resemble, processed animal meat products, such as burgers, sausages, filets, nuggets, and cold cuts. Whether these products actually replace conventional meat products in practice is debated (Andreani et al. 2023; Bryant, Ross, and Flores 2023; Zhao et al. 2023), and more research is needed. Plant-based meat alternatives vary widely in nutritional composition, level of processing, and ‘closeness’ to mimicking real meat—what is known as a meat analog (see below).

### 2.1.4. Meat analog

Meat analogs are plant-based meat products that seek as much as possible to mimic real meat in their organoleptic (sensory) properties—taste, texture, mouthfeel, smell, appearance, etc., as well as their reaction to being cooked. A specific example of an innovation in plant-based meat is the Impossible plant-based burger’s genetically engineered color additive, soy leghemoglobin, that causes it to ‘bleed’ and sizzle when cooked like its animal-based counterpart. Many plant-based meat producers dedicate extensive resources into research and development to come as close to not just the taste but the overall experience of eating meat as possible, as it is not vegans and vegetarians but rather omnivores and flexitarians (meat reducers) who make up the large majority of the plant-based meat market.

### 2.1.5. Flexitarians / meat reducers / reducetarians

Much like “vegetarian” and “pescetarian” describe specific diets, the terms “flexitarian”, “meat reducer”, and “reducetarian” have more recently been used to describe people who eat mostly

plant-based and deliberately opt out of regular consumption of animal products for multiple purposes, most often for environmental and health reasons (Kanerva 2021). The rise in this consumption behavior corresponds with the increase in sales of meat substitutes, though it is difficult to determine whether one trend caused the other. The word “fleksitarianer” has very recently become part of the Norwegian language, being crowned the word of the year in 2016, with the justification that the year brought “new lifestyles and a new commitment to the environment and sustainability” (Bugge 2020). It has also become common to refer to this group as “meat reducers” (Sundet, Hansen, and Wethal 2023). Reducetarian is a less commonly used word that means largely the same thing, but with more explicit focus on the action or process of (meat) reduction (Kanerva 2021, 73).

#### 2.1.6. Ultra-processed foods

Ultra-processed foods (UPFs) are a category of food as defined by the NOVA food classification system. These foods are defined as “formulations of substances derived from foods, such as starches, sugars, fats, and protein isolates, with little, if any, whole food, and often with added flavours, colours, emulsifiers, and other cosmetic additives” (Wickramasinghe et al. 2021, 1). They are also described as products that cannot easily be created in domestic kitchens, instead requiring specialized ingredients and equipment for processing. UPFs are often linked to health concerns such as obesity, diabetes, and cardiovascular disease due to the fact that they are typically energy dense and high in fat, salt, sugar, and additives, while lacking dietary fiber and micronutrients (Fraanje, Garnett, and Breewood 2019, 5). Moreover, UPFs are designed to be hyperpalatable (attractive in both taste and appearance), encouraging overconsumption. They are typically convenient, coming in ready-to-eat forms and requiring minimal preparation. However, the status of ultra-processed does not necessarily mean a product is unhealthy—for example, whole-grain breads, recommended by dietitians, are also classified as ultra-processed (Arnesen 2023).

Plant-based meats often, but not always, meet the NOVA criteria for ultra-processed foods, based on the ingredients and level of processing of those ingredients. For example, products that contain plant protein isolates requiring special machinery to create are considered ultra-processed, which includes most plant-based burgers and sausages (Arnesen 2023). This association has effects on demand—it can drive higher consumption due to convenience and hyperpalatability but can also be a turn-off for more health-conscious consumers. Plant-based product designers, manufacturers



and marketers must take into account current popular perceptions of ultra-processed foods and their impact on demand when designing new products.

#### 2.1.7. Food neophobia

Food neophobia refers to the “reluctance to eat and/or avoidance of novel foods” (Pliner and Hobden 1992, 105). In this case, novel foods are those that are new and unfamiliar to the consumer. Neophobia can also be present in food preparation and cooking methods, as in the reluctance to use plant-based meat products in cooking due to unfamiliarity in their preparation. When it comes to plant-based meat, several studies point towards neophobia as a barrier to acceptance and consumption of new plant-based meats. “The main personal-related barriers to acceptability are related to food and food technology neophobia” (Andreani et al. 2023, 8).

### 2.2. Focus areas in PBM literature

This section will discuss five key focus areas that were found within the PBM literature: (1) environmental footprint, (2) health and nutrition, (3) consumer attitudes, (4) marketing and messaging, and (5) market trends and forecasts. These focus areas, while discussed separately in the sections below, are highly interlinked and are of concern to most actors in the industry, albeit to varying degrees. For example, PBM producers and investors are likely most interested in market trends, forecasts, and consumer attitudes. Environmental researchers are heavily concerned with the environmental impacts of PBM. Doctors, health organizations, and governments place their main focus on the health and nutrition of these novel products. The subsections below will provide an overview of the key findings within each focus area, and the discussion section will link these findings to trends and tensions in the Norwegian market. While not explored in depth in this report, there is also a stream of critical literature on PBMs in the social sciences and humanities.

#### 2.2.1. Environmental footprint

Because plant-based meat alternatives arose partly to address the numerous environmental issues associated with animal agriculture, the environmental impacts of plant-based meat production are important to understand. Bryant’s 2022 review summarizes 43 studies on both the healthiness and environmental sustainability of PBMs, concluding that “[i]n terms of environmental sustainability, [PBMs] are more sustainable compared to animal products across a range of outcomes including greenhouse gas emissions, water use, land use, and other outcomes” (Bryant 2022, 1). As a result

of such findings, sustainability is beginning to play a larger role in diet considerations, both for consumers and governments. Connections between health and sustainability are increasingly cropping up in national and regional nutrition recommendations (Blomhoff et al. 2023; Willett et al. 2019). However, conflicting studies challenge whether PBMs are always more sustainable. One study found that adoption of meat alternatives could influence the environmental impact in either a positive or negative way, but “could also trigger indirect impacts with higher consumption rates” (Smetana et al. 2023, 1). Another report critiqued the notion of alternative proteins being a ‘win-win-win’ solution for animals, people, and the planet, stating that they “may improve individual sustainability indicators in direct comparisons with their industrially produced equivalents. However, the evidence to date is limited and speculative (particularly for lab-grown meat). The implications for health and sustainability ultimately depend on what ingredients are used, how they are produced and processed, as well as what they are replacing and where they are being marketed. Many of the latest substitutes rely on energy-intensive hyperprocessing to produce key additives, as well as sourcing ingredients from industrial monoculture systems” (IPES-Food 2022, 48). Moreover, when plant proteins are isolated into their purest form, an extensive amount of processing must take place, requiring more energy, more water use, and higher costs. Dry processing methods such as dry fractionation are more sustainable, requiring far lower water and energy use, but their ‘downside’ is being unable to produce plant protein isolates in their ‘purest’ form (FoodProFuture 2022). Finally, footprints of meat production vary widely by type and production system, complicating any direct comparison in terms of sustainability. Alternative protein production is therefore not automatically more environmentally friendly than animal protein production, yet there is evidence that some plant-based alternatives win out in a number of categories.

### 2.2.2. Health and nutrition

PBMs aim not only to present a more environmentally friendly alternative to animal meat products, but also a healthier one. In fact, much literature addresses both health and sustainability in equal measures (Bryant 2022; IPES-Food 2022; Hu, Otis, and McCarthy 2019; Godfray et al. 2018). Bryant’s aforementioned 2022 review looked at a number of studies related to assessing the healthiness of PBMs and found that they “present a number of benefits, including generally favourable nutritional profiles, aiding weight loss and muscle synthesis, and catering to specific

health conditions” (Bryant 2022, 1). However, as with environmental footprints, the conclusion cannot be made for all products across the board. Many studies that examined the nutritional profiles of PBMs pointed to the fact that there are large variations in the nutritional compositions of each product (Mayer Labba et al. 2022; Tonheim et al. 2022; Romão et al. 2023; Curtain and Grafenauer 2019). Several studies suggest ways in which healthiness of PBMs can be improved through using optimal ingredients and processing.

Despite a wealth of studies providing evidence for improved health outcomes of eating PBMs, especially when compared to their animal-based equivalents (Crimarco et al. 2020), several articles were critical to the health benefits of PBMs, calling attention to their ultra-processed nature and the fact that nutrients like iron and zinc are less bioavailable to the human body when they come from plant foods than animal foods (Mayer Labba et al. 2022; van Vliet, Kronberg, and Provenza 2020; Wickramasinghe et al. 2021; FAO 2023). News articles about plant-based meats also tended to focus on the health impacts, tending to raise the issue of ultra-processing and limited bioavailability (Spilde 2022; Mat for Helsen n.d.; Steenbuch 2023). In Norway, a report by the Norwegian Consumer Council highlighted that nutrition values of plant-based products varied widely and there were very few keyhole-certified options, a certification indicating a healthy product (Forbrukerrådet 2022, 3). When discussing plant-based alternatives, dietary recommendations included choosing whole vegetables and legumes over ultra-processed products (Nasjonalt råd for ernæring 2021; Blomhoff et al. 2023).

### 2.2.3. Consumer attitudes

A focus on consumer attitudes, preferences, and adoption of PBMs was frequent in the literature reviewed. The literature found that the majority of consumers are unwilling to transition completely from meat products to PBMs, and that overall acceptance of these products is low but improving (He et al. 2020; Onwezen et al. 2021). Several articles pinpointed various factors influencing consumer adoption of PBMs, which include taste, texture, price, food neophobia, familiarity, attitudes, disgust, situational factors, culture, and social norms, among others (Bryant and Sanctorem 2021; Onwezen et al. 2021; Anusha Siddiqui et al. 2022; Szenderák, Fróna, and Rákos 2022; Motoki et al. 2021; Ismail, Hwang, and Joo 2020; Ueland, Rødbotten, and Varela 2022). Food neophobia in particular was described as preventing PBMs from taking off, though it is anticipated that it will reduce over time as more consumers are introduced to tastier plant-based

products (Ismail, Hwang, and Joo 2020). Literature also discussed variety between consumers, from frequent meat-eaters to meat reducers to meat abstainers, and how these populations have shifted over time (e.g., more people are reducing their meat intake for health and sustainability reasons).

#### 2.2.4. Marketing and messaging

Plant-based meat products are most frequently advertised in such a way as to appear as close to meat as possible, in appearance, description of the product (juicy, meaty), and product types (burgers, nuggets, filets, sausages, mince). However, PBMs are subject to health-based concerns and confusion related to the ultra-processed nature of products (Tziva et al. 2023). Several articles discussed challenges related to labeling of products and the corresponding legislation limiting certain words from being used in the marketing of PBMs. Others explored how the concept of meat is changing with plant-based meats being marketed as new, “better” versions of meat (Sexton, Garnett, and Lorimer 2019; Broad 2020; Kanerva 2021).

#### 2.2.5. Market trends and forecasts

Most of the literature discussing market trends and forecasts were, predictably, industry reports and news articles. The Good Food Institute, a nonprofit organization dedicated to accelerating alternative protein innovation, has released a comprehensive State of the Industry report that reviews the latest trends of the plant-based meat, seafood, egg, and dairy market (Good Food Institute 2022b). Other organizations such as Bloomberg and CB Insights report on trends and forecasts, with Bloomberg forecasting explosive growth for the industry (Bloomberg 2021; CB Insights 2021). Zhao et al (2023) examined demand for new generation PBMs and found that while the current market demand for PBMs is still incomparable with conventional meat, the growth of PBM sales is significant.

### 3. Products in the Norwegian plant-based meat market

This section will discuss the main methods and findings of the research into the marketing of plant-based meat products in Norway.

#### 3.1. Product mapping

This report contains a comprehensive mapping of 129 plant-based meat products that have been and are currently for sale in large Norwegian grocery stores (both physical and online) as of September 2023. Plant-based meat products were selected for inclusion based on resemblance to popular processed meat products (e.g., burgers, mince, nuggets, etc.) while also being advertised as plant-based, made from plants, vegan, and/or vegetarian. The researcher visited a total of eight stores in Oslo and online:

- Coop Mega Alexander Kiellands Plass
- MENY Ringnes Park
- Rema 1000 Torggata
- KIWI Bygdøy Allé
- Extra Gimle
- Bunnpris Blindern
- ODA (Online)
- MENY (Online)

One limitation to this approach is that as product selection varies between stores, findings cannot necessarily be generalized to each chain.



*Figure 1. The refrigerated vegetarian/vegan food display at Coop Mega. Photo by the author.*



*Figure 2. The refrigerated display of PBM products at Kiwi. Photo by the author.*

When visiting the stores, product information was collected by photographing the front and back of all plant-based meat products in each store, as well as price tags. Product details, including the text from the packaging, ingredient lists, and prices, were recorded in two Excel spreadsheets (one table listing each unique product and the other tracking prices) for further analysis. 228 prices were recorded. For online stores, products were found by searching popular plant-based brands, keywords, and browsing the “plant-based” category (Figures 3 & 4). 30 products were found or suspected to be discontinued (e.g., permanently out of stock or no longer being sold in Norway). The researcher chose to include these products in the database as long as some relevant data was available (e.g., the last known price and/or product packaging photos from online retailer pages).



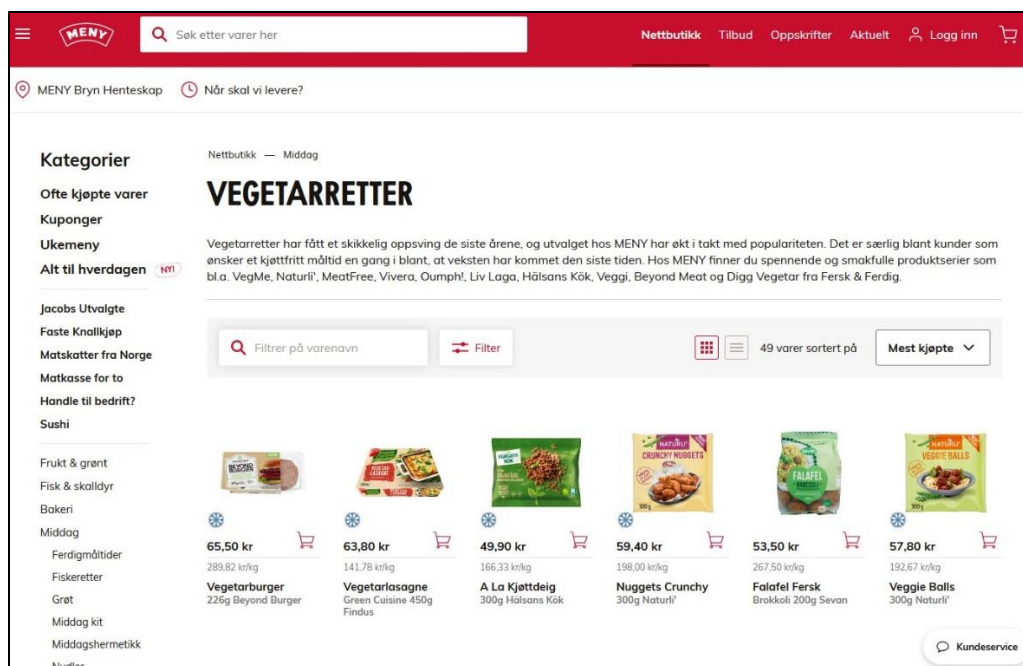


Figure 3. A screenshot of MENY's online vegetarian/vegan product page.

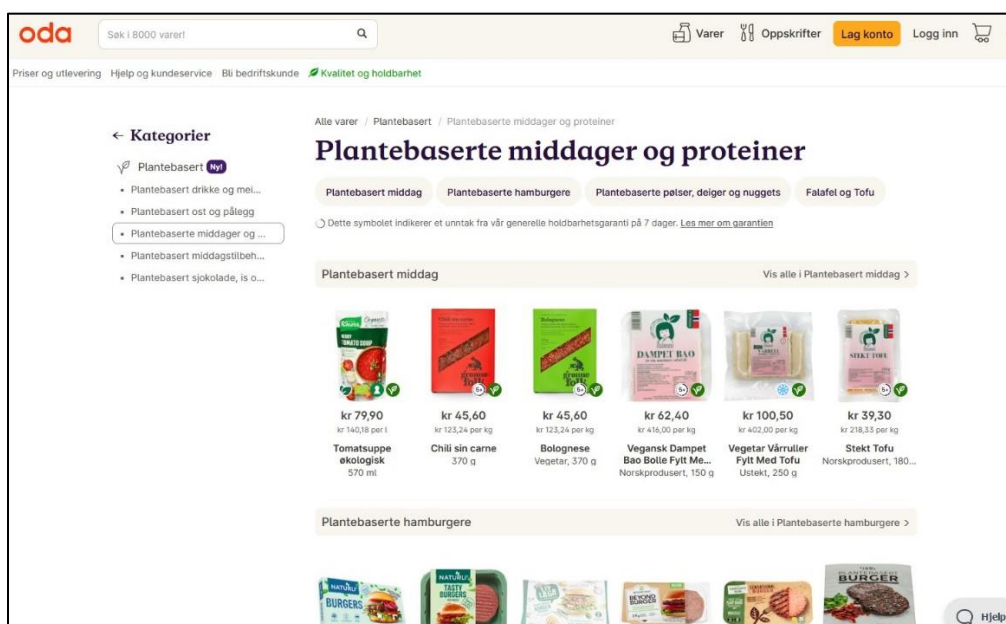


Figure 4. A screenshot of ODA's online plant-based products page.

Based on the information collected, products were assigned a product category (e.g., burger, sausage, pieces, mince, etc.) and the main protein ingredient for each product was identified (in most cases, the first non-water/oil ingredient). 10 product categories were defined, and 22 main proteins were identified (Table 2). Burgers were the most common category type, with 29 varieties on offer (Figure 5; Table 1).

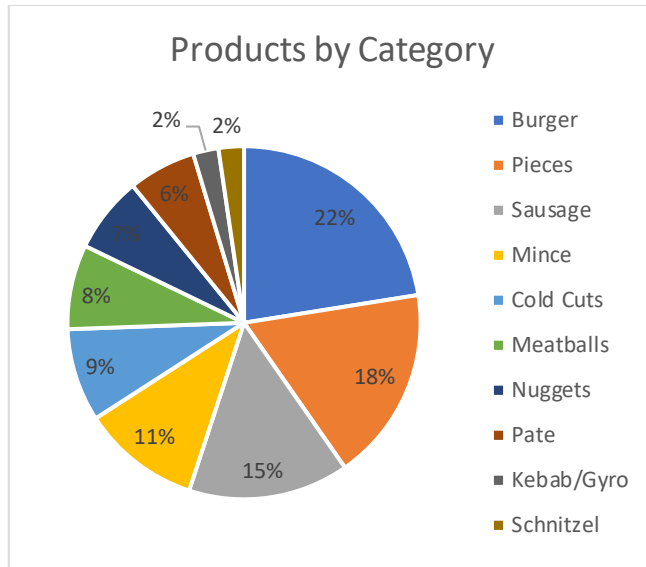


Figure 5. PBM products by product category assigned by the researcher (e.g., burger, sausage, mince, etc.)

Category	#	%
Burger	29	22 %
Pieces	23	18 %
Sausage	19	15 %
Mince	14	11 %
Cold Cuts	11	9 %
Meatballs	10	8 %
Nuggets	9	7 %
Pate	8	6 %
Kebab/Gyro	3	2 %
Schnitzel	3	2 %
<b>Grand Total</b>	<b>129</b>	<b>100 %</b>

Table 1. PBM products by category, in table form.

Main protein ingredient	#	%
Pea protein	31	24 %
Soy protein	27	21 %
Pea and field bean	13	10 %
Vegetables	9	7 %
Egg white	9	7 %
Soy and wheat protein	8	6 %
unknown	5	4 %
Potato	4	3 %
Mycoprotein	3	2 %
Sunflower seed and pea protein	3	2 %
Black / red beans	3	2 %
Beef	2	2 %
Wheat protein	2	2 %
Pea and potato protein	2	2 %
Seitan	1	1 %
Jackfruit	1	1 %
Beetroot and lentils	1	1 %
Broccoli and pea	1	1 %
Lentils	1	1 %
Sunflower seeds	1	1 %
Mushroom	1	1 %
Chickpeas	1	1 %
<b>Grand Total</b>	<b>129</b>	<b>100 %</b>

Table 2. Count and percentage of PBM products by their main protein ingredient (typically the 1st non-water/oil ingredient in the ingredient list).



In total, 29 brands were recorded with PBM product offerings per brand varying widely. The top brands based on the number of unique PBM products offered were Coop Vegetardag (20 products), Go’Vegan (14), Naturli’ (10) and Hälsans Kök (10) (Figure 6).

Brands

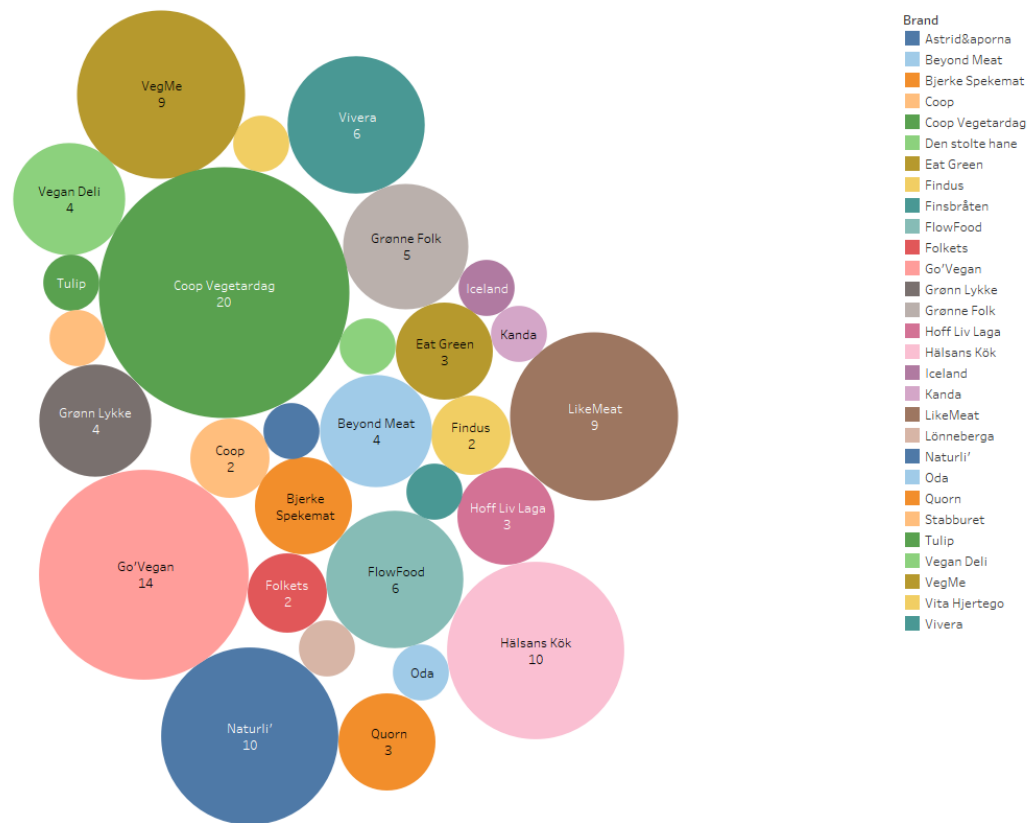


Figure 6. A packed bubble chart showing the number of unique products offered by each brand. The size of the bubble corresponds to the volume.

Product availability varied by store. Hälsans Kök had the highest number of products stocked on shelves across all stores combined, followed by Go’Vegan, then Naturli’ (Table 3). This data, based on the individual prices recorded, indicates which brands were most available across the stores visited. For example, while Hälsans Kök currently only offers 10 unique PBM products, these products showed up most often across all the stores visited, with Hälsans Kök Mince showing up in 7 out of the 8 stores visited (Table 4).

<b>Brand</b>	<b># Products (all stores)</b>
Hälsans Kök	43
Go'Vegan	42
Naturli'	30
Vivera	15
Coop Vegetardag	15
Vegan Deli	8
Beyond Meat	8
Hoff Liv Laga	7
Grønne Folk	5
Vita Hjertego	5
FlowFood	5
LikeMeat	5
Stabburet	5
Folkets	5
Grønn Lykke	4
Findus	4
Bjerke Spekemat	3
Quorn	3
Tulip	3
Eat Green	3
Coop	2
Lønneberga	2
Astrid&aporna	1
Finsbråten	1
Kanda	1
Den stolte hane	1
Iceland	1
Oda	1

Table 3. Number of product prices recorded for each brand across all stores visited.

The following products were the most commonly offered across the eight stores visited (Table 4):

<b>Product</b>	<b># of stores where product was sold</b>
Hälsans Kök Mince	7
Go'Vegan Salami	6
Naturli' Burger	6
Go'Vegan Skinke	6
Hälsans Kök Schnitzel	6
Hälsans Kök Filet Pieces	6
Hälsans Kök Crispy Mini Filets	5
Naturli' Veggie Balls	5
Naturli' Shape Me Minced	5
Hälsans Kök Burger	5
Vita Hjertego Grønnsakspostei	5
Hälsans Kök Burger Sensational	5
Stabburet Pate	5

Table 4. The most commonly available products, as indicated by the number of stores in which the product was available for purchase.

Of the stores visited, ODA had the greatest selection of PBM products (45), with Coop Mega falling closely behind (41) and MENY's online store offering slightly fewer products (35) (Table 5). Aside from Eat Green, a PBM producer selling their own products online, the store with the most limited selection was Bunnpris with only 5 products, though this is not surprising as it is a smaller convenience store. One surprising finding was that Rema 1000, one of the popular grocery chains, lagged considerably behind similar types of stores like Coop and KIWI when it came to PBM product offerings, with only 22 PBM products compared to others with 30+.

Store	# of PBM products
ODA	45
Coop Mega	41
MENY Online	35
KIWI	33
MENY	32
Rema 1000	22
Coop Extra	11
Bunnpris	5
Eat Green (Online)	3
<b>Grand Total</b>	<b>227</b>

*Table 5. Number of PBM products for sale in each store visited.*

The country of origin of products (as labeled on the packaging) was also recorded. According to MENY's website: "Country of origin means the country where the product was produced in its entirety, or where it was last subject to significant processing. [...] Last significant processing means a processing process that involves more than repackaging goods, assembling goods into sets, storing the goods or packaging them. Exceptions may occur due to a shortage of raw materials. Country of origin is always clearly marked on the package in store". Just over half of products are of Norwegian origin, while the other half comes from mostly European countries, such as Sweden, the Netherlands, Czech Republic, Belgium, and Germany (Figure 7).

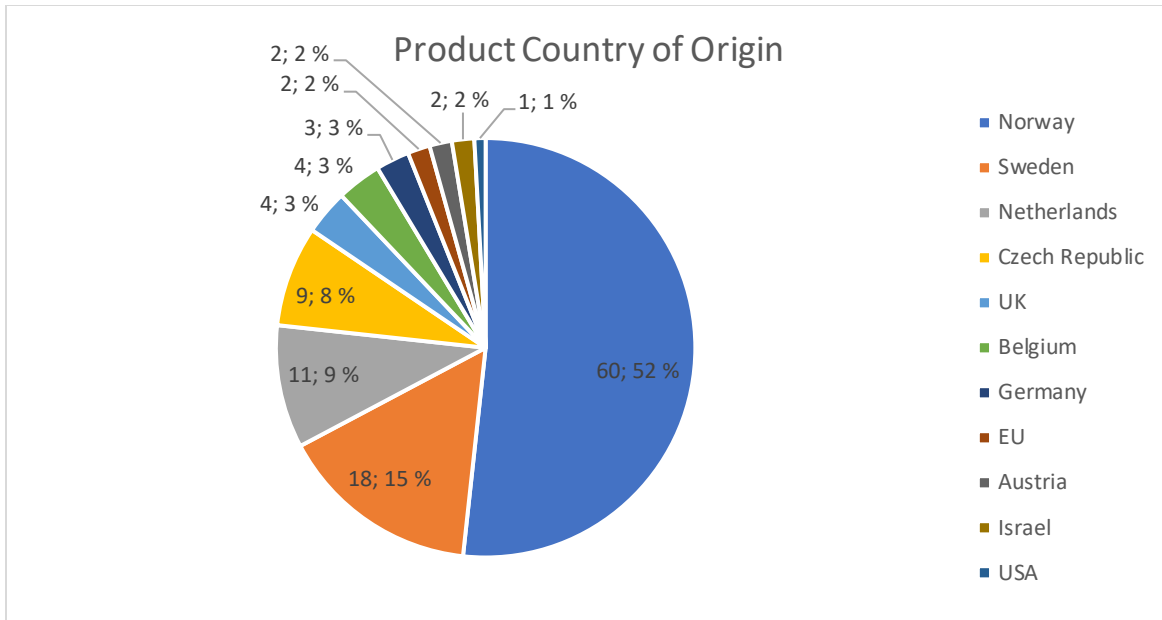


Figure 7. PBM products by country of origin (where the product was either produced in its entirety or last subject to significant processing). Country of origin is marked on all products (in Norwegian, “opprinnelse” or “opprinnelsesland”).

Contents of the products were also examined. Of the 129 products recorded, 17 (13%) contained animal products (in the form of beef for hybrid meats or egg and milk for vegetarian products) (Figure 8). 38 products (29%) contained soy (Figure 9). Products were also classified as either meat-like or vegetable-like in nature, with 105 (81%) being categorized as meat-like, while 24 (19%) were veggie (Figure 10). These categorizations were subjectively decided by the researcher based on product name, appearance, description, and how it was packaged and marketed. For example, if the product was described as being juicy and meaty, it would fall under meat-like, while products that obviously appear to be made from vegetables and are not imitating meat (such as red beet burgers) would fall under the veggie category. This distinction could be developed further in future research, using a more explicit set of specifications.

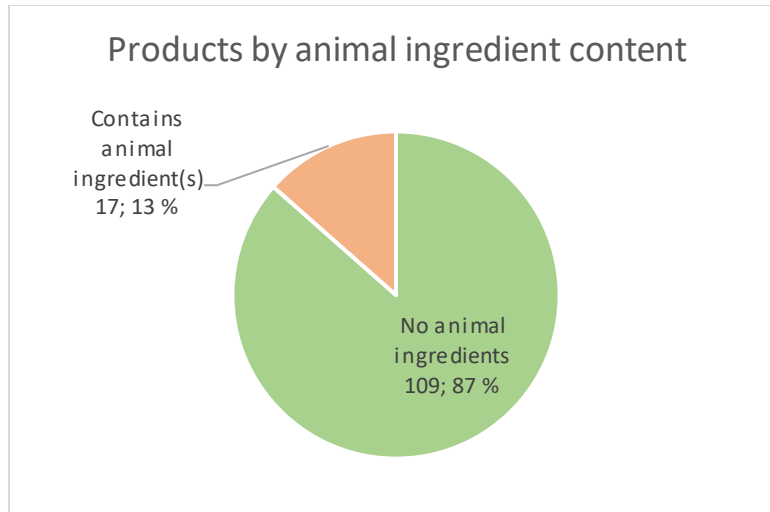


Figure 8. Pie chart depicting the % of PBM products in the database that contain animal ingredients (milk, eggs, etc.) vs vegan products (no animal ingredients).

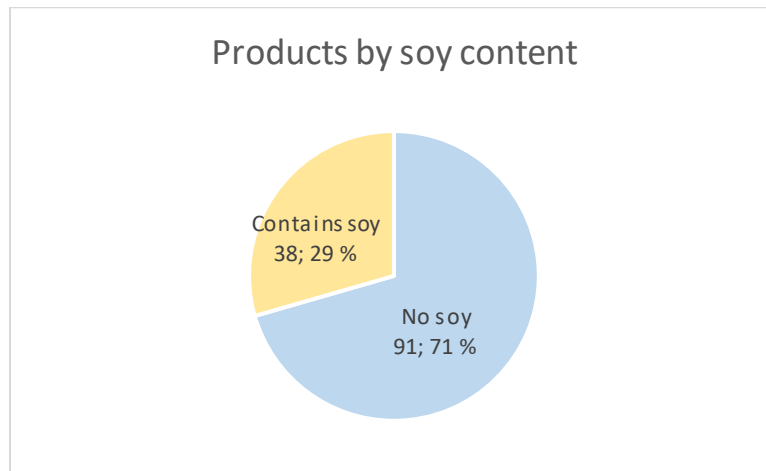


Figure 9. Pie chart depicting the % of products with soy vs without.

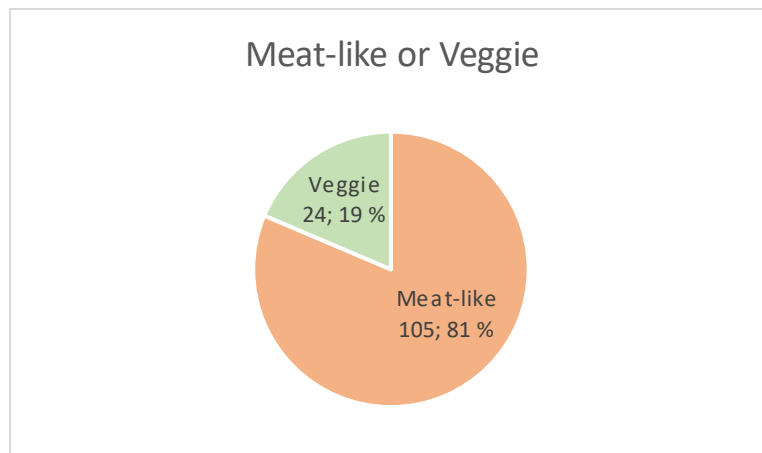
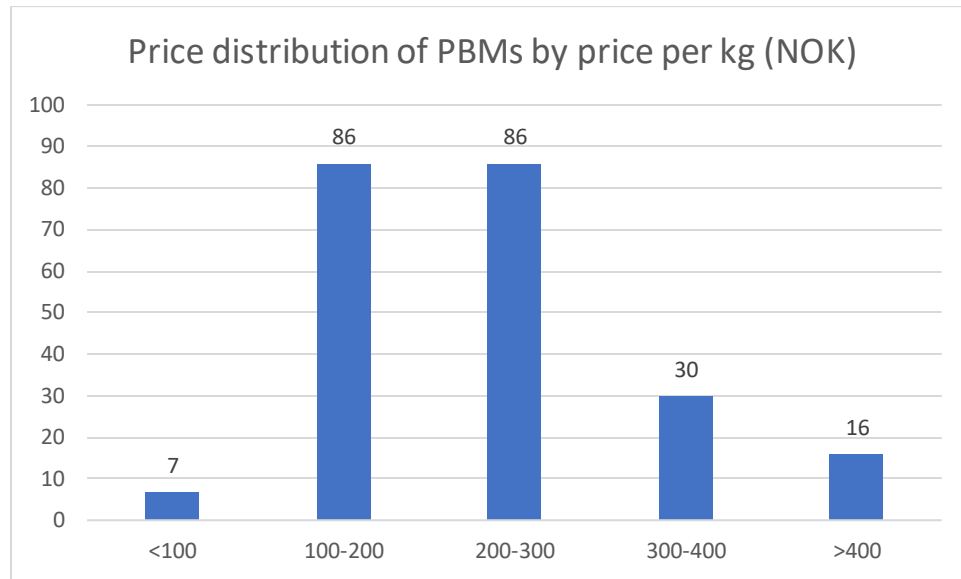


Figure 10. Pie chart depicting the % of meat-like vs vegetable-like products.

Product prices were recorded to examine price differences within PBMs. Examining and comparing prices of conventional meat product equivalents was outside the scope of this research but could be interesting to explore in future studies. To easily compare prices across products, the price per kg was recorded and used in the analyses below.



*Figure 11. Vertical bar chart of the price distribution of PBMs by price per kg in NOK.*

Most products fell in the middle price range, between 100-300 NOK per kg (Figure 11).

When looking at average price per kg by the main protein ingredient (Figure 12), the proteins for the most expensive products were egg whites, pea/potato protein, beetroot/lentils, mushroom, broccoli/pea, sunflower seeds, and wheat protein. The cheapest products had beef, potato, jackfruit, beans, lentils, and chickpeas as their main protein ingredients. Beef was the main protein source in the 2 hybrid meat products from Coop that were included in the dataset, which had a 50-50 meat to plant ratio. Unfortunately, there was no way of being able to tell from which country ingredients originated.

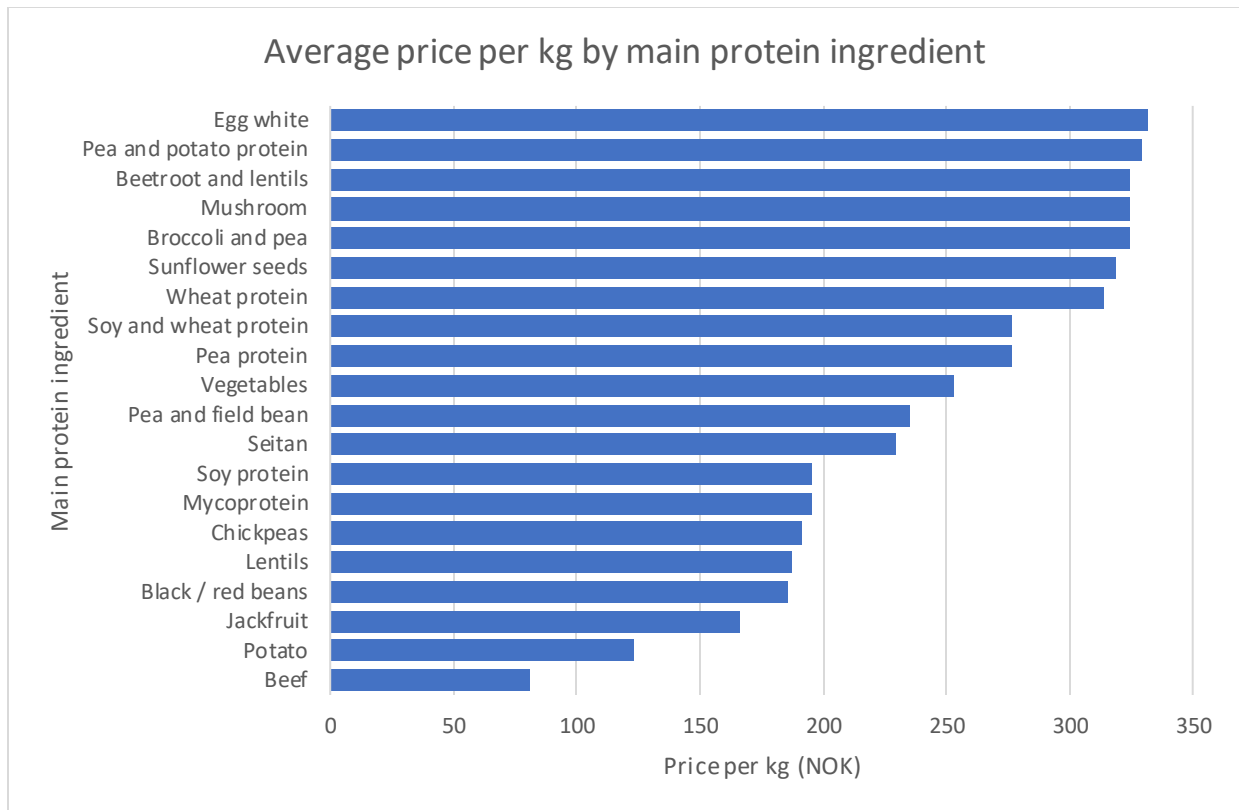


Figure 12. Horizontal bar chart of average price per kg by main protein ingredient (1st non-water/oil ingredient).

With the average price per kg of products grouped by product category (Figure 13), cold cuts were the most expensive products, while minces were the cheapest. There is, however, great variation in prices between brands, stores, and individual products. Cold cuts are likely more expensive by kg because they tend to be lightweight products, yet still require similar, or even increased, levels of processing that can affect the product price.

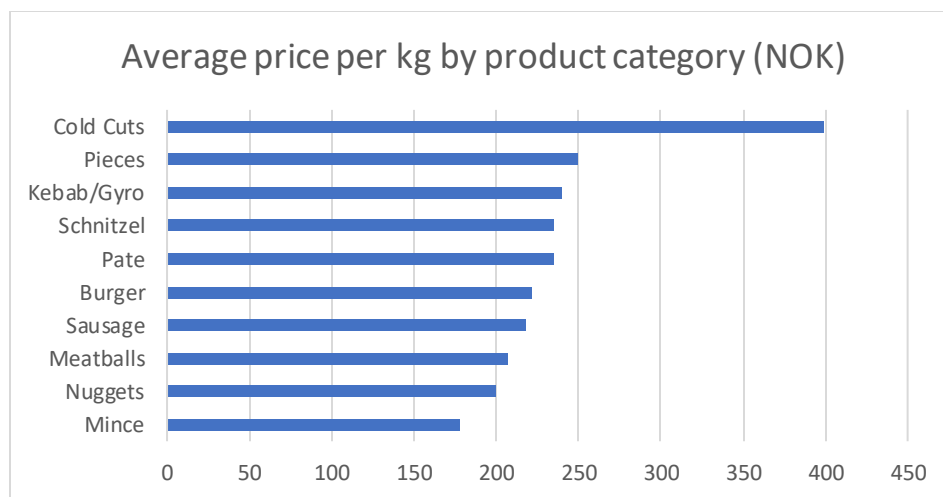


Figure 13. Horizontal bar chart of average price per kg by product category in NOK.

### 3.2. Marketing approaches – examining claims on package labels

This section discusses the various marketing claims made on PBM packaging. It also connects these claims to broader trends in the industry as well as relevant actors. Only the text from the front of the packaging was included, due to time constraints and the assumption that the majority of food shoppers browsing product shelves for items to purchase only view the front of products they are unfamiliar with. A summary of the 21 claims as coded and counted by the researcher is shown in Figure 14 and Table 6 below. Each claim will be discussed in the following sections.

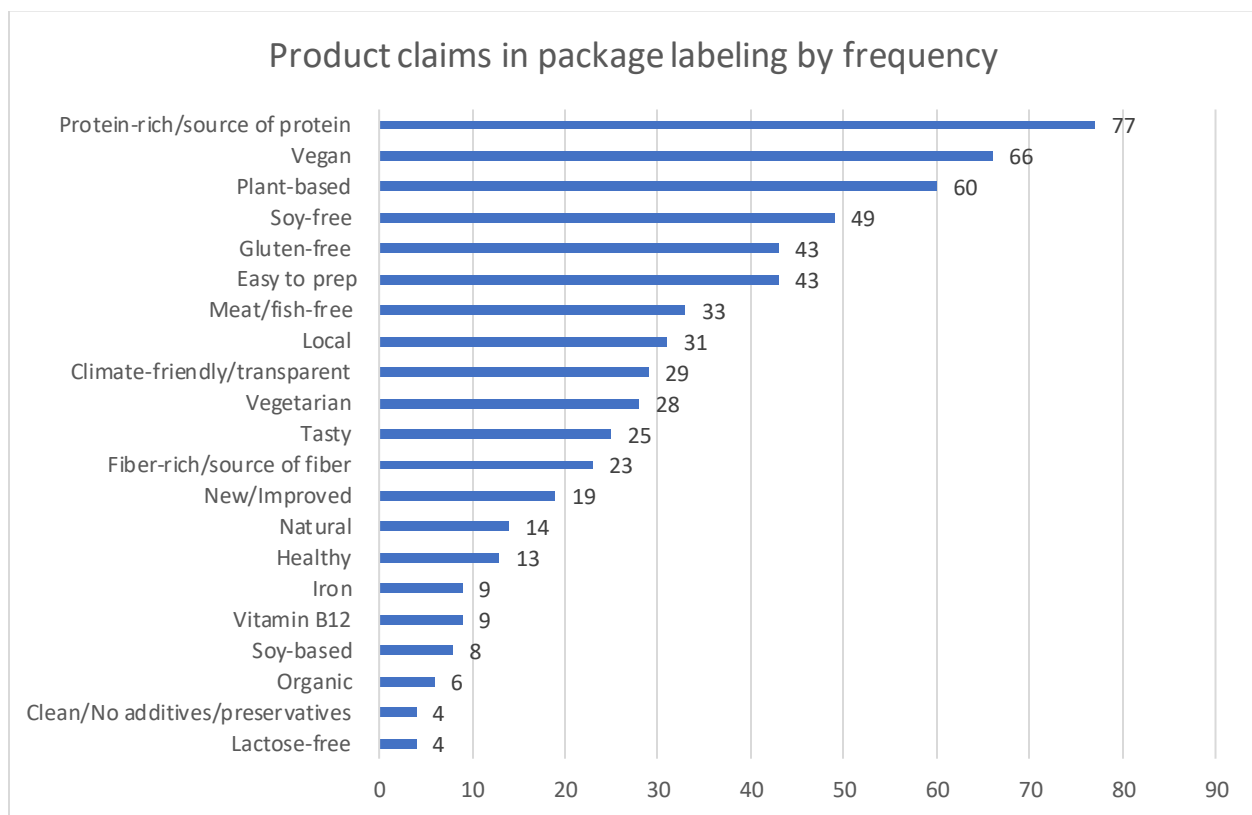


Figure 14. Horizontal bar chart of product claims in package labeling by how often the labels appeared across all products.



<b>Claim on Packaging</b>	<b>#</b>	<b>%</b>
Protein-rich / source of protein	77	60 %
Vegan	66	51 %
Plant-based	60	47 %
Soy-free	49	38 %
Gluten-free	43	33 %
Easy to prep / guidance for prepping	43	33 %
Meat/fish-free	33	26 %
Local	31	24 %
Vegetarian / Veggie	31	24 %
Climate-friendly / transparent	29	22 %
Tasty	25	19 %
Fiber-rich / source of fiber	23	18 %
New / Improved	19	15 %
Natural	14	11 %
Healthy	13	10 %
Vitamin B12	9	7 %
Iron	9	7 %
Soy-based	8	6 %
Organic	6	5 %
Lactose-free	4	3 %
Clean / No additives / preservatives	4	3 %

*Table 6. Count and percentage of claims on PBM packaging.*

### 3.2.1. Vegan, plant-based, vegetarian

Just over half of products (66, or 51%) were labeled as vegan (Figure 15), 60 (47%) were labeled as plant-based (Figure 16), and 31 (24%) were labeled as vegetarian/veggie (Figure 17). The majority of products (89, or 69%) were labeled as vegan or plant-based or both. Vegan labeling often came in the form of a vegan logo, but also included text describing or naming the product or brand as vegan. In fact, 18 (14%) of the products labeled as vegan were due to being part of the brand “Go’Vegan” and “Vegan Deli”, which have vegan in the name. More products (66) were labeled as vegan than plant-based (60), and many (37) included both vegan and plant-based labels.



Figure 15. Vegan labelling on PBM packaging.



Figure 16. Plant-based labelling on PBM packaging.



Figure 17. Vegetarian/veggie labelling on PBM packaging.

### 3.2.2. Rich in protein, fiber

Protein has attained great cultural status and significance as a sought-after nutrient, especially when it comes to meat and products that resemble meat. Protein is seen as nutritionally important as a building block for the body, and “its longtime associations with vigor, strength and energy, along with current day obsessions with the negatives of fats and carbohydrates, renders it the one remaining macronutrient that it is unequivocally good” (Guthman and Biltekoff 2023). Thus, it makes sense why the majority of PBM products (77, or 60%) mentioned protein on the packaging, using phrases like “rik på protein” (rich in protein), “proteinkilde” (source of protein), and “high in protein”, among others (Figure 18).

23 products (18%) mentioned fiber as a benefit on their packaging (Figure 18). When comparing plant-based products with their animal-based counterparts, the area where plant-based meats nearly always outperform are their fiber values. Plant foods naturally contain a high amount of fiber, while in contrast, animal products contain very little, if any. Increasing dietary fiber intake is a crucial component of many dietary guidelines, so many PBM manufacturers have chosen to specifically highlight this valuable aspect of their products by labeling them as “rich in fiber” or a “good source of fiber”.

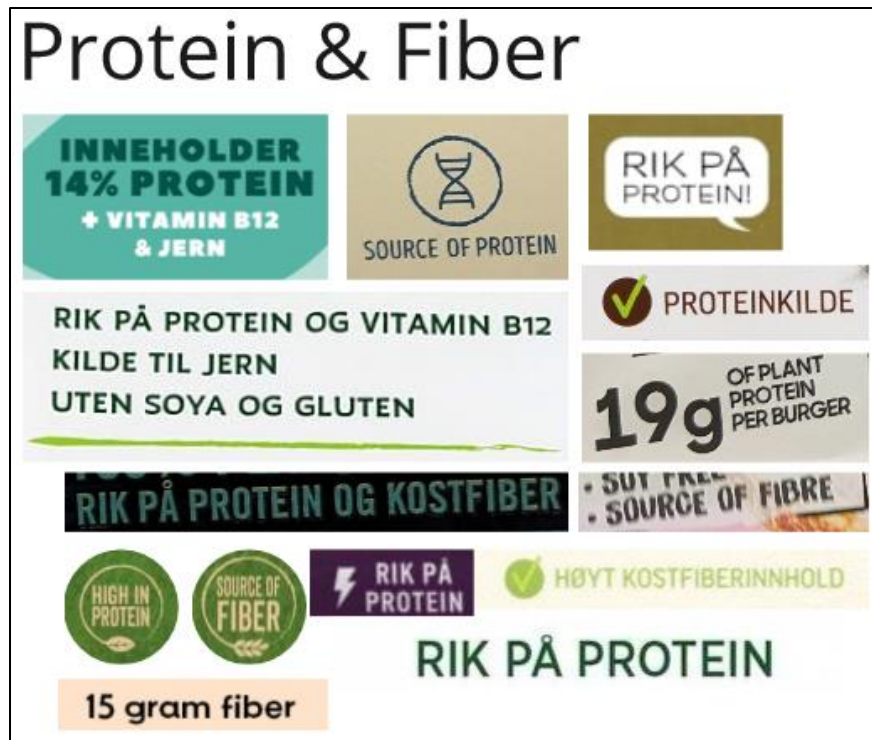


Figure 18. Protein- and fiber-rich labelling on PBM packaging.

### 3.2.3. Free from soy, gluten, meat, fish, additives, lactose

Free-from labeling on food products has grown in popularity. The expansion in specialty foods has even led to entire sections of grocery stores that feature “free-from” products, Norway included. “[In the past], plant-based and free-from products were largely limited to specialist health stores. Today, however, it is common to find entire plant-based and free-from sections in major supermarkets, as well as numerous options on the menus of high-street restaurants and public institutions” (Sexton, 2016, p. 69). 45 products (39%) were labeled as soy-free, 42 (37%) as gluten-free, 30 (26%) as meat and/or fish-free, 4 (3%) as additive/preservative-free, and 4 (3%) as lactose-free (Figures 19 & 20). Regarding the lactose-free status, this claim is more likely to be made on products meant to replace those that typically contain lactose, such as plant-based milks and yogurts. In the case of soy, it is not that consumers expect there to be soy in the animal counterparts, but rather that they expect soy to be present in plant-based products due to its frequency of use in PBMs. In fact, soy is an ingredient in 38 of the products reviewed (29%). Soy is a common ingredient due to its high protein content, though it has in recent years come under criticism for contributing to environmentally unfriendly practices, as its production is linked to deforestation in

South America. For this reason, soy-free has become a popular claim not only for those allergic to soy, but also for consumers attempting to make more environmentally conscious food choices. Many consumers choose PBM products for environmental reasons, so the soy-free status of a PBM product can be an attractive feature.



Figure 19. Meat-free labelling on PBM packaging.



Figure 20. Gluten-free and soy-free labelling on PBM packaging.

#### 3.2.4. Soy-based

While many products were advertised as being free from soy, 8 products (6%) indicated on the packaging that they were soy-based. It was found that the majority of plant-based meat products



sold in Norway (53%) are made with soy protein. When examining both the content and labeling of soy in the PBMs, the following statistics were found:

# products with soy that mention it on packaging	8
# products with soy that don't mention it	30
# products without soy that mention it on packaging	49
# products without soy that don't mention it	42

*Table 7. Count of products with soy-based and soy-free contents and labelling.*

30 of the products that contained soy deliberately avoided mentioning it on the front of the packaging, while only 8 advertised being soy-based. More products (49) explicitly highlighted the lack of soy rather than promoted that they contain soy (8), suggesting that being soy-free is a more desirable trait for PBM products to have. For products that did promote being soy-based, several specifically referred to being “made with European soy”, presumably to counter consumer concerns about the problematic nature of non-European soy being linked to environmental destruction of rainforests, like in Brazil.



*Figure 21. Soy-based labelling on PBM packaging.*

### 3.2.5. Easy to prepare / meal guidance

Commonly cited barriers to acceptance for PBMs in the literature were unfamiliarity with plant-based alternatives and unwillingness to try or learn how to prepare new foods (food neophobia). Many PBM products, eager to overcome this barrier, include text on the packaging that assures

consumers the product will be “enkel å tilberede” (easy to prepare) in the same way they are used to preparing the meat-based version (Figure 22). Others stated that they come “ready to eat” (though this may be somewhat misleading as most package instructions indicate that the product should be heated before eating). Some packaging even mentions specific meals or displayed a QR code for recipes tied to the product. Much of the packaging also incorporates imagery of the product in its finished form (though only text was included in the count for this category). A total of 43 products in the database (33%) indicate ease of preparation or provide guidance in the form of recipes and meal suggestions. These indications serve to appease consumers’ worries by promoting convenience and familiarity.



Figure 22. Easy to prepare / guidance for preparing labelling on PBM packaging.

### 3.2.6. Climate-friendly or transparent

With 96% of Norwegians agreeing that climate change is real and 60% agreeing that they have an individual responsibility for cutting their own greenhouse gas emissions (Aasen et al. 2022), climate-friendly labeling is becoming more common across multiple food products in Norway. 29 PBM products (22%) mentioned being climate-friendly or transparent, with phrases such as “bærekraftig” (sustainable), “low in CO<sub>2</sub>”, and “klimakompensert” (carbon compensated) (Figure 23). VegMe sausage packaging included the phrase “good for our planet”, and several of Naturli’s products, such as the “plantebasert deig” (plant-based mince) included an estimate of the climate

footprint (1.5 kg CO<sub>2</sub>E/kg in the case of the mince). Several products also highlighted the use of recycled plastic in the product's packaging.



Figure 23. Climate-friendly and transparent labelling on PBM packaging.

### 3.2.7. New, improved

Despite some consumers avoiding PBMs for reasons related to food neophobia, novelty is sometimes an attractive feature for certain consumer segments, particularly younger generations. 19 products (15%) included wording that indicated the product was new and/or an improved version of the product (Figure 24). This strategy could perhaps be a response to the development of food neophobia associated with PBMs that came about from a prior negative experience (most often related to taste). Text that promises an even better taste could convince skeptical consumers to give the product a second try.



Figure 24. New / improved labelling on PBM packaging.



### 3.2.8. Tasty

Taste is often cited as a primary factor in consumer acceptance of PBMs (Onwezen et al. 2021; Bryant and Sanctorem 2021; Anusha Siddiqui et al. 2022; Szenderák, Fróna, and Rákos 2022; Weinrich 2019; Rubio, Xiang, and Kaplan 2020; Andreani et al. 2023). 25 products (19%) explicitly called attention to the tastiness of their products on the packaging (Figure 25). Similar to the previous point, claims of improved taste could influence consumers towards purchasing the products.



Figure 25. Tasty labelling on PBM packaging.

### 3.2.9. Local

28 products (24%) had labeling that promoted the product as local, sometimes via the common product label “nyt Norge” (enjoy Norway) that highlights products of Norwegian origin, but also in text describing the product as “laget i Norge” (“made in Norway”) or “produsert i Norge” (“produced in Norway”) (Figure 26). Buying locally produced food is very important to Norwegian consumers. The 2020 Norwegian Eating Facts survey showed that 60% expressed that it was important to them that the products they ate were produced in Norway, while only 10% were indifferent to food’s origin (FoodProFuture 2022). 25 out of the 60 PBM products made in Norway (42%) had local labeling.



Figure 26. Local labelling on PBM packaging.

### 3.2.10. Natural, healthy, organic, clean

14 products (11%) indicated on the packaging that the products were natural, 13 (10%) indicated being healthy, 4 (3%) were described as clean (without additives or preservatives), and 6 (5%) were advertised as organic (Figure 27). For many consumers, the word “natural” evokes positive connotations of health, purity, goodness, and normality, in contrast to “unnatural”, which is linked to more negative perceptions. Organic labeling also presents an image of purity and being better for one’s health, in the sense that products are not exposed to artificial fertilizers and pesticides like conventional products are. Labeling products as natural, organic, healthy, and ‘clean’ (without preservatives) appeals to health-conscious consumers and serves to shift perceptions of PBMs away from being ultra-processed and unhealthy. It is interesting that a small minority of PBM products were organic. The PBM brand Naturli’, for example, states that they do not yet offer organic products due to cost and difficulty of obtaining organic ingredients (Naturli’ n.d.).



Figure 27. Natural / healthy / organic / clean labelling on PBM packaging.

### 3.2.11. Contains vitamin B12, iron

9 products (7%) had labeling that highlighted that the product contained vitamin B12, and 9 products (7%) advertised being rich in iron (oftentimes the products mentioned both together) (Figure 28). In the case of plant-based meats, both nutrients are additives that are introduced to bring the product closer in nutrient values to its animal-based counterpart. These nutritional benefits are specifically sought-after for health-conscious consumers.



Figure 28. Vitamin B12 and iron labelling on PBM packaging.

## 4. Discussion

### 4.1. Trends in the marketing of plant-based meats in Norway

4.1.1. Most PBMs in Norway are meat-like and are marketed as the same, but better

Meat demand is increasing in many countries, and Norway is no exception. Developers of PBMs recognize this desire and aim to give people what they want, but a better version of it, as evidenced by the 81% of PBMs in Norway being meat-like in nature. As Sexton (2018) argues, “the aim of [alternative protein (AP)] developers is to not only produce ‘the same’ but to provide better alternatives to conventional animal products. This notion of better-ness has been a key part of APs becoming food and is likewise materially and discursively bound to their edibility formation. In becoming food, APs have been positioned as cleaner, safer, higher-functioning [...], and more nutritious, ethical and sustainable alternatives to their conventional counterparts, and these traits are an important part of how developers promote them” (595). This trend of “same but better” is especially evident in the ways PBMs are formulated to be prepared and used in the same ways as their animal counterparts. Product types are designed to be familiar favorites – they closely resemble other processed meat products, like burgers, mince, nuggets, sausages, and more. Familiarity is a strategy to counter food neophobia that can deter consumers from trying new products. Consumers are further encouraged by text on the packaging to prepare the products just like meat, e.g., “ikke laget av dyr, men kan brukes på akkurat samme måte” (not made of animals but can be used in the exact same way) on Go’Vegan nuggets, and “use in your favourite recipes” on Beyond Mince. PBMs also highlight key nutritional features that consumers often search for in meat, namely protein. Yet, they go beyond conventional meat (“meat, but better”), by also offering a fiber-rich product with a lower carbon footprint. What’s more, PBMs provide opportunities for meat-reducing and meat-abstaining consumers to continue socially participating in meat-intensive practices such as summer barbecues (Hansen and Wethal 2023). It is only logical for PBM producers to continue producing meat analogs for the largely flexitarian target market that continues to demand such types of products.

### 4.1.2. Soy-free is a more popular claim than soy-based

Soy is a contentious ingredient for environmental and health-related reasons (Gonera and Milford 2018, 19). The soy crop does not thrive in colder climates to Norway and thus must be imported.

It has a reputation of being “produced on previous rainforest land, and therefore attributed the negative consequences of rainforest logging” (ibid., 19). However, “since [it] has some valuable qualities as an ingredient in meat analogues [such as high protein content,] it is still largely in use” (ibid., 19). The data shows that over half of PBMs sold in Norway (53%) are made with soy protein. At the same time, more products explicitly highlighted being soy-free rather than promoting that they contained soy, which suggests that being soy-free is a more desirable trait for PBM products to have. The contentious nature of soy could harm a product’s marketability, especially for consumers concerned about the environment who associate soy with rainforest destruction (ibid., 19). While research indicates that soy is no longer a direct driver of deforestation in the Brazilian Amazon (Ritchie and Roser 2021), more PBMs in Norway prefer to advertise being soy-free rather than soy-based, at least for the time being.

#### 4.2. Tensions in the marketing of plant-based meats in Norway

##### 4.2.1. There is confusion regarding the healthiness of PBMs

It’s not easy to find a news article or health-related report about PBMs that doesn’t mention ultra-processing in some way. Varela et al. (2022) found that “many [...] find a conflict between health & sustainability in industrial products [such as PBMs], perceiving them as highly processed and suggesting that [PBMs] might not be a straightforward way to drive omnivorous consumers to shift to a more plant-based diet” (1). This leads to confusion as consumers attempt to determine whether incorporating plant-based meat products into their diet makes sense. The research does not give a clear-cut answer on whether PBMs are healthy because it depends on several factors, such as what the product is being compared to and what ingredients and levels of processing the product contains (both of which vary greatly from product to product). The picture becomes even more complex when consumers are responsabilized to eat in an ethical and environmentally friendly way (Sexton 2018, 587), while at the same time being reminded to eat healthy and avoid ultra-processed foods. This conflict between values leads to hesitation in adopting new and existing PBM products on the market.

##### 4.2.2. There is a conflict between meat culture and sustainability

Trends have shown that people want to be sustainable but don’t want to give up meat, which is one reason why flexitarianism, rather than veganism or vegetarianism, is on the rise. In Norway, meat cultures are entrenched in eating practices, from the everyday to special occasions. Yet at the

same time, many Norwegians are aware of the climate crisis and meat production's connection to it. PBM products like Coop Vegetardag present alternatives that can help ease one's conscience with regards to the environment by giving consumers the opportunity to have a "vegetarian day" once in a while. With PBM labeling also highlighting climate footprints and recycled packaging, the product calls for the consumer to make the "right" ethical choice by selecting a more climate-friendly product. Yet climate footprints don't mean much when there is nothing to compare them to – if the equivalent beef product were required to have the same climate labeling, the label might have a different effect. In fact, meat products can also be packaged with recycled packaging and labeled as more environmentally friendly. The tension between a strong meat culture and a nation that strives towards a green shift is evident in the marketing of PBMs.

#### 4.2.3. There are complex trade-offs in shopping local vs sustainable vs healthy

Perhaps even more so than sustainability, local production matters a great deal to Norwegian consumers in their food choices (FoodProFuture 2022). The food landscape in Norway has changed drastically over the past century from the influence of globalization and the proliferation of convenience foods, as well as increased individual purchasing power. Norway currently imports 50% of its food from abroad (Norges Bondelag n.d.). However, demand for locally produced food ("kortreist mat") is rising, especially as a reaction to the war in Ukraine resulting in disrupted food supply chains and heightened uncertainties regarding food security (Good Food Institute 2022a). Environmental concern for the carbon footprints of imported goods is also a factor affecting the shifting preference towards local production. Meat and dairy producers and organizations are capitalizing on this rise in local interest to promote Norwegian animal agriculture as more sustainable, even if lifecycle analysis comparisons of conventional vs plant-based meat show otherwise (Bryant 2022). Local production remains a high priority for Norwegians, and PBM producers are starting to adapt by researching and developing plant proteins based on local ingredients such as faba beans (also known as broad beans). Faba beans are promising to researchers because they "have a protein content of ca 30 percent. [Researchers] have developed a fractionation technique that doubles the protein content of the protein fraction" (Hægermark 2022). Despite these innovations, for many PBM producers, cost remains a barrier to using Norwegian ingredients. Gonera and Milford (2018) found that "using Norwegian ingredients is an aspiration, but as the raw material is a key determinant of the final price of the product, Norwegian commodities that are not protected by tariffs from import competition have a disadvantage" (4).

## 5. Summary and implications

### 5.1. Key takeaways

The key findings of this report are summarized below.

Literature review findings:

- There remains low consumer acceptance of plant-based meats, though acceptance is increasing.
- Some evidence suggests that plant-based meats are not fully displacing the demand for conventional meat.
- Flexitarians are the primary target market for plant-based meat products, and while flexitarianism is on the rise, it is increasing largely in stated identity rather than in practice.
- The plant-based meat industry faces adoption challenges related to perceptions of the unhealthiness of PBMs' ultra-processed status, as well as confusion about nutrient uptake and bioavailability when it comes to plant proteins.
- There is much nutritional variation across products, making it difficult to conclude that PBMs across the board are 'healthy' or 'unhealthy'.
- Plant-based meat products tend to be more environmentally friendly than their conventional counterparts, but not in all cases. Processing, ingredients, marketing, and other factors influence the environmental footprints of products.

Marketing label analysis findings:

- The majority of PBM products in Norway are meat-like in nature, aiming to appeal to meat-eaters and meat-reducers (flexitarians).
- PBMs are more frequently marketed as soy-free than soy-based, implying that soy-free is a more attractive trait for products in the Norwegian PBM market.
- There are complex trade-offs consumers make between local, sustainable, healthy, tasty, and affordable food. When it comes to PBMs, there is greater uncertainty as to whether products are healthy, tasty, local (in terms of sourcing of ingredients), and sustainable.
- Affordability of PBMs remains low.

## 5.2. Implications of findings

The findings of this report can provide a clearer picture of the trends, tensions, and discourses surrounding plant-based meat alternatives and their marketing. The product mapping provides data that can be useful to relevant research projects within Norway, or a framework that can be replicated in other contexts. Findings can potentially influence the direction of future research, policy planning, and PBM product development in Norway.

## 5.3. Limitations

While the alternative proteins category includes a wide variety of product types, this report restricts its focus primarily to plant-based meat and thus largely excludes discussion of other meat alternatives like cell-based or insect-based products, as well as other animal product alternatives like plant-based egg and dairy alternatives, though these are highly relevant to the alternative protein industry as a whole. There are indications from the findings of this report that the cellular agriculture market is expected to grow potentially even beyond the PBM market.

The data collected on plant-based products offered in Norway is very likely to be incomplete for several reasons. First, the researcher only visited a small selection of stores. These stores were located in Oslo and may not be representative of the plant-based meat offerings throughout the rest of Norway. In addition, product offerings are changing constantly, with new PBM products entering the market on a regular basis while others go out of production or stop being sold in Norway. The selection of products can also vary from store to store and day to day. Finally, the prices of the plant-based meat products should only be used as a general estimate as prices frequently fluctuate, as the researcher observed during the course of the research project from May to September 2023. Price data was also collected across the entire research period, not all on the same day, so price fluctuations that may have happened during the course of the research may have skewed the data. Future studies wishing to utilize price data would be better off obtaining this data from a reputable online source all on the same day rather than through manual collection over time if resources allow.

## 5.4. Suggestions for further research

A number of studies made suggestions for future research directions, which will be briefly summarized here, along with some additional suggestions by the researcher.



The lack of clarity on plant-based meat's nutritional value, especially when it comes to nutrient uptake, remains a key challenge for the PBM industry and is important for a variety of key actors, especially health professionals and governments putting forth updated dietary guidelines in the midst of a changing food tech landscape. Research on how to improve nutrient uptake from plant-based foods is key for the industry's future success.

Research into consumer acceptance of PBMs is available but sparse. Bryant et al. (2019) contends that the benefits of alternative proteins like PBM and clean meat will only be realized to the extent that they displace demand for conventional meat; therefore, understanding consumer attitudes towards these products and how they change over time is imperative for increasing acceptance, as many other researchers also argue (He et al. 2020; Onwezen et al. 2021; Bryant and Sanctorem 2021; Anusha Siddiqui et al. 2022; Weinrich 2019). Research by Bryant et al (2023) presents evidence that increased consumption of meat and dairy alternatives were linked to decreased consumption of meat and dairy, but other literature (Good Food Institute 2023; Woroniecka 2022) expresses doubt. Thus, more research is needed to better understand how consumption of PBMs impacts consumption of animal-based products.

More research needs to be undertaken regarding how the ultra-processed status of many PBMs affects both attitudes and market demand, as well as how products can be produced and marketed differently to improve acceptance of ultra-processed PBMs.

Future research could also include data on conventional meat products for comparison purposes. It would be particularly interesting to compare price differences, as price is often stated as a factor influencing PBM adoption.

According to the Good Food Institute's latest industry report (Good Food Institute 2022b), global demand for PBMs has stagnated. Their outlook report also indicates an industry shift towards greater investment in cellular agriculture as compared to PBMs (Good Food Institute 2023). The Research Council of Norway has invested €2 million into a five-year project called "The Arrival of Cellular Agriculture – Enabling Biotechnology for Future Food Production" (Good Food Institute 2022a, 36). It remains to be seen how increased investment in cellular agriculture will affect PBM demand. Future research on the impacts of investment in cellular agriculture, among other emerging areas of alternative proteins, would contribute to increasing the understanding of the market.

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## Appendix B: Table of Prices of PBM Products in Norway

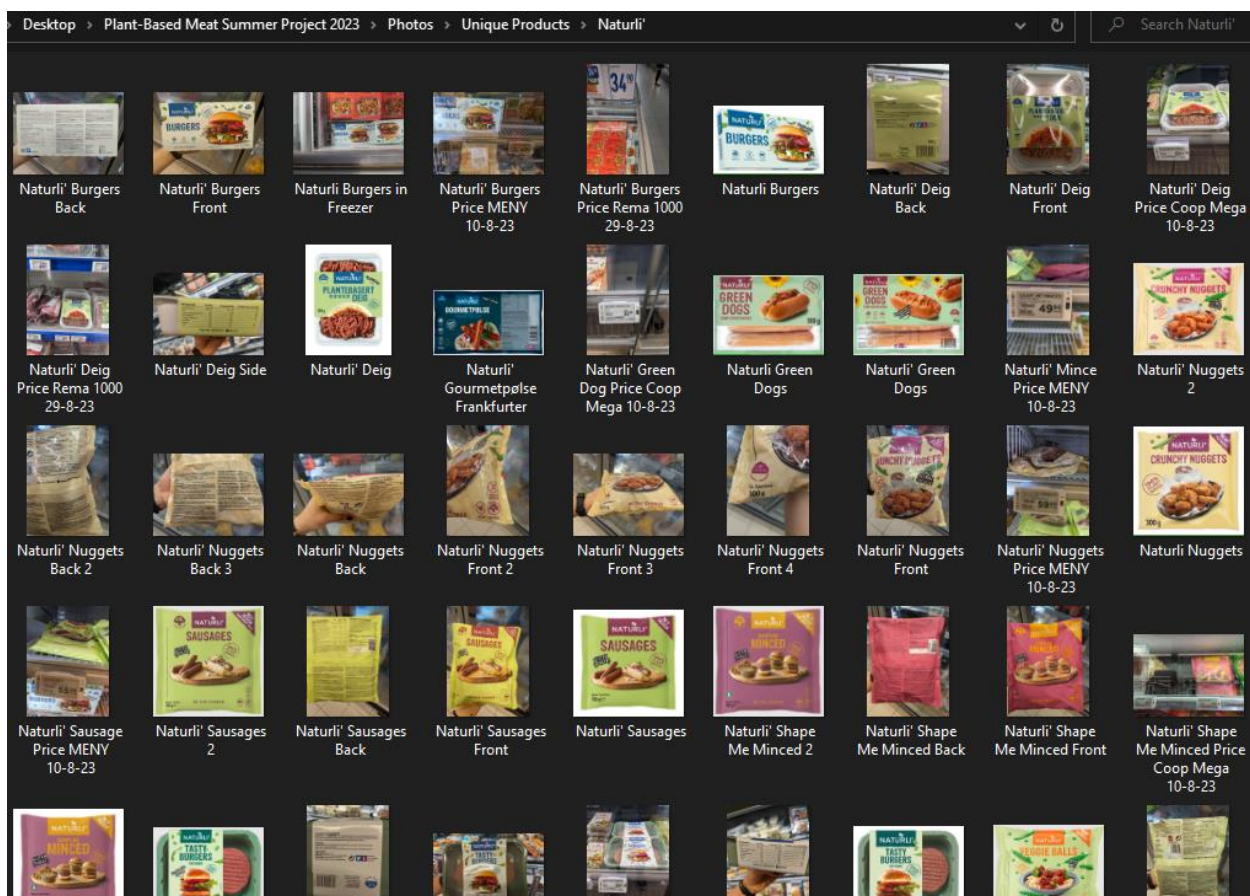
Contact [johannrv@uio.no](mailto:johannrv@uio.no) for access to the data.

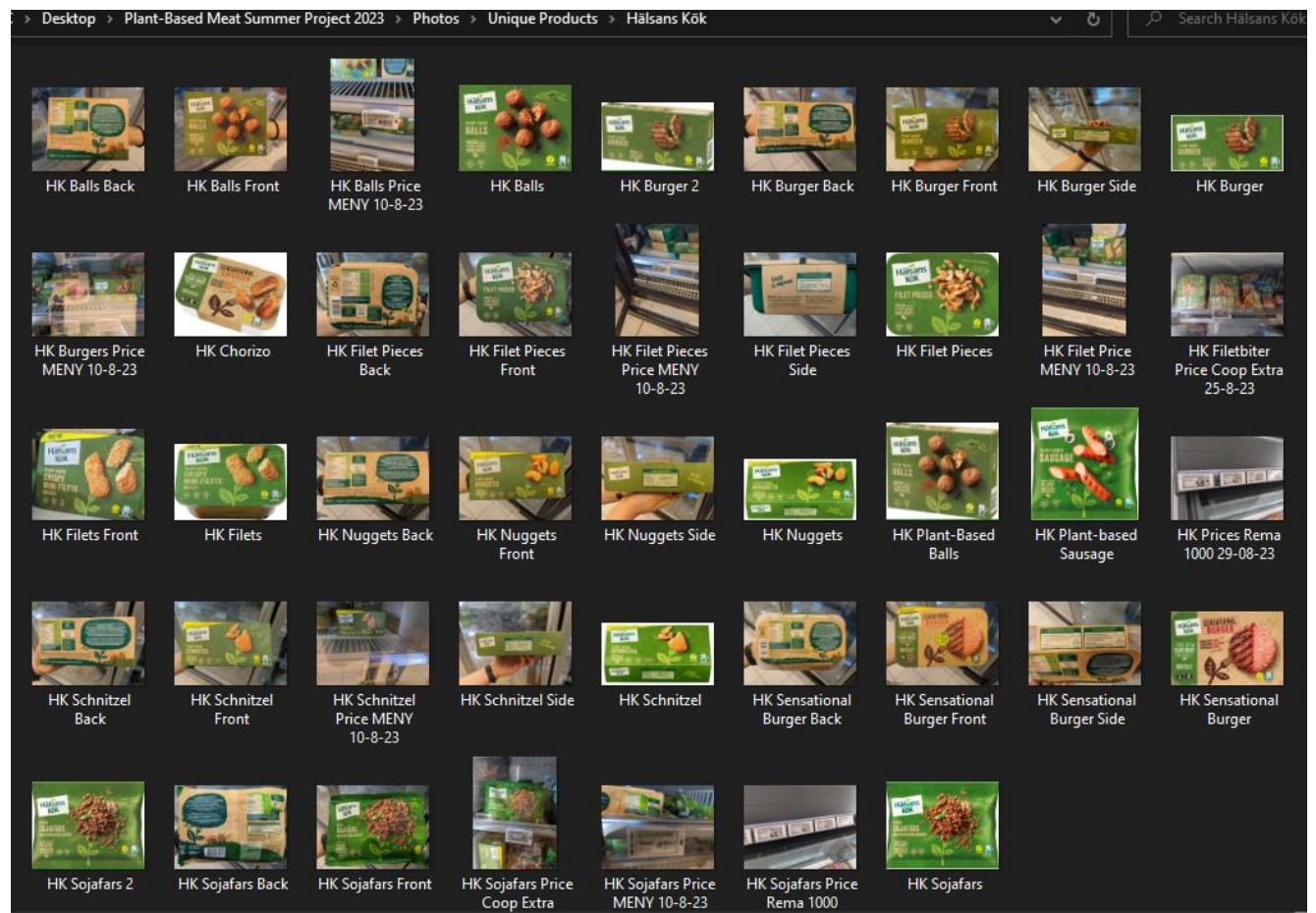
Seller	Brand	Category	URL	Product Identifier	Product	Main protein ingredient	Wt (g)	Price	Price per kg	Price per kg group	Status	Date recorded
MENY Online	Astrid&apoma	Cold Cuts	<a href="https://meny.no/produkt/Astrid&amp;apoma-Salami">https://meny.no/produkt/Astrid&amp;apoma-Salami</a>	Astrid&apoma Salami	Salami Vegansk   100g Astrid&apoma	Wheat protein	100	49.90	499.00	>400	In stock	16.08.2023
Coop Mega	Beyond Meat	Burger	n/a	Beyond Burger	Beyond Burger	Pea protein	226	90.90	402.21	>400	In stock	26.07.2023
KIWI	Beyond Meat	Burger	n/a	Beyond Burger	Beyond Burger	Pea protein	226	52.40	231.86	200-300	In stock	22.07.2023
MENY	Beyond Meat	Burger	<a href="https://meny.no/produkt/Beyond-Burger">https://meny.no/produkt/Beyond-Burger</a>	Beyond Burger	Beyond Burger	Pea protein	226	65.50	289.82	200-300	In stock	26.07.2023
ODA	Beyond Meat	Burger	<a href="https://oda.no/produkt/Beyond-Burger">https://oda.no/produkt/Beyond-Burger</a>	Beyond Burger	Beyond Burger 2 stk	Pea protein	226	53.20	234.36	200-300	In stock	16.06.2023
MENY	Beyond Meat	Meatballs	<a href="https://meny.no/produkt/Beyond-Meatballs">https://meny.no/produkt/Beyond-Meatballs</a>	Beyond Meatballs	Beyond Meatballs	Pea protein	200	72.40	362.00	300-400	In stock	26.07.2023
MENY	Beyond Meat	Mince	<a href="https://meny.no/produkt/Beyond-Mince">https://meny.no/produkt/Beyond-Mince</a>	Beyond Mince	Beyond Mince	Pea protein	300	73.70	245.67	200-300	In stock	26.07.2023
ODA	Beyond Meat	Mince	<a href="https://oda.no/produkt/Beyond-Mince">https://oda.no/produkt/Beyond-Mince</a>	Beyond Mince	Minced kjøttdeigstatning 300 g	Pea protein	300	71.50	238.33	200-300	In stock	16.06.2023
MENY	Beyond Meat	Sausage	<a href="https://meny.no/produkt/Beyond-Sausage">https://meny.no/produkt/Beyond-Sausage</a>	Beyond Sausage	Beyond Sausage	Pea protein	200	74.50	372.50	300-400	Sold out	26.07.2023
ODA	Bjerke Spekemat	Cold Cuts	<a href="https://oda.no/produkt/Bjerke-Vegetarpalegg-Jalapeno">https://oda.no/produkt/Bjerke-Vegetarpalegg-Jalapeno</a>	Bjerke Vegetarpalegg Jalapeno	Vegetarpalegg Jalapeno 80 g	Egg white	80	44.50	556.25	>400	In stock	16.06.2023
ODA	Bjerke Spekemat	Cold Cuts	<a href="https://oda.no/produkt/Bjerke-Vegetarpalegg-Naturell">https://oda.no/produkt/Bjerke-Vegetarpalegg-Naturell</a>	Bjerke Vegetarpalegg Naturell	Vegetarpalegg Naturell 80 g	Egg white	80	44.50	556.25	>400	In stock	16.06.2023
ODA	Bjerke Spekemat	Cold Cuts	<a href="https://oda.no/produkt/Bjerke-Vegetarpalegg-Pepper">https://oda.no/produkt/Bjerke-Vegetarpalegg-Pepper</a>	Bjerke Vegetarpalegg Pepper	Vegetarpalegg Pepper 80 g	Egg white	80	44.50	556.25	>400	In stock	16.06.2023
Coop Mega	Coop	Pieces	n/a	Coop Karbonader	Karbonader (50% Kjøtt, 50% Grant)	Beef	400	32.90	82.25	<100	In stock	26.07.2023
Coop Mega	Coop	Meatballs	n/a	Coop Kjøttboller	Kjøttboller (50% Kjøtt, 50% Grant)	Beef	400	31.90	79.75	<100	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Meatballs	n/a	Coop Vegetarlag Boller	Coop Vegetarlag Boller	Vegetables	350	83.90	239.71	200-300	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Burger	<a href="https://coop.no/produkt/Coop-Vegetarlag-Burger-brokkoli">https://coop.no/produkt/Coop-Vegetarlag-Burger-brokkoli</a>	Coop Vegetarlag Burger brokkoli	Burger av Brokkoli og Erter	Broccoli and pea	160	51.90	324.38	300-400	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Burger	n/a	Coop Vegetarlag Burger med røkt smak	Burger med røkt smak	Pea and field bean	240	51.90	216.25	200-300	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Burger	n/a	Coop Vegetarlag Burger rødbrøt	Burger av rødbrøt, linser og søtpotet	Beetroot and lentils	160	51.90	324.38	300-400	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Burger	<a href="https://coop.no/produkt/Coop-Vegetarlag-Burger-sopp">https://coop.no/produkt/Coop-Vegetarlag-Burger-sopp</a>	Coop Vegetarlag Burger sopp	Burger av Sopp	Mushroom	160	51.90	324.38	300-400	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Pieces	n/a	Coop Vegetarlag Chunks	Chunks	Pea protein	250	79.90	315.60	300-400	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Mince	n/a	Coop Vegetarlag Deig	Vegansk Deig	Pea protein	200	38.90	194.50	100-200	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Nuggets	n/a	Coop Vegetarlag Nuggets	Nuggets	Pea and field bean	300	53.90	179.67	100-200	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Pieces	n/a	Coop Vegetarlag Panett	Panett	Pea and field bean	180	48.90	271.67	200-300	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Sausage	<a href="https://coop.no/produkt/Coop-Vegetarlag-Pølser">https://coop.no/produkt/Coop-Vegetarlag-Pølser</a>	Coop Vegetarlag Pølser	Pølser	Egg white	330	62.90	190.61	100-200	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Sausage	n/a	Coop Vegetarlag Pølser ost og chili	Pølser ost og chili	Egg white	330	62.90	190.61	100-200	In stock	26.07.2023
Coop Extra	Coop Vegetarlag	Cold Cuts	n/a	Coop Vegetarlag Pållegg Jalapeno	Pållegg Jalapeno	Egg white	80	15.30	191.25	100-200	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Cold Cuts	n/a	Coop Vegetarlag Pållegg Jalapeno	Pållegg Jalapeno	Egg white	80	17.90	223.75	200-300	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Cold Cuts	n/a	Coop Vegetarlag Pållegg Naturell	Pållegg Naturell	Egg white	80	17.90	223.75	200-300	In stock	26.07.2023
Coop Mega	Coop Vegetarlag	Cold Cuts	<a href="https://coop.no/produkt/Coop-Vegetarlag-Pållegg-Pepper">https://coop.no/produkt/Coop-Vegetarlag-Pållegg-Pepper</a>	Coop Vegetarlag Pållegg Pepper	Pållegg Pepper	Egg white	80	22.50	281.25	200-300	In stock	26.07.2023
MENY Online	Den stolte hane	Pieces	<a href="https://meny.no/produkt/Den-stolte-hane-Pieces">https://meny.no/produkt/Den-stolte-hane-Pieces</a>	Den stolte hane Pieces	Planteprotein   Spicy Paprika 200g Dsh	Pea protein	200	53.90	269.50	200-300	Sold out	16.06.2023
Eat Green (Online)	Eat Green	Mince	<a href="https://eatgreen.no/produkt/Eat-Green-Mince">https://eatgreen.no/produkt/Eat-Green-Mince</a>	Eat Green Mince	Meat Free Mince	Pea protein	300	44.90	149.67	100-200	In stock	31.08.2023
Eat Green (Online)	Eat Green	Pieces	<a href="https://eatgreen.no/produkt/Eat-Green-Pulled">https://eatgreen.no/produkt/Eat-Green-Pulled</a>	Eat Green Pulled	Pulled BBQ	Jackfruit	300	49.90	166.33	100-200	In stock	31.08.2023
Eat Green (Online)	Eat Green	Mince	<a href="https://eatgreen.no/produkt/Eat-Green-Taco-Mince">https://eatgreen.no/produkt/Eat-Green-Taco-Mince</a>	Eat Green Taco Mince	No Meat Taco Mince	Pea protein	300	59.90	199.67	100-200	In stock	31.08.2023
Coop Extra	Findus	Nuggets	<a href="https://coop.no/produkt/Findus-Nuggets">https://coop.no/produkt/Findus-Nuggets</a>	Findus Nuggets	Sprebakte Grønnsaks Nuggets	Vegetables	310	47.20	152.26	100-200	In stock	10.07.2023
ODA	Findus	Nuggets	<a href="https://oda.no/produkt/Findus-Nuggets">https://oda.no/produkt/Findus-Nuggets</a>	Findus Nuggets	Sprebakte Grønnsaks Nuggets	Vegetables	310	49.90	160.97	100-200	No longer available	29.08.2023
Coop Mega	Findus	Pieces	n/a	Findus Spinatpinner	Spinatpinner	Vegetables	284	43.90	154.58	100-200	In stock	26.07.2023
MENY	Findus	Pieces	<a href="https://meny.no/produkt/Findus-Spinatpinner">https://meny.no/produkt/Findus-Spinatpinner</a>	Findus Spinatpinner	Spinatpinner	Vegetables	284	40.00	140.85	100-200	In stock	26.07.2023
MENY Online	Finsbrøten	Sausage	<a href="https://meny.no/produkt/Finsbrøten-Sausage">https://meny.no/produkt/Finsbrøten-Sausage</a>	Finsbrøten Sausage	Grillpølser   Meatfree 200g Finsbrøten	Egg white	200	69.90	349.50	300-400	Sold out	16.06.2023
ODA	FlowFood	Burger	<a href="https://oda.no/produkt/FlowFood-Burger">https://oda.no/produkt/FlowFood-Burger</a>	FlowFood Burger	Plantebaserte Burgere 2 stk	Pea and field bean	240	69.30	288.75	200-300	In stock	16.06.2023
ODA	FlowFood	Meatballs	<a href="https://oda.no/produkt/FlowFood-Meatballs">https://oda.no/produkt/FlowFood-Meatballs</a>	FlowFood Meatballs	Plantebaserte Stekte Boller 240 g	Pea and field bean	240	64.90	270.42	200-300	In stock	16.06.2023
Coop Mega	FlowFood	Mince	n/a	FlowFood Mince	FlowFood Mince	Pea and field bean	400	54.90	137.25	100-200	Sold out	26.07.2023
ODA	FlowFood	Mince	<a href="https://oda.no/produkt/FlowFood-Kjøttdeig">https://oda.no/produkt/FlowFood-Kjøttdeig</a>	FlowFood Kjøttdeig	Plantebasert kjøttdeig 400 g	Pea and field bean	400	74.90	187.25	100-200	In stock	06.09.2023
ODA	FlowFood	Nuggets	<a href="https://oda.no/produkt/FlowFood-Nuggets">https://oda.no/produkt/FlowFood-Nuggets</a>	FlowFood Nuggets	Plantebaserte Nuggets 240 g	Pea and field bean	240	64.90	270.42	200-300	In stock	16.06.2023
Bumpis	Folkets	Burger	n/a	Folkets Burger	Very Hip Vegan Burger	Soy protein	226	45.90	203.10	200-300	In stock	16.08.2023
KIWI	Folkets	Burger	n/a	Folkets Burger	Very Hip Vegan Burger	Soy protein	226	45.40	200.88	200-300	In stock	29.08.2023
MENY	Folkets	Burger	<a href="https://meny.no/produkt/Folkets-Burger">https://meny.no/produkt/Folkets-Burger</a>	Folkets Burger	Vegansk Burger   226g Folkets	Soy protein	226	53.80	238.05	200-300	In stock	26.07.2023
MENY Online	Folkets	Burger	<a href="https://meny.no/produkt/Folkets-Burger">https://meny.no/produkt/Folkets-Burger</a>	Folkets Burger	Vegansk Burger   226g Folkets	Soy protein	226	49.90	220.80	200-300	In stock	16.06.2023
KIWI	Folkets	Mince	n/a	Folkets Deig	Plantebasert Deig av Soyabønner	Soy protein	250	39.90	159.60	100-200	In stock	29.08.2023
Bumpis	GoVegan	Sausage	n/a	GoVegan Bratwurst	Bratwurst	Pea protein	240	59.50	210.42	200-300	In stock	16.08.2023
KIWI	GoVegan	Sausage	n/a	GoVegan Bratwurst	Bratwurst	Pea protein	240	44.90	187.08	100-200	In stock	29.08.2023
MENY	GoVegan	Sausage	n/a	GoVegan Bratwurst	Bratwurst	Pea protein	240	55.30	230.42	200-300	In stock	26.07.2023
ODA	GoVegan	Sausage	<a href="https://oda.no/produkt/GoVegan-Bratwurst">https://oda.no/produkt/GoVegan-Bratwurst</a>	GoVegan Bratwurst	Plantebasert Bratwurst 240 g	Pea protein	240	45.20	188.33	100-200	No longer available	16.06.2023
Bumpis	GoVegan	Burger	n/a	GoVegan Burger	Burger	Pea protein	220	59.90	272.27	200-300	In stock	16.08.2023
MENY	GoVegan	Burger	<a href="https://meny.no/produkt/GoVegan-Burger">https://meny.no/produkt/GoVegan-Burger</a>	GoVegan Burger	Burger	Pea protein	220	57.40	259.91	200-300	In stock	16.08.2023
Bumpis	GoVegan	Sausage	n/a	GoVegan Chorizo	Chorizo	Pea protein	240	48.90	203.75	200-300	In stock	16.08.2023
KIWI	GoVegan	Sausage	n/a	GoVegan Chorizo	Chorizo	Pea protein	240	49.90	207.92	200-300	In stock	06.09.2023



## Appendix C: PBM Photo Archive

Contact [johannrv@uio.no](mailto:johannrv@uio.no) for access to the photo archive.







## Appendix D: All PBM Products by Type

