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Plant-based foods for future: Results of consumer and professional expert interviews in five European countries, EIT-Food Project "The V-Place"

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Plant-based foods for future

**Results of consumer and professional expert interviews in five European
countries - EIT-Food Project „The V-Place“**

Beate Gebhardt & Klaus Hadwiger

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1 Classification in the EIT Food-Project „The V-Place“

A consortium of partners from science and industry, including the Universities of Hohenheim (UHOH), Aarhus, Bologna and Turin, the companies Danone and Doehler, and the non-governmental organization ProVeg International as consulting partner, is investigating the decisive factors in purchasing decisions for plant-based foods in a two-stage European consumer study in 2020. In the project "The V-Place - Enabling consumer choice in Vegan or Vegetarian food products", the drivers and barriers of plant-based food purchases and the information needs of consumers in the six countries Denmark, France, Germany, Italy, Spain and Poland are also being determined. The leading questions are the following:

- Are health, ethical, ecological or completely different reasons the driving forces to buy plant-based foods?
- Which reservations and barriers to purchase do consumers have towards plant-based food products?
- Do the taste and/or appearance of the alternative products have to come as close as possible to the original - or on the contrary should they be clearly distinguishable?

The project is accompanied by background articles as well as social media actions in cooperation with the EIT Food Web platform „FoodUnfolded“ (<https://www.foodunfolded.com/>) which is dedicated to information and entertainment around the topics of food and nutrition. The project is led by the Hohenheim Research Center for Bioeconomy, University of Hohenheim. The Department of Agricultural Markets at the University of Hohenheim is responsible for the qualitative studies. This project is funded by EIT Food, the Food Innovation Community of the European Institute of Innovation and Technology (EIT). EIT is an EU institution under Horizon 2020, the EU Framework Programme for Research and Innovation.

The interviews with 70 consumers and professional experts in total, as part one of the two-stage study of „The V-Place“ in six European countries, has already been completed. This working paper documents the methodology of the qualitative studies (see chapter 3) and the resulting insights (see chapter 4). We will start with some few theoretical basics and background in chapter 2 and close with an outlook on the next steps.

2 Basics and background to plant-based food products

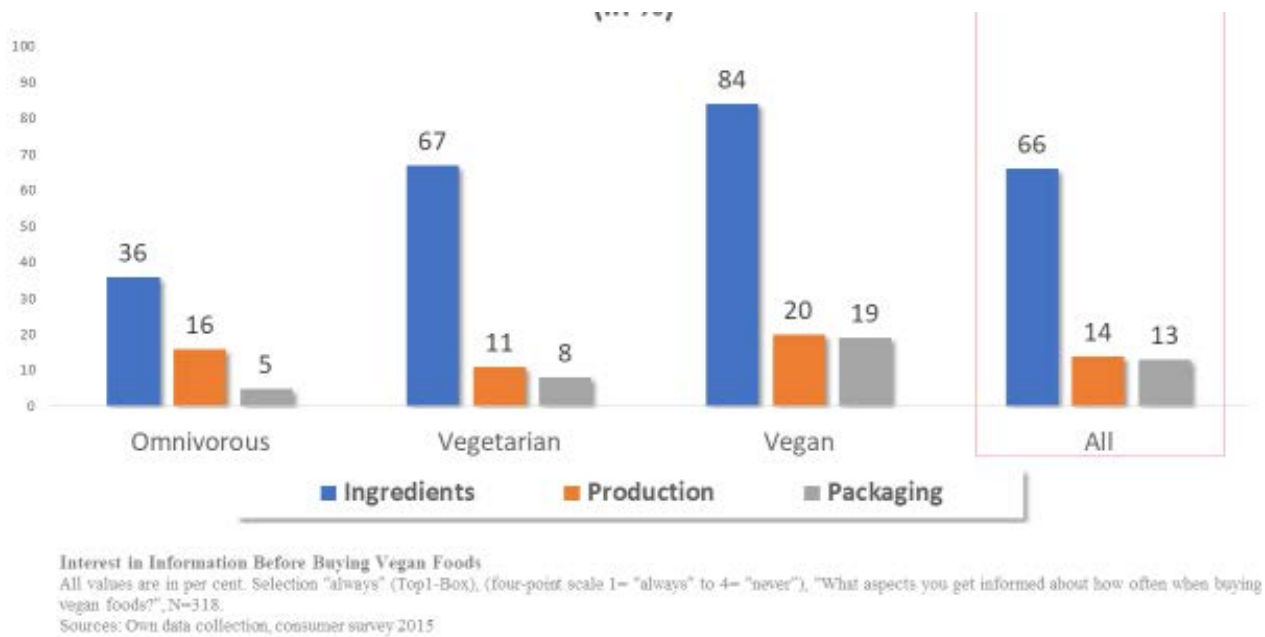
The demand for vegan and vegetarian food products, including alternatives to meat, milk, or eggs, has increased significantly in Europe in recent years: The market for these so-called "plant-based foods" is booming and there is no end in sight to this growth trend. Around 75 million people in Europe have adopted a vegetarian or vegan diet. The number of flexitarians, i.e. people who are increasingly concerned about the sustainability of their food consumption and wish to limit their meat consumption, is much greater still. In 2019, the global meat alternatives market was valued at \$4,532.6 million and is anticipated to reach \$7,106.7 million by 2025. The global dairy alternatives market (including milk substitutes) is valued at \$16,130.9 million in 2019 and is anticipated to reach \$41,061 million in 2025. The European plant-based food market is set for "incredible growth" (www.vegansociety.com).

But for many consumers who want to replace products of animal origin partially or completely, finding the right information, including how to avoid nutritional deficiencies, is a challenge. There is an identified need to research and actualize the knowledge about consumer expectations, attitudes, and needs to adapt current strategies accordingly.

Former studies have shown that consumers' expectations and the information need about vegan-vegetarian food products vary according to their nutrition style, or age, gender, and education level (e.g. Gebhardt et al., 2019; Gebhardt, 2017). Consumers can be distinguished by their preferred dietary habits:

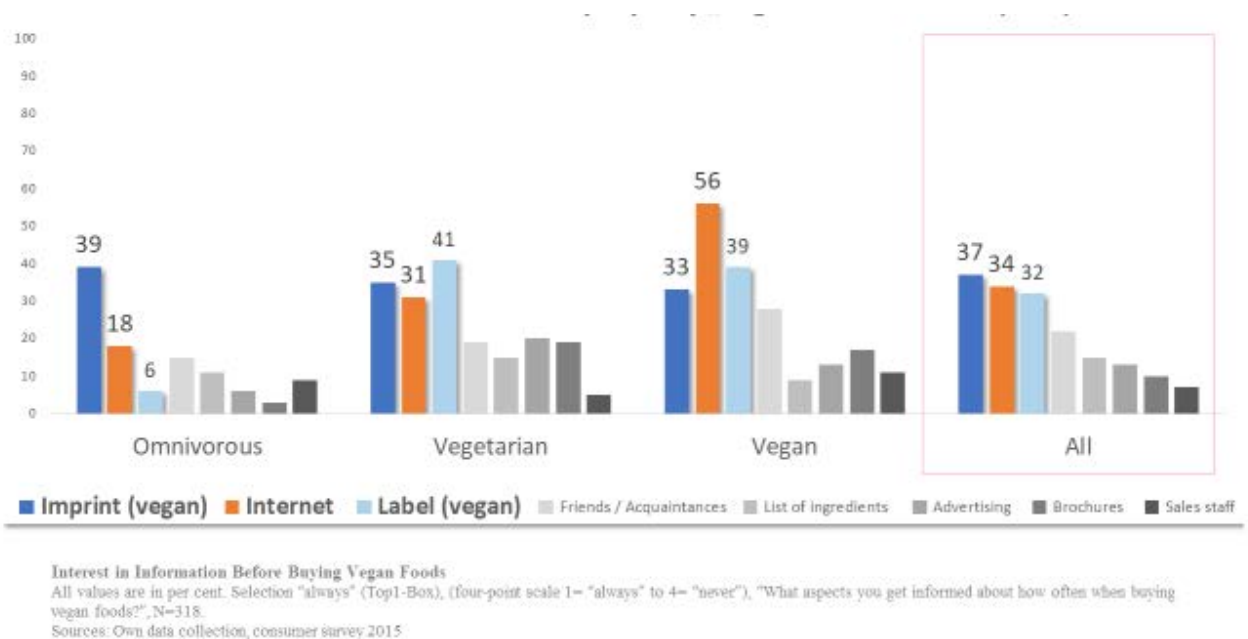
- *Omnivorous*: nutrition includes both animal and plant-based foods, unspecialized
- *Flexitarian*: nutrition is mainly similar to omnivorous but with an active reduction of animal-derived foods
- *Vegetarian*: nutrition without meat and fish (only eggs, milk, and dairy etc. are accepted)
- *Vegan*: nutrition is exclusively plant-based without any animal products

Figure 1: Consumers' prior interest in information before buying vegan foods (in %)



Source: Gebhardt et al. 2019.

Figure 2: Sources of information on the property „vegan“ on foodstuff (in %)



Source: Gebhardt et al. 2019.

All respondents in a study among 318 German consumers (Gebhardt et al., 2019) are primarily interested in information regarding the ingredients of plant-based foods and

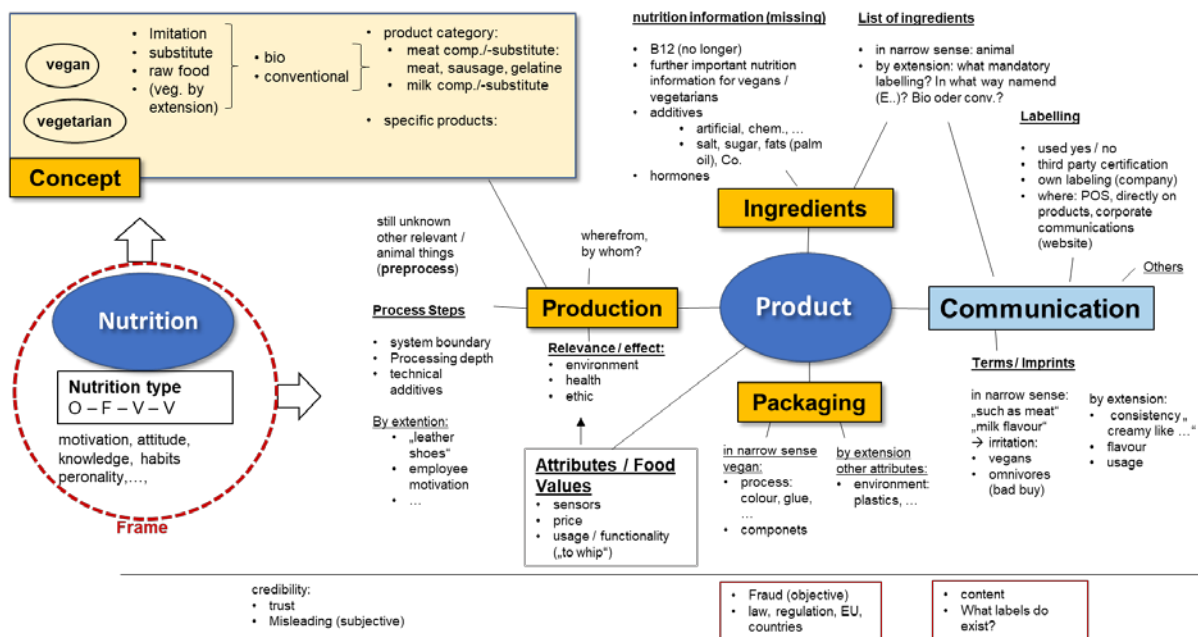
less often in their production or packaging (see figure 1). On average, around 66 per cent of respondents always learn about the ingredients when buying plant-based food. From the group of omnivores, 36 per cent always get informed about the ingredients, while from the group of vegans, 84 per cent do so. This illustrates that many vegans need to be constantly sure about the vegan property of their products; they look for information about this in various sources, but rarely on the list of ingredients (see figure 2).

“Vegan” is an artificial word. The Vegan Society of England (VSE, n.d.) created it in 1944 using the first three and last two letters of the term “vegetarian”. Its aim was to distinguish itself from the ovo-lacto-vegetarian diet as “more consistent vegetarianism” (VSE, n.d.). Advertisements and even today’s everyday language often use the terms “vegan”, “vegetarian”, or “purely vegetable” undifferentiated or as synonyms (Taschan, 2016; Gebhardt et al., 2016). “Meatless” or “made from soy” are further variants that suggest vegan foods and thus contribute to consumer confusion (Ökotest, 2016). Internationally, there are different definitions of vegan. Only in April 2016 did the consumer ministers of the federal states in Germany agree on a common definition of “vegan food”, which is now to be used as the basis for food safety control in Germany: In this respect, food is vegan if “it is not of animal origin and no ingredients [...], processing aids, or non-food additives [...] of animal origin are used at any stage of production and processing” (Verbraucherschutzministerkonferenz [VSMK], 2016). Vegetarian foods include here vegan foods, but not vice versa. Vegan foods appear in many forms or concepts: Imitates, substitutes, or raw foods (see figure 3). Meat imitates are similar in texture and taste to meat, and the same applies to milk or egg substitutes. In addition to these imitations, substitutes such as vegetable spreads are also among vegan foods (IFH Köln, 2016). Raw food, i.e. unprocessed vegetable food, is particularly important in vegetarian and vegan diets. However, it is not classified nor claimed as vegan food as defined above.

So far, looking at the product alone before purchase or during consumption has not made it possible for consumers to determine whether a food is vegan or non-vegan in the case all production and processing stages and if all ingredients and additives used have been taken into account (VSMK, 2016). Since processing aids also do not have to be declared on the list of ingredients, consumers do not find them there either (Verbraucherzentrale Bundesverband [vzbv], 2015; Gebhardt et al., 2020a). The

designation of plant-based foods as "vegetarian schnitzel" or "veggie sausage" seems also to be confusing. In view of these challenges, vegan is a "credence quality", the quality of which cannot easily be judged either by prior observation (Darbi & Karni, 1973; Jahn, Schramm, & Spiller, 2005). Only additional informative measures by manufacturers, independent organizations, or the state can help to overcome information asymmetries and establish reliable and transparent traceability (Akerlof, 1970). Warranties, labels, or advertising may constitute such a signal (Gebhardt et al., 2020b). It leads to the "dilemma of information and animation" (Belz & Ditze, 2005, p. 78) in the face of an increasing flood of information and an enormous financial advertising volume.

Figure 3: Framework of consumer interest or concerns on plant-based foods



Source: Own illustration.

A brainstorming exercise with colleges and experts at the University of Hohenheim gave additional insights in consumer interest or concerns about plant-based foods (see figure 3) which can be used as a framework for analysis and points out to what has to be considered in detail in the following research concept.

3 Methods of the qualitative studies

According to these criteria, consumers as private household experts are selected for the qualitative study (see chapter 3.1). In addition, the opinion of professional experts is also taken into account (see chapter 3.2). This ensures that drivers and barriers in the production and communication of vegan-vegetarian food, as well as the entire market situation in five European countries observed in this study, are adequately captured.

Within this survey, “plant-based food products” are considered products of purely plant origin attempting to resemble the texture, taste, and/or appearance of animal-derived food, such as meat, milk, or egg, or can substitute those in usage situations. For example, milk alternatives can be oat milk and other plant derived drinks. Similarly, as meat alternatives are considered soy shreds, burger patties, etc.

3.1 Consumer survey

In the following, the guidelines to implement the qualitative consumer survey are described. All project partners were asked to conduct the telephone interviews uniformly in following scheme to get comparable results from each country.

3.1.1 Recruiting of appropriate consumers & quotation

Within the qualitative data acquisition, in total 5 to 9 consumer interviews should be conducted in an oral way (telephone or personal interviews) in each participating country. Responsible persons for purchasing food in their households (always, sometimes, for own needs) have to be chosen only (mandatory). Excluded are all consumers that never or almost never buy food products. Consumers should be well selected from the categories Age and Gender. The quota information (see table 1) is for orientation. Different education levels and nutrition styles can be additionally considered. The aim is to create the broadest possible picture of consumers in each country who are interested in vegan-vegetarian food products and alternatives, or who are interested to reduce their consumption of animal-derived food products.

Table 1: Consumer survey – sampling & quotation

Category		Specification	Quota	Questionnaire
1	Responsible persons for purchasing food in their household	Always	Mandatory	V-Place consumer survey 2020_questionnaire
		Sometimes		
		For own needs only		
		Never or almost never	Exclude	
2	Age	Under 30 years 30 to 59 years 60 years and older	At least 1 person each	
3	Gender	Female Male	50:50	
Opt.	Education Level	Low Middle High	e.g. 1 person each	
Opt.	Nutrition Style	Omnivorous / Flexitarian Vegetarian Vegan	e.g. 70:20:10	

Source: Own survey

Adapting to the challenges of the Corona crisis in 2020, personal contacts and network could be used first. It was also possible to launch via social media, a press release, or a message posted in the supermarket.

3.1.2 Questionnaire

UHOH have prepared and pre-tested guiding questions for this purpose (V-Place consumer survey 2020_questionnaire). The telephone interview will take around 30 to 40 minutes. Each interview had to be voice recorded, transcribed, and translated. 12 LEAD questions are subdivided in following chapters:

- A: Experience and opinion about plant-based food;
- B: Purchase criteria and expectations toward plant-based food products;
- C: Information behaviour about plant-based food products.

3.1.3 Implementation and Documentation

Information about preparation of the interviewers have been given. The following scheme for further implementation process was proposed.

- Translation of the questionnaire correctly into each domestic language;
- Recruiting consumers as recommended above;

- Consent of voice recording must be given. Fill-in of basic information have to be completed;
- Recommendation of voice recording each telephone interview by mobile phone or other voice recorders;
- Instructions on how to transcript the telephone interviews;
- Translation of answers into English, original answers have to be kept;
- Given deadline of return of all files (e.g. original and translated consumer-answers) to UHOH.

3.2 Expert survey

In the following, the guidelines for the implementation of a written expert survey are described. All project partners are asked to conduct the written interviews according to following scheme to get comparable results from each country.

3.2.1 Choice of appropriate experts

Within the qualitative data acquisition, in total 5 to 9 expert interviews should be conducted in a written way in each country. Experts have to be chosen from each of the three categories below: industry, science, and other (see table 2).

Table 2: Expert survey – sampling

Category		Field	Questionnaire
1	Industry	Food manufacturers of alternatives to meat products or with a mixed product portfolio Food manufacturers of alternatives to dairy products or with a mixed product portfolio	V-Place expert survey 2020_corporate science
2	Science	Food technology Packaging technology Nutritional science / medicine	
3	Others	Vegan-vegetarian initiative (NGO), e.g. ProVeg or other State / Governmental Institution / Food control	V-Place expert survey 2020_NGO state

Source: Own survey

Personal contacts and network could be used first. It was advised to get in touch with potential experts by telephone beforehand. Contact persons of the industry should be from management, marketing, or production (e.g. product manager).

3.2.2 Questionnaires

UHOH have prepared two questionnaires in English language for this purpose. One for the experts from companies and science (V-Place expert survey 2020_corporate science). Another - longer one – for experts from vegan-vegetarian initiatives (NGOs) or governmental institutions (V-Place expert survey 2020_NGO state).

Accordingly, the following groups had to be assigned to the group industry and scientist: Food technologists, packaging technologists, nutritionists, or medical and dietary experts. This questionnaire (V-Place expert survey 2020_corporate science) contains questions about the challenges of producing plant-based foods, consumers' drivers and barriers from the perspective of manufacturers and consumers' need of support and information, subdivided in:

- A: Relation to plant-based food products;
- B: Frame and market of plant-based food products;
- C: Future and support of plant-based food products.

The second questionnaire (V-Place expert survey 2020_NGO state) contains more questions, specifically concerning the market situation, legal statue, and language use with plant-based foods. NGOs or governmental institutions are recommended to provide information on this. However, this extended questionnaire could also be used to ask a consumer or market researcher.

3.2.3 Implementation and documentation

The following scheme for further implementation was proposed.

- Translation of both questionnaires correctly into each domestic language.
- Recommendation to create a fillable PDF, e.g. with Adobe Destiller. An attached German questionnaire served as an example.
- Distribution of questionnaires (see table 2) by E-mail to selected experts with extra information on submission deadline and the data protection guideline.
- Translation of answers into English, original answers had to be kept.
- Deadline of returning the filled-in questionnaires to UHOH.

3.3 Sampling

In the period from April to May 2020, a total of 70 interviews with consumers and experts were conducted in 5 European countries (Denmark, Germany, Italy, Poland, Spain) in accordance with the methodological guidelines (see chapters 3.1 and 3.2). 32 experts (see Table 3) and 38 consumers (see Table 4) participated in the qualitative studies.

Due to the corona-induced shutdown in all European countries at that time, consumers were mostly contacted by telephone, and the experts were questioned in a written form. While the recruitment of the consumers took place almost without problems - also because personal contacts were permitted in this special time - the recruitment of the experts from industry or governmental institutions turned out to be increasingly difficult. In some cases, the participation of the experts was cancelled at short notice because the crisis period required capacities elsewhere.

Table 3: Expert interviews - sampling

Field			All	Denmark	Germany	Italy	Poland	Spain
	Total responses		32	5	8	5	8	5
I	Industry	Manufacturer of alternatives to meat products	6	1	1	1	2	1
		Manufacturer of alternatives to dairy products	4	1	1	1	1	0
		Other manufacturer	1	0	0	0	0	0
		<i>Sum industry</i>	11	2	2	2	3	1
	Science	Medicine / nutritional Science / other science	7	2	2	1	1	1
		Food technology	3	0	0	1	1	1
		Packaging technology	0	0	0	0	0	0
		<i>Sum science</i>	10	2	2	2	2	2
II	Other experts	Consumer or market research	1	0	1	0	0	0
		Vegan-vegetarian-organisation / NGO	9	1	3	1	3	1
		State / governmental institution / food control	1	0	0	0	0	1
		<i>Sum other experts</i>	11	1	4	1	3	2

Comments:

- In total 32 experts' responses, min 5 to max 8, in 5 countries (Denmark, France, Germany, Italy, Poland, Spain)
- France don't participate on qualitative study, but send out expert questionnaire (english version): 1 manufacturer responded (but no information about legal definitions and market situation are given)
- No response of any experts of packaging technology
- "Other experts" are mainly vegan-vegetarian organisation (9) (some of their answers seems copy-paste)
- F: E1 (manufacturer) > *non-specific to France or related to French consumer (more to NL, B or DE)

Source: Own survey

3.3.1 Survey of experts

Finally, a total of 11 experts from companies producing meat or dairy alternatives or other plant-based food, 10 scientists and 11 other experts from governmental institutions or consumer protection organizations could be recruited. The country-specific participation ranges from 5 to 8 (min-max) experts (DK: 5; F: 1; DE: 8; IT: 5; PL: 8; ES: 5) (see Table 3).

3.3.2 Consumer survey

The consumer interviews were targeted at those who are responsible for food purchases in the households or at least purchase for own needs only. The country-specific participation ranges from 6 to 9 (min-max) consumers (DK: 7; F:0; DE: 7; IT: 6; PL: 9; ES: 9), including 8 omnivores, 15 flexitarians, 10 vegetarians, and 5 vegans. All age groups (min-max from 19 to 84 years) are represented. The gender ratio is almost balanced (female: male 55:45). In all countries, consumers with a high level of education were predominantly reached, while medium and low educational levels are underrepresented. In the latter case, not a single person could be recruited (see Table 4).

The interviews lasted from 28 to 120 minutes. The transcription and translation were done in the respective countries and to a varying degree of detail (Germany; Denmark: word by word; others: more key points; shorter).

Table 4: Consumer interviews – sampling

Category	Field	All		Denmark		France*		Germany		Italy		Poland		Spain	
		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
	Total responses	38	100	7	100	0	100	7	100	6	100	9	100	9	100
Responsible persons	Always	25	66	3	43			7	100	5	83	5	56	5	56
	Sometimes	12	32	4	57			0	0	0	0	4	44	4	44
	For own needs only	1	3	0	0			0	0	1	17	0	0	0	0
Age	Under 30 years	11	29	3	43			2	29	2	33	2	22	2	22
	30 to 59 years	18	47	2	29			3	43	2	33	5	56	6	67
	60 years and older	9	24	2	29			2	29	2	33	2	22	1	11
Gender	Female	21	55	4	57			4	57	4	67	4	44	5	56
	Male	17	45	3	43			3	43	2	33	5	56	4	44
Education level	Low	0	0	0	0			0	0	0	0	0	0	0	0
	Middle	8	21	0	0			1	14	1	17	3	33	3	33
	High	30	79	7	100			6	86	5	83	6	67	6	67
Nutrition style	Omnivorous	8	21	1	14			0	0	3	50	0	0	4	44
	Flexitarian	15	39	2	29			6	86	2	33	4	44	1	11
	Vegetarian	10	26	4	57			0	0	0	0	4	44	2	22
	Vegan	5	13	0	0			1	14	1	17	1	11	2	22

Source: Own survey

4 Results

Ten key results of the qualitative studies and the perspectives of 70 experts and consumers in five European countries are summarised in the following synopsis.

Key results of the qualitative studies

1. Continued strong growth market for plant-based foods in Europe.
2. More, better and more diverse: the future of plant-based foods is innovative and consumer-oriented.
3. The future is plant-based.
4. Plant-based nutrition and plant-based food, respectively vegan, must be more clearly distinguished.
5. Flexitarians are difficult to grasp as a target group so far.
6. Health, animal and environmental protection are important, but not the only reasons for the consumption of plant-based food.
7. Taste, a lack of product range and a too expensive price are important reasons for consumers not to consume plant-based food – but there are more.
8. Plant-based food costs more than the animal origin – experts explain why this is so.
9. A move away from too much ideologization and more content push on plant-based foods and nutritional styles are considered important drivers.
10. More information about sensory, sustainability and practical issues around plant-based food is demanded.

Further point by point details are given in the following 10 sub chapters (see chapter 4.1 to 4.10) in short. They integrate both, the consumers' and the experts' perspective.

4.1 Continued strong growth market for plant-based foods in Europe

- Plant-based food is predicted to continue its strong growth in all European countries considered (see table 5).

Table 5: Overview of the market for plant-based foods from an expert perspective

	Denmark	Germany	Italy	Poland	Spain
N (experts)	5	8	5	8	5
Labelling and communication					
Official definition vegan-vegetarian food	No (in planning)	Yes (since 2016)	No	Yes (since 2014)	No
Communication V-Label	70% (Green Heart is better known: 84%)	Best known	Less known (vegan-ok is better known)	Best known	Best known (Veganflower for food from UK)
Image vegan / veganism	Negative connotation	Somewhat hindering	Somewhat hindering	Strongly negative connotation (associated with mental disorder)	Somewhat hindering, more and more associated with „healthy“
Claims misleading (MW 1 (no) - 6 (very))					
Companies	5,5	1,3	3,7	5,7	3,5
NGOs	No answer	2,3	1	3,5	3,5
Consumers	2,3	3,5	1,0 (?)	2,8	2,9
Market of milk alternatives					
Particularities	Very strong brand competition (from cow's milk segment); Organic is in demand	Most important segment of the pbf; organic-varieties often first on the market		Many foreign markets	
Market share	Ca 4% (in total)	? Well positioned	?	120–140 Mio. PLN ? 1% (Yoghurt)	? (total) 11,2% (Milk) 2,06% (Yoghurt) 2,78% (Dessert)
Previous growth	High	High, recently weakened, ca. 20% (Milk)	Growth market	15-26% (2019)	+3,4% (Milk) +10,6% (Yoghurt) +15,2% (Dessert)
Growth forecast	<ul style="list-style-type: none"> • Further high growth • Organic very important 	<ul style="list-style-type: none"> • Further growth • Pb milk mix 	<ul style="list-style-type: none"> • Further growth 	<ul style="list-style-type: none"> • Further growth • Organic; regional 	<ul style="list-style-type: none"> • Further growth
Product diversity	High	High	High	High (milk); otherwise variety and good quality are missing	High

cont.	Denmark	Germany	Italy	Poland	Spain
Most important pbf products	<ul style="list-style-type: none"> • Milk-drinks (esp. organic, oat) • Plant-based butter • Spreads 	<ul style="list-style-type: none"> • Milk-drinks (very diverse) • Yoghurt-alternatives • Cheese-alternatives 	<ul style="list-style-type: none"> • Soymilk; oat-milk 	<ul style="list-style-type: none"> • Milk-drinks (esp. soy, many new varieties) 	
Missing pbf products	<ul style="list-style-type: none"> • Sour cream • Cheese (tasty) 	<ul style="list-style-type: none"> • Cheese (Variety: Feta to Fondue) 	<ul style="list-style-type: none"> • Cheese (in supermarkets) 	<ul style="list-style-type: none"> • Cheese • Other drinks (as yoghurt) • 100% local (Poland) 	<ul style="list-style-type: none"> • Cheese • Ice cream
Placement (market)	Separate bloc	Separate bloc	Same bloc	Increasingly often in the same block	Separate bloc
Price level (in comparison) e.g. oat milk	higher (2-4 times)	Significantly higher	higher (1-2 times)	higher (2-4 times)	higher
Market of meat alternatives					
Particularities	Missing numbers, competitive pressure	Missing numbers		Missing numbers	
Market share	?	?	?	?	0,2%
Previous growth	Strong growth (in the past 5-10 years)	+10% Strong growth 2014-2016, weakened since	?	growth	+8,7%
Growth forecast	Further growth; More local ingredients	Further growth	?	Further growth	Further growth
Product diversity	Very limited; Organic; ore versatile	Medium	Medium	Medium	Very limited
Most important pbf products	Minced meat sausages	Burger Patties Nuggets Shredded food Cold cut	Burger Patties	Ham Sausages Ready meals Soja-varieties	
Missing pbf products	Fish alternatives; Egg alternatives	Variety of sausages (e.g. Salami, ham); Tasty variants	More variety in total	Fresh „meat“ / minced meat; Polish sausages (Kabanos)	
Placement (market)	Separately	Separately (vegan)	Separately (organic; gluten free)	Separately (eco; fit, organic; „world cuisine“); Increasingly in the same bloc	Separately
Price level (in comparison (e.g. shredded soy)	Higher (1-2 times)	Higher (1-2 times)	Higher (1-2 times)	Higher (1-2 times)	higher

Source: Own survey, EIT project “The V-Place”, qualitative Studies 2020.

- High potential is expected above all among those consumers who want to reduce their meat consumption, the so-called flexitarians. Flexitarians are considered as particularly interesting for the asked experts. However, they are seen as a not yet appropriately focused target group for plant-based food.
- Flexitarians can be reached apparently better with product offers of plant-based food - mostly in taste and texture close to the animal original - and a more precise (non-vegan) target group-oriented address.
- Different framework conditions and markets in the countries under consideration are the starting point for growth potential. Complete market figures for plant-based food for all countries in Europe are missing, especially for plant-based meat alternatives.
 - A) Dairy and meat products form the largest food segments in both the animal and vegetable variants. Plant-based dairy or meat alternatives are often directly linked to the visibly well-known animal original and its main ingredient in the sensory expectations of consumers. The plant-based alternatives of these two segments were therefore selected in Year 1 of the EIT Food project "The V-Place".
 - B) The use of official definitions of vegan-vegetarian food and a basis for food controls, is missing in most countries and EU-wide.
 - Germany is considered a pioneer: in 2016, an official definition was adopted in the Conference of Consumer Ministers based on the V-Label (ProVeg). Since 2019, corresponding guidelines for vegetarian and vegan food have been included for the first time in the Food Book (in German: "Lebensmittelbuch"), which also forms the basis of food control in Germany. The general food labelling regulations also apply to vegan and vegetarian food in Germany. This serves to protect consumers from being misled. And this with apparent success, as companies and other experts and consumers confirm in the interviews for Germany.
 - In Poland, an official definition has been in place since 2014, but it appears to be little known, and, from the point of view of companies, hardly protects against misleading statements.
 - In Denmark, a regulation is in preparation. Companies currently describe high levels of misleading.
 - "Vegan", "vegetarian" can be used without these regulations by all market players, including manufacturers, at their own discretion. Furthermore, this

applies in all countries to food products designated as "plant-based". There are no official definitions.

- C) Different tax regulations (VAT rates) of animal-derived foods and plant-based alternatives at the expense of plant-based drinks.
 - In Germany, this concerns vegetable drinks, e.g. oat or soy milk, but also fruit and vegetable juices, which must be taxed at the standard rate (19%, at present and temporarily, 16%), whereas the reduced rate (7%, at present and temporarily, 5%) can be applied to cow's milk or unprocessed fruit and vegetables.
 - Different tax rates for vegetable drinks also apply in Italy and Spain, but not in France and Denmark. Poland is missing data. (for more information see point 4.8)
- D) Prices for plant-based food are usually several times higher than the animal-derived original in all countries. The exemplary price comparison cow's milk vs. oat drink resulted in a two to four times higher price.
- E) Plant-based foods are offered in all countries mainly in supermarkets and discounters, in organic supermarkets, and in the (specialized) online trade. Offers by out-of-home deliveries and in gastronomy are described as rarer. An urban-rural divide seems to exist. This is in contrast to the view of consumers in some countries who cite the low availability of plant-based food in their usual or nearby shops as a major obstacle to purchasing. (The follow-up, quantitative country survey is bound to provide more information on this).
- F) Different market shares and developments and a different image of different nutritional styles (especially veganism is often negatively connotated) seem to be related: The foreign causes irritation and fear.
 - This is particularly noticeable in Poland. Here, many myths have been noted: "Vegans destroy the Catholic Church" or "Vegans are mentally disturbed". Warsaw meanwhile ranks among the top-three cities in Europe regarding the multiplicity of vegan catering trade.
 - In Spain, however, "vegan" is increasingly associated with wellness or health.
- The offer of plant-based milk alternatives is described by experts in all countries as particularly varied. Milk replacement drinks are offered in several, sometimes many, varieties. Soy and oat milk in particular are frequently mentioned. Above all, there is

a perceived lack of cheese alternatives that are tasty, correspond to the desired variety (from feta to fondue cheese), or are offered in the familiar supermarket.

- The variety of plant-based meat alternatives is described by experts as medium to low. Above all, burger patties and ground meat and sausage imitates characterize the offer. However, there is a general lack of variety, e.g. in sausages, fresh "meat", ham or country-specific recipes for alternative products. Fish and egg alternatives are also lacking.
- There are manufacturer and dealer brands in all countries, Alpro, Oatly, Provamel are particularly often mentioned as well-known brands for milk alternatives; for meat alternatives these are BeyondMeat, Like Meat and local brands (e.g. Rügenwalder Mühle, Taifun in Germany).

4.2 More, better and more diverse: the future of plant-based food is innovative and consumer-oriented

Where exactly will plant-based food be heading in the future? The experts expected many improvements and changes. They emphasized multi-attributes, such as Plus Bio, Plus Regio, sensory developments, and above all an ongoing growth trend:

- Long lasting growth market in all countries considered;
- Further reduction of animal-derived food in the diet of ever more population strata;
- Choice of a middle way (limitation instead of exclusion), also in production (diversification) and formulation;
- Greater availability and product variety in retail and out-of-home consumption including fast food;
- Product innovations in challenging niches (fish, egg, baked goods, cheese...);
- Greater variety of ingredients and raw materials (peas, lupine, lentils, cereals, mushrooms...);
- Strong improvement of the sensory quality (taste and looks);
- Spreading of the product range between even more ultra-highly processed (laboratory meat), and much simpler plant-based ingredients for home preparation;
- More imitations, more convenience, more ready-to-eat meals;

- More independent new plant-based foods;
- More organic products;
- Significantly more consideration of sustainability and health aspects;
- More clean labels (e.g. CO₂; water consumption);
- More 100% vegan;
- Better communication and a few more hypes (like Beyond Meat);
- More regional value chains;
- More cheap plant-based food or equalization of the prices of animal originals.

4.3 The future is (called) “plant-based”

- „'Plant-based' is the future" - Future studies emphasize the great importance of plant-based nutrition and name "plant-based food" as an important trend on the way to a more sustainable future;
- „Plant-based" is an accepted more neutral term variant for the term "vegan", which has a rather negative connotation in all countries considered;
- „Vegan" is often negatively associated with highly processed foods, renunciation, challenges, hysteria, and ideologization, also with tofu, soy milk, but also convenience and creativity. "Vegetarian", on the other hand, is more strongly and neutrally associated with plants, raw materials, experiences of nature or processed foods.
- The term "plant-based" remains unclear - there is no official definition in all countries.
- Definition of plant-based foods in the V-Place project meaning plant-based substitute products or processed plant-based alternatives, but not "plant-food", i.e. unprocessed fruit and vegetables.

„This refers to all products that are of purely vegetable origin but try to resemble animal foods (such as meat, milk, eggs or other products) in texture, taste or appearance and are intended to replace them. For example, milk alternatives such as oat drink and other plant-based drinks or meat alternatives such as soy slices and burger patties etc. are meant by this. Bananas, apples or vegetables etc. are not included in the following“.

- From the consumer's point of view, plant-based includes both alternatives and substitutes for animal-derived foods, as well as independent plant-based foods and fruit and vegetables ("plant food") that they can prepare themselves.
- Attractive terms for plant-based food are according to experts and consumers above all "plant-based food", less so "vegan", which steers the focus strongly on the nutritional style, or life-style, of vegans and is negatively connotated in the mainstream (see table 6). Further, frequently mentioned examples orientate themselves at different plant-related terms (vegetable, herbal, floral), and the linguistic purity warranty (pure, 100%; off). Further suggestions for products or for websites include:

Table 6: Attractive terms for plant-based foods

	Denmark	Germany	Italy	Poland	Spain
Product	<ul style="list-style-type: none"> • Plant-rich diet • Planetary diets 	<ul style="list-style-type: none"> • Purely vegetable • Plant-based alternatives • Alternative • xy-based • off xy • Vegetable... • Just call it by its name! • From plants • Plant powered • Green power 		<ul style="list-style-type: none"> • Plant origin • 100% vegetable/floral • floral • healthy, • ecological, • harmless to the environment, • natural, • unprocessed 	<ul style="list-style-type: none"> • 100% plant origin
Website	<ul style="list-style-type: none"> • Plant Base • Plant Forum • Green XX • Plant Paradise • Veggie space • Vegplech • Plant Info • Plant Diet • Climate-friendly diet 	<ul style="list-style-type: none"> • Practical education • healthy nutrition 	<ul style="list-style-type: none"> • Nature • Vegetable sphere • Healthy food for all 	<ul style="list-style-type: none"> • Green planet • Eat natural • Something with word "simple" • Without veget. /vegan • Plant.com • Live healthy, eat colorful • Eat healthy • Vege knowledge • Green portal • Plant base 	<ul style="list-style-type: none"> • Veggieworld • Something that starts in "Vega" • Nutritional Vegamecum • Vegan place • Vegetable place

Source: Own survey, EIT-Project „The V-Place“, qualitative surveys 2020.

4.4 Plant-based diet and plant-based food, respectively vegan, must be more clearly distinguished.

- Very important: Plant-based nutrition and plant-based food must be distinguished. Motives for one or the other can be very different. Nevertheless, they are often mixed up. This is also shown by interviews with experts and consumers;
- This difference becomes particularly clear with the example health! The renouncement of meat or animal ingredients, or their reduction, is often based on the desire of humans to be less health endangered or burdened. This motive cannot simply be reversed to an expected health benefit through the (frequent) consumption of plant-based substitute products. This is already known from my earlier studies in Germany, this was now repeated in the interviews, also on the part of consumers in the other countries considered;
- The same can be said for the motive of reducing one's environmental burden;
- The health benefits of plant-based foods are increasingly being questioned by consumers, broadening the debate about whether and to what extent a vegan diet is beneficial or harmful to health. Nutritionally as well as product-related there is a great uncertainty and a high need for education and information;
- We also observed health concerns about plant-based foods, especially from vegans or vegetarians. The reasons often cited are the very high degrees of processing or the additives used, such as salt, sugar, stabilizers, or other. The preparation of fresh plant-based meals at home by hand seems to be an important strategy for this group, not the purchase of plant-based alternatives from the food industry, however! We will have a closer look at this in the quantitative surveys for each country.

4.5 Flexitarians are difficult to grasp as a target group so far.

- Flexitarians are a highly interesting target group for plant-based foods and are to be addressed more strongly in the growth market according to the findings from the expert interviews. However, flexitarians are difficult to grasp. Definitions give "active reduction" (e.g. GfK) or "rare meat consumption" (e.g. YouGov). Some also speak of "part-time vegetarians";

- The diversity of definitions leads to very different figures, as the example of Germany illustrates. In Germany, the proportion of flexitarians is estimated at 55 percent (Forsa 2020). In 2015, according to the GfK consumer scan, 37% of Germans were flexitarians, whose proportion increases with age (this contrasts with vegans and vegetarians who tend to be young). YouGov (2019) subdivided flexitarians in a recent study by gender, resulting in a share of 34% female and 20% male flexitarians. In contrast, Statista (2020) estimates the proportion of flexitarians based on consumer self-assignment in 2018 as follows: Germany (9%), France (6%), Spain (4%), Poland (1%) and Italy (1%);
- The definitions of nutritional styles used in the EIT Food project "The V-Place" are based on the usual scientific description:

Omnivore	<i>This type of nutrition type eats both animal and plant-based foods, so it is not specialized.</i>
Flexitarian	<i>The diet is very similar to the omnivorous diet, but food of animal origin is actively reduced.</i>
Pescetarian	<i>Nutrition is similar to the omnivorous diet, but no meat is consumed at all. Fish, eggs, milk and dairy products are allowed.</i>
Vegetarian	<i>Food without meat and fish. Eggs, milk and dairy products are possible.</i>
Vegan	<i>Nutrition is exclusively plant-based - without any animal products.</i>

- Variety of the animal-/meat-reduced or animal-/meat-poor nutrition styles is strongly narrowed in the often used and meat-consumption-oriented typology Omnivore - Flexitarian - Vegetarian – Vegan;
- Often, these "pure forms" are not found in reality: Flexible are also Vegetarians and Vegans and not alone Omnivore towards more or less consumption. The explorative consumer questioning shows:
 - On one hand, there are omnivores who are also interested in a balanced diet with plenty of fruit and vegetables or even in eating alternative products;
 - On the other hand, there are vegetarians and vegans who take a time-out from their meat-free and/or animal-free nutrition, for example when visiting a

- restaurant or invitations with family and friends, but still classify themselves as vegetarians or vegans if they are asked for their dietary pattern;
- There are also consumers who, alone in one segment, milk or meat, reduce or eliminate the consumption of animal products or replace them with alternatives, but not in both. Vegetarians are called those who change their diet related to the consumption of meat, and do without it. For the others (milk renouncement), a designation is missing. Usually one speaks here of humans with lactose intolerance. These are not always considered as flexitarians (e.g. in application of the definition 'Flexitarian=rare meat consumption');
 - Country-specific differences can also be seen e.g. in a differing self-designation. "Flexitarians who largely reduce meat consumption call themselves "vegetarian" in Germany, and "omnivores" in Italy;
 - The observed motives, decision patterns, the type and quantity of consumption of animal-derived products, as well as plant-based products, varies considerably in the interviews conducted with this unclearly defined group of flexitarians. This definitional imprecision and simplification to a single dietary style makes it difficult to successfully reach them as a target group for the marketing of plant-based food products;
 - Also, the search for information is varying within the nutritional styles. Typically, vegans and also vegetarians are described as very active information seekers. In the interviews, we found
 - from highly interested (active information seeking) omnivorous to low (passive) information seeking vegetarian consumers;
 - Passive information seeking consumer can also be vegetarian (with long-standing habits = very habitualised consumer behavior in general (same store, same products, same brand) and on plant-based food in particular);
 - In the follow-up quantitative surveys, the flexitarians in six European countries will be examined more closely and described in more detail.

4.6 Health, animal and environmental protection are important, but not the only reasons for consuming plant-based foods.

- In addition to the motives known from other studies about the purchase and consumption of plant-based foods, the qualitative survey should also collect additional motives that may be important for each country.
- Health, ethics (above all related to animal protection), and environmental and/or climate protection, dominate the reasons for the renouncement of animal-derived food in all regarded countries. These are, however, only a part of the motives for the purchase of plant-based food. Also, in the interviews this was mixed very frequently with the nutritional styles.
- Other motives or reasons are:
 - o Expectation of body-aesthetic benefits (reduction of body weight, slowing down of aging processes, improvement of skin appearance);
 - o Avoidance of concrete personal health consequences (food intolerance, allergy, fat reduction);
 - o Avoidance of nutrition-related health risks (hormones or drugs from livestock farming, nutritional physiology of animal ingredients);
 - o Taste preferences;
 - o Religious reasons;
 - o Curiosity to try something new, to have new taste experiences;
 - o Spontaneous decisions at the point of sale;
 - o Wrong purchase (bad buy), instead of animal-derived variant;
 - o Search for 'natural' or healthy food;
 - o Familiarity with organic food;
 - o Habit of eating plant-based food (socialization);
 - o Desire to reduce animal-derived food (partially);
 - o Knowledge and familiarity with the preparation of herbal ingredients (tradition);
 - o Lack of knowledge and familiarity with the preparation of animal ingredients;
 - o Preparation of meals with family or friends (social settings);
 - o Individual well-being (well-being; self-improvement);
 - o Lack of confidence in the quality of animal-derived food, e.g. after meat scandals;
 - o (Sustainable) lifestyle;
 - o (Sustainable) nutritional education of children;

- o Higher availability of products;
- o Brand orientation and new products;
- o Trends / Mainstream;
- o Recommendations / role models (influencers).
- A distinction is made between self- or person-related reasons and influences from the social or economic environment;
- Different directions and diversity of health expectations are important: avoiding general health risks and improving one's own health situation or general well-being.

4.7 Taste, lack of variety, and high price, are important reasons for consumers not to consume plant-based foods – but there are more.

- In the explorative interviews, experts and consumers in five countries were asked what reasons prevent consumers from buying and consuming (more) plant-based foods. Here also, further reasons should be collected beside the familiarity;
- Here, too, a distinction must be made between self- or person-related reasons, and influences from the social or economic environment. Above all, aspects of processing and communication about plant-based foods and their lack of transparency are of particular importance;
- It is very important to note that the desire to reduce meat consumption or the consumption of animal ingredients does not necessarily lead to a higher proportion of plant-based alternatives in purchasing;
- More culinary diversity and better availability of plant-based food is desired in all countries. Higher prices for plant-based foods compared to their animal "originals" are met with a lack of understanding. These are the known reasons that prevent the purchase of plant-based – and actually of all sustainable – food products;
- Criticism of a too high degree of processing of plant-based foods and concern about too many additives is voiced by consumers in all countries and is confirmed by the companies surveyed as justified criticism - especially in the case of meat alternatives that try to imitate the original in taste (umami) and texture (muscle tissue, fat);
- Further barriers include:
 - o Perseverance of habits and traditions;
 - o Dominance of habitual buying (habitual choice of brand and shopping location);

- o Low innovative spirit, little openness for new products / product variations;
- o Preference for traditional dishes and preparations;
- o Lack of knowledge to prepare certain, sometimes very special, plant-based dishes;
- o Lack of interest and attention for sustainability issues;
- o Higher time expenditure for the preparation;
- o Negative taste experiences;
- o Too many additives (e.g. too salty in Poland);
- o Negative health image;
- o Insufficient functionality (e.g. foaming of milk, melting of cheese, egg substitute);
- o Too little product variety;
- o Insufficient availability outside large cities;
- o No fresh products, too much prepackaged food;
- o Generally unclear recipes and ingredients, food that has been processed to (ultra) high levels;
- o Constantly changing formulations;
- o No local products or raw ingredients from the own country, e.g. soy;
- o Too heavily packaged, e.g. multiple packaging / plastic packaging;
- o Unclear recipes related to possible animal-derived ingredients (e.g. gelatine);
- o Unclear marking with untrustworthy labels;
- o Misleading communication of highly processed foods claimed as sustainable and natural;
- o Too "stylish"/ negative stereotyping of innovators (buyer types).

4.8 Plant-based food costs more than the animal-derived original.

Plant-based food costs more - sometimes much more - than the animal-derived original. Plant-based meat alternatives are up to twice as expensive as the original, according to the experts surveyed in 5 countries using the example of minced soy vs. minced pork. Dairy products are even up to four times more expensive than the animal-derived original (example oat milk vs. cow milk). Consumers describe this as an important obstacle to buying more or even completely plant-based food.

The interviewed experts from 5 countries, including experts from companies and NGOs, explained the reasons for this high price difference with

- *Economies of scale*: sales are simply much lower, many pioneers/start-ups;
- *Effects of costs*: raw material prices are usually not lower than for animal-derived products (which one might assume at first) due to lower purchase quantities and lower availability of some raw materials;
- *Quality effects*: High-quality plant-based food, which also needs to taste delicious, requires appropriate know-how, special machinery, and high-quality ingredients and spices. A high quality is more expensive;
- *Multi-Premium*: multi-added-value combination, e.g. organic-veggie, leading to higher prices for consumers;
- *Deadweight loss*: the manufacturers usually follow a skimming/premium strategy at product launch because they can simply charge higher prices to the target group, sometimes in the absence of competitive pressure. Therefore, there are (still) very good margins on plant-based products (for many animal-derived products, these are in the low cent range, if at all);
- *Follow-up effects on the market*: there are fewer price campaigns for plant-based food;
- *External effects*: Animal-derived foods do not take into account true external costs imposed on the environment and society (social). Many (if not all) animal-derived foods are far too cheap on the shelves, or would need to be much more expensive, if the true external costs would be priced-in (also considering potential intangibles, like animal wellbeing)!
- *Statutory regulations*: Different VAT rates for plant-based and animal-derived food in some countries (e.g. in Germany the VAT rate for cow's milk is reduced (7%, currently 5%), but not for soy, coconut, other drinks (19%, currently 16%). Non-alcoholic beverages are excluded from the exemption for basic foodstuffs in Germany. The VAT rate for vegetable juices or sweet potatoes (!) is also not reduced. This procedure is not really comprehensible, even for tax experts, and is criticized as not logical. This also concerns Italy, Spain, and France, but not Denmark and France (VAT rates in Europe for cow milk and vegetable milk; ProVeg Plant Milk Report, 10/2019, p. 29)

VAT RATES FOR DAIRY MILK AND SOYA MILK IN SEVERAL EUROPEAN COUNTRIES ⁷³⁻⁹⁰

Country	Cow's milk	Soya milk	VAT gap
Belgium	6%	6%	none
Denmark	25%	25%	none
Finland	14%	14%	none
France	5.5%	5.5%	none
Ireland	0%	0%	none
Netherlands	9%	9%	none
Portugal	6%	6%	none
United Kingdom	0%	0%	none
Greece	13%	24%	+85%
Austria	10%	20%	+100%
Slovakia	10%	20%	+100%
Spain	4%	10%	+150%
Germany	7%	19%	+171%
Italy	4%	22%	+450%

Source: ProVeg Plant Milk Report, 10/2019, p. 29

4.9 A move away from too much ideologization and more content push on plant-based foods and nutritional styles are considered important drivers.

- Results show a high and diverse need for basic and practical information about plant-based foods. In short: More, more credible, and more "right" information from the right sources, in the sense of target-group-specific information from the right people. This will be investigated in greater depth in the quantitative survey;

- Consumer irritation and deception seem to be particularly obvious in the absence of official definitions. Examples include: confusing original product names; naturally vs. processed food; misleading labeling / information; poorly legible labeling; proprietary misleading "vegan" seals; confusing similarity of vegan labels; EU-wide inhomogeneous vegan label and term usage;
- Credible sources of information about vegetable food are above all from national or scientific sources and/or science-based facts, only conditionally vegan or vegetarian organizations are considered as suitable transmitters for an objective representation. Consumers want to be reached with information or communication where they already are: On the Internet, social media, apps, or at the point of sale (i.e. in the familiar supermarket / discounter on site and also at the familiar shelf location);
- Altogether, there are many possibilities to support consumers in the reduction of animal-derived food, and possibly to replace them with plant-based alternatives - communication-related and otherwise. The interviewed experts pointed to the following:
 - Improving taste and communicating it: The imitation and production of alternative meat and dairy products is, in the experts' view, the greatest challenge in meeting consumer expectations ("chefs instead of food technologists");
 - A significantly higher consideration of sustainability and ecological aspects in the production, packaging, and communication of plant-based food is demanded. From the companies' point of view, such communication with the consumer promises to be most successful;
 - Support and clear recommendations from different sides: governmental institutions are particularly called upon here, as are politicians, physicians, nutritionists, and companies.
 - Less processed plant-based food, above all with meat alternatives, is wished. Both better imitations of animal-derived originals and more independent plant-based food products with higher visibility are demanded;
 - Reasonably priced plant alternatives, reduction of subsidies for animal-derived products, education about pricing of high-quality food;
 - Expansion of the range of goods on offer with better availability;
 - More attractive product design (packaging, brand, product name);

- Moving away from ideologization and promoting social acceptance, including "middle ways", for example in school lessons or in workshops and cooking shows.

4.10 More information on sensory analysis, sustainability, and practical issues related to plant-based foods is requested.

Experts and consumers give examples about what information is particularly important for consumers to make their purchasing decisions about plant-based foods.

First and foremost, information about processing and sensory improvements!!

- Research insights on sensory improvements of plant-based foods
- Taste experience of plant-based foods
- Why are plant-based foods (replacements) often so highly processed?
- News about product developments: vegan cheese, vegan fish, bakery products (insights)

Also important, holistic and evidence-based health information

- Both, health beneficial and health harmful effects of meat and meat products
- Are plant-based food products (meat is not diet!) really health beneficial?
- Which is the nutritional value of plant-based foods (replacements)?
- (Experience with) unhealthy ingredients in plant-based foods (e.g. additives and artificial flavors; pesticides)
- Which most used additives in plant-based foods (replacements) are necessary or harmless, which not?
- Do plant-based food products (not diet) provide enough protein?
- Which vitamins are in plant-based food, which not (not only B12)?

More information about preparation and purchase situations

- Concrete information on availability of plant-based foods in retail in different countries or regions (where, what, in which quality, price)
- Who offers vegan / vegetables dishes in restaurants?
- Why are / are plant-based foods more expensive?
- How is the nutritional value of plant-based foods declared?

- Which certificates on plant-based foods are credible (e.g. in Poland)?
- Which sources on communication about plant-based foods are credible, which not?
- 100% plant-based composition – which products are? How they are identifiable?
- How easy is the preparation (recipes)?
- How long to store (expiration / best before date)?

Long neglected, sustainability and environmental effects in the value chain

- More information on the origin of concrete plant-based food products
- Plant-based food and fair trade, GMO, and/or organic?
- More on the entire production process / processing insights of plant-based foods
- Environmental impact/ amount of resources saved
- Working conditions in food factories (meat, fruit, vegetables, plant-based food)
- Plant-based foods as a part of culturally adequate diets (better limitation than substitution)
- How plant-based food products differ from plant-based diets (e.g. health-beneficial, health-harmful, in terms of sustainability)
- True Cost Accounting (the presentation of the true costs and environmental impact of a product) should be addressed, as vegan products are considered very expensive

5 Outlook

5.1 Quantitative online panel surveys in six European countries

Still in 2020, a quantitative survey will be conducted in Germany, Denmark, France, Italy, Spain and Poland, with focus on following topics:

- Drivers and barriers, as well as approaches, for target-group-specific communication about plant-based food products will be determined for a sample with a target size of at least 3000 participants;
- Focus on alternatives for dairy and meat products;
- The impact of Covid-19 on the consumption of animal and plant-based foods;
- Results will be published separately, also taking into account the here reported insights.

5.2 A follow-up application for funding in 2021 has been submitted to EIT Food

The V-Place project, with its overall target group being the mainstream consumer who likes to adopt a more sustainable food consumption pattern, is bound to focus in 2021 on impact and behavior change with an evaluation, integration and expansion of its communication streams including FoodUnfolded. It will be looked at what kind of communication is most appreciated, and what are the most pivotal elements in achieving actual behavior change. Sensory co-creation exercises to explore the possibilities of plant-based food products and dishes will be launched in the form of experimental hands-on cooking events with consumers, chefs, science, and industry, in at least three European countries (Poland, Germany and Italy, with France as option). Additional consumer panel surveys on innovative product types, as e.g. replacements for egg and seafood, in cooperation with our industry partners will complement and take-up the results from 2020. A V-Place app will be launched for providing tailored information on plant-based food products. This will enable a direct interaction of consumers and inspire industry to develop new, or improve existing products that can replace meat, dairy, or other animal-based food products.

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