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Preliminary Analysis of Voluntary Information on Organic Milk Labels in Four European Union Countries

Karolina Woś [1], Lisa Marie Borghoff [2], Andrijana Horvat [3], Flavio Paoletti [4], Eleonora Saggia Civitelli [4] and Ewa Rembiałkowska [1,*]

[1] Department of Functional and Organic Food, Warsaw University of Life Sciences, 02-787 Warsaw, Poland
[2] Department of Food Nutrition Facilities, FH Münster University of Applied Sciences, 48149 Münster, Germany
[3] Department of Agrotechnology and Food Sciences, Wageningen University and Research, P.O. Box 17, 6700 AA Wageningen, The Netherlands
[4] CREA—Research Centre for Food and Nutrition, Via Ardeatina, 546-00178 Rome, Italy
* Correspondence: maria_rembialkowska@sggw.edu.pl

Abstract: The concern for the environment among European consumers is growing and in the future the need for sustainable shopping is expected to increase. Through transparent on-packaging communication with consumers, organic producers have the opportunity to show attributes of organic production system and build a strong market position. The aim of the study was to analyse voluntary packaging information on organic milk from four European markets in the context of organic food quality, i.e., Germany, the Netherlands, Italy and Poland. More specifically, the textual content of 106 organic milk packages was analysed and voluntary information on each package was categorized according to process- and product-related organic milk attributes. The assortment and content of voluntary packaging information varied across the four countries. The largest number of products was found on the German market (37) and the smallest on the Polish market (14). Dutch milk had the greatest amount of voluntary information on animal welfare, product locality, environmental protection, quality confirmation, naturalness and nutritional value. German milk had the most information on enjoyment and conditions of processing, while the Italian milk on the social perspective. The products available on the Polish market had the least voluntary information. Pasteurized organic milk had noticeably more information about organic quality attributes than micro filtrated and UHT milk.

Keywords: milk package; organic; content analysis; optional; value

Citation: Woś, K.; Borghoff, L.M.; Horvat, A.; Paoletti, F.; Civitelli, E.S.; Rembiałkowska, E. Preliminary Analysis of Voluntary Information on Organic Milk Labels in Four European Union Countries. *Sustainability* **2022**, *14*, 16901. https://doi.org/10.3390/su142416901

Academic Editor: Jacopo Bacenetti

Received: 8 November 2022
Accepted: 14 December 2022
Published: 16 December 2022

1. Introduction

1.1. Legal Framework and Principles of Organic Farming

European consumers are paying progressively more attention to sustainable, especially organic food consumption [1]. Achieving sustainable consumption requires that consumers consider not only their own needs (e.g., taste, price, convenience, etc.), but also a product's social responsibility attributes (e.g., animal welfare, environment, fair trade) during purchase [2,3]. The pro-environmental attitude among consumers directly influences the purchase (and consumption) of organic products and paying attention to such features as healthiness, trustworthiness, quality, control system, authenticity, safety [4]. Organic production is in line with these trends in consumer behavior because according to the Council Regulation 848/2018 organic production is define as "an overall system of farm management and food production that combines best environmental and climate action practices, a high level of biodiversity, the preservation of natural resources and the application of high animal welfare standards and high production standards in line with the demand of a growing number of consumers for products produced using natural substances and processes. Organic production thus plays a dual societal role, where, on the

one hand, it provides for a specific market responding to consumer demand for organic products and, on the other hand, it delivers publicly available goods that contribute to the protection of the environment and animal welfare, as well as to rural development." [5]. The regulation indicates high quality of organic products, which is the result of standards for health, the environment and animal welfare in the production of organic products but also ensuring that producers receive a fair return for complying with the organic production rules. Complementary to this International Federation of Organic Agriculture Movements (IFOAM) specifies the principles of organic production such as:

- Principle of health—organic agriculture (OA) should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible;
- Principle of ecology—OA should be based on living ecological systems and cycles, work with them, emulate them and help sustain them;
- Principle of fairness—OA should build on relationships that ensure fairness with regard to the common environment and life opportunities;
- Principle of care—OA should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment [6].

1.2. Organic Sector and Corporate Social Responsibility (CSR)

Organic food is therefore a very unique food sector, which in its fundamental principles fit into a Corporate Social Responsibility (CSR) strategy which is increasingly common among manufacturers of various sectors (e.g., food, fashion, beauty products). Companies in their voluntary activities take into account social interests, environmental aspects, or relations with various stakeholder groups and the company's environment. By doing so, they contribute to the formation of conditions for sustainable social and economic development and, as importantly, to increasing the competitiveness of the company [7]. Thus, the requirement for organic producers is not only to comply with organic production principles, but also to properly and successfully communicate this unique quality with the present-day consumers.

1.3. Communication of the Organic Sector with the Consumers

Communication of specific characteristics of organic food products is not easy because consumers have different level of knowledge and beliefs and they can be confused by the multitude of different labels on food products [8]. For instance, the understanding and recognition of the European organic product logo varies from country to country [9]. In Poland, 33% of consumers can understand and recognize the organic logo [10]. For those who buy organic products more regularly, the rate is 45%, but 23% of respondents mistakenly consider products with the crossed-thorn mark used on gluten-free products as organic food.

The organic food market in the European Union is growing rapidly and was valued at 37.4 billion euros in 2018 [11]. However, within European Union, there are significant differences between individual countries. Most organic food retailers are located in Germany, France and Italy. Central & Eastern European (CEE) countries, such as Poland, Hungary, and Romania, have traditionally been important growers and exporters of organic crops. However, internal markets are slowly developing also in these countries.

An important communication tool between food producers and consumers is an packaging product labelling. According to the Regulation (EU) No 1169/2011 [12] "'labelling' means any words, particulars, trademarks, brand name, pictorial matter or symbol relating to a food and placed on packaging." The regulation also lists legally mandatory information that is required to be provided to the final consumer by Union provisions (Regulation (EU) No 1169/2011 [12] and Council Regulation 848/2018 [5]). The organic product label must include elements such as: the EU logo, the identification number of the certification body to which the producer is subject and the indication of the place of production of the raw

materials from which the final product is made (EU Agriculture, non-EU Agriculture, EU/non-EU Agriculture).

Moreover, it is possible for producers to provide additional, voluntary content, e.g., information on the production process or the environmental impact of production. Food information provided on a voluntary basis should not misinform or confuse the consumer. A potential advantage of voluntary information is that an appropriate communication can provide more transparency on organic food quality. This is likely to increase consumer confidence in organically produced food, which is particularly important in developing countries [13].

1.4. Consumers and Eco-Labeling

Consumer studies show a positive relationship between eco-labelling and environment ally-friendly purchase intentions [14–16]. Consumers who received information about the ethical features of organic farming, such as animal welfare and environmental sustainability, showed a greater willingness to pay for organic milk than for conventional milk [17–19]. The concern for the environment among European consumers is growing and in the future the need for sustainable products could increase. Therefore, informing about such aspects of production may be beneficial for organic food producers. According to Żakowska-Biemans (2015), organic food is most often bought by consumers representing the "healthy" segment. This group of consumers is interested in labels and is looking for labels about food production methods and their environmental impact. At the same time, these consumers have higher incomes and they can more easily afford organic food, which is more expensive [20].

Given the legal obligations and consumer expectations, organic manufacturers are faced with a challenge. There are no instructions or guides on what is worth putting on the packaging to effectively show the high quality of organic products. It is difficult for producers to communicate the quality of their products and the rationale for a premium price on markets that offer other competitively priced products [21]. It should be kept in mind that organic products compete for consumers' attention with other products too such as pesticide-free, local/regional, vegan, climate-protected, non-GM, fairtrade, etc.

1.5. Organic Food Quality Criteria

Even regulators, organic experts and researchers have difficulties to define organic food quality criteria. IFOAM Standards (2008) also describe the principles related to ethical values: responsibility, integrity, care, health, sustainability, naturalness [6]. However, there is no clear definition nor explanation what exactly should be understood under the mentioned notions which are listed. Council Regulation 848/2018 provides some quality criteria that are not clearly defined, e.g.,: "true nature", "processing with care" or "natural production techniques". Council Regulation 848/2018 tells that processing methods should 'guarantee that the organic integrity and vital qualities of the product are maintained through all stages of the production chain'. In a chapter 3. Point (74) Definitions it explains what is integrity:

'integrity of organic or in-conversion products' means the fact that the product does not exhibit non-compliance which:

(a) in any stage of production, preparation and distribution affects the organic or in-conversion characteristics of the product; or
(b) is repetitive or intentional [5].

Organic food quality problems are discussed in several scientific papers related to the topic [22–25]. Kahl et al. (2012) defined organic food quality through two aspects: process-related and product-related. The aspects are further defined by specific criteria. Process-related criteria can be environmental (e.g., criteria indicating the impact of production process on soil, plants, animals, atmosphere) and societal (i.e., considering social, cultural and economic perspectives). Product-related criteria are safety, nutrition,

enjoyment/pleasure, vital qualities, organic integrity and true nature). Kahl et al. (2012) underline that there is a necessity to work on these definitions [22].

Beck et al. (2012) proposed similar criteria of organic food quality, i.e., sensory properties, nutrition/health, specific organic properties and authenticity/traceability. Authors also listed attributes for the examination of organic food quality, i.e.,: vital quality, naturalness, organic integrity, careful production, true nature, integrity, animal welfare, holistic production, fairness [23].

In the absence of clear definitions of the above terms describing the quality of organic products, processors are left to their own inventiveness in informing consumers about the qualities of their products. The main method for communicating this information is through suitably designed product labels. This can enable organic products to have a stronger market position and be more competitive on the market [26].

1.6. The Aim of Study

As mentioned above, there is a lack of any regulation or indication of voluntary information on the packaging of organic products. There is also a lack of scientific research in this area. We therefore considered it appropriate to carry out the research presented here. The aim of our study was to identify themes in voluntary labelling of organic milk in some EU countries, among others trying to compare the situation of well-developed organic markets and less developed ones. Basing on Willer et al. [11] we have selected 4 EU countries—Germany as a highly developed organic food market, the Netherlands and Italy as medium developed markets, and Poland as a less developed market. The delimitation of our research lies in the fact that we have assumed in advance a certain limited scope of analysis. We are aware that the European Union currently consists of 28 countries and that 4 countries are just a fragment of the European Union with many cultural differences, also with regard to the consumption of organic products. Our countries represent central Europe (Germany, Poland), northern Europe (the Netherlands) and southern Europe (Italy). The most western part of Europe (Spain, Portugal) is not represented. We discuss wider the delimitations and limitations of our study in a chapter 5. Limitations and recommendations at the end of the manuscript.

1.7. Research Questions and Hypotheses

The main research question posed in this paper is how do producers of organic milk communicate with consumers? Does the way in which they communicate depend on the level of development of the organic market in their country? In addition, we wanted to find out whether it is possible to differentiate the information on the packaging concerning the widely understood production process of the milk from the information concerning the product itself. Finally, we wanted to find out which processing methods and packaging are used by organic milk producers in selected EU countries. In order to verify these research questions, five hypotheses were formulated.

The research hypotheses were set at the beginning of the study. On the basis of the available scientific data, we have assumed that (1) Organic milk available on the European food market includes a voluntary labelling information on organic quality attributes; (2) Voluntary packaging information could be categorized by process-related and product-related criteria of organic food quality evaluation; (3) The assortment of organic milk and content of voluntary packaging information varies depending on the market (German, Dutch, Polish and Italian); (4) Content of voluntary packaging information varies depending on the milk processing method (UHT, pasteurization, microfiltration). Finally, we have assumed that (5) The predominant milk processing system in each country depends on the degree of development of the market for organic products.

2. Materials and Methods

2.1. Sample Collection

In 2019, an inventory of organic cow's milk in four European countries with a different level of organic retail sales and organic per capita consumption was conducted, i.e., Germany as a highly developed organic food market, the Netherlands and Italy as medium developed markets, and Poland as a less developed market [27].

Organic milk with a different fat content (i.e., whole, semi-skimmed and skimmed), processing method (i.e., pasteurization, UHT, microfiltration) and packaging (multi-layered, glass and plastic bottle) was analysed. The study distinguished between traditional pasteurisation (72–75 °C for 15–30 s, HTST), pasteurisation plus microfiltration and ultra-high temperature (UHT) treatment.

Products came from specialized organic stores and conventional supermarkets. Milks for special dietary needs (e.g., lactose-free) and flavoured milks were excluded.

In Germany (Münster), one organic store and seven conventional supermarkets were included in the study. In the Netherlands (Utrecht and Wageningen) one organic and two conventional, in Italy (Rome) one organic and seven conventional, and in Poland (Warsaw) three organic stores and five conventional supermarkets were included. It should be stressed that there is no set method for carrying out the research we have undertaken. The authors of the study chose a set of shops in which to analyse the packaging of organic milk.

2.2. Content Analysis of Voluntary Information on Organic Milk Products

Milk packages were photographed from all sides and voluntary textual information was extracted from the packaging and noted in an Excel file. The extracted text was categorized into categories, according to the product related aspects and process-related aspects (see Section 2.3 "Categorization methodology"). Furthermore, the categorized voluntary information was further analysed and for each category, multiple criteria and sub-criteria were defined (see Supplementary Materials for a detailed description of categories). Finally, the messages in each sub-category were counted and reported in the Section 3.

The names of the criteria and sub-criteria were selected by the authors based on scientific publications on organic food quality assessment [22–25]. The authors have repeatedly checked and discussed the relevance of individual voluntary textual information to the relevant criteria and sub-criteria categories.

If the content of packaging voluntary information belonged to multiple criteria and sub-criteria categories, the authors interpreted it as different messages and assigned it to each belonging category. This explains the phenomenon that some criteria have a higher number of packaging messages than the number of milk products analysed.

2.3. Categorization Method

The categorisation method was elaborated by the authors of this paper and is a novel methodical approach which has not been used before. Of course, other authors have also previously dealt with the quality criteria of organic food important for the consumers. Here we should mention such papers as Chryzochou (2010) [28], Żakowska-Biemans (2011) [29] and Song et al. (2016) [30]. In the context of animal welfare, it is worth mentioning the work of Borkfelt et al. (2015) [31] and Scozzafava et al. (2020) [32].

The voluntary information on organic milk packaging has been classified as process-related and product-related. Among the process-related information, groups of information have been selected and named "criteria". The authors have identified such criteria as:

- animal (cows) welfare—information concerning cow feeding and breeding conditions;
- product locality—information related to the place of origin of production and support for local producers;
- social perspective—information related to honestly rewarding producers and supporting the local community;
- environmental protection—information related to the lack of negative or existence of positive impact of the production process on the environment.

The information on product-related aspects was divided into 5 criteria:

- quality confirmation—information on the high product quality ensured by labelling, certification, selection and control;
- enjoyment—information describing sensory attributes and the impact of organic milk consumption on well-being;
- naturalness—in this category we focused on observing the context in which manufacturers emphasize the "naturalness" of their products and searched for all the information containing the key word natural. There is no official definition of organic naturalness—here we tried to find out how the producers emphasize this attribute of organic production system;
- nutritional value—messages about processing method's impact on nutrition aspects, information about positive/negative nutrients (macro elements, vitamins, minerals);
- conditions of processing—voluntary information on specific processing methods: stages, conditions of thermal processes, influence on the final product and its shelf life.

3. Results

3.1. The Assortment of Analysed Organic Milk Products in Different Countries

Table 1 shows that the highest number of milk products was found in Germany (37), intermediate in the Netherlands (27) and Italy (28) and the lowest in Poland (14). Furthermore, Table 1 shows that in Germany microfiltration is a predominant processing method (40% of products), followed by UHT and pasteurization. In the Netherlands, pasteurization is predominant (71%), followed by UHT, while none of the products were microfiltrated. In Italy, on the other hand, microfiltration and UHT represent 46% each, with pasteurisation accounting for a small share. Finally, in Poland pasteurisation represents 57%, UHT 29% and microfiltration 14% of products.

Table 1. The assortment of analysed organic milk products in different countries.

	Number of Milk Products							
Country	**Germany**		**The Netherlands**		**Italy**		**Poland**	
Total number of products	37		28		24		14	
Method of milk processing								
Pasteurization	8	22%	20	71%	2	8%	8	57%
Microfiltration	15	40%	0	0%	11	46%	2	14%
Ultra-high temperature sterilization (UHT)	14	38%	8	29%	11	46%	4	29%
Type of milk packaging								
Glass bottle	4	11%	2	7%	1	4%	1	7%
Plastic bottle	0	0%	2	7%	4	17%	8	57%
Multi-layered packaging	33	89%	24	86%	19	79%	5	36%

Table 1 also shows that in 3 countries (Germany, the Netherlands and Italy), multilayer packaging was the predominant type of packaging for organic milk, while Polish producers mostly used plastic bottles.

3.2. The content of Voluntary Packaging Information on Organic Milks

Tables 2 and 3 show the voluntary packaging information belonging into process-related and product-related criteria categories.

Table 2. Process-related packaging voluntary information on organic milks.

Criteria	Sub-criteria	Germany	The Netherlands	Italy	Poland	Total
Total number of milk packages		37	28	24	14	103
Animal (cow) welfare	Species appropriate Husbandry	6	32	2	0	40
	Feed ingredients	21	13	2	2	38
	Organic feed	16	12	6	0	34
	Welfare control	4	24	2	0	30
	Non-GMO feed	19	0	5	1	25
	Natural feed	8	2	8	0	18
	Meadow description	10	0	0	0	10
	Transparency in milking of cows	0	4	3	0	7
	Freedom of cows	0	0	5	0	5
	Feed origin	0	4	0	0	4
	Months spent on the meadow by cow	2	2	0	0	4
	Animal welfare in general	0	2	0	0	2
	Natural cows' horns	0	1	0	0	1
	Total	86	96	33	3	218
Environmental protection	Nature preservation	14	45	8	0	67
	Environmentally friendly packaging	31	19	6	1	57
	Wellbeing of animals	14	10	6	0	30
	Other information linked to environmental protection	9	7	6	0	22
	Total	68	81	26	1	176
Product Locality	Information about small scale of production	6	9	11	6	32
	Information about a specific area	1	8	3	4	16
	Information about farmers	0	10	0	0	10
	Close contacts between farmers and local dairy industry	0	5	2	1	7
	Supporting local milk production and dairy industry	3	0	0	0	3
	Total	10	32	16	6	64
Social perspective	Contribution to social conditions	7	5	8	0	20
	Fair price for farmers	4	0	6	0	10
	Affordable price for Customers	0	5	0	0	5
	Other information linked to social perspective	7	0	0	1	8
	Total	18	10	14	1	43

Table 2 shows that the largest amount of process-related voluntary information belonged to the criterion animal welfare (218 messages), with subcategories such as non-GMO feed, welfare control and species appropriate husbandry. For example the milk from Germany had the following message "Animal husbandry appropriate to the species and the natural feeding of the cows are the basis for the typical full-bodied taste of this milk" and

the milk from Italy with a message "Our alpine organic milk is the best organic milk thanks to the welfare of animals and the natural feed of the cows". The packaging of German milks also provided a description of meadows and green areas to which organically farmed cows had access, for example: "On our Arla organic farms the cows stand on lush green meadows whenever possible and eat fresh grass, clovers or herbs".

Voluntary information on environmental protection was the second most frequent process related information on the milk packaging (176 messages), pertaining to information on nature protection and environmentally friendly packaging. For example, "Together we stand for sustainable organic quality, which places respect for animals and the long-term preservation of our soil at the centre of our work; in this way we protect the environment and preserve it as the basis of life for humans and animals" (Germany); "And the packaging? We are also making it more and more environmentally friendly. Pack by pack. In this way, we contribute together to less climate impact." (The Netherlands); "When selecting our organic products, we strive for the best conditions for people, animals and the environment" (The Netherlands).

Many messages were related to the product locality criterion (64). For example, "At least 60% of the feed must come from their [producers'] own company or from the region." (The Netherlands); "At Jumbo we like to know our farmers personally. For example, we get our milk from Landgoed Het Hengelman in Twente, where Jos and Dorthy Elderink keep more than 100 dairy cows surrounded by beautiful meadows"(The Netherlands); "We are a Polish dairy cooperative owned by farmers running farms in the area of the Green Lungs of Poland." (Poland).

Milks also hadmessages related to the social perspective criterion (43), for example, messages from German milks: "By purchasing this milk you make an important contribution to the future of the local agriculture and the Bioland farmer families"; "We Arla dairy farmers are the owners of Arla dairy. We stand for the fact that products made from our milk are manufactured with great care. By buying this product you support our commitment."; "Farmers receive a fair price for this Alnatura-stable Alpine milk so that they can manage their farms in the long term. By buying this milk you as a customer help to maintain and promote the local organic dairy industry."

Table 3 shows that product quality confirmation criteria was the most frequently observed product-related voluntary information on milk packages (167 messages). The most frequent sub-criterion was labels of organic farming associations, initiatives or companies.

The information on the conditions of milk processing was only slightly less frequent (159 messages). We found the most information of this type on German milks, where most often details of processing (exact time, temperature, consecutive processes) were given. The manufacturers also provided information about the impact of the processing method on the shelf life and on the preservation of nutrition and taste.

Information on gentle processing rarely appeared on the analysed milk packages. Only 18 products (all German) had this type of information. For example, "Thanks to our special heating process, with which the milk is gently processed, the full taste and valuable ingredients are retained for a particularly long time"(Germany); "Our delicious fresh low-fat milk gets its longer shelf life through our particularly gentle filtration process, which reduces the germ content of the milk" (Germany). Information about careful processing appeared even less frequently, i.e., three times (one German milk and two Italian milks). For example, "Valuable raw milk and careful processing are the basis for the controlled high quality of our Weihenstephan organic fresh milk." (Germany) and "The milk undergoes a careful microfiltration process that allows it to last longer, but which respects the taste and nutritional value of raw milk." (Italy).

Table 3. Product-related packaging voluntary information on organic milks (table shows total numbers of messages per country in each criteria and sub-criteria category).

Criteria	Sub-criteria	Germany	The Netherlands	Italy	Poland	Total
Total number of milk packages		37	28	24	14	103
Quality confirmation	Labels of organic farming associations, initiatives or companies	37	57	11	7	112
	Control of production, processing or quality	28	8	1	3	40
	Organic farming association mentioned	10	0	0	3	13
	High quality in general terms	0	2	0	0	2
	Total	75	67	12	13	167
Enjoyment /pleasure	Taste	34	24	5	0	63
	Freshness	15	10	0	0	25
	Full-bodied flavour	11	2	2	0	15
	Other enjoyment information	8	0	0	0	8
	Total	68	36	7	0	111
Naturalness	Natural nutrient content	1	19	0	9	29
	Care for nature	10	14	0	0	24
	Natural product origin	2	10	2	1	15
	Natural care for animals	7	2	0	0	9
	Natural technological aspects	8	4	1	0	13
	Naturalness as philosophy	2	4	1	0	7
	Other mention of nature	1	0	2	0	3
	Total	31	53	6	10	100
Nutritional values	Content of vitamins and microelements	0	12	2	11	25
	Presence of nutrients and health improving properties	4	7	12	1	24
	Protein and fat properties	0	10	0	1	11
	Packaging impact on value preserving	2	0	3	0	5
	Total	6	29	17	13	65
Conditions of milk processing	Processing condition details	20	12	32	8	72
	Value-preserving processing	22	0	4	1	27
	Processing impact on shelf life extension	18	0	0	0	18
	Gentle processing	18	0	0	0	18
	Processing impact on taste	9	1	0	0	10
	Traditional production method	5	0	1	1	7
	Careful aspects of the supply chain	0	2	0	2	4
	Careful processing	1	0	2	0	3
	Total	93	15	39	12	159

In addition to the above criteria, there were also messages related to enjoyment/pleasure (111), naturalness (100) and nutritional value (65). In the enjoyment/pleasure criterion, the

most messages were about the unique, delicious taste of organic milk and its freshness. For example, "Naturally organic. This is how fresh milk tastes best" (Germany); "Enjoy a piece of nature without genetic engineering with every sip of our good and tasty organic milk"(Germany); "Take it and enjoy the best that nature has to offer" (The Netherlands); "Campina Organic is made with care and passion and you can taste it" (The Netherlands); "Fresher than fresh" (The Netherlands); "Did you know that every cow gives its own milk? Not every bottle tastes exactly the same. In the summer we eat fresh grass and hay in the winter. You can taste it. Just like the spicy grassland where we graze and the humus-rich sandy soil of the farm" (The Netherlands); "The cows get the care they deserve and from a healthy environment comes tasty and nutritious milk!" (The Netherlands); "Cows are fed with fodder grown at more than 1000 m in the frame of untouched nature that provides milk with a unique flavour" (Italy).

In the nutritional values category, the most common was information about the content of vitamins and microelements and the presence of nutrients and health improving properties. For example, "It [milk] is naturally a source of: calcium for strong bones and teeth, protein for contribution to growth and recovery of your muscles, vitamins B2 and B12, to help you get energy from your diet"(The Netherlands); "Milk is a source of calcium, an element that plays an important role in maintaining healthy bones and teeth. Two glasses of milk provide 38% of the daily calcium requirement" (Italy); "Milk is packed with healthy proteins, which are indispensable for our body. Protein gives us energy and helps us to grow, develops our brains and maintains the muscles." (The Netherlands).

Since no official definition of organic product naturalness exists, to identify messages related to the naturalness criterion, we identified messages that contained words such as nature and natural. These words appeared the most often in the context of the care for nature and natural nutrient content. For example messages like: "For tomorrow's nature" (The Netherlands); "The best milk with responsibility for animals, people and nature." (Germany); "From nature with love and conscience" (Italy); "Love for nature and the cows. That is what drives the farming families of Campina Organic. For generations. The cows graze on green, flowery meadows, where nature can take its course." (The Netherlands); "As a farmer with heart and soul, I believe a lot in naturalness. That's why I feed my cows traditionally—and, of course, without genetic engineering." (Germany); "I became an organic farmer because nature is the best role model for me. That is why the cows on my farm live as naturally as possible." (Germany); "Jersey cows' milk naturally contains more fat and protein" (The Netherlands).

A comparison of the voluntary information on organic milk packaging between the countries analysed is shown in Figure 1. It compare the countries studied in terms of information on packaging. The horizontal axis shows the average amount of information given on the product packaging in each country. This reflects the intensity of consumer information on a given topic in each country. For example, the Netherlands is clearly at the forefront when it comes to the frequency of information on organic milk packaging. This applies to several categories—'animal welfare', 'environmental protection', 'quality confirmation', 'naturalness', 'product localness' and 'nutritional value'. Germany, on the other hand, leads by far in the categories 'processing conditions' and 'eating pleasure'. Italy leads only in the category 'social perspective', while Poland does not lead in any category.

Figure 1 also synthesises the quality information on milk packaging. The leading categories are 'animal welfare', 'environmental protection', 'processing conditions' and 'quality confirmation'. The least popular categories were 'product locality', 'nutritional value' and 'social perspective'. An analysis of the sentences on packaging showed that such information appears on organic milk packaging in Germany, the Netherlands and Italy. This information can be divided into groups such as animal (cow) welfare, product locality, environmental protection and social perspective.

Figure 2 shows voluntary information on organic milk in relation to the processing method, i.e., pasteurisation, low pasteurisation with microfiltration and ultra-high temper-

ature (UHT) processing. A total of 38 pasteurised, 28 microfiltered and 37 UHT milks were analysed.

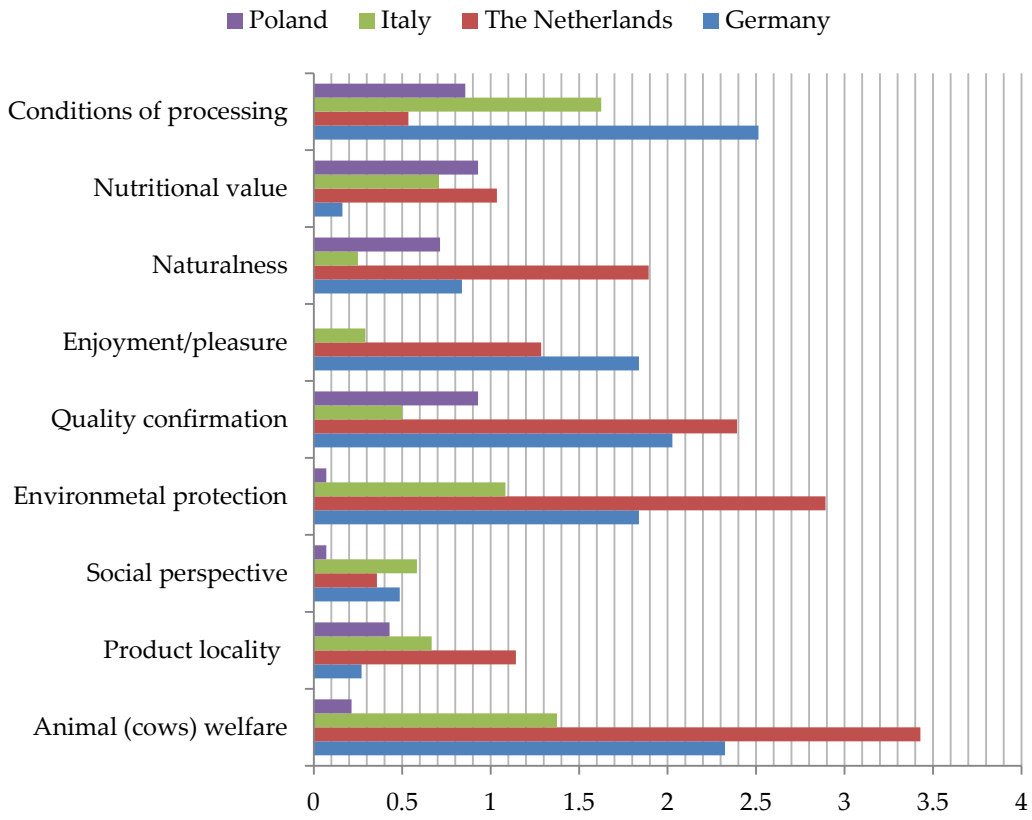

Figure 1. Average number of packaging messages per product in the analysed countries, divided into criteria.

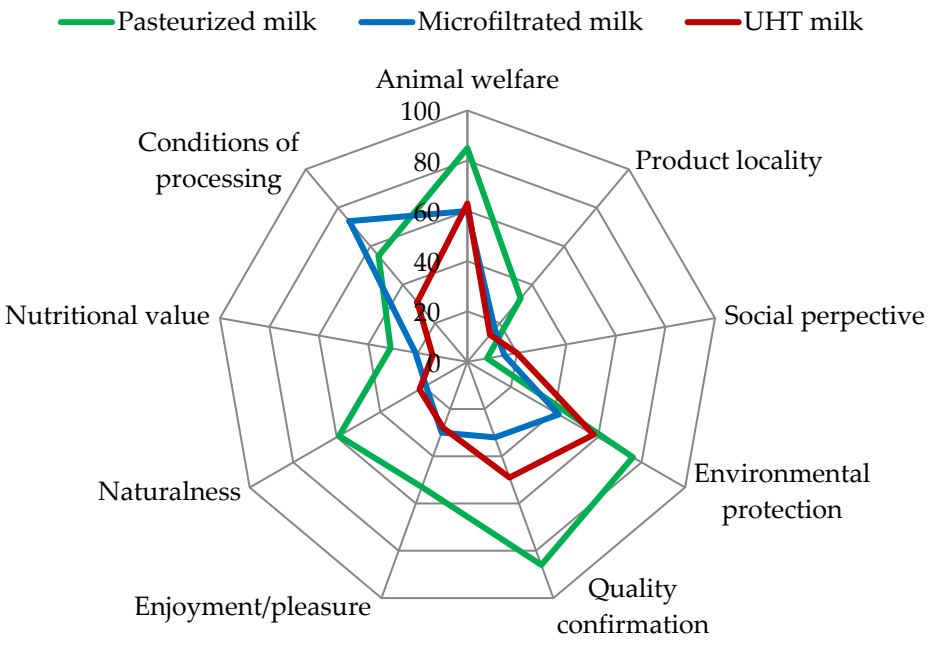

Figure 2. Content of voluntary information on organic milks processed by pasteurization, microfiltration and ultra-high temperature processing (UHT) (a total number of messages; all countries together).

From Figure 2 it follows that pasteurised milk had the most voluntary information. Compared to other processing methods, this milk had clearly more information about quality confirmation, animal welfare, environmental protection, naturalness, sensory qualities, product locality, nutritional value.

Microfiltered milk had the most information about processing conditions. Typically, the messages on the packaging explained the microfiltration process, listed the processing steps he and the impact on the product properties. For example: "The milk undergoes a careful microfiltration process that allows for a longer shelf life but preserves the taste and nutritional value of the raw milk" (Italy); "By using a special production process (microfiltration), the taste of the milk is preserved longer and the valuable ingredients are largely retained" (Germany). Compared to other processing methods, organic UHT milk had the most information of the social perspective type, while the least information was given on product location, sensory qualities, nutritional value and processing conditions.

4. Discussion

Verification of Hypothesis 1: 'Organic milk available on the European food market includes a voluntary labelling in-formation on organic quality attributes'

Results of the study confirmed hypothesis 1 in all countries—voluntary information has been found at most of the analysed milk packages. Admittedly, the amount and variety of this information is at a different level in each country, but everywhere such information is included on organic milk packaging.

Verification of Hypothesis 2: 'Voluntary packaging information could be categorized by process-related and product-related criteria of organic food quality evaluation'

Hypothesis 2 was also confirmed in the study. It was proven that voluntary information on milk packaging can be categorised according to both process and product-related criteria for assessing organic food quality. Admittedly, the authors did not have an easy task when categorising process and product criteria. Indeed, this categorisation, according to Kahl et al. (2012), is very complicated due to the lack of precise guidelines for the quality assessment criteria of processed organic food [22]. More clarity in this regard would help both legislators and organic food producers and processors.

In an attempt to distinguish between the different types of information on packaging, the authors had to select key words and create specific criteria according to previous publications [22,23,25]. For process criteria, attributes such as animal (cow) welfare, environmental protection, product locality and social perspective were extracted. For product attributes, we extracted quality certification, sensory value, naturalness and processing method.

From various European surveys of organic milk consumers (Germany, UK, Italy, Austria, Switzerland), the most important of the ethical attributes tested were: "animal welfare", "regional production" and "fair prices for farmers" [19,32–35]. Consumers showed an increased willingness to pay for organic foods with these additional ethical attributes. Consequently, the researchers suggest that organic processors should increasingly focus on additional ethical attributes in production and communication with consumers. German consumers perceive labels as good advice in the purchasing process, especially if they are looking for products without genetic engineering, fair trade, regional origin and products that guarantee animal welfare and organic production [36–38]. Furthermore, for most consumers, reinforcing animal welfare with other types of consumer values, such as functional or emotional value, can motivate them to purchase animal-friendly products [39].

Thus, it can be said that providing voluntary information about practices that fit in with CSR is beneficial to companies, and the survey results show that organic producers are doing so. In Yu et al. (2021) research it has been proven that corporate social responsibility (CSR) image of organic food company may influence on the consumption behavior and co-developing behavior of customers—it can effectively promote consumer trust, continuous purchase, and active engagement in the co-development of products and services [40].

Verification of Hypothesis 3: 'The assortment of organic milk and content of voluntary packaging information varies depending on the market'

The study verifies hypothesis 3—the range of organic milk and the content of voluntary information on the packaging are different depending on the organic production market in a given country (Germany, the Netherlands, Poland and Italy). The assortment of organic milks presented in Table 1 was the biggest in Germany, followed by the Netherlands, Italy and the lowest in Poland, which confirms the hypothesis 3. Figure 1 (see Results) shows a diversity of the label information in four analysed countries. The wealth and diversity of information on milk packaging is greatest in Germany and Netherlands, less in Italy and least in Poland.

It can be assumed that producers who put such information on organic milk are aware of consumer expectations, want to present their product in a transparent way and pay attention to the best possible presentation of the attributes of their organic production. Such information is very poor on the milk available in Poland. This can be explained by the fact that in Poland the organic market is in an early growth phase. Only about 30% of Polish organic consumers admitted that they check the presence of eco-labels on products, and one of the barriers to buying organic food is a lack of trust in the certificate [10].

Of the product-related criteria, the group of information related to quality certification was the most numerous. Publications on this topic state that German consumers have more trust in national organic labels than in the EU-Eco-Label [41]. Perhaps this is why the number of labels of organic farming associations, initiatives or companies on German products is so high. Research shows that if the label 'organic' is trusted by consumers, they can transfer the belief in high quality to other attributes of the product: taste and healthiness [34]. According to cited research, Danish consumers have an even stronger tendency to infer good taste and wholesomeness from the label 'organic' than German consumers. This may be due to the fact that in Denmark the labelling system for organic products has been in place for a longer period of time and enjoys a very high degree of consumer confidence, even for consumers who do not buy such products regularly [42]. Among the product-related criteria, processing conditions appeared to be of lower frequency in the countries analysed. German products had the highest amount of such information, and in this country producers most often mention gentle or careful processing (18% of processing messages). Microfiltration is a relatively new processing method and probably therefore micro filtered milk producers choose to explain exactly what the process is, the steps involved and the advantages.

Package information on the sensory and nutritional qualities of milk can be important for consumers focused on the personal benefits of eating organic food. In some markets, nutritional information may be more profitable for producers than other aspects of quality. For example, in Poland, consumers choose organic food for its good health effects and personal benefits, while environmental or ethical issues are of secondary importance [10,43]. In summary, hypothesis 3 was fully confirmed in the research. The richness and variety of voluntary information on milk packaging are greater the more developed the market for organic production in a country. The results are in line with objective figures showing the level of development of the organic market in the countries surveyed in 2019. Organic retail sales in 2019 in million € were highest in Germany (11970), followed by Italy (3625), the Netherlands (1211) and Poland (314). Consumption of organic products per capita in 2019 [€/person/year] was highest in Germany (144.2), followed by the Netherlands (71.0), next in Italy (59.8) and lowest in Poland (8.3) [27,43].

Verification of Hypothesis 4: 'Content of voluntary packaging information varies depending on the milk processing method (UHT, pasteurization, microfiltration)'

We can say that hypothesis 4 is fully confirmed. Figure 2 (see Results) shows the voluntary information on organic milk depending on the processing method. Overall, the least voluntary information was given for UHT milk, slightly more for microfiltered milk and the most for pasteurised milk. According to the authors, this is due to the fact that

pasteurised milk is the oldest and most well-known way of processing milk, which makes it easier for producers to highlight the quality differentiators that consumers look out for and trust. Therefore, producers of pasteurised milk have the most extensive system of communication with consumers, presumably to differentiate their product from others.

Verification of Hypothesis 5: 'The predominant milk processing system in each country depends on the degree of development of the market for organic products'

Hypothesis 5 is not fully confirmed. The authors hypothesised that countries with a higher development of organic agriculture are characterised by milk processing methods that are most beneficial from the point of view of the nutritional value of the product from its environmental impact. However, the analysis of the acquired data did not unequivocally confirm the latter hypothesis, as the results on how milk is processed in different countries can hardly be related to the degree of development of organic production in each country. Microfiltration is by far the best way to process milk, as it preserves its nutritional properties to the maximum extent [40]. However, in the Netherlands, for example, which is otherwise advanced in terms of the development of organic farming, this method is not often used—not a single type of milk processed in this way was found in the study. Here, pasteurisation dominates, as in Poland. At the same time, UHT milk is relatively popular in Germany and Italy, which is not beneficial for consumers, as the UHT method radically alters the composition of milk lowering its natural nutritional value [43]). At the same time, these countries use microfiltration much more frequently than Poland. This result is consistent with the fact that this technology is relatively young and countries such as Poland have only recently applied it. This is related to the development of environmental awareness and technology—Poland started to introduce friendlier food processing methods later than the other countries represented in this study. As can be seen from the analysis described, the milk processing system only partially reflects the degree of development of the organic market in a country. It is likely that the predominant milk processing system in a country is strongly influenced by the habits of both producers and consumers, but further research would be needed to verify this.

5. Limitations and Recommendations

The authors of this study are aware of the limited scope of the research carried out and therefore of the limited possibilities for conclusions.

First of all, the research concerns only 4 EU countries, which is a small sample in the context of the 28 EU member states. Due to the research capacities of the ProOrg project consortium, two central European countries were selected—Germany and Poland, one country closer to the north of the continent—the Netherlands—and one southern European country—Italy. The western part of the continent (Spain, Portugal) and Scandinavia are not represented. The EU is culturally very diverse and this also applies to the issue of organic food consumption and consumer expectations in this respect. In addition, in each country the range of organic milk was examined in a several shops in one city, what makes it difficult to generalise to the whole country. Finally, our results only refer to 2019, while major global and local changes followed—the COVID 19 pandemic and Russia's armed invasion of Ukraine. These events have changed the picture of the world and the European Union—probably also in terms of organic food consumption.

For the above reasons, the results obtained are preliminary and cannot be generalised to the entire European Union. They can mainly be applied to Central Europe, where most observations were made. Besides, our results have a preliminary diagnostic character and shed light on the issue of voluntary information on organic milk packaging. They provide a basis for the preliminary claim that this information is richer the more developed the market for organic production is in a given country. However, this claim needs to be confirmed in further research over more years, in more EU countries and in more cities/shops in each country.

The future direction of the research should also include an analysis of a larger number of different types of organic milk in the countries studied and an attempt to find answers

to some unresolved questions, e.g., what factors influence the choice of specific processing methods for organic milk in each country. Another issue worth further investigation is the effectiveness of voluntary information on milk packaging in the context of consumers' purchasing decisions. If such information positively influences purchasing decisions, organic milk producers should aim for more extensive and suggestive information on packaging.

6. Conclusions

The study analyse voluntary information on organic milk packaging from four European markets in the context of organic food quality, i.e., Germany, the Netherlands, Italy and Poland. Indeed, voluntary information is an important way of communicating with consumers and can promote the product as valuable and thus encourage consumers to buy. The study confirmed most of the research hypotheses made at the outset.

The analysed organic milk available on the German, Dutch, Italian and Polish food markets had voluntary information on packaging regarding process and product quality attributes. Dutch milk, compared to the other countries, had the most voluntary information on animal (cow) welfare, product localisation, environmental protection, quality confirmation, naturalness and nutritional value. German milk had the most information on sensory qualities and processing conditions. Milk available on the Italian market contained the most information on the social perspective, while Polish milk had only information on the environmental quality, nutritional value of the product and processing method. Thus, it can be concluded that the analysed milk from Germany, the Netherlands and Italy had mainly information on process organic quality criteria, while Polish milk had mainly product-related information.

At the same time, the amount of voluntary information on packaging was lowest in Poland, slightly higher in Italy, and highest in Germany and the Netherlands. This corresponds to the degree of development of the organic market and the range of organic milk in the respective country. In the German market, which is the most developed, the highest number of products was found with 37 milks. In the intermediate developed markets, the number of products was 27 (Netherlands) and 28 (Italy). In Poland, the least developed organic market, only 14 products were found.

The content of the voluntary information on the packaging differed according to the milk processing method. Compared to other processing methods, pasteurised organic milk had clearly more information on quality confirmation, animal welfare, environmental protection, naturalness, pleasantness, product localisation, nutritional value. Organic microfiltered milk had the most information on processing conditions. Organic UHT milk had the most information about the social perspective, while other attributes of organic production such as nutritional value and processing conditions were noticeably less observable.

In Germany, the Netherlands and Italy, the predominant packaging type for organic milk was multi-layered packaging, while in Poland it was the plastic bottle.

Based on the above statements, it can be concluded that in countries with a more developed market for organic products, producers inform consumers more extensively about the environmental and nutritional qualities of organic milk than in countries with a less developed organic market. The implication is that producers in the latter countries could learn a lot from their more experienced colleagues in terms of consumer communication. Organic producers by providing information about the characteristics of their products can build their brand and demonstrate Corporate Social Responsibility and through this take an active part in creating the conditions for sustainable social and economic development and increase the competitiveness of their company.

Another conclusion concerns the way organic milk is processed—still a large proportion is processed using the UHT method, which, according to scientific studies, leads to unfavourable changes in the composition of the milk and alters its natural qualities. Education on this subject should be spread among organic producers in all countries. At the same time, it should be borne in mind that the best method of processing milk is still under

debate among scientists. Providing producers and consumers with a clear characterisation of the different processing methods would help to improve the nutritional value of the milk on offer and to build up clear content on organic milk packaging.

Finally, based on the data collected, it can be concluded that the nature of organic milk packaging in the countries studied raises a number of environmental and health concerns. Both the multi-layered packaging and the plastic bottle, which dominate as current packaging, are controversial from an environmental point of view, as they contribute to littering and pollution. There should be a push to change the packaging of organic milk towards safe biodegradable or light glass packaging. The organic sector should point the way towards packaging that is most beneficial to the environment and the health of the public.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su142416901/s1, Table S1: Criteria of organic milk quality used to analyse.

Author Contributions: Conceptualization, K.W., A.H., L.M.B., F.P. and E.R.; data curation, K.W., A.H., L.M.B., F.P. and E.R.; formal analysis, K.W. and L.M.B.; funding acquisition, E.R. and F.P.; investigation, K.W., A.H., L.M.B., F.P. and E.S.C.; methodology, K.W., A.H., L.M.B., F.P. and E.R.; supervision, A.H., F.P. and E.R.; writing—original draft, K.W. and L.M.B.; writing—review and editing, K.W., A.H., L.M.B., F.P. and E.R.; All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by ProOrg Project 'Code of Practice for organic food processing', ERA-NET CO-FUND within Horyzont 2020, COREORG/COFUND/PROORG/4/2018. The work of Lisa M. Borghoff is additionally funded by the Werner-und-Elisabeth-Kollath-Stiftung for the promotion of scientific nutrition and health research.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: We would like to thank the students of the Scientific Circle of Nutritionists at the Warsaw University of Life Sciences and FH Münster University of Applied Sciences, Department of Food · Nutrition · Facilities, Germany for their help in collecting the initial research data.

Conflicts of Interest: The authors declare no conflict of interest.

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