

“CLEAN LABEL” AS ONE OF THE LEADING TRENDS IN THE MEAT INDUSTRY IN THE WORLD AND IN POLAND – A REVIEW

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ABSTRACT

The contemporary market of food products is highly variable. The reason for this is, among others the significant number of factors governing consumer choices in relation to food. Research results indicate that Polish consumers are increasingly declaring their interest in food features such as sensory and health properties, and safety. Most likely, social education, campaigns of food societies and own initiatives of food producers promoting new, “healthy” products have contributed to this. Among other things, the ever increasing consumer knowledge on the relationship between lifestyle and diet and health has become for many food businesses prerequisite for the development and marketing of new products. In food production in the world and in Poland the so-called “clean label” trend is one of fastest growing initiatives aimed at improving the health quality of foods. The “clean label” has not yet been defined in food law and is understood rather subjectively. Generally, this term is attributed to products free from “artificial” additives and produced by “natural” or based on a traditional recipe methods known to consumers. In the article, based on the available literature, selected trends in food production at the beginning of the 21st century, with particular emphasis on “clean label” have been discussed. Taking meat processing industry as an example, the measures undertaken by the companies of food industry to produce “clean label” food products have been illustrated. In addition, consumer attitudes toward contemporary trends in the food market, including meat and meat products, have been characterized. In conclusion, the need for legislative intervention to provide appropriate definition for the term “clean label” and the need for consumer education about assessment of quality of foods are emphasized.

Key words: *clean label, food additives, food labeling, health, meat products, legislation*

STRESZCZENIE

Współczesny rynek produktów spożywczych jest bardzo zmienny. Powodem tego jest między innymi znaczna liczba czynników rządzących wyborami konsumenckimi w odniesieniu do żywności. Wyniki badań wskazują, że polscy konsumenci coraz częściej deklarują swoje zainteresowanie cechami żywności, takimi jak właściwości sensoryczne oraz bezpieczeństwo i zdrowotne. Najprawdopodobniej przyczyniła się do tego edukacja społeczna, kampanie towarzystw żywnościowych i własne inicjatywy producentów żywności promujące nowe, „zdrowe” produkty. Między innymi stale rosnąca wiedza konsumentów na temat związku między stylem życia a dietą i zdrowiem stała się dla wielu firm spożywczych warunkiem rozwoju i wprowadzania na rynek nowych produktów. W produkcji żywności na świecie i w Polsce trend tzw. „czystej etykiety” jest jedną z najszybciej rozwijających się inicjatyw mających na celu poprawę jakości zdrowotnej żywności. „Czysta etykieta” nie została jeszcze zdefiniowana w prawie żywnościowym i jest rozumiana raczej subiektywnie. Ogólnie termin ten przypisuje się produktom wolnym od „sztucznych” dodatków i wytwarzanym „naturalnymi” metodami lub opartymi na tradycyjnych recepturach znanych konsumentom. W artykule na podstawie dostępnej literatury omówiono wybrane trendy w produkcji żywności na początku XXI wieku, ze szczególnym uwzględnieniem „czystej etykiety”. Biorąc za przykład przemysł przetwórstwa mięsa, zilustrowano działania podejmowane przez firmy z branży spożywczej w celu wyprodukowania produktów spożywczych, które mogłyby zostać opatrzone „czystą etykieta”. Ponadto scharakteryzowano postawy konsumentów wobec współczesnych trendów na rynku żywności, w tym mięsa i produktów mięsnych. Podsumowując, podkreślono potrzebę interwencji legislacyjnej w celu zapewnienia właściwej definicji terminu „czysta etykieta” oraz potrzebę edukacji konsumentów na temat oceny jakości żywności.

Słowa kluczowe: *czysta etykieta, dodatki do żywności, etykietowanie żywności, zdrowie, produkty mięsne, ustawodawstwo*

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INTRODUCTION

Marketing trends are the basis for planning and making decisions for every industry, and this is also applicable for food sector companies. A keen observation of the marketing activities is extremely important as the modern food market is subjected to continuous fluctuations. The reason for this variation is, among others, increasing diversity in the needs of consumers and a considerable number of factors influencing the consumer choices of food products [5].

As a consequence of the globalization process, the Polish food industry, including the meat industry, has become an integral part of an open global economic system. This means that industry is constantly subjected to strong competitive pressure and needs to be modified to meet the demand. Native producers successfully undertake many measures to maintain the quality of agri-food products according to global standards and take advantage of market niches. They are very flexible and their activities are modified according to the current trends prevailing in the world food market [5].

One of the fastest-growing agricultural sectors in Poland is meat production [85]. The meat products have played a crucial role in human evolution. Till date, they continue to be an important component of a well-balanced and mixed diet due to the presence of rich nutrients [13, 53, 83]. The importance of meat industry in Poland is evidenced by the fact that producers of meat and meat products constitute one of the three largest groups of companies in the food sector, in addition to alcohol producers and dairy industries. It is estimated that in 2018, Poland has produced 2,350 thousand tons

of poultry meat, 1,957 thousand tons of pork, and 580 thousand tons of beef [85]. The statistical data with regard to the consumption of meat in the culinary form and as meat preparations for several years has indicated that each person consumes close to or exceeding 70 kg of meat per year [30]. However, like the other branches of the food industry, the meat industry must adapt to current market changes to increase sales. These changes are largely shaped by consumer requirements and new market trends.

The aim of this study was to review research concerning new trends in food production in the world and in Poland aimed at improving the health quality of food, especially the “clean label” trend. Taking meat processing industry as an example, the measures undertaken by the companies of food industry to produce food products with “clean label” have been illustrated. In addition, consumer attitudes toward contemporary trends in the food market, including meat and meat products, have been briefly characterized.

“CLEAN LABEL” AND OTHER TRENDS ADOPTED IN THE PRODUCTION OF MEAT AND MEAT PRODUCTS AND CONSUMER ATTITUDES

The new trends adopted in food production, which on the one hand aim to meet the growing demand for food and on the other hand adapting the product to the new requirements of consumers, are presented in Figure 1. The trends concerning the production of the so-called “clean label” products are also included in this article.

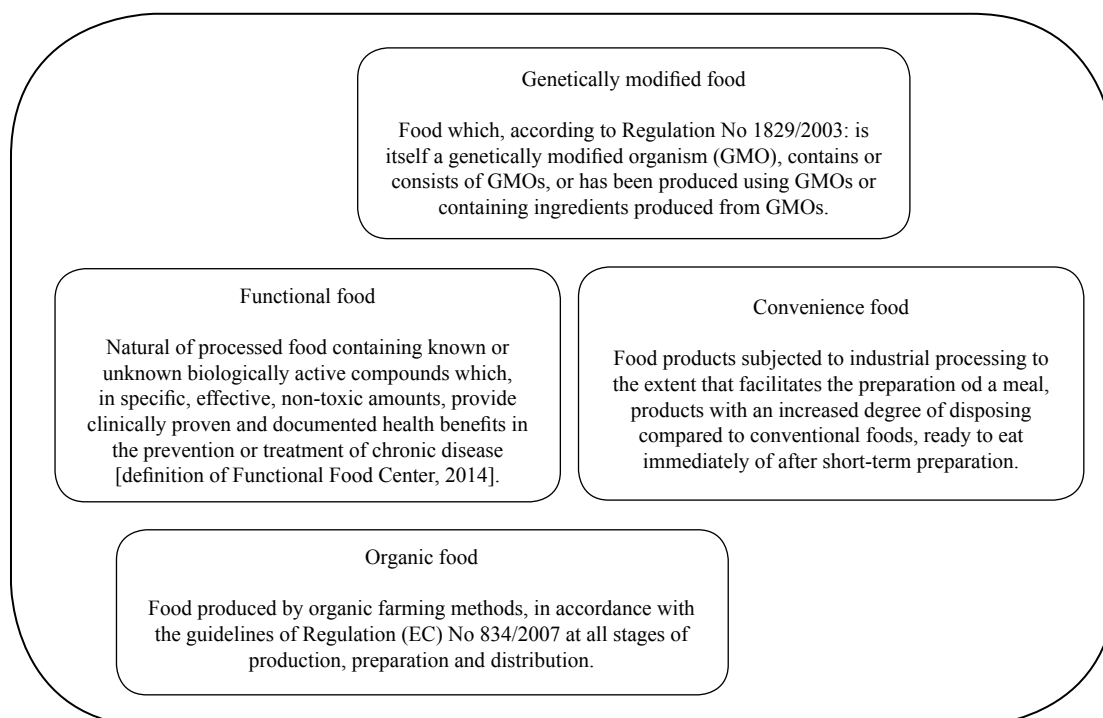


Figure 1. Selected trends in food production in the world and in Poland in the 21st century [8, 9, 33, 34, 44, 94]

As many aspects of food production are regulated by law in European Union (EU), the selected acts of food law referring to the issues raised in this article have been summarized in Table 1.

Table 1. Selected legal acts regarding food safety and labeling, use of food additives, organic farming, and production of novel and genetically modified foods

Regulated food production areas	Title of legal act
Food safety	<ul style="list-style-type: none"> • Regulation (EC) 178/2002 of the European Parliament and the Council of 28 January 2002 laying down the general principles and requirements of food law, appointing the European Food Safety Authority, and laying down the procedures concerning food safety. Off J EU L 31, 1.2.2002. • Ustawa z dnia 25 sierpnia 2006 r. o bezpieczeństwie żywności i żywienia. Dz U 2017 r. poz. 149.
Food labeling	<ul style="list-style-type: none"> • Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. Off J EU L 404, 30.12.2006. • Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers, amending Regulations (EC) No 1924/2006 and (EC) No 1925/2006 of the European Parliament and of the Council, and repealing Commission Directive 87/250/EEC, Council Directive 90/496/EEC, Commission Directive 1999/10/EC, Directive 2000/13/EC of the European Parliament and of the Council, Commission Directives 2002/67/EC and 2008/5/EC and Commission Regulation (EC) No 608/2004. Off J EU L 304, 22.11.2011. • Ustawa z dnia 4 listopada 2016 r. o zmianie ustawy o jakości handlowej artykułów rolno-spożywczych. Dz U 2016 poz. 2007. • Rozporządzenie Ministra Rolnictwa i Rozwoju Wsi z dnia 16 grudnia 2016 r. w sprawie wzoru znaku graficznego zawierającego informację “Produkt polski”. Dz U 2016, poz. 2148.
Use of food additives	<ul style="list-style-type: none"> • Regulation (EC) No 1333/2008 of the European Parliament and of the Council of 16 December 2008 on food additives. Off J EU L 354, 31.12.2008. • Commission Regulation (EU) No 1129/2011 of 11 November 2011 amending Annex II to Regulation (EC) No 1333/2008 of the European Parliament and of the Council by establishing a Union list of food additives. Off J EU L 295, 12.11.2011.
Organic farming and organic foods	<ul style="list-style-type: none"> • Ustawa z dnia 25 czerwca 2009 r. o rolnictwie ekologicznym. Dz U 2009 nr 116 poz. 975. • Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labeling of organic products and repealing Council Regulation (EC) No 834/2007. Off J EU L 150, 14.6.2018.
Novel foods	<ul style="list-style-type: none"> • Regulation (EU) 2015/2283 of the European Parliament and of the Council of 25 November 2015 on novel foods, amending Regulation (EU) No 1169/2011 of the European Parliament and of the Council and repealing Regulation (EC) No 258/97 of the European Parliament and of the Council and Commission Regulation (EC) No 1852/2001. Off J EU L 327, 11.12.2015.
Genetically modified foods	<ul style="list-style-type: none"> • Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed. Off J EU L 268, 18.10.2003.

Information available in the literature [5, 6, 12, 32, 50] indicates that many factors underlie the selection of food products by Polish consumers. Among others, it has become prerequisite for many food businesses, for the development and marketing of new products, that they satisfy the ever-increasing consumer knowledge on the relationship between diet and health. According to *Białoskurski*, the concept of “new” food product development is recognized by consumers primarily as a product that is upgraded to meet the new needs and modified in various ways [12].

Polish consumers are increasingly showing their interest toward food products featuring sensory and health properties as well as safety. The findings of the study of *Ozimek* and *Żakowska-Biemans* [50] indicate at the same time that the perception regarding quality of food is dependent on the evaluated product and its place of purchase. Food products dedicated to specific groups of consumers (e.g., infants and people struggling with health problems) are perceived to be possessing high quality. On the other hand, food products with food additives and which are highly processed and genetically

modified are more often considered to be of low quality. In the context of the above findings, it has been noticed that attitude toward food and the ability to classify it as “healthy” and “unhealthy” are developed from an early age onward. Such a subjective classification of foods can be misleading because of a lack of nutritional knowledge. Therefore, the role of the food industry seems to be invaluable, because due to the production of a large range of highly processed products, on the one hand, it is responsible for public health, while on the other, it has to modify its product according to the current dietary recommendations [50, 91].

In response to the market demand, food producers, including meat sector companies, are undertaking various initiatives that are aimed at diversifying their commercial product, and at the same time adapting it to the current market trends. One of such activities is the so-called “clearing” of food labels. Although the term “clean label” is already mentioned on different products and has appeared more frequently in literature in recent years, no common objective and legally binding definition of “clean label” for a food product has been developed so far [8].

Consumers generally assess the quality of a product and the “cleanliness and clarity” of its label through the packaging information (or information accompanying it during the sale). The results of research indicate that the choice of a “clean label” food product is dependent on a number of factors, most important among them being health consciousness and a desire to lead a healthy lifestyle. There has been an increasing interest among the inhabitants of industrialized countries to know the ingredients of the food they consume, its nutritional value, and the bioavailability of various nutrients, as well as food production methods. Most people have a negative perception with regard to intensive farming, which involves extensive processing of food and excessive “chemization,” since they believe that the food products produced by this technique negatively affect the health of consumers. This problem also applies to meat and meat products [47]. Moreover, there are growing concerns about the impact of food production methods on environmental sustainability and climate changes. These demands have prompted the search for less processed, more “natural” products that contain no synthetic food additives, and hence are considered to be “healthier.” Foods that meet the above-mentioned criteria are referred to as “clean label” products [9].

The results of a recent consumer research study indicate that interpretation of the term “clean label” is largely subjective, because it depends on the consumer’s knowledge of both health and food production. Consumer behavior confirms the tendency to avoid buying food which in their opinion does not meet the adopted criteria or expectations. This is called “negative attitude.” Taking the above factors into consideration, it

seems that the key to successful selling of food product with the so-called “clean label” is the manner in which the food information is provided [1, 8].

In European Union, issues relating to the labeling of food products are regulated by food law (Table 1). Polish requirements in this area are designed based on the EU legislation guidelines, which establish the general principles, requirements, and obligations regarding the provision of food information to consumers. The food product label is a kind of platform for communicating with the consumer and providing him the food information. The provisions of Regulation (EU) No 1169/2011 indicate which information is mandatory on the product label and which may be provided voluntarily. In the light of the above provisions, statements such as “clean label,” “natural product,” and “no artificial food additives” are non-compulsory. When placing them, the food business operator responsible for the food information (i.e., the operator under whose name or business name the food is marketed or if that operator is not established in the EU, the importer into the Union market) cannot mislead the consumer.

Consumers accept the fact that the price of a product with a “clean label” may be higher than that of its “conventional” counterpart. Not everyone, however, realize that low-processed products, often described as “natural,” “traditional,” with “improved health value,” do not have to be produced using organic farming methods or old production technologies; they can be successfully manufactured using the conventional food processing techniques [8].

Products with improved health quality, including nutritional value, represent a fairly wide group of innovative food products on the Polish market. Under certain conditions, they may also be called as functional foods. The study of consumer attitudes and behavior toward various forms of functional foods have shown that health-promoting values of food are appreciated mainly by people interested in their own health and families (especially women) [9]. In the opinion of Polish female consumers, in order to obtain meat of better health quality, one should use natural methods of animal husbandry, in particular an appropriate way of taking care of their health, feeding, and keeping (so-called “free-range”); subject them to humane slaughter; and use an appropriate method for pretreatment, storage, and distribution of meat products [32].

The variables affecting the consumption of meat products with improved health quality and consumers’ buying habits were, among others, the following: own assessment of the health benefits associated with the diet, identification of special nutritional needs, health and nutrition information on food labels, product type, having prior knowledge about the product, and new product

concept. The consumers showed high uncertainty toward consumption of meat products with improved health value. However, the respondents showed a positive attitude toward concepts which involved modification of the recipe composition, such as reducing the content of salt (sodium chloride) and fat, and replacing sodium nitrate (III) with ingredients of natural origin. A skeptical opinion was expressed with regard to the addition of

“healthier” ingredients to meat products, such as n-3 polyunsaturated fatty acids and vitamin E [75, 76].

Many studies [3, 7, 21, 22, 23, 36, 46, 80, 81, 95] concerning the methods to improve the health quality and nutritional value of meat and meat products have been published. More information on concepts aimed at improving the health quality of meat and meat products is presented in Table 2.

Table 2. Concepts to improve health quality of meat and meat products and examples of activities in this field

Concepts to improve health quality of meat and meat products		
Modification of animal carcass composition	Changes in the recipe composition of meat products	Changes in the production process and in technology
<ul style="list-style-type: none"> • Reduction of fat content [39, 87] • Lowering the cholesterol content [19] • Change in the profile of fatty acids [41] • Increasing the content of certain minerals [35, 54] • Increasing the content of antioxidants and vitamins [31, 79, 88] 	<ul style="list-style-type: none"> • Reduction of fat content [29] • Change in the profile of fatty acids [4, 16] • Elimination of allergenic ingredients [90, 92] • Incorporation of certain ingredients into product recipe composition to obtain beneficial effects on health [52, 55] • Addition of probiotics and prebiotics [18, 24, 38, 86, 93] 	<ul style="list-style-type: none"> • Reduction of nitrate (III) content in favor of the ingredients of natural origin [2, 10, 44, 82] • Eliminating traditional smoking method and replacing it with smoke preparations [43, 78, 89] • Biopreservation [40]

The range of potential buyers of meat products with improved health benefits is very broad, and therefore the market for these products has been steadily growing. In addition to growing interest and market demand for meat products with improved nutritional value and health quality, stimulated through, among others, the campaigns of nutrition societies and experts of international organizations in the field of human nutrition and medicine, it is worth emphasizing the importance of the initiatives undertaken by the producers themselves. In recent years, the meat industry has developed and implemented a number of strategies aimed at improving the health value of the products offered, ranging from measures adopted in the area of animal production, through the processing of raw material and design of product composition,

to the selection of appropriate storage conditions and preparation of the final product for consumption. For example, in Europe, the producers of meat products have been focusing for several years on expanding the market by offering products with reduced content of table salt [36, 84] and fat [83]. Relevant information to facilitate the identification of such products is included in the form of statements on their packaging or labels.

Functional food is being discussed in Europe in the context of nutrition and health claims provided on the labels of individual packages of food products [42]. The list of food claims authorized for use in the EU and harmonized rules for their use are regulated by Regulation (EC) No 1924/2006, as amended (Table 1). The types of food claims and examples thereof are summarized in Table 3.

Table 3. Types of food claims and examples thereof according to the Regulation (EC) No 1924/2006

Nutrition claim – definition	Nutrition claim – examples
<p>“Nutrition claim” means any claim which states, suggests, or implies that a food has particular beneficial nutritional properties due to: (a) the energy (calorific value) it (i) provides, (ii) provides at a reduced or increased rate, or (iii) does not provide; and/or (b) the nutrients or other substances it (i) contains, (ii) contains in reduced or increased proportions, or (iii) does not contain</p>	<p>“Energy reduced” “Low fat” “High protein” “Salt-free” “Source of fiber”</p>
Health claim—definition	Health claim—examples
<p>“Health claim” means any claim that states, suggests, or implies that a relationship exists between a food category, a food product, or one of its constituents and health</p>	<p>“Calcium is needed for the maintenance of normal bones” “Beta-glucans contribute to the maintenance of normal blood cholesterol levels” “Replacing saturated fats in the diet with unsaturated fats contributes to the maintenance of normal blood cholesterol levels. Oleic acid is an unsaturated fat”</p>

Producers quite often display the claims in the food labels to highlight the characteristics of the product or the health benefits associated with its consumption [42, 51]. The message available in the claim is an easily available source of information about the product and can facilitate the decision to buy it. However, the presence of a claim is not always reflected in the intent to purchase the product. The credibility of both types of statements is comparable, although consumers rate the health claims slightly better than the nutritional claims [77].

It is now evident that consumers prefer food products with a “clean label” because of the lack of negatively perceived ingredients, such as allergenic substances or food additives which sound like chemical names. Instead, products with a “simple” composition are preferred, i.e., containing only the necessary ingredients that consumers know and perceive as natural and associate with a product based on a traditional recipe. When looking for a “clean label,” many consumers avoid products with ingredients which are unknown to them or are, in their opinion, only unnecessary food additives [1].

According to consumers, food additives are defined as both additives authorized for use in food and ingredients added to food products during processing. In the Member States of the European Union, the use of food additives is regulated by law. The scientific evaluation of food additives proposed for use in food products is carried out by the European Food Safety Authority (EFSA). Scientific opinions prepared by EFSA constitute the basis for the development of legal regulations in this field.

The definition of “food additive” has changed over time, since its first formulation in 1995 by the joint committee of FAO/WHO expert [14]. In the light of the opinion of EFSA and the Food and Drug Administration (FDA) of the United States, food additives are intentionally introduced into food to obtain the intended effect, and as a result become its components. In Europe, food additives are marked with the letter E and a sequence number. Food additives include a large group of chemical compounds. They can be divided based on various criteria, most common among them being origin (natural, identical to natural, and synthetic) and basic function (e.g., preservatives, coloring agents, flavoring agents, texturizing agents, nutritional additives, and miscellaneous agents) [14, 15].

Food ingredients are not considered as food additives, according to Regulation (EC) No 1333/2008 (Table 1). However, they are intentionally added during the production of a food product, in accordance with the principles of Good Manufacturing Practice. Their use does not raise - according to the current state of knowledge - health concerns, which is expressed,

inter alia, by not marking them with the letter E. A few examples of such substances used in meat processing are table salt, soy protein, potato starch, and gelatin.

Despite the fact that the addition of food additives confers benefits to the food products, such as improving quality, extending consumer durability, and reducing manufacturing costs, consumer attitudes toward food additives have mostly been unfavorable. Increased knowledge about healthy lifestyle has led to increased concerns about the quality of food with a long list of additives. In addition, the European terminology of food additives (E number) and the strange-sounding “chemical” names of many of them do not support their acceptance [8, 49].

Contrary to the concerns of some consumers, a food additive may be included in the EU lists available in Annexes II and III of Regulation (EC) No 1333/2008 only if at the proposed level of use it does not pose a threat to consumer health and its presence in food does not mislead the consumer. Fulfillment of the condition that there is no risk to consumer health is ensured by the EFSA’s safety assessment of the food additives. EFSA’s reevaluation program regarding the safety of food additives that were authorized in the EU before January 20, 2009 is currently underway. This program has been published in Commission Regulation (EU) No 257/2010 [20]. It covers 316 substances and the report should be completed by December 31, 2020. The criteria on the basis of which the order of the reevaluation of individual groups of food additives was adopted were, among others, availability of new scientific evidence, scope for use of a given substance in food, and data on the consumption of food additives in the EU [20, 27, 28]. Some decisions on the use of relevant food additives in the meat industry, taken by the European Commission based on the safety reevaluation carried out by EFSA, are presented in Table 4.

In the light of the above-mentioned findings, food producers are taking various actions to improve the quality of their products according to the “clean label” trend. One of them is product reformulation, i.e., modifying the recipe composition in terms of the possibility of eliminating synthetic food additives. For products containing food additives of natural origin or identical to natural ones, it may be a good option to add its name in the food label which in turn can exert a positive impact on consumers (e.g., “potato starch”). A change in the attitude of consumers to a “disliked” or unknown food additive or food ingredient may also be addressed by explaining its role in the product and / or indicating consumer-oriented benefits on the food label. Such benefits may include higher content of one or more nutrients or vitamins, more desirable texture, color stability, longer shelf-life of the product, etc. [1].

Table 4. Some decisions on food additives taken by the European Commission based on safety reevaluation carried out by EFSA [27, 28]

Food additive number and name [function]	Decision on the use of the food additive [EFSA opinion]
E128 Red 2G [food synthetic color]	The application of E128 in food has been suspended and justified by the potential genotoxic effects of one of the derivatives of metabolism [48]
E102 Tartrazine, E104 Quinoline yellow, E110 Sunset Yellow FCF, E122 Azorubine/Carmoisine, E124 Ponceau 4R, E129 Allura Red AC [food synthetic colors, the so-called "Southampton colors"]	Since July 2010, food labels should contain a warning if the product contains at least one of the six colorants from Southampton study: "May have an adverse effect on activity and attention in children" [62, 63, 64, 65, 66, 67]
E 120 Cochineal, carminic acid, carmines [food natural and identical to natural colors]	The name of E120 was changed to "carminic acid, carmines"; new specifications have been established for cochineal extracts ("carminic acid" is an aqueous, alcoholic, or aqueous-alcoholic extract of cochineal) and "carmine," i.e., hydrated aluminum chelates (lakes) of carminic acid [71]
E150a–E150d Caramel colors [identical to natural colors]	The value of the accepted daily intake (ADI) for all four caramel colors was set at 0–300 mg / kg body weight × day, including the individual ADI value for E150c ammonia caramel at 0–100 mg / kg body weight × day [68]
E620 Glutamic acid and salts thereof (E621–E625) [flavor enhancers]	The value of the ADI for glutamic acid and its salts (total intake E620–E625) was set at 0–30 mg / kg body weight × day [74]
E311 Octyl gallate, E312 dodecyl gallate [antioxidants]	E311 and E312 have been removed from the list of permitted food additives [69, 70]
E249 Potassium nitrite, E250 sodium nitrite, E251 sodium nitrate, E252 potassium nitrate [food preservatives]	The current ADI values have been maintained at previous levels for nitrites and nitrates; the need to regulate the use of vegetable extracts containing nitrates and nitrites for meat preparations instead of curing salt has been emphasized [72, 73]

Like other industries, the meat industry, in response to market demand, is trying to limit the use of food additives by eliminating them from the formulation of various products or replacing them with ingredients of natural origin. On the labels of meat products (mainly smoked meats and sausages), one can see information placed by producers, which takes form of claims or declarations, e.g., "without the addition of monosodium glutamate," "without the addition of phosphates," "without added preservatives." At the same time, to ensure safety and sufficient shelf-life and maintain high sensory attributes of meat products, producers have resorted to solutions such as the use of spice preparations or yeast extract to improve palatability, the use of plant (e.g., soy protein or lupine protein) or animal (e.g., sodium caseinate or collagen protein) preparations to maintain the desired structure and production efficiency, as well as the use of plant extracts rich in nitrates (V) together with bacterial denitrifying cultures to give the sausages a pink-red, durable color. The above measures simultaneously serve to improve the nutritional value of meat products, as mentioned earlier. Market information indicates that Polish producers of meat preparations are also implementing procedures to improve the quality of their products. For example, allergenic ingredients

and food additives are eliminated from the product composition [25, 56].

Substances or products that are known to cause allergies or intolerances are other food ingredients that are increasingly avoided by consumers. The aim of the work of *Cegielka and Mańkowska* was to assess the presence of allergenic components in the selected technological groups of meat products, i.e., cooked and raw smoked meats as well as raw and thermally processed sausages, which were available in retail trade in Warsaw. Based on the information provided by the producers on the product packaging (product labels), it was found that substances or products causing allergies or intolerances were found in 45% of meat products. The possible presence of allergens was demonstrated in 30% of the products, and information on the presence of allergens among the ingredients of the product was provided on the packaging of 14% of all products. The availability of meat products free of allergens is much less (11% of all products). The greater number of substances causing allergies was found in sausages than in smoked meats. Irrespective of the technological group of meat products assessed, the most commonly used components that may cause allergic reactions in consumers were soybeans, mustard, and milk and products thereof [17].

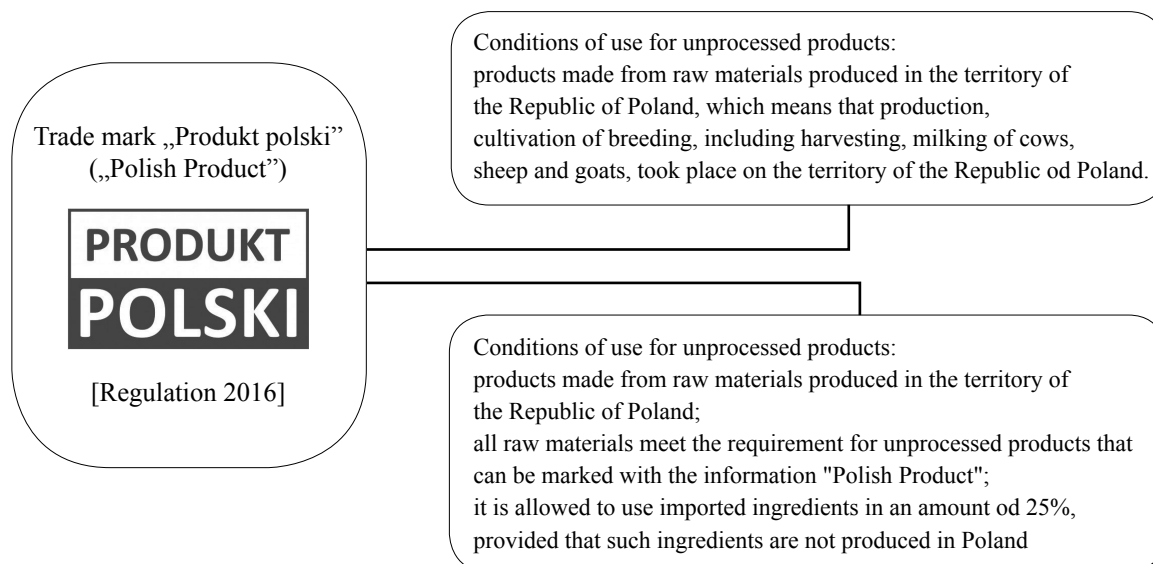


Figure 2. The “Polish product” mark and conditions of its use [59].

The production of food with controlled allergenicity can be of significant importance to face market competition and may contribute to building a positive and well-associated image of the manufacturer, by not only satisfying the requirements of high-quality products, but also caring for the health of the buyers of their products. The fact that such undertakings are possible in the meat processing industry was confirmed by a team of scientists from the Warsaw University of Life Sciences (SGGW) and the Institute of Genetics and Animal Breeding of the Polish Academy of Sciences [90], who obtained a patent entitled “A method for producing pork meat products with controlled allergenicity”. The proposed innovative method for the production of meat products with reduced allergenicity and increased content of selenium and polyunsaturated fatty acids is characterized by the appropriate selection of raw material, functional additives, and the technology of their production. Similar activities of Polish producers in meat preparations are financially supported by the EU from the European Regional Development Fund [25].

For a growing number of consumers, the concept of healthy lifestyle has attributed to a growing interest in organic foods (also referred to as “bio-foods” or “ecological foods”). The use of organic raw materials in food production is sometimes equated with “cleaning” the label. Organic food is in fact a product of organic farming (Figure 1), defined as a system which involves plant and animal production based on environment-friendly practices, by adapting to the local conditions and biodiversity [61].

Consumers are convinced that organic products are healthier than conventional foods and are characterized by high quality, absence of harmful pesticides, high nutrient value, etc. [57, 58, 61]. The use of organic raw materials in food processing techniques usually indicates that the finished product does not contain food additives or contains only those necessary for

its production. This concept of a food product thus corresponds to the idea of a “clean label” [8].

The consumers’ interest in ecological methods of food production has increased significantly in Poland following the accession of this country to the EU [32, 60]. According to a study by *Dolatowski* [23], lesser interest in meat and meat products produced organically, in comparison with other food groups, resulted in relatively low supply, high prices, and unsatisfactory quality. However, according to *Salejda and Krasnowska* [61], Polish consumers are aware of the benefits of organic farming and hence are prepared to compromise for a higher price and slightly lower sensory features of smoked meats and sausages, which they most often purchase.

Another aspect of understanding the “clean label” of food products maybe - apart from the desire to know the method of production - to know the place of its manufacture. This behavior is typical for ethnocentrically oriented consumers, being the opposite of global consumers. In people in whom globalization has not weakened their ties with the country or region of residence, or the sense of national and local identity, increased interest in national and local products is being observed. The ethnocentric consumer is convinced with the advantage of domestic products over foreign ones, which in turn is guided by rational and emotional criteria when choosing them [5]. The BEUC [11] study showed that in countries such as Austria, France, Poland, and Sweden, nearly 70% of consumers considered the origin of meat as an important factor in purchasing it. For processed foods - of both plant and animal origin - the majority of respondents would want to easily identify the country of origin of both the primary ingredient and the final product. Finding such information was often troublesome for consumers [11, 26]. In response to this demand, the new EU legislation on food labeling

(Table 1) has extended the obligation to label origin of meat coming from beef to poultry, pigs, and sheep and strengthened the obligation to inform consumers about the place of processing of raw materials if the main component has different origin from the product itself.

In order to meet the expectations of consumers in Poland regarding easier identification of products made from Polish raw materials and by Polish manufacturers, the Ministry of Agriculture and Rural Development developed rules for using the information and the “Polish product” mark (Figure 2). In Poland, labeling of food products with the information and the “Polish product” mark is voluntary and does not require registration. However, compliance of products marked with the “Polish product” mark with statutory criteria is subject to verification by the inspection services.

CONCLUSIONS

Identifying current trends and studying consumer behavior in an extremely diverse food market still seems necessary to better understand and, consequently, better tailor the market offer to its needs. One of the relatively new and still current direction toward the development of food market is the concept of “clean label.” Among the whole range of factors explaining consumer preferences regarding “clean labeling” of food, the results of previous studies emphasize in particular the characteristic features of the product and sociocultural factors determining the individual attitude of the consumer, primarily related to health. The “clean label” has not yet been defined in food law and is understood rather subjectively. Generally, this term is attributed to products free from “artificial” additives and produced organically or by “natural” methods based on a traditional recipe known to consumers. In the absence of a clear definition of the “clean label” for a food product, both producers and consumers perceive the need for its precise description. On the one hand, this would facilitate positioning of products on the market and communication of producers with consumers, while on the other hand, it would reduce the risk of consumers being misled about the expected quality features of food with the “clean label.”

Conflict of interest

The author declare no conflict of interest.

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