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# Fodder enrichment and sustaining animal well-being as methods of improving quality of animal-derived food products, in the aspect of consumer perception and acceptance*

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**Improvement of animal-derived food products can be implemented by modification of fatty acids profile, by reducing fat, calories, cholesterol or sodium level or by incorporating bioactive compounds. However, consumer behavior towards novel enhanced quality products depends on many factors, including consumer attitude and believes. The aim of the study was to evaluate consumer acceptance of animal-derived food products of improved quality, as well as to evaluate factors that may influence consumer purchase decision in the aspects of fodder enrichment and sustaining animal well-being. The research was conducted using a method of direct "face-to-face" personal interview, in the technology of Computer Assisted Personal Interview. It was conducted on the group of 1009 representative Polish inhabitants, recruited using the PESEL database. The participants were asked about determinants of quality, methods to improve quality and their acceptance of mentioned methods. The obtained results indicated that sustaining animal-wellbeing**

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**to improve quality of products is generally highly accepted by consumers, but the highest acceptance level is indicated for individuals who perceive the origin as the determinant of quality.**

**KEY WORDS: consumer preference / animal origin products / quality**

Animal-derived food products are a part of properly balanced diet of majority of people, but simultaneously, consumers often perceive them as an unfavorable, due to increased risk of diet-related diseases [Valsta *et al.* 2005]. Therefore breeders, producers and researchers analyzed and developed a number of new methods of obtaining quality of animal-derived food products with potential health benefits, to encourage consumers [Velasco and Williams 2011]. However, simultaneously, except consumers' concerns about their health, large number of them are not willing to compromise sensory quality for health [Font-i-Furnols and Guerrero 2014].

Improvement of animal-derived food products can be implemented by modification of fatty acids profile [Strzałkowska *et al.* 2009, Poławska *et al*. 2013, 2016, Horbańczuk *et al.* 2015], by reducing fat, calories, cholesterol or sodium level or by incorporating bioactive compounds, as antioxidants [Hathwar *et al.* 2012, Horbańczuk and Wierzbicka 2016, Zdanowska-Sąsiadek *et al*. 2016]. For various compounds, there are two methods of changing composition of animal-derived food products – by adding them to a fodder or directly into the product, during processing. In the field of animal nutrition, the opportunity for improving quality is feeding them with the fodder containing additives such as vitamins, vitamin-like compounds, minerals including trace elements, fatty acids, probiotics and other bioactive compounds [Jóźwik *et al*. 2010ab, Poławska *et al*. 2011, 2012, Pinotti *et al.* 2014]. However, the crucial issue is associated with the quality of the final product, as keeping the initial quality features may not be easy to obtain [Guzek *et al.* 2012].

The consumer behavior towards novel products with improved quality depends on many factors [Olewnik-Mikołajewska *et al.* 2016]. It should be also emphasized, that some researchers stated, that between novelty of product and consumer willingness to try such products exists a non-linear relationship [Steenkamp and Gielens 2003], so marketing of new products is quite challenging and it requires above all the knowledge of a consumer acceptance. Only identifying consumers' needs, enables producers to develop new methods to enhance the meat quality to gain consumer satisfaction [Shepherd and Ahmed 2000].

The aim of the study was to evaluate consumer acceptance of animal-derived food products of improved quality, as well as to evaluate factors that may influence consumer purchase decision in the aspects of fodder enrichment and sustaining animal well-being.

## Material and methods

The research was conducted in January 2013, using a method of direct "face-to-face" personal interview, in the technology of Computer Assisted Personal

Interview (CAPI). It was conducted on the group of 1009 (513 women and 496 men) representative adult Polish inhabitants (≥19 years old), recruited using the names and addresses, randomly chosen from the PESEL database. Only the respondents who met the recruitment criteria, i.e. made their own or cooperative food purchases, participated in the study. With each consumer, who agreed to participate in the study, a personal interview was conducted in his home, at the convenient time. The recruited group of participants was characterized in the previous publication [Sajdakowska *et al.* 2015].

The applied questionnaire was an original contribution of the authors of the study. It included *inter alia* questions about issues associated with improving quality of animal-derived food products in aspect of consumer acceptance. The number of three questions, associated with mentioned issues, were analyzed as an object of the presented study.

The first analyzed question was an open-ended one – the respondents were asked to indicate the most important (in their opinion) determinant of quality of the animal-derived food products. Each participant was able to indicate only one determinant and if he indicated more than one, the first one was interpreted as the most important in his opinion. During analysis, the answers were grouped into seven groups of subjects: origin (e.g. "country", "organic farming"), technology of production (e.g. "processing", "certification of production"), producer (e.g. "brand", "company"), composition and nutritional value (e.g. "additives", "nutrients content"), image and taste (e.g. "fresh appearance", "natural taste"), expiration date (e.g. "freshness", "short shelf life"), price (all respondents specified it using the term "price"). In the last, eighth group of answers, were clustered responses of participants who were not able to specify any determinant of quality of the animal-derived food products (e.g. "I don't know", "I have no idea").

The second analyzed question was semi-open-ended question – the respondents were asked if they know any method to improve the quality of animal-derived food products by producers (yes-no part of the question). If consumer declared, that he knows, he was asked to specify the known methods (open-ended part of the question). The respondents were able to specify as many methods, as they wished. During analysis, the answers were clustered into two groups of subjects: fodder enrichment (e.g. "fodder", "components of fodder"), sustaining animal well-being (e.g. "hygiene of animal production", "organic farming").

The third analyzed question was one-choice question, assessing the acceptance of various methods of improving the quality of animal-derived food products, existing on the Polish market. The respondents were asked about various methods of improving the quality of food products and for each method they had to specify their level of acceptance in the scale from 1 to 7 (1 – definitely do not accept, 2 – moderately do not accept, 3 – slightly do not accept, 4 – neutral attitude, 5 – slightly accept, 6 – moderately accept, 7 – definitely accept). The additional, eighth category was formulated as "I do not observe it on the Polish market". The methods of improving the quality of animal-derived food products that were chosen to analysis were the ones, indicated by respondents in the second question – fodder enrichment and sustaining animal well-being.

As presented above, the applied questionnaire enabled the interview deepening. Firstly, the participants were asked about determinants of quality, afterwards – about methods to improve quality and finally – about their acceptance of indicated methods.

The analysis enabled answering two research questions – about the influence of perceived determinants of quality and of known methods of improving quality on the consumer acceptance of applied methods. The mentioned analysis was conducted separately for: fodder enrichment, sustaining animal well-being (included into presented article).

The statistical analysis was conducted using Statgraphics Plus for Windows 4.0 software (Statistical Graphics Corporation, Rockville, MD, USA). Comparison of the declared acceptance of applied methods of improving quality between subgroups was conducted using $chi^2$ test. The level of significance $\alpha=0.05$ was accepted to determine the significance.

## Results and discussion

### The analysis of the acceptance of fodder enrichment as the method of improving quality of animal-derived food products

The acceptance of fodder enrichment as a method of improving quality of animal-derived food products, in groups of consumers indicating various determinants of quality is presented in Figure 1. It was concluded, that perceiving various determinants of quality of food products does not influence the acceptance of fodder enrichment as a method of improving quality ($p=0.1582$) – the acceptance did not differ significantly in groups of respondents indicating origin, technology of production, producer, composition and nutritional value, image and taste, expiration date and price as the predominant determinant of quality. It was also the same in the group of individuals who were not able to specify any determinant of quality of the animal-derived food products.

In spite of the fact, that the acceptance assessed in the presented study was the declarative acceptance of fodder enrichment (consumers did not assess the acceptance of real food products during consumer survey, but declared the acceptance of the procedure), the obtained results were similar as in the case of assessment of real food products. In the study of Kaźmierska *et al*. [2007], the consumer acceptance of eggs collected from Japanese quails (*Coturnix coturnix Japonica*) fed with fodder enriched with polyunsaturated fatty acids, by the addition of 1% of linseed oil and 0.5% of fish oil was assessed. The acceptance of taste, smell, egg white consistency, egg yolk consistency, color and overall acceptance were assessed in the 5-grade scale of acceptance. It was concluded, that the addition of linseed oil and fish oil to the fodder (in comparison with the standard fodder) does not influence the sensory acceptance of eggs (both fresh and stored) [Kaźmierska *et al.* 2007]. These observation was also

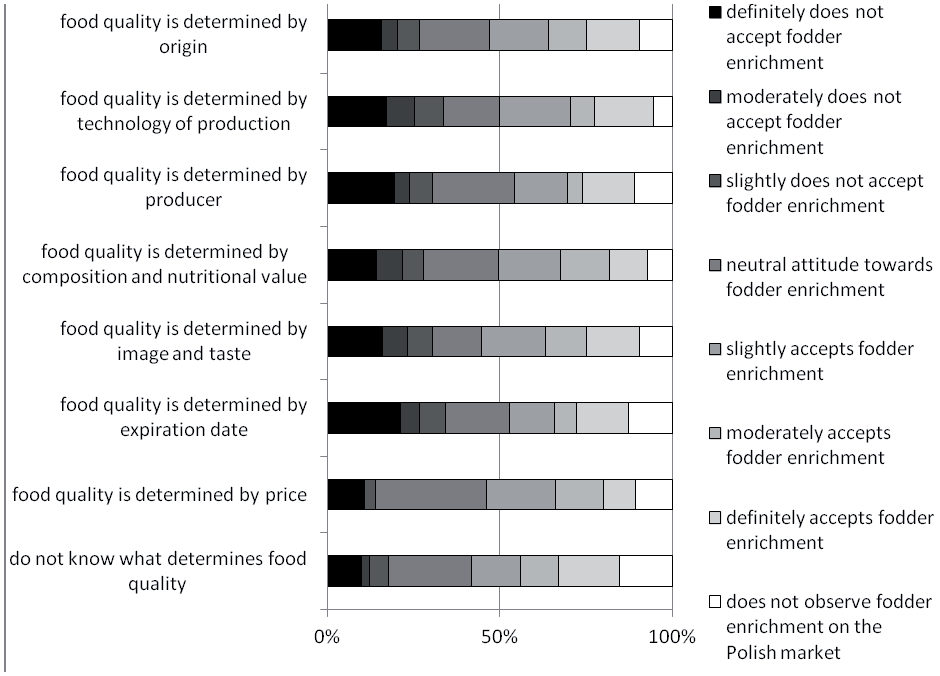


Fig. 1. Acceptance of fodder enrichment as a method of improving quality of animal-derived food products, in groups of consumers indicating various determinants of quality (p=0.1582).

confirmed in research conducted on chicken meat [Zdanowska-Sąsiadek *et al.* 2016] and milk [Lock and Bauman 2004] enriched using special fodder.

The acceptance of fodder enrichment as a method of improving quality of animal-derived food products, in groups of consumers declaring various knowledge of methods of quality improvement is presented in Figure 2. It was concluded, that knowledge about the fact, that fodder enrichment is applied as the method of quality improvement significantly influences the consumer acceptance (p=0.0246). It was observed, that in the case of consumers indicating fodder enrichment as an example of method of improving quality of animal-derived food products, the share of individuals accepting mentioned method was higher (51.3%) than in the case of individuals indicating other examples of methods of improving quality (38.8%) and than in the case of individuals who declared that they do not know any method of improving quality (41.2%). Simultaneously, the share of individuals not accepting mentioned method was lower (21.6%) than in the case of individuals indicating other examples of methods of improving quality (38.8%) and than in the case of individuals who declared that they do not know any method of improving quality (27.3%).

The neophobia associated with the lack of knowledge about applying fodder enrichment may be indicated as a reason of observed results. It was described by Slovic [1987], as associated with the fact, that unknown risk causes great worries.

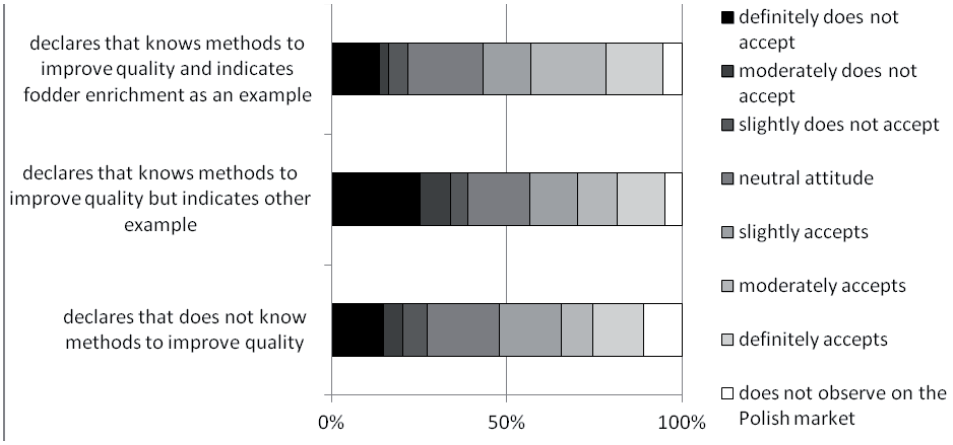


Fig. 2. Acceptance of fodder enrichment as a method of improving quality of animal-derived food products, in groups of consumers declaring various knowledge of methods of quality improvement (p=0.0246).

In the area of food production, it was defined by Lusk *et al.* [2014], who indicated, that familiarizing consumers with and informing them about food technologies would lead to higher acceptance of food products. They presented the necessity of informing consumers, using model of two similar hypothesis – the familiarity hypothesis (lack of familiarity with a technology may be associated with its reluctance) and the knowledge-deficit hypothesis (lack of knowledge leads to technology rejection) [Lusk *et al.* 2014].

Referring to Polish consumers, highly processed and genetically modified food were assessed as having low quality that reflect consumers' fears towards food additives and new controversial technologies applied in food production [Ozimek and Żakowska-Biemans 2011]. However, research shows that the majority of consumers has relatively little knowledge about the technologies used in the food production [Bruhn 2007].

**The analysis of the acceptance of sustaining animal well-being as the method of improving quality of animal-derived food products**

The acceptance of sustaining animal well-being as a method of improving quality of animal-derived food products, in groups of consumers indicating various determinants of quality is presented in Figure 3. It was concluded, that perceiving various determinants of quality of animal-derived food products influences the consumer acceptance of sustaining animal well-being as a method of improving quality (p=0.0258). It was observed, that the highest share of consumers accepted sustaining animal well-being as a method of improving quality, in the case of consumers indicating origin as the predominant determinant of quality (82.2%). The lower share of consumers accepting sustaining animal well-being was stated for individuals indicating technology of production (73.4%), producer (72.3%), composition and

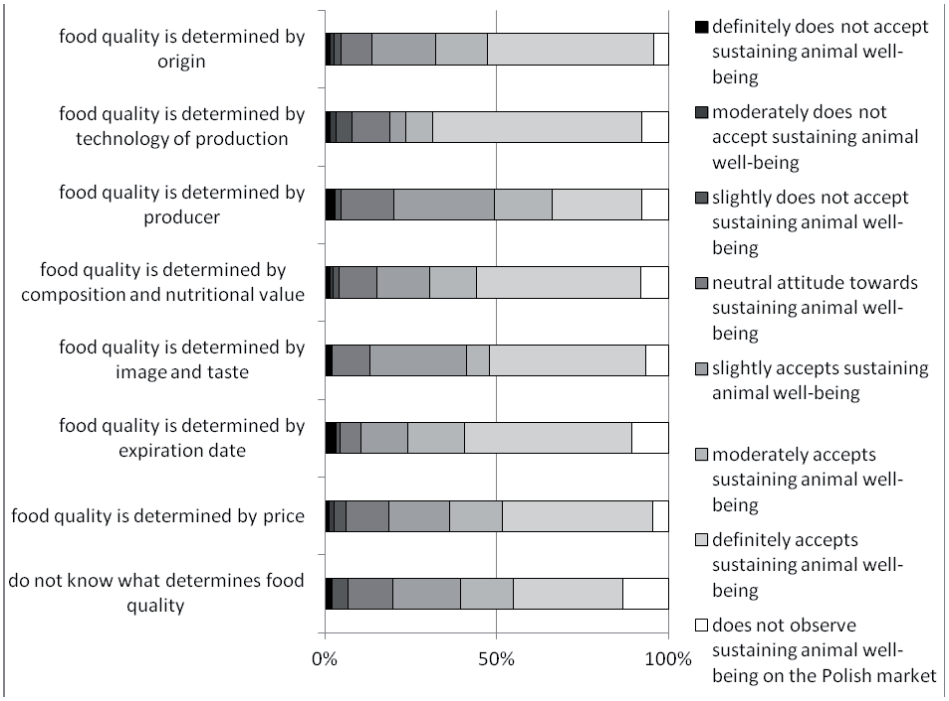


Fig. 3. Acceptance of sustaining animal well-being as a method of improving quality of animal-derived food products, in groups of consumers indicating various determinants of quality (p=0.0258).

nutritional value (76.8%), image and taste (80.4%), expiration date (78.9%), price (77.0%) and individuals who were not able to specify any determinant of quality of the animal-derived food products (67.0%).

It must be emphasized, that individuals who perceive origin as a predominant determinant of quality accepted sustaining animal well-being, as well as, that individuals who does not know any determinants of quality were characterized by the lowest acceptance of sustaining animal well-being.

In the comparison with previously indicated acceptance of fodder enrichment (acceptance declared by 51% of respondents who declare that knows methods to improve quality and indicates fodder enrichment as an example), it must be indicated, that sustaining animal well-being is characterized by higher level of acceptance (acceptance declared by 92% of respondents who declare that knows methods to improve quality and indicates sustaining animal well-being as an example). The studies of other authors [Malak-Rawlikowska *et al.* 2010] indicate, that attitude towards animal well-being is diverse and depends on the country, but in the comparison of the obtained results, the similar results may be indicated for the United States of America and Italy. Also in the case of study conducted in the United States of America, the majority of consumers not only accepted sustaining animal well-being, but even prioritize it

during making the purchase decision. According to the 2014 Cone Communications Food Issues Trend Tracker, 69% of consumers prioritized animal welfare (data from an online survey conducted by ORC International among a demographically representative sample of adults 18 years of age and older) [Earley 2015]. Similarly, in the study conducted in Italy, it was stated, that information concerning high standards of animal welfare (high cleanliness and high freedom of movement) affected not only acceptance, but even willingness to pay for the yoghurt, but it was stated only in the case of most acceptable yoghurt (consumers were tasting various products) [Napolitano *et al.* 2008]. Except the acceptance of product, in the study of Taylor and Signal [2009], also self-rated knowledge of animal-based production and general concern for animal well-being, influenced willingness to pay for the product obtained in the animal welfare-conscious production.

It may be concluded, that a specific group of consumers indicated the sustaining animal well-being as a method of improving quality of animal-derived food products, as it was stated mainly for individuals indicating origin as the determinant of quality. As the origin was associated with e.g. organic farming, the association with animal welfare was expectable. In general, it is indicated, that a large segment of animal welfare-sensitive consumers may be identified [Napolitano *et al.* 2013]. In own study this group may be equated with consumers indicting animal origin as the determinant of quality. However, it is stated, that simultaneously also price-conscious consumers, accept higher prices, while it is justified [Napolitano *et al.* 2013] (e.g. by production respecting animal well-being). It may be associated with the fact, that consumers perceive such products as "healthy" and "natural", as well as with willingness to pay for socially responsible products [Tully and Wine 2014].

The acceptance of sustaining animal well-being as a method of improving quality of animal-derived food products, in groups of consumers declaring various knowledge of methods of quality improvement is presented in Figure 4. It was concluded, that knowing that sustaining animal well-being is applied as the method of quality improvement significantly influences the acceptance of it ($p=0.0455$). It was observed, that in the case of consumers indicating sustaining animal well-being as an example of method of improving quality of animal-derived food products, the share of individuals accepting mentioned method was higher (91.7%), than in the case of individuals indicating other examples of methods of improving quality (80.6%) and than in the case of individuals who declared that they do not know any methods of improving quality (75.7%). Simultaneously, the share of individuals not accepting mentioned method was lower (nobody from this group declared not accepting) than in the case of individuals indicating other examples of methods of improving quality (3.7%) and than in the case of individuals who declared that they do not know any method of improving quality (5.6%).

In the case of presented comparison, similarly as for presented above (Fig. 3), it may be indicated, that a great majority of consumers perceive sustaining animal well-being as a positive trend, however, in the case of individuals not knowing this

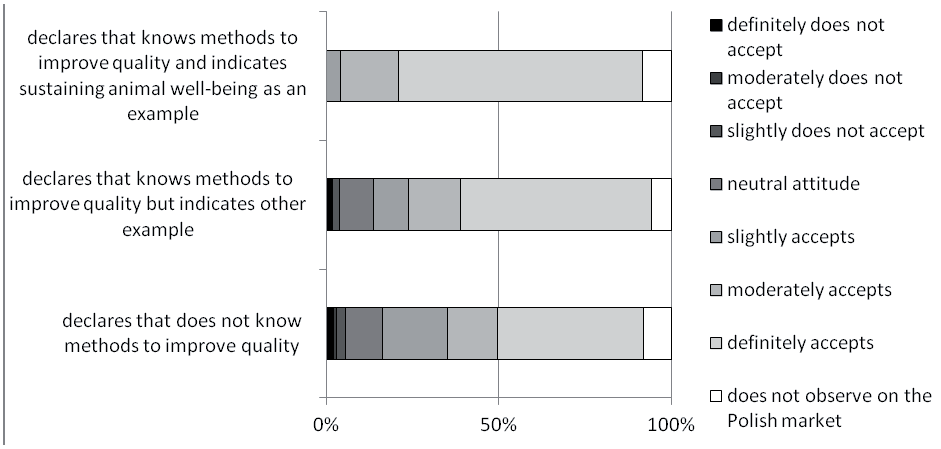


Fig. 4. Acceptance of sustaining animal well-being as a method of improving quality of animal-derived food products, in groups of consumers declaring various knowledge of methods of quality improvement (p=0.0455).

method, there are some people who do not accept it. It is compatible with results of the report of the Organic and Natural Health Association, formulated on the basis of the results of the survey conducted by Natural Marketing Institute in January 2015 on a representative sample of United States of America adult consumers [Crane 2015]. The results of the report indicate, that consumers are a little bit confused and do not understand the label information, that are presented for specific products.

In the above-mentioned report it was emphasized, that 36% of consumers do not believe there is a difference between natural and organic food products. However, it should be mentioned that in fact, the United States Food and Drug Administration did not formally regulate the products labeled as natural. Moreover, 46% of consumers believe the United States government regulates products labeled as natural, whereas only 61% of consumers knows, it regulates products labeled as organic [Crane 2015]. Furthermore, in some cases consumers not only do not understand or misunderstand the information on the label, or even do not accept it, because such information is "too technical" [Lenhart *et al.* 2008]. It was stated also by Grunert *et al*. [2010], who observed some overestimation of consumer label claims understanding.

In consumers' opinion there are also the barriers when it comes to the involvement of labels into the decision process, because it takes both time and effort [Žeželj *et al.* 2012]. Moreover, consumers preferred simple health statement comparing to the benefits of functional food product consumption [Bitzios *et al.* 2011].

The obtained results indicated that sustaining animal-wellbeing to improve quality of products is generally highly accepted by consumers, but the highest acceptance level is indicated for individuals who perceive the origin as the determinant of quality. Moreover, consumer knowledge and understanding method of improving quality

is an important factor creating its acceptance. In the case of fodder enrichment and sustaining animal well-being, the need for consumer education may be indicated.

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