ACTA SCIENTIARUM POLONORUM *Oeconomia 8 (4) 2009, 35–42*

GENETICALLY MODIFIED FOOD – ASSESSMENT OF CONSUMER ACCEPTANCE OF NOVEL FOOD

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Abstract. Genetically modified food is a subject of many discussions nowadays. The respondents feel anxious for new food because they lack general knowledge on the subject and also they have no information of the possible effect of this food on human organism and health. This kind of food belongs to the category of novel food created as an scientists and producers answers for contemporary consumers needs and preferences. The aim of the paper is to present and analyze the opinions and expectations of respondents from Mazovia region concerning the acceptance, availability and possibilities of introducing genetically modified food into the Polish market. An investigation was performed during the period January – March 2008. It included 735 respondents aged over 18 years. Empirical research in the form of questionnaires with a high degree of standardization confirmed a negative attitude of consumers towards genetically modified food. If food of that type was available on the market in the future, then the consumers would make decision concerning its purchase, however, under the condition that it would have many new traits not found in traditional food. Such food should be characterized by decreased caloricity, higher content of vitamins and mineral components and also a lower price as compared with traditional food.

Key words: consumer, food, novel food, genetically modified organisms, genetically modified food

INTRODUCTION

Genetically modified organisms (GMOs) have been introduced in the agricultural and on the market of consumers goods in the last 10–20 years, initially in the USA but also increasingly in the developing countries.

Genetically modified food is an example of novel food which could be defined as foods and food ingredients that have not been used for human consumption to a significant

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degree within the EU before 15 May 1997. Genetically modified food, called transgenic food or GM food originates from plants or animals genetically changed. The term GMOs is most commonly used to refer to crop plants created for human or animal consumption using the latest molecular biology techniques. They are products, which contain modified organisms or their parts and have proteins or DNA of those organisms [Azevedo, Araujo 2003, Twardowski 2001, 2003, 2005]. Transgenic food unlike traditional food may have new traits, including: changed usability qualities as well as nutritional, health, technological or sensory traits [Kolodinsky 2004, Grajek 2006, Zimny 2007]. Obtaining innovative traits of that food is possible, according to Twardowski [2003], by:

- the addition of genes conditioning new characteristics, increasing the number of genes responsible for a specific trait (enhancing that trait)
- the removal of chosen genes allowing getting rid of unwanted characteristics.

In food biotechnology, genetic modification techniques have been most extensively applied to enhance enzyme production by microorganisms used in food manufacture. In agriculture, the focus has been mostly on producing genetically modified crops that are resistant to insects, viral pathogen, and commonly used herbicides. Research are also under way to produce crops and food with enhanced nutritional and health benefits (functional food) [Hails 2000; Deisingh, Badrie 2005; Vergragt, Szwejnwald-Brown 2008].

Since the discovery of genetic engineering, with its potential to modify DNA of living organisms, discussion and controversy have been abundant [Singer, Soll 1973; Cantley 2004].

The views of societies on transgenic food differ in particular countries. The causes of those varieties could be looked for in economic, political and legal conditions. Populations inhabiting North America and Asia have positive attitude towards GMO and GM foods [Hoban 2000], while Europeans, including Poles, present more skeptical attitude [Berger, Filimonow 2004]. The controversies have been worldwide, but most prominent in the European Union, for reasons that include distrust of authorities, scientists and technocratic decision making. An informal moratorium in the EU came recently to an end, without solving the underlying problems. The public objections had numerous causes, including the concerns about the risk assessment, the ethics and equity issues, power relations and the mistrust of technocrats and public authorities [Schilter, Constable 2002; Zerbe 2004].

Genetic engineering is considered as a highly promising approach to address important food-related challenges. However, modified crops and foodstuff have been highly controversial for environmental, health and ethical reasons [Vergragt, Szwejnwald-Brown 2008]. The investigations of opinion and attitudes of consumers towards GM food seem to be understandable due to the fact that at present an intensive development of biotechnology and transgenic cultivations is observed in the world. Consumers should be aware of its effect on health and should be able to choose what products they are going to consume. On the other hand food producers should see the needs and preferences of the consumers. It depends on the consumer whether the effort of biotechnologists and nutritional scientists in the field of food improvement would be noticed and accepted and the new food would not only meet the human physiological requirements but also add to its greater variety.

Over the years, there has been a continuous improvement of food quality and availability through the application of various innovative genetic approaches. Food crops currently consumed originate from wild plants whose genetic make-up and physiology have been profoundly by techniques such as domestication, selective breeding, hybridization and induction of mutations through irradiation or treatment witch chemical mutagens. Genetic engineering is the most recent technology developed [Schilter, Constable 2002].

AIM OF THE PAPER

The work aimed at recognizing the opinions and expectations of respondents concerning the possibility of introducing genetically modified food on the Polish market.The aim of the research allowed the determination of the scope of the investigation which included:

- evaluation of the knowledge of respondents on the subject of genetically modified food;
- cognition of the sources of knowledge of the respondents about the GMO food;
- determination of the consumer attitude towards genetically modified food;
- analysis of fears and risks towards genetically modified food presented by the consumers
- analysis of the possibility of increase of the GMO food on the Polish market;
- cognition of expectations of consumers towards new food.

The purpose of this research was to develop an understanding factors influencing consumers' preferences for GMO food products that will serve to guide policymakers in the development of policy and food manufacturers in developing and marketing products.

MATERIAL AND METHODS

In order to investigate the level of knowledge, acceptance and expectation towards genetically modified food an investigation was performed during the period January – March 2008. It included 735 respondents aged over 18 years from the Mazovia region. Nearly 62% of the respondents lived in towns. The investigated population comprised 53% women and 47% men. The most numerous age group comprised people aged 35–49 years (32%) and 50–69 years (21%). Most people in the population had secondary and higher education (49% and 38%).

All statistical analyses were performed using the statistical package SPSS for Windows.

RESULTS

The analysis of the collected empirical data allowed the statement that 62% of the investigated population had heard about genetically modified food. Nearly 50% of the respondents asked what genetically modified food is, pointed out that it is food to which "other organisms are added", 15% knew that "properly prepared genes are added" to such

food and as many as 35% of population were not able to give any definition of the term. The respondents presented only slight knowledge concerning the identification of the short GMO. As many as 89% of the people asked had not heard such short and were not able to identify it. The term genetically modified food was known most often, in a statistically significant way, to people with a higher level of education, respondents of 18–25 and 35–49 years of age and living in towns. People who declared some knowledge about genetically modified food stated that their knowledge originated mainly from daily papers (37.8%), television (19.6%) and also from the Internet (14.9%).

Nearly 78% of the investigated people, despite their sex, age, educational level or place of living did not feel to be informed enough about genetically modified food.

Respondents were asked whether they would buy food products knowing that they are genetically modified or contain components originating from modified cultivation or breeding. In that case the results of the investigation showed a negative attitude of consumers towards such food, since over 3/5 of the population would not buy such food, 29% would decide to buy it and 10% had no opinion on the subject.

Women, respondents aged 18–35 years, people living in towns, people with secondary or higher education as well as people who are not satisfied with economic situation of their household or respondents who think that the nutritional needs of their families are fulfilled in an unsatisfactory way would buy genetically modified food less often (value statistically significant).

Some of the questions in the questionnaire concerned the expected effect of transgenic food on the consumer health and also the health and dietary expectations connected with that type of food. Over 75% of the investigated people considered the research on genetically modified food and its effect on human health state as justified. However, over half of the respondents were afraid that the consumption of that type of food may cause the worsening of the human health, 26% expected that such food could cause the improvement of the health state and 22% had no opinion on the subject.

If the GMO food could be bought on the Polish market, then, according to the respondents, it should be characterized by a few desirable and expected traits distinguishing it from traditional products. These traits should positively affected human health (Fig. 1).

Women, respondents aged 35–49 years, people with higher educational level statistically more often pointed to the fact that food products produced from genetically modified food should be characterized by lower caloric value, i.e. they should have lower content of fat and sugar. On the other hand, respondents of 18–35 years of age stated that such food should have better nutritional value as compared to the traditional products.

Respondents were afraid that the consumption of genetically modified food could lead to the worsening of their health state in the future. New food could contribute to the increase of allergies (37.3%) and diseases that are not observed in humans nowadays (37.3) Analyses performed by ecological organizations showed that transgenic food is not available in the Polish shops [Wyniki raportu…, 2008]. Still, our own investigations showed that nearly 90% of respondents were sure that genetically modified food could be bought in the Polish shops. Relatively more often this opinion was found in the group of men, people with elementary or vocational education level, elderly people over 65 years of age and also people who were not satisfied with the economic situation of their household.

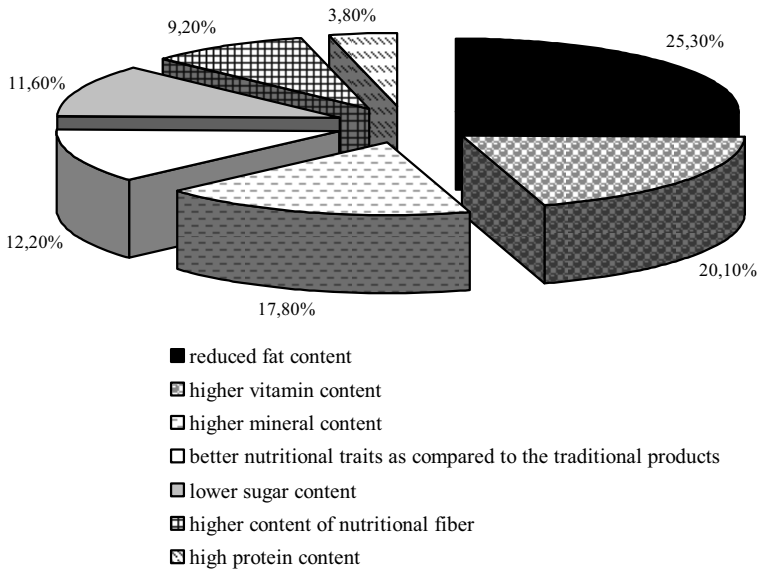

Fig. 1. Opinions of the respondents on the expected traits of GMO food products
Rys. 1. Oczekiwania respondentów w zakresie cech produktów żywnościowych modyfikowanych genetycznie
Source: Authors' investigation.
Źródło: Badania własne.

Among transgenic products, which according to respondents could be bought in shops were the following: tomatoes (27.4% of responses);bananas (21.7%) potatoes (15.5%) most imported vegetables and fruits (12.8%);oranges (8.7%);melons (6.9%);tangerines (7.4%); cucumbers (2.3%).

In Poland as well as in all Western countries, labeling of food products is strictly regulated. Labels are required to be informative in that they must provide the consumer correct and useful descriptions of the characteristics of the food products. Buying food products for own household 45.2% of respondents declare that they read information on the package. However, 95.1% of the investigated people had never looked for the information about genetic modifications of the purchased product. It is worth noticing, that nearly 3/5 of the investigated population agreed that the package of the product should contain the information that the product partly or totally originates from components obtained from a genetically modified cultivation or breeding

Only 29.3% responses stated that they would buy genetically modified food if it was commonly available. The determinants helping the respondents in decision making would be the information on the package stating that:

- food was thoroughly examined (39.8% of responses)
- food has no negative/harmful effect on human health (22.1%)
- food was enriched with additional substances, i.e. mineral compounds, mineral salts or compounds protecting against cancer (19.6%)
- food is characterized by a lower price as compared with traditional food (13.5%)
- food is characterized by a high quality (i.e. colour, flavour, fresh appearance) (5.0%).

Out of various types of food, the investigated population declared that the most willingly they would buy ecological food and the last choice would be genetically modified food (Fig. 2)

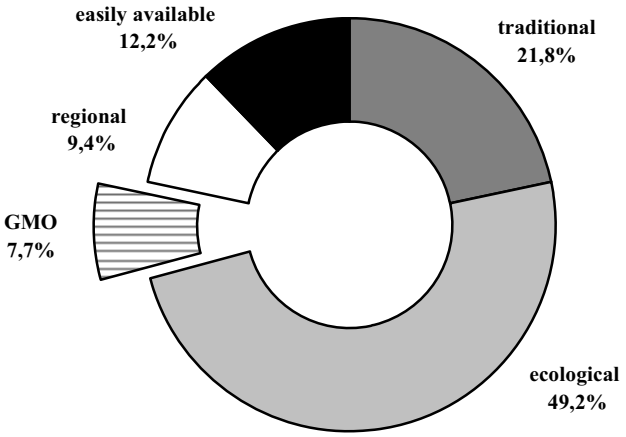

Fig. 2. Declarations of respondents concerning the choice of various types of food
Rys. 2. Deklarowane wybory rodzaju żywności
Source: Authors' investigation.
Źródło: Badania własne.

Ecological food would be chosen more often (statistically significant, $p < 0,01$) by women, people living in towns, people from the age group 35–46 years, people better educated and also such people who declare a higher level of satisfaction of economic situation of their household.

Consumers have always made decisions about the food they eat based on price and quality. But today, consumers also consider convenience, health and process attributes. Informed decisions require a good understanding of nutrition, food science and, sometimes, even agriculture.

According to 47.3% of the investigated people, genetically modified food will not be accepted by the Polish consumers in the future. Only about 1/5 of respondents declare their possible acceptance and 35.6% have no opinion on the subject.

CONCLUSIONS

New technology such as genetic engineering and genetically modified foods may hold risks which have to be evaluated and controlled. As for other novel food products, all concerns have been addressed by regulations in order to minimize the possibility that unsafe products will reach the market. Nevertheless, there has been in Europe an increasing public concern about the impact of GM foods on human health and environment.

The paper illustrates that:

- The level of respondent knowledge concerning genetically modified food is relatively low. Over 60% of the investigated people had heard about such food but were not able to explain its essence. What is more, they stated, against the truth and actual situation, that GMO food is commonly available on the Polish market.
- The basic sources of information about genetically modified food are mass media, i.e. daily press, television and radio.
- The consumers expect from genetically modified food that unlike the traditional food it would be less caloric and its consumption would supply the organism with bigger amounts of vitamins and mineral components. Among the mentioned dangers resulting from the consumption of new food, the consumers enlisted the possibility of allergies and other diseases which had not been observed in the population.

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ŻYWNOŚĆ MODYFIKOWANA GENETYCZNIE – OCENA AKCEPTACJI NOWEJ ŻYWNOŚCI PRZEZ KONSUMENTÓW

Streszczenie. Problematyka dotycząca żywności modyfikowanej genetycznie jest obecnie przedmiotem wielu społecznych dyskusji. Respondenci odczuwają obawy przed żywnością tego typu przede wszystkim ze względu na brak wiedzy i brak docierających informacji, pozwalających na budowanie własnych przekonań o wpływie organizmów modyfikowanych genetycznie na ludzki organizm i zdrowie. Żywność GM zaliczana jest do tzw. nowej żywności (ang. novel food), która powstała jako odpowiedź naukowców i producentów na potrzeby i preferencje współczesnych konsumentów. Celem prezentowanego badania było poznanie opinii respondentów pochodzących z województwa mazowieckiego o postrzeganiu i stosunku do żywności modyfikowanej genetycznie, jak również możliwościach akceptacji tej żywności na polskim rynku. W badaniu empirycznym jako narzędzie badawcze wykorzystano kwestionariusz ankiety o wysokim stopniu standaryzacji, który posłużył do zbadania i poznania opinii badanych o żywności modyfikowanej genetycznie. Badanie wykazało negatywne nastawienie respondentów do żywności GMO. Zdaniem badanych, gdyby taka żywność była powszechnie dostępna na rynku w przyszłości i miała być zaakceptowana i kupowana przez nabywców, to musiałaby posiadać wiele nowych właściwości, których nie posiada żywność tradycyjna. Między innymi powinna charakteryzować się zmniejszoną kalorycznością, większą zawartością witamin i związków mineralnych i nie wyższą ceną od powszechnie dostępnych produktów żywnościowych.

Słowa kluczowe: konsument, żywność, nowa żywność, organizmy modyfikowane genetycznie, żywność modyfikowana genetycznie

Accepted for print – Zaakceptowano do druku 11.11.2009