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The Sous-Vide Technology as a Response to the Needs of Consumers of Catering Establishments

Summary

Development and changes in gastronomy are dictated by the needs of consumers which may significantly differ from one another depending on individual preferences, economic status, and socio-cultural conditioning. Nowadays, the growing awareness and consumers' knowledge about food and nutrition are important determinants of the development of the catering industry. This situation imposes gastronomy trends, mainly related to the increase of the quality of food served. The aim of the study was to determine the applicability of the sous-vide technology to meet the healthy needs of catering facilities clients. The survey was conducted among 120 respondents aged 16 to 50 years, using the catering services. The surveyed individuals have identified that during the selection of dishes the most important aspects are: the flavour, appearance, and nutritional value and quality of food identified with freshness and the concept of "healthy food". These aspects can be provided through the sous-vide technology.

Key words: pro-health trend, catering facilities, sous-vide technology.

JEL codes: D12, M31

Introduction

Over recent decades we have to deal with the development of civilization, which contributed to increasing the welfare of humanity by extending their life and improving its quality. However this progress led to the adverse impact to the human health. Changing environmental factors and an intense lifestyle affected the development of many diseases, such as: diabetes, obesity, cancer and cardiovascular diseases (Betlejewski 2007). Increasing general knowledge of consumers makes them more aware of the impact of nutrition on health and body functioning. Thus, in recent years, it is observed that consumers pay more attention to the quality of food than its price. They are putting special emphasis on the considerations related to the nutritional and health status of the food they eat. The consumer not only wants to eat, but also wants a meal suitable in terms of sensory and quality, and do not want to wait too long for this meal. In view of above expectations of consumers, changes are taking place also and in the gastronomy.

Technological development and ever-faster speed of life has led to the fact that at the beginning of the XXI century gastronomy is one of the fastest growing branches of the service

sector. Currently in Poland two dominating trends can be defined: traditional - restaurants, cafes, taverns and modern - fast-food facilities, food-courts (Milewska et al. 2010).

To meet the demands of consumers, more and more often catering facilities are using technologies included in the group of so-called combined, for example: cook chill, cook freez, as well as the still rarely used in Poland sous-vide technology. Combined techniques also called integrated, consist in the simultaneous application, together or in the determined order, of a few strengthening, so-called factors of fences in the framework of the technological process.

The aim of the study was to determine the applicability of sous-vide technology to meet the healthy needs of catering facilities consumers.

Material and methods

The research problem was developed on the basis of empirical data collected by the questionnaire. The survey was conducted in the area of Mazovian among 120 respondents aged 16 to 50 years, using the catering services.

The study was conducted in 2015 on the basis of a questionnaire, which included questions open and closed and certificate. The sample was chosen on a discretionary basis - intentional.

The study population consisted of 54% women and 46% men. Given the age of the respondents 27% were young people aged 16-20 years, 67% - respondents aged 21-30 years, and the 3% of people aged 31-49 years and above 50 years. Young people are prevalent in the study population, according with numerous studies, they use of catering services very often (Kwiatkowska 2010; Zimna 2008).

52% of respondents had a higher education. Secondary education had 33% of the respondents, the basic 11%, while professional 4% of the population.

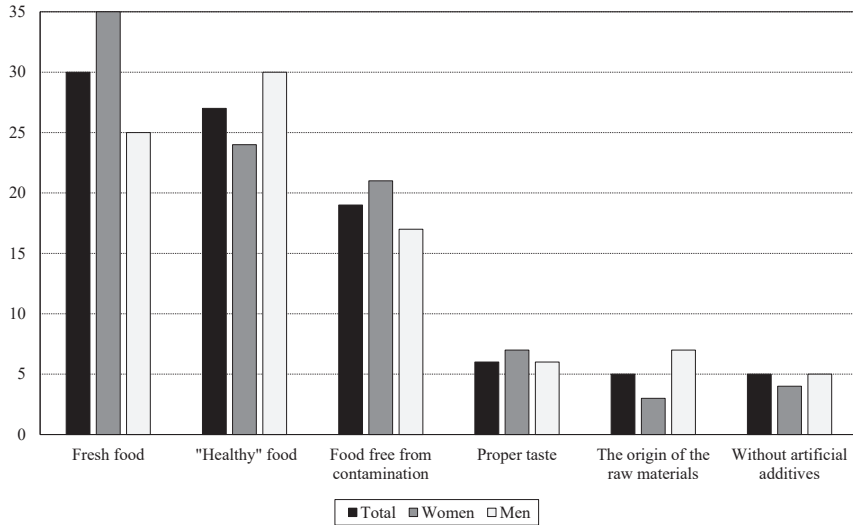
Findings

In the questionnaire were included questions, which should indicate what "food quality" means to respondents (Figure 1). According to respondents, this is primarily "fresh" (30%) and "healthy" (27%) food. Every fifth respondent stated that the concept is associated with food free of chemical and microbiological contaminants, and every tenth, that the food have adequate taste. Fewest readings concerned the reply, that the "food quality" was connected with the origin of individual raw materials and doesn't contain artificial additives. Fundamental differences in given replies on account of the sex polled weren't recorded-

Another question concerned the factors affecting the food quality. For more than half of the respondents health safety and nutritional value have the greatest impact on the quality of food (Figure 2). Almost half of the respondents considered that this is both a way of production, as well as the attractiveness of sensory (taste, smell, appearance). Every tenth

Figure 1

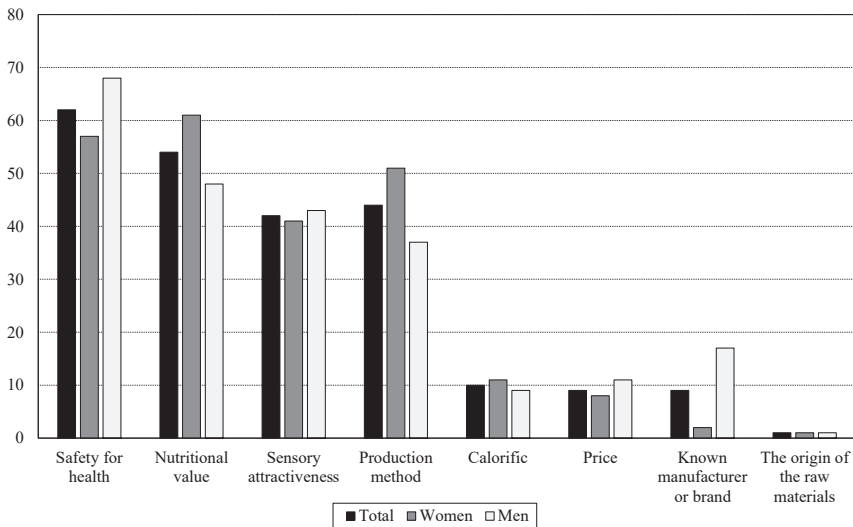
Associations of respondents related to the concept of “food quality”(%)



Source: own research.

Figure 2

Factors affecting the quality of the food according to the respondents (%)



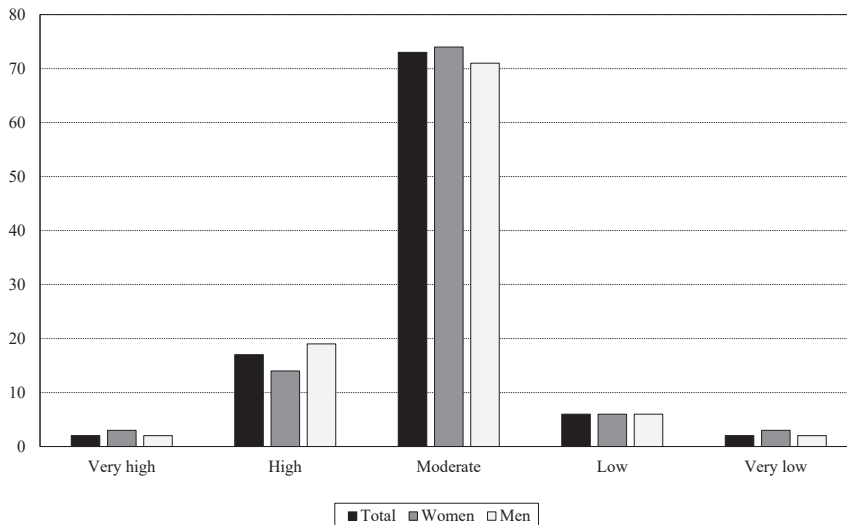
Source: as in Figure 1.

respondent stated that the calorific value and price affects the quality of food. Few respondents however felt that the on the quality affects “place of origin” and “the content of artificial additives.” Considering replies of women and men it is possible to notice the certain diversity. According to the women on the food quality definitely greater influence has a way of production and its nutritional value and caloric. According to the men, the quality of the food primarily affects health safety, then - food production by the company with a brand name, price and sensory appeal.

Later in the survey respondents were asked to identify associations with the term „high-quality food.” More than half of respondents (53%) associated the term with the possession of a certificate or a quality label. Another frequent association is „does not contain additives” (19%). Every tenth respondent believes that high quality food means that it has a „high nutritional value.” There were also answers: „has the right taste and appetizing appearance” (8%), „is produced by known producer,” and is also „expensive” (in 3% of responses). No differences in the answers given by men and women were noted. It can only be concluded that more women than men, associated this term with having the high nutritional value.

On the basis of studies the factors which guided respondents choice of meals were determined. Most of the respondents as the most important recognized: the flavor (80%) and price (52%). Almost a third of respondents pointed to aspects such as appearance (29%) and nutritional value (22%).

Figure 3
Evaluation of the quality of food offered in catering facilities (%)



Source: as in Figure 1.

Respondents were also asked about how to rate the quality of the food offered in visited catering facilities. Three-quarters of them considered that the quality of food is moderate. Every fifth respondent said that it is high, and every twentieth, however, that it is low. Small percentage of the respondents rated the quality of the food both very high and very low.

Comparing the evaluation of men and women can be seen that more men than women considered the high quality of food in eating facilities (Figure 3).

Respondents were also asked about the actions that they believe should be taken to increase the quality of products offered in catering facilities. Respondents gave their answers in an open question. Essentially 105 opinions were given. However, every fifth respondent stated that “does not know” how to increase the quality of our dishes. According to less than 20% of respondents to improve food quality could influence more frequent internal and external monitoring. Every tenth respondent concluded that there should be used properly fresh and “natural” products. Part of the answers (8 %) concerned the adequate hygiene of the staff and places of prepared meals. Respondents suggested to conduct specialized trainings for staff preparing meals in order to increase their awareness of hygiene. Part of answers (10 %) was tied with change of the applied technology, limiting frying in fat, implementing the boiling e.g. on steam what simultaneously could increase the quality of the final product. A small part of answers (3%) concerned the “introduction of diet food”.

Sous-vide technology and the expectations and needs of the consumers of catering facilities

It is true that a small group of respondents suggested changing technology to improve the quality of meals in catering establishments. However, studies have shown that the quality of food, including the concept of high-quality food, consumers associate with food fresh, “healthy”, tasty and free from contamination. Examined consumers also claimed that technological processes and attraction were affecting the food quality. Therefore, catering facilities, in order to fully meet the expectations and needs of consumers are supposed to reach and apply new technologies, such as sous-vide. According to the British organization (Sous-Vide Advisory Committee, SVAC) sous-vide (also known as Cuisine en Papillote Sous-Vide) is an interrupted catering system, in which raw or partially cooked food components are packaged in vacuum bags or containers of a laminate, subjected to controlled heat treatment, cooled rapidly, then reheated again to give after refrigerated storage (NSWFA 2012). This technology was developed in the 70s by a French chef Georges Pralus. He discovered that the application of vacuum packing and immersed in a water bath at the specified temperature helps to reduce shrinkage of the pate foie gras from 40% to 5%. In addition, he noticed significantly improve of the sensory properties of the prepared dishes (Tiampo 2006). In the literature can be found numerous works, conducted in various centers of scientific - research concerning the influence of heat treatment, parameters and conditions of cold storage on the sensory quality of sous-vide food. The results show that the sensory properties of sous-vide dishes are maintained at high level, especially compared to other technologies of dishes

preparation (Baldwin 2012; Church, Parsons 2000, Edwards et al. 1998; Schellekens 1996). Sensory properties of sous-vide dishes have good sensory quality thanks to the elimination of water losses and the flavor ingredients (Grzesińska, Tomaszewska 2013). Many studies have shown that the evaluation of flavor discriminants, regardless of the products are often significantly more intense for sous-vide dishes, compared to conventionally prepared meals (Creed 1998; Schellekens 1996; Tomaszewska et al. 2011). In case of products prepared with traditional technology negative changes in smell and taste of food products during storage are caused mainly by the microbial activity, as a result of the evaporation of volatile flavor compounds and biochemical reactions (Grabowska 2007). Meanwhile, vacuum packing, used as one of the phases of the sous-vide technique, largely inhibits oxidative changes in food and reduces the release of such compounds as sodium chloride, amino acids, organic acids and nucleic, which in result contributes to a better taste of the finished product (Creed 1998). Undesirable flavor changes will also be limited due to reduction in the activity of proteolytic and lipolytic enzymes (Church 1998). Sous-vide products are also characterized by well-preserved color (Tomaszewska et al. 2011; 2012). Preservation of an attractive color is related to, among others, the inhibition of oxidation of dyes encountered in food and lack of leaching them into the environment during the heat treatment.

Another important aspect in the evaluation of consumers is food safety. Vacuum packing technology used in the sous-vide eliminates the risk of contamination during technology process and storage, and reduces the development of aerobic bacteria, but creates the possibility of growth of anaerobic bacteria. In the product can survive, and later during cooled storage, grow psychrophilic sporulating bacteria, as well as the relative anaerobes: *Clostridium botulinum*, *Listeria monocytogenes*, *Yersinia enterocolitica* i *Aeromonas hydrophila* (Zalewski 2003). Considering the type of sous-vide products, particular attention is paid to *Clostridium botulinum*. It is considered as one of the most dangerous pathogens in the case of cooked, vacuum-packed and refrigerated food. Due to their strictly anaerobic nature and the ability to produce heat resistant spores they are able to survive the heat treatment process (Grzesińska, Tomaszewska 2013). Therefore, the determinants of safety of products prepared by using sous-vide technology are factors such as applied heat treatment parameters, the parameters of the cooling process and the conditions of storage of refrigerated food. The higher parameters of heat treatment (time and temperature) will be applied, the greater is its safety and extended life (González-Fados et al. 2005).

Beside microbiological safety and sensory quality, an important feature for the consumer is the nutritional value of meals. In researchers' opinion (Werlein 1998; Hansen et al. 2002) the nutritional value of sous-vide food is at a high level. As emphasized by Zalewski (2003) sous-vide cuisine has comparable nutritional value in comparison to the freshly prepared meals.

An important issue is consumer's perception of a dish prepared by sous-vide cooking. Roascio-Albistur and Gambaro [2017] indicated that sous-vide technique is unknown by consumers and, therefore, its advantages. Negative associations were made with processed food packed in a bag, a fact that should be considered in the packaging design.

Summing up, according to respondents dishes should be sensory attractive (taste, color, appearance) and free from artificial ingredients. These types of requirements and expectations can meet the application of sous-vide technology. Sous-vide provides sufficient durability of food while maintaining its high quality and minimal loss of nutrients. Dishes prepared in accordance with the technological regime characterized by a natural taste and aroma, high nutritional value, maintaining the original appearance, color and freshness. In addition, use of several factors that inhibit the multiplication of microflora in one method, results in prolonging life of the products, which can increase the offer of dining facilities.

Conclusions

In the conducted survey, consumers said that the quality of the offered dishes in the catering facilities is moderate and they suggested improving it. Respondents under concept of quality understand the fresh and “healthy” food, as well as free from contamination. In addition, dishes should be sensory attractive and free from artificial ingredients. Sous-vide cooking can meet these expectations, because of offering advantages from both the sensory and safety point of view.

Due to the sample selection (non-random), the relatively small number of respondents and the limited territorial coverage, obtained results can not be generalized to the whole population. In spite of the limitations mentioned above, findings of this study contribute to better understanding the preferences of the catering industry and may be used to develop a research with representative sample.

Bibliography

- Baldwin D.E. (2012), *Sous-Vide Cooking: A review*. “International Journal of Gastronomy and Food Science”, No. 1.
- Betlejewski S. (2007), *Choroby społeczne, cywilizacyjne czy choroby stylu życia*. „Wiadomości Lekarskie”, nr LX.
- Church I. (1998), *The sensory quality, microbiological safety and shelf life of packaged foods*, (in:) Ghazala S. (Ed.), *Sous-Vide and Cook-Chill Processing for the Food Industry*. Aspen Publishers, Inc.
- Church I.J., Parsons A.L. (2000), *The sensory quality of chicken and potato products prepared using cook-chill and sous-vide methods*, “International Journal of Food Science and Technology”, No. 35.
- Creed P.G. (1998), *Sensory and nutritional aspects of sous-vide processed foods*, (in:) Ghazala S. (Ed.), *Sous-Vide and Cook-Chill Processing for the Food Industry*, Aspen Publishers, Inc.
- Edwards J.S.A., Schafheitle J.M., Reeve W.G., Edwards A. (1998), *Food Production Techniques in Catering Today - A Comparative Study, Culinary Arts and Sciences 2*, Bournemouth University, Bournemouth .

- González-Fandos E., Villarino-Rodríguez A., García-Linares M.C., García-Arias M.T., García-Fernández M.C. (2005), *Microbiological safety and sensory characteristics of salmon slices processed by the sous-vide method*. "Food Control", No. 16.
- Grabowska J. (2007), *Substancje zapachowe*, (in:) Sikorski Z.E. (Ed.), *Chemia żywności. Składniki żywności*, WNT, Warszawa.
- Grześnińska W., Tomaszewska M. (2013), *Technologia sous-vide a jakość potraw - za i przeciw*. „Przegląd Gastronomiczny”, nr 5.
- Hans-Dieter W. (1998), *Comparison of the quality of sous-vide and conventionally processed carrots*, "Zeitschrift für Lebensmittel-Untersuchung und-Forschung", No. 207,.
- Hansen K., Kall M., Lassen A., Ovesen L. (2002), *A comparison of the retention of vitamins B1, B2 and B6, and cooking yield in pork loin with conventional and enhanced meal-service systems*, "European Food Research and Technology", No. 215.
- Kwiatkowska E. (2010), *Wybrane uwarunkowania demograficzne korzystania z usług gastronomicznych (na przykładzie aglomeracji warszawskiej)*.
http://www.wne.sggw.pl/czasopisma/pdf/EIOGZ_2010_nr80_s61.pdf [access: 30.11.2017].
- Milewska M., Prączko A., Stasiak A. (2010), *Podstawy gastronomii*, PWE, Warszawa.
- NSW Food Authority (2012), *Sous-vide. Food safety precautions for restaurants*,
http://www.foodauthority.nsw.gov.au/_Documents/science/sous_vide_food_safety_precautions.pdf [access: 12.12.2014].
- Roascio-Albistur A., Gámbaro A. (2017), *Consumer perception of a non-traditional market on sous-vide dishes*, "International Journal of Gastronomy and Food Science",
<https://doi.org/10.1016/j.ijgfs.2017.10.002> [access: 30.11.2017].
- Tiampo J. (2006), *The Nutrition, Food Safety, and Operational Benefits of Sous-Vide Technology for North American Restaurants*, Wydane J. Tiampo.
- Schellekens M. (1996), *New research issues in sous-vide cooking*, "Trends in Food Science & Technology", No. 7.
- Tomaszewska M., Zalewska M., Gomulska I. (2011), *Porównanie jakości sensorycznej marchwi przygotowanej technologią sous-vide (pod próżnią) oraz konwencjonalnie*, „Postępy Techniki Przetwórstwa Spożywczego”, nr 1.
- Tomaszewska M., Zalewska M., Gomulska I. (2012), *Ocena właściwości fizycznych marchwi przygotowanej technologią sous-vide oraz tradycyjnie*, „Postępy Techniki Przetwórstwa Spożywczego”, nr 1.
- Zalewski S. (2003), *Systemy produkcji potraw w zakładach żywienia zbiorowego*, (in:) Świdorski F. (red.), *Żywność wygodna i żywność funkcjonalna*, WNT, Warszawa.
- Zimna M. (2008), *Panorama polskiej gastronomii*, Konferencja Food Business Forum, Warszawa, 16 kwietnia.

Technologia *sous-vide* jako odpowiedź na potrzeby konsumentów zakładów gastronomicznych

Streszczenie

W gastronomii rozwój i zmiany dyktowane są potrzebami konsumentów, które mogą w znacznym stopniu różnić się od siebie w zależności od indywidualnych pre-

ferencji, statusu ekonomicznego, uwarunkowań społeczno-kulturowych. W dzisiejszych czasach ważną determinantą rozwoju gastronomii jest rosnąca świadomość i wiedza konsumentów na temat żywności i żywienia. Taki stan rzeczy narzuca gastronomii kierunki zmian, związane głównie z podwyższaniem jakości serwowanej żywności. Celem pracy było określenie możliwości zastosowania technologii *sous-vide* do zaspokojenia prozdrowotnych potrzeb konsumentów zakładów gastronomicznych. Badanie ankietowe przeprowadzono wśród 120 respondentów w wieku od 16 do 50 lat, korzystających z usług gastronomicznych. Badane osoby określiły, że podczas doboru dania najważniejszymi aspektami są: smakowitość, wygląd zewnętrzny i wartość odżywcza, a jakość żywności utożsamiali ze świeżością oraz pojęciem „zdrowa żywność”. Wymienione aspekty mogą być zapewnione dzięki technologii *sous-vide*.

Słowa kluczowe: trend prozdrowotny, zakłady gastronomiczne, technologia *sous-vide*.

Kody JEL: D12, M31

Технология *sous-vide* как ответ на потребности клиентов заведений общепита

Резюме

В общественном питании развитие и изменения диктуются потребностями потребителей. Они могут значительно отличаться друг от друга в зависимости от индивидуальных предпочтений, экономического статуса и социально-культурных обусловленностей. В настоящее время важным детерминантом развития общепита являются растущая сознательность и знания потребителей в отношении пищи и питания. Такое положение вещей навязывает общепиту направления изменений, связанные в основном с повышением качества выдаваемой пищи. Цель работы – определить возможности применения технологии *sous-vide* для удовлетворения направленных на здравоохранение потребностей клиентов заведений общепита. Опросы провели среди 120 респондентов в возрасте от 16 до 50 лет, которые пользуются услугами общепита. Опрошенные определили, что по ходу выбора блюда самыми важными аспектами являются вкус, внешний вид и питательная ценность, а качество пищи они отождествляли со свежестью и понятием «здоровая пища». Указанные аспекты могут обеспечиваться благодаря технологии *sous-vide*.

Ключевые слова: тренд, направленный на сохранение здоровья; заведения общепита; технология *sous-vide*.

Коды JEL: D12, M31

Artykuł zaakceptowany do druku w lutym 2018 roku

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