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IMPACT OF THE GRATING THICKNESS ON THE QUALITY OF POTATO PANCAKES®

Wpływ rozdrobnienia miększu ziemniaka na cechy jakościowe placków ziemniaczanych®

The article presents the results obtained during the research on the impact of the type of potato grating thickness on the quality of potato pancakes. Four mixtures were made, each by means of blades with different size of grating holes. The mixtures differed in consistency and appearance, which resulted in different quality parameters of fried potato pancakes. The pancakes were subjected to organoleptic assessment with the 5-point method. The evaluation team consisted of a group of fifteen trained reviewers. Based on the obtained assessments, the results were analyzed and discussed. Potato pancakes made with a rotary grinding machine with a drum blade for potato grating were rated the highest. Their appearance, smell, taste and consistency were characteristic of this dish. Pancakes made on blades with medium holes were rated the worst. During frying, these pancakes quickly browned from the outside, but inside the mass of potato mixture remained raw. The conducted research confirmed that the way of grinding vegetables into potato mass has a large impact on the quality of ready potato pancakes, and thus on their sensory acceptability.

Key words: potato pancakes, organoleptic evaluation, sensory evaluation, grating thickness, production technology, food quality.

Artykuł przedstawia wyniki uzyskane podczas badań wpływu rodzaju rozdrobnienia ziemniaków na jakość placków ziemniaczanych. Sporządzono 4 ciasta, każde z wykorzystaniem różnych grubości oczek do tarcia. Ciasta różniły się między sobą konsystencją oraz wyglądem, co skutkowało różnicą parametrów jakościowych usmażonych placków ziemniaczanych. Placki zostały poddane ocenie organoleptycznej metodą 5 punktową. Zespół oceniający stanowiła piętnastoosobowa grupa przeszkolonych ankietów. Na podstawie uzyskanych ocen dokonano analizy i dyskusji wyników. Najwyżej ocenione zostały placki ziemniaczane wykonane maszynką do mięsa z funkcją tarcia ziemniaków na placki ziemniaczane. Ich wygląd, zapach, smak i konsystencja była charakterystyczna dla tej potrawy. Najgorzej oceniono placki sporządzone na ostrzach z grubymi oczkami. Placki te podczas smażenia szybko ulegały zarumienieniu się z zewnątrz, lecz w środku masa ciasta ziemniaczanego pozostawała surowa. Przeprowadzone badania potwierdziły, że sposób rozdrobnienia warzyw do masy ziemniaczanej ma duży wpływ na jakość gotowych placków ziemniaczanych, a przez to na ich akceptowalność sensoryczną.

Słowa kluczowe: placki ziemniaczane, ocena organoleptyczna, rozdrobnienie, technologia produkcji, jakość żywności.

INTRODUCTION

Root crops are those whose utility parts are underground, called tubers or roots. The usable parts contain a lot of carbohydrates, compared to the protein or fiber content. In the group of root crops we find annual and biennial species, which combine a similar cultivation method from sowing to weeding and ridging. Potatoes belong to the root crops, to the family of solanaceous plants, they propagate vegetatively through

tubers. They are annual plants, the usable part is the tuber, and their purpose is wide as they can be used for edible purposes for both humans and animals. They are also used for industrial purposes to produce, among other things, potato flour. Due to their shape and taste we can distinguish a large number of varieties [9]. Potatoes belong to the most popular vegetables not only in Poland but also in the world. They are commonly used in such countries as: Cyprus, Russia, Germany and the Netherlands. In terms of cultivation area, they occupy seventh

place among eleven most important plants in the world [9]. It is worth to pay special attention to the composition of potatoes as they are rich in energy components, vitamins and, most of all, they do not belong to the indigestible plants. Potatoes and their products are the main source of carbohydrates in human nutrition next to wheat and rice [11]. They are consumed in boiled, baked and fried forms. The share of potatoes in the diet has decreased in recent years and thus its production has been limited. This trend is mainly caused by the change in dietary trends [11,12]. Potato products are characterized by high content of starch, vitamin C, B group vitamins as well as potassium, magnesium, iron, copper and iodine. It is worth noting that the daily intake of 200g of potatoes covers 50% of the daily vitamin C requirement [1,2,3,8,10,11,12]. The alkaline reaction of potatoes allows to neutralize the acid reaction of other consumed products. Therefore, potatoes are widely used in the diet of people with sensitivity and gastrointestinal diseases, potassium deficiency and heart diseases [5,6,7]. Boiled potatoes are characterized by a relatively high glycemic index and therefore they are not recommended for people with fluctuating blood glucose levels [11,12]. For many years, they have been the basis of Polish meals mainly due to their rich nutritional and culinary value, as well as low price and access to this product all year round. An average Pole consumes even 130 kg of potatoes per year. The number of potato varieties is impressive. In 2011, 137 varieties were recorded in the National Register, 108 of them were edible and 29 starch varieties [4].

PURPOSE AND SCOPE OF WORK

The aim of the study was to assess the effect of the degree of potato grinding on the quality of obtained potato pancakes. The scope of work included preparation of four types of potato pancakes using four different sizes of potato grating blades. Fried potato pancakes were subjected to organoleptic evaluation. On the basis of the obtained results an analysis was made and conclusions from the conducted research were presented.

RESEARCH METHODOLOGY

The research material was potato pancakes prepared according to the same recipe.

Two devices were chosen to prepare the mixture for potato pancakes: a rotary grinding machine with two different blades and a vegetable box grater using also two blades. Four mixtures were prepared according to the prepared recipe.

Mixture No. 1 – prepared using a rotary grinding machine equipped with blades for grating potatoes for pancakes (ground pancakes).

Mixture No. 2 – prepared with the use of a rotary grinding machine equipped with blades for shredding vegetables.

Mixture No. 3 – prepared on a box grater with the use of shredding blades.

Mixture No. 4 – prepared on a box grater with the use of blades for fine grating.

The potato mixture was fried in the shape of pancakes and subjected to organoleptic evaluation. The evaluation team

consisted of 15 people of different ages, but the majority of them were between 22 and 24 years old. The evaluators received a card with a 5-point scale of evaluation of selected quality features of finished products. During the preparation of potato mixture (using different blades for processing raw materials) a significant difference in consistency of mass, mass density and appearance was noticed. Figure 1 shows the blades used for grounding and grating the potatoes and the mixture mass obtained.









Device	Mixture
Rotary grinding machine – drum blade for grating potato pancakes. 	Mixture No. 1 
Rotary grinding machine – drum blade for shredding vegetables with medium holes. 	Mixture No. 2 
Box grater – blade to shred vegetables with large holes. 	Mixture No. 3 
Box grater – blade to grate vegetables with small holes. 	Mixture No. 4 

Fig. 1. Blades and the obtained mass of potato mixture. Rys. 1. Ostrza oraz masa uzyskanego ciasta placków ziemniaczanych.

Source: Own study

Źródło: Opracowanie własne

Figure 2 shows the process of frying the pancakes and the blade used to grate the potatoes.









Device	Mixture
Rotary grinding machine – drum blade for grating potatoes. 	Potato pancakes made of mixture No. 1 
Rotary grinding machine – drum blade for shredding vegetables with medium holes. 	Potato pancakes made of mixture No. 2 
Box grater – blade to shred vegetables with large holes. 	Potato pancakes made of mixture No. 3 
Box grater – blade to grate vegetables with small holes. 	Potato pancakes made of mixture No. 4 

Fig. 2. Comparison of the appearance of fried potato pancakes made on four different grater blades.

Rys. 2. Porównanie wyglądu smażonych placków ziemniaczanych sporządzonych na czterech różnych oczkach tarki.

Source: Own study

Źródło: Opracowanie własne

ANALYSIS AND DISCUSSION OF RESULTS

The examined characteristics of the quality of the cakes were: external appearance, color, taste, smell, texture and cross-section. The results of the analysis are presented below in the form of bar charts.

Figure 3 presents the results of the organoleptic evaluation of potato pancakes, where the tested quality was determined by their external appearance. According to the respondents, the most favorable appearance was achieved by potato pancakes processed with a drum blade for grating potatoes. A slightly lower result was achieved by potato pancakes grated on a box grater with small hole blade. The respondents assessed equally potato pancakes grated with large holes and medium holes in the same way.

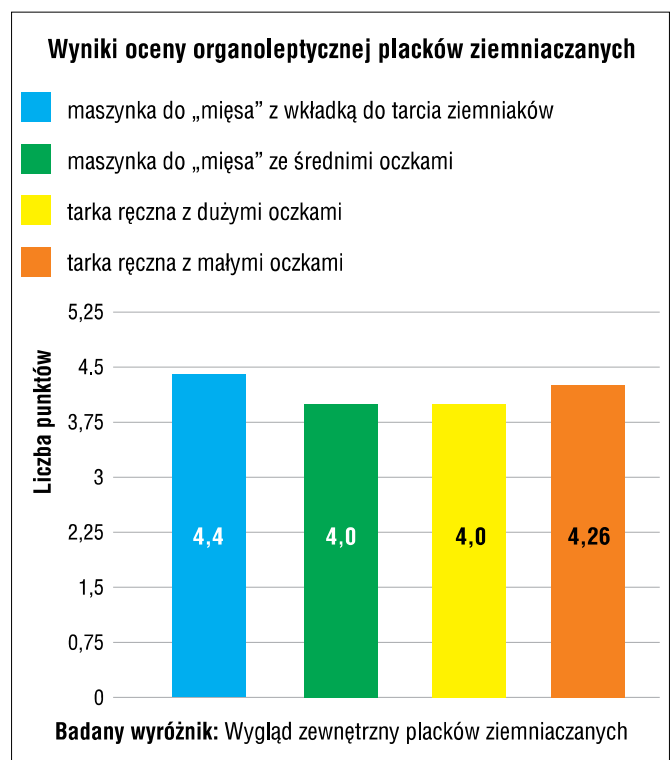


Fig. 3. Results of organoleptic assessment of potato pancakes in terms their external appearance.

Rys. 3. Wyniki oceny organoleptycznej placków ziemniaczanych ze względu na ich wygląd zewnętrzny.

Source: Own study

Źródło: Opracowanie własne

The color of the potato pancakes was considered to be the second most important quality marker in the evaluation of potato pancakes. The analysis concluded that the respondents assessed the appearance of potato pancakes grated with different blades quite similarly. However, the results slightly differ from each other, the research group assessed the potato pancakes grated on medium holes in the most favorable way. Potato pancakes grated on small holes assessed the least favorably in terms of the color obtained.

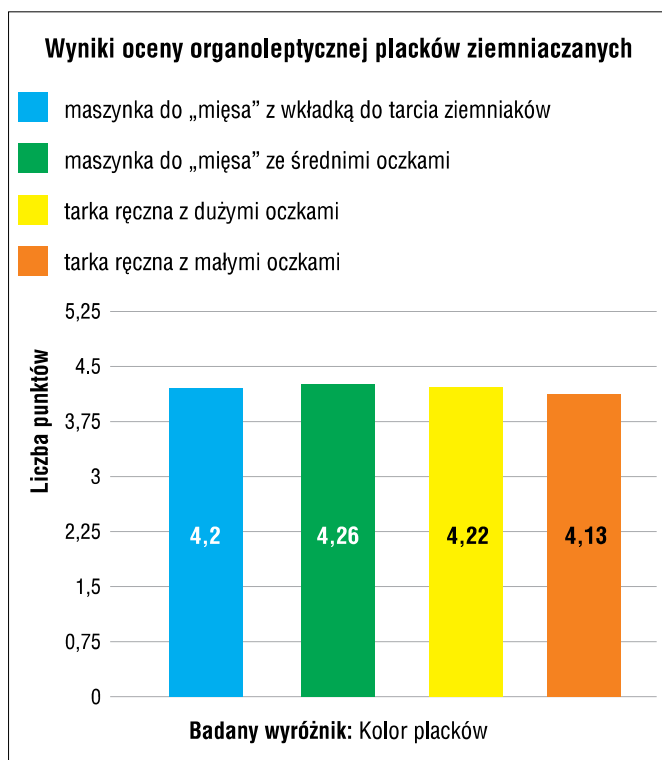


Fig. 4. Results of organoleptic evaluation of potato pancakes in terms of the obtained color.

Rys. 4. Wyniki oceny organoleptycznej placków ziemniaczanych ze względu na uzyskany kolor.

Source: Own study

Źródło: Opracowanie własne

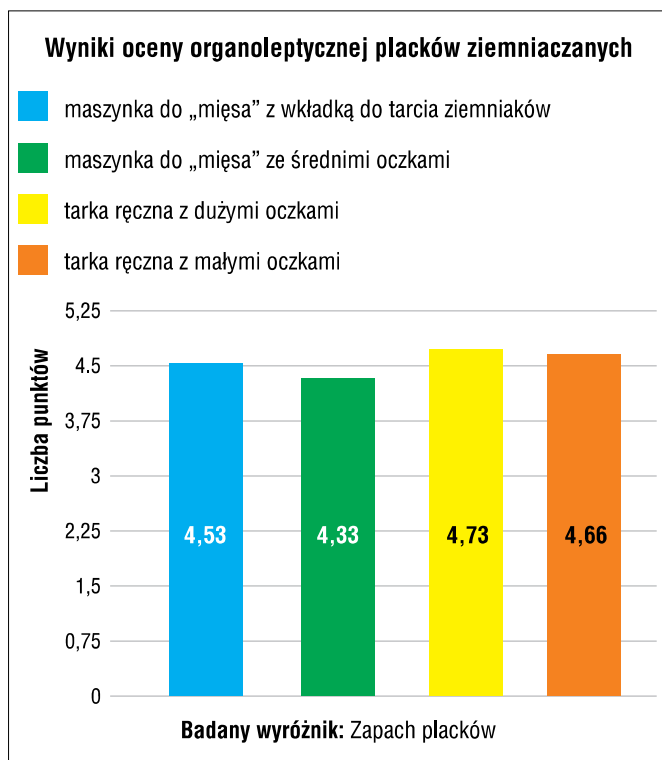


Fig. 5. Results of the organoleptic evaluation of potato pancakes in terms of smell.

Rys. 5. Wyniki oceny organoleptycznej placków ziemniaczanych ze względu na zapach.

Source: Own study

Źródło: Opracowanie własne

The smell of potato pancakes was also evaluated organoleptically. The respondents found that potato pancakes grated on medium holes smell best. The second place in this classification was taken by the potato pancakes grated on small holes of the box grater and those prepared with the grating blade of the rotary grinding machine. The respondents found pancakes grated on medium holes to be the least attractive in terms of color.

A very important quality feature in organoleptic evaluation is taste. In the case of conducted research, it turned out that the taste of potato pancakes depends on the thickness of grating. The potato pancakes ground in the rotary machine were considered the best by the research group. Not as good as the best pancakes but still highly rated were the potato pancakes grated on medium holes. Potato pancakes grated on small and large holes scored the lowest and thus were considered to be the least tasty according to the respondents.

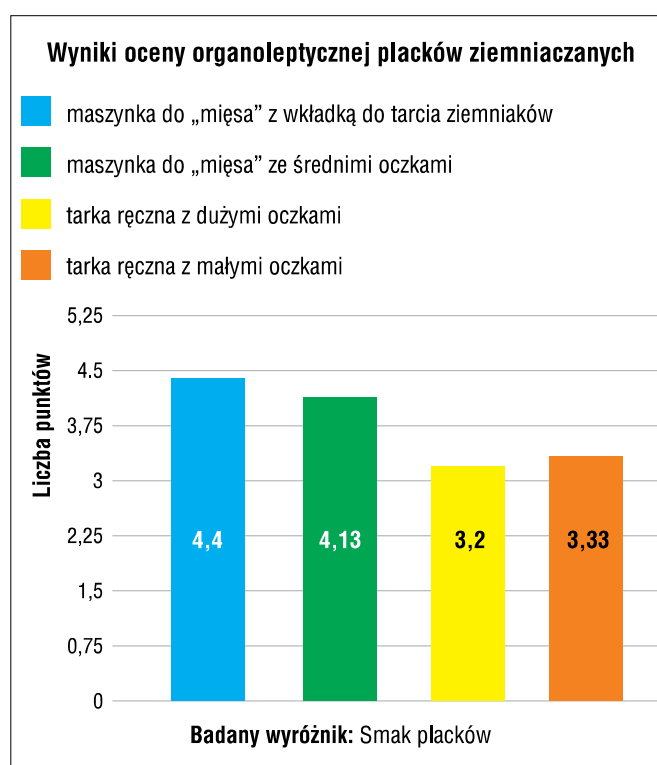


Fig. 6. Results of the organoleptic evaluation of potato pancakes in terms of taste.

Rys. 6. Wyniki oceny organoleptycznej placków ziemniaczanych ze względu na smak.

Source: Own study

Źródło: Opracowanie własne

The last quality marker examined was the cross-section and texture of potato pancakes. The respondents found that the potato pancakes grated by means of a grating blade of the rotary machine were the best in this category. Potato pancakes grated on small and medium holes were assessed much worse. While the potato pancakes grated on large holes are the worst.

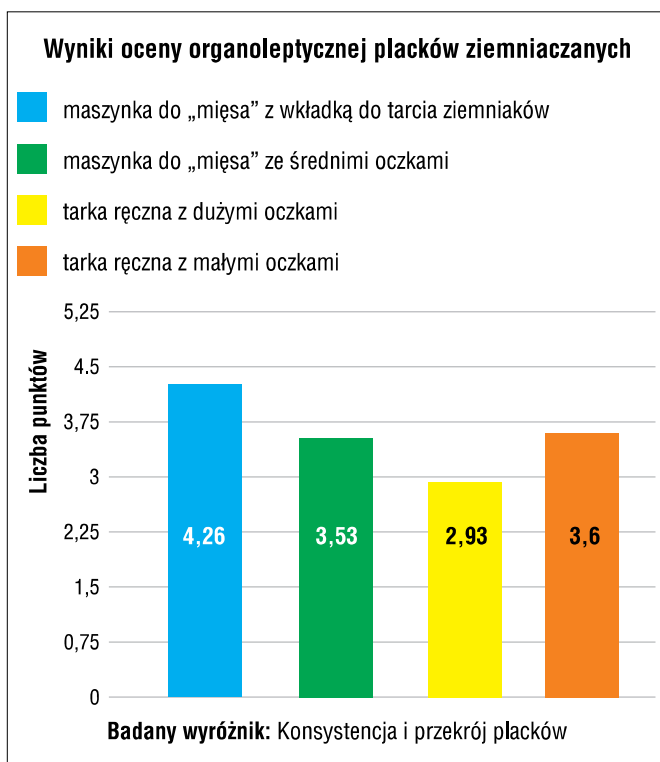


Fig. 7. Results of organoleptic evaluation of potato pancakes in terms of their texture and cross-section.

Rys. 7. Wyniki oceny organoleptycznej placków ziemniaczanych ze względu na ich konsystencję oraz przekrój.

Source: Own study

Źródło: Opracowanie własne

CONCLUSIONS

On the basis of the tests carried out, it is concluded:

1. The method of preparing the potato mixture in terms of grating thickness affects the quality parameters of the fried potato pancakes.
2. The method of grating potatoes with a rotary grinding machine has a positive effect on the taste, texture and cross-section of potato pancakes. Fine texture has a positive effect on the frying degree of potato pancakes.
3. Grating potatoes on medium holes can make the inside of the pancakes raw and the outer layer of the pancakes burnt. This has a significant effect on the deterioration of the taste of potato pancakes.
4. The thickness and method of grating of the potatoes does not significantly affect the differences in color of the fried potato pancakes.

WNIOSKI

Na podstawie przeprowadzonych badań, stwierdza się:

1. Sposób przygotowywania masy ziemniaczanej ze względu na stopień rozdrobnienia warzyw ma wpływ na parametry jakościowe gotowych placków ziemniaczanych.
2. Metoda przecierania ziemniaków za pomocą maszyny do mielenia korzystnie wpływa na smak, konsystencję, przekrój placków ziemniaczanych. Drobną konsystencją wpływa pozytywnie na wysmażenie placków ziemniaczanych.
3. Ścieranie ziemniaków na grubych oczkach może przyczynić się do tego, iż środek placków pozostanie surowy, a zewnętrzna warstwa placków zostanie przypalona. Ma to istotny wpływ na pogorszenie smaku placków ziemniaczanych.
4. Stopień oraz metoda rozdrobnienia ziemniaków nie wpływa istotnie na różnice w kolorze wysmażonych placków ziemniaczanych.

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