

Quality Diagram in Evaluation of Biscuits Sensory Properties

Ocjnjivanje senzorskih svojstava keksa dijagramom kakvoće

Ljiljana Primorac¹, M. Filajdić² and Vesna Martinušić³

¹Prehrambeno-tehnološki fakultet, Vijenac I. Meštrovića 7, HR-54000 Osijek, Croatia

²Prehrambeno-biotehnološki fakultet Sveučilišta u Zagrebu, Pierottijeva 6, HR-41000 Zagreb, Croatia

³Tvornica keksa i kruha »Sloboda«, Zeleno polje 209A, HR-54000 Osijek, Croatia

Received: June 28, 1994

Accepted: December 22, 1994

Summary

The aim of this paper was to suggest an appropriate way of following and presenting the sensory quality of biscuits and similar products. This method would enable simple control of production.

The sensory quality of 10 products of the Biscuit and Bread Factory in Osijek was analyzed. The scoring system with different scales (different number of intervals) for each characteristic was applied for the sensory evaluation of the products. The results of rating were expressed by a 0 to 5 score applying weighting factors. The average scores and confidence interval were calculated for each property.

The results are shown graphically, by a polar diagram, in which the properties are presented by coordinates and the scores by concentric circles.

The average score and confidence interval for each sensory property were plotted on the appropriate coordinate, so the quality diagrams of the selected products were obtained.

From these diagrams one gets an immediate insight into the quality of food products. When presented on a transparent sheet they could be used as a standard to compare the results of daily production.

Introduction

Sensory properties, among many other factors, influence considerably the quality of food products.

A product could have an excellent composition and satisfy the highest nutrition criteria, but if it is unsatisfactory in appearance, taste or odour, it will not find the way to consumers. The sensory control of products is a very important segment of food quality control, which still does not occupy an adequate place in Croatia.

For biscuits and similar products the sensory attributes are very important since these products are chosen and bought according to these properties. In spite of this the methodology of sensory evaluation is not regulated within the official methods. It is up to the producer to choose the method and the dynamics of sensory evaluation.

Sažetak

Cilj je ovog rada bio predložiti pogodan način praćenja i prikazivanja senzorske kakvoće keksa i srodnih proizvoda koji bi omogućio jednostavnu kontrolu proizvodnje.

Analizirana je senzorska kakvoća 10 proizvoda Tvornice keksa i kruha »Sloboda« iz Osijeka, koja pri ocjenjivanju svojih proizvoda primjenjuje sustav bodovanja s različitim brojem poena za pojedina obilježja.

Rezultati bodovanja preko faktora značajnosti izraženi su ocjenama od 0 do 5, a zatim je za svako obilježje izračunana prosječna ocjena i granice pouzdanosti.

Rezultati su prikazani grafički, polarnim dijagramom, u kojem su obilježja označena koordinatama, a ocjene koncentričnim krugovima. Prosječna ocjena i granice pouzdanosti za svako senzorsko obilježje nanoseni su na odgovarajućoj koordinati te su tako dobiveni dijagrami kakvoće odabranih proizvoda.

Iz njih se dobiva trenutačni uvid u kakvoću proizvoda, a nanoseni na prozirnu foliju mogu se koristiti kao standard s kojim će se uspoređivati rezultati dnevne proizvodnje.

The aim of this paper was to suggest an appropriate way of following and presenting the sensory quality of products which would enable simple control of daily production.

Materials and Methods

The experimental data were obtained in the Biscuit and Bread Factory »Sloboda« in Osijek, Croatia. For the evaluation of sensory properties of finished products the system with 35 point scoring scale was applied, with different number of points for individual properties (2 to 10).

The panel of five assessors, whose abilities had been checked by appropriate tests, made the evaluation (1).

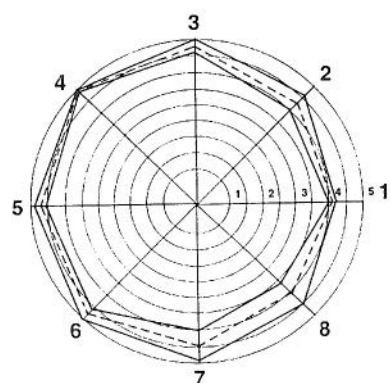


Fig. 1. Quality diagram of wafer dessert
»Jadro«
Slika 1. Dijagram kakvoće vafli-proizvoda
»Jadro«

Sensory properties for Figs. 1 and 2
Senzorska svojstva za slike 1 i 2

- 1 - Wafer bake-colour
Ispečenost oblatni-boja
 - 2 - Wafer crunch
Prhkost oblatni
 - 3 - Wafer taste
Okus oblatni
 - 4 - Filling structure
Struktura punjenja
 - 5 - Filling taste
Okus punjenja
 - 6 - Filling odour
Miris punjenja
 - 7 - Cut, shape and size
Rezanje, oblik i veličina
 - 8 - Filling thickness
Debljina punjenja
- \bar{x}
—— $\bar{x} \pm t_{0,05} \cdot S_{\bar{x}}$

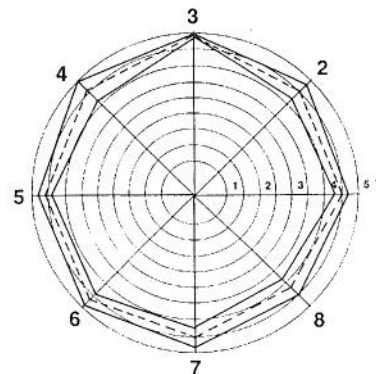


Fig. 2. Quality diagram of wafer dessert
»Karmela«
Slika 2. Dijagram kakvoće vafli-proizvoda
»Karmela«

The results of rating (14 to 20 sample depending on products) were through the weighting factors presented by scores (0-5), and then the average score and confidence interval for each property were calculated. The 95 % confidence interval was determined by t-distribution (2,3).

The polar diagram was chosen for the graphical presentation of results. Each co-ordinate represented one property. The scores from 0 to 5 were denoted on the co-ordinate, starting from the centre. The same scores were connected by concentric cycles so that the whole diagram looked like a spider-web.

The average score and confidence interval for each sensory property were given on the appropriate coordinate, and the quality diagrams of chosen products were obtained (4). In this way 10 products were analyzed.

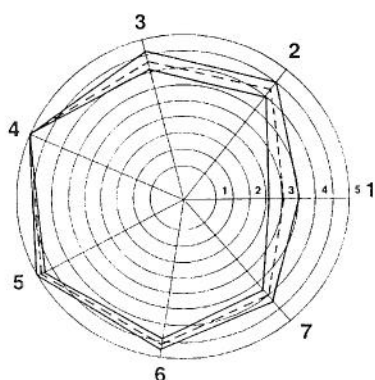


Fig. 3. Quality diagram of ladyfinger
»Karolina«
Slika 3. Dijagram kakvoće piškota
»Karolina«

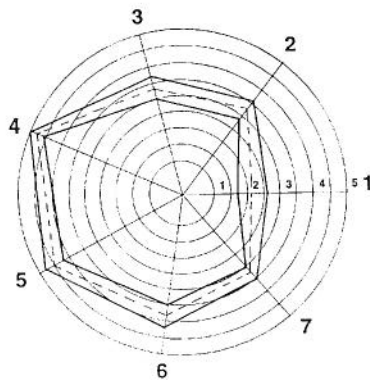


Fig. 5. Quality diagram of tea biscuit
»Čajni kolutići«
Slika 5. Dijagram kakvoće čajnog peciva
»Čajni kolutići«

Sensory properties for
Figs. 3, 4, 5 and 6
Senzorska svojstva za
slike 3, 4 i 5

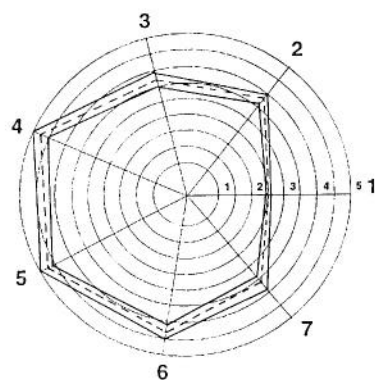


Fig. 4. Quality diagram of biscuit »Petit beurre«
Slika 4. Dijagram kakvoće keksa »Petit beurre«

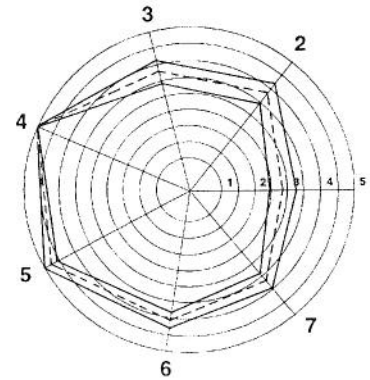


Fig. 6. Quality diagram of crackers
Slika 6. Dijagram kakvoće krekeri

- 1 - Shape and size
Oblik i veličina
 - 2 - Bake-colour
Ispečenost-boja
 - 3 - Structure
Struktura
 - 4 - Cut colour
Boja presjeka
 - 5 - Odour
Miris
 - 6 - Taste
Okus
 - 7 - Surface appearance
Izgled površine
- \bar{x}
—— $\bar{x} \pm t_{0,05} \cdot S_{\bar{x}}$

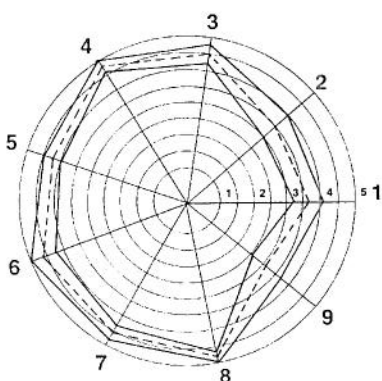


Fig. 7. Quality diagram of filled tea biscuit »Moto«
Slika 7. Dijagram kakvoće punjenog čajnog peciva »Moto«

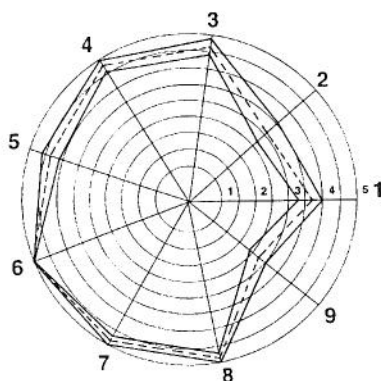


Fig. 8. Quality diagram of filled tea biscuit »Pola« (vanillin)
Slika 8. Dijagram kakvoće punjenog čajnog peciva »Pola« (vanilin)

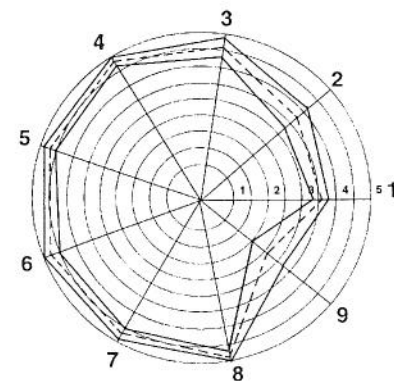


Fig. 9. Quality diagram of filled tea biscuit »Pola« (cacao)
Slika 9. Dijagram kakvoće punjenog čajnog peciva »Pola« (kacao)

Sensory properties for Figs. 7, 8 and 9
Senzorska svojstva za slike 7, 8 i 9

- | | |
|--|----------------------------------|
| 1 – Biscuit bake-colour
Ispečenost keksa-boja | 3 – Biscuit taste
Okus keksa |
| 2 – Biscuit shape
Oblik keksa | 4 – Biscuit odour
Miris keksa |

- | | |
|---|-------------------------------------|
| 5 – Biscuit structure
Struktura keksa | 7 – Filling taste
Okus punjenja |
| 6 – Filling structure
Struktura punjenja | 8 – Filling odour
Miris punjenja |

- | |
|---|
| 9 – Filling thickness
Debljina punjenja |
| ----- \bar{x} |
| ———— $\bar{x} \pm t_{0,05} \cdot S_{\bar{x}}$ |

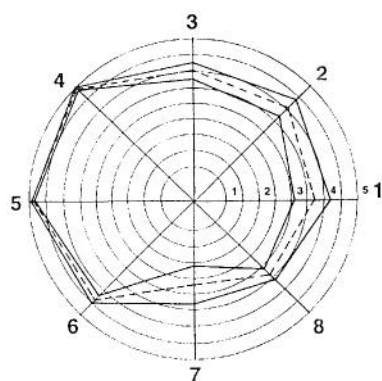


Fig. 10. Quality diagram of salted sticks »Bobi«
Slika 10. Dijagram kakvoće slanih štapića »Bobi«

Sensory properties for Fig. 10
Senzorska svojstva za sliku 10

- | |
|---|
| 1 – Shape and size
Oblik i veličina |
| 2 – Bake-colour
Ispečenost-boja |
| 3 – Structure
Struktura |
| 4 – Cut colour
Boja presjeka |
| 5 – Odour
Miris |
| 6 – Taste
Okus |
| 7 – Salt dredging
Posuta sol |
| 8 – Surface appearance
Izled površine |
| ----- \bar{x} |
| ———— $\bar{x} \pm t_{0,05} \cdot S_{\bar{x}}$ |

Results and Discussion

By the application of the described procedure very clear and illustrative reports were obtained of the sensory properties of the assayed products, i.e. quality diagrams.

An immediate insight into the product quality and the degree to which an individual property satisfies requested quality condition, is gained.

The diagrams clearly show that none of the properties of the wafer products (Figs. 1 and 2) had an average score lower than 4. For ladyfingers (Fig. 3), biscuits (Fig. 4), tea biscuits (Fig. 5) and crackers (Fig. 6) very low scores for »shape and size« were noticed. The salted sticks (Fig. 10) had the lowest score for »salt dredging«, while filled tea biscuits (Figs. 7, 8 and 9) got the lowest scores for the »filling thickness«. The average scores of cited properties were,

except in two cases, lower than score 3; in these two cases the scores were barely above 3.

Within the applied scoring method with different number of intervals (points) these properties were evaluated with point 2. If we exclude production errors these low scores might be the result of a small interval scale. Due to this fact a recommendation is made to use a uniform 5-point scoring scale, for each property. To compensate for the faults of linear rating the weighting factors were established.

The quality diagram put on a transparent plastic sheet could be used as a standard with which the results of daily production could be compared.

Conclusion

The application of a polar diagram in the sensory evaluation of biscuits gives clear reports about the sensory properties of the investigated products, so-called quality diagrams. These diagrams put on a transparent plastic sheet, enable simple control of production.

References

1. R. Neuman, P. Molnar, S. Arnold, *Sensorische Lebensmitteluntersuchung*, VEB Fachbuchverlag, Leipzig (1983) p. 205.
2. P. Molnar, *Sensory Evaluation of Food, I Scoring Method*, ISO/TC 34/SC 12 »Sensory Analysis« 190E DC 1985-02-05, 5–24.
3. L. L. Havlicek, R. D. Crain, *Practical Statistics for the Physical Sciences*, American Chemical Society, Washington, (1988) pp. 168–171.
4. J. M. Mecredy, J. C. Sonnemann, S. J. Lehmann, *Food Technol.* 28 (1974) 36.