DOES CONSUMER PREFERENCE EXCEED INITIALLY INDICATED WISHES? THE CASE OF DESSERT TOPPING

Katarina BOROVŠAK [1, 2], Xavier GELLYNCK [3], Sara De PELSMAEKER [3], Aleš KUHAR [1]

Does consumer preference exceed initially indicated wishes? The case of dessert topping

Success of a new food product on the market is strongly related to how good that product is adapted to consumers' preferences, wishes, expectations and needs. This paper shows the importance of consumer studies including consumer sensory tests for product prototype optimization on the case of an innovative sweet topping made from well-known Slovenian wine Teran. Empirical study was made combining two stages, first the exploratory qualitative research with focus groups and questionnaire and second a test for new food prototype with consumer sensory techniques. The results of the exploratory research were very encouraging and perceived market potential was substantial. However, when more precise and objective research techniques were applied, obtained managerial recommendation critically differ. Application of the consumer sensory tests, namely preference test and JAR (just about right) test, disconfirmed high expectations from the exploratory phase and showed that chocolate flavour is the main driver of liking the topping.

Key words: food / new food products / sweet topping / Teran / consumers / sensory testing / preference test / hedonic test / prototype optimization

Ali potrošnikov prvi odziv presega dejanske preference? Primer desertnega preliva

Uspeh novega živilskega izdelka na trgu je močno povezan s tem, kako dobro je izdelek prilagojen željam, pričakovanjem in potrebam potrošnikov. V prispevku prikažemo pomembnost študije potrošnikov, ki vključuje senzorične teste pri optimizaciji in razvoju prototipa živilskega izdelka na primeru sladkega desertnega preliva, narejenega iz znanega slovenskega vina teran. Empirična raziskava je potekala v dveh stopnjah. Prvo kvalitativno stopnjo raziskave smo izvedli z intervjuji in fokusnima skupinama in drugo stopnjo z vprašalnikom, ki je vključeval testiranje s senzoričnimi tehnikami. Rezultati prvega dela raziskave so bili zelo spodbudni in zaključek prve stopnje raziskave je nakazoval visok tržni potencial za nov izdelek. S poglobljeno analizo in podrobnim vprašalnikom s senzoričnim testiranjem pa smo pridobili rezultate, ki so se kritično razlikovali od prvotno načrtovane strategije. Uporaba senzoričnih testov s potrošniki, in sicer preferenčnega testa in JAR (just about right-ravno prav) testa, je ovrgla visoka pričakovanja iz prve raziskovalne faze in pokazala, da je čokoladni okus glavni motiv všečnosti desertnega preliva.

Ključne besede: živila / novi živilski izdelki / sladki preliv / teran /potrošniki / senzorična analiza / test preferenc / hedonski test / optimizacija prototipa

1 INTRODUCTION

It can be clearly noticed that the innovation intensity and business performance of the Slovenian food companies has significantly weakened in the last decade (Kuhar, 2009). Slovenian food industry is one of the most important manufacturing sectors (Kuhar, 2009),

however the revealed lack of innovation and new product development have a significant effect on the market position and business performance. It is known that a positive relationship exists between market orientation and business performance (Rodriguez Cano *et al.*, 2004), which is largely dependent on the involvement of consumers' needs and wants in the innovation process (Moskowitz and Hartmann, 2008). New product devel-

1 Univ. of Ljubljana, Biotechnical Fac., Dept. of Animal Science, Chair of Agricultural Economics, Policy and Law, Groblje 3, SI-1230 Domžale, Slovenia
2 Corresponding author: borovsak.katarina@gmail.com
3 Ghent Univ., Fac. Bioscience Engineering, Dept. Agricultural Economics, Div. Agri-Food Marketing & Chain Management, Coupure links 653, B-9000 Gent, Belgium

opment and related business processes are key factors in forming competitive advantages and are crucial for the success of a food enterprise. Therefore, a decline in industrial research and development processes in Slovenian food industry might be the key reason for deteriorated business performance in the last years. Hence, for the Slovenian food enterprises to regain the market impetus a continual supply of novel products is essential, however these should be based on knowledge-driven development process focusing on superior understanding of consumers' preferences (Stewart-Knox and Mitchell, 2003). To ensure a success in developing new food products it is necessary to include, in early stages, findings obtained with different consumer analysis techniques and to attack problems in an interdisciplinary way, which is still rare in both sensory and consumer research (Köster, 2009). Only a systematic and integral experimentation can adequately support the product development, and one should involve consumer in testing the new product propositions. The case of a new dessert topping is under study in this research.

1.1 IMPORTANCE OF CONSUMER BEHAVIOUR STUDIES IN FOOD PRODUCT DEVELOPMENT PROCESS

A basic marketing concept states that firms exist to satisfy consumers' needs and that understanding their behaviour is good business (Solomon *et al.*, 2006). New food product prototypes that include consumer needs and wants have a greater chance for consumer approval on the market. Success on the market is usually a result of comprehensive market research, planned product development program and an organized marketing effort (Side, 2002). Consumers want to be able to choose the products that consistently meet their demands and desires (Perry and Cochet, 2009). However, in reality smaller food companies often neglect consumer behaviour studies and launch the new products without detailed market and consumer analysis, which can lead to failure and rejection on market and a great business loss. Because most part of the food industry has relied on an incomplete knowledge of consumer preferences (Moskowitz and Hartmann, 2008) far too many food product introductions fail and that is a generally accepted fact (Costa and Jongen, 2006; Linnemann *et al.*, 2006). Side (2002) estimated a failure rate of over 90 %. The majority of innovations (approximately 65 %) are line-extensions aiming at variation (Linnemann *et al.*, 2006). According to Lord (2000), 72 % of true new products and 55 % of line extensions fail. For non-leading, smaller companies a success rate is only 12 % (Lord, 2000).

In this study, the consumer acceptance and evaluation of a new dessert topping, made from Teran wine, is studied. Initially, qualitative research is conducted to identify the possible acceptance and the wanted characteristics of the products according to the consumer. Based on these results, the product was developed and consumer testing was done. Next, a comparison was conducted with substitute products. The results of the qualitative research are compared to the blind evaluation of the product. The aim of this research is to study the differences and similarities between indicated and actual preferences based on blind tasting.

1.2 CONSUMER SENSORY TESTING

Much of the success or failure of a food product in the marketplace results from consumer perception of sensory quality (Moskowitz *et al.*, 2006). Consumers' evaluations of products are affected by their appearance, taste, texture or smell (Solomon *et al.*, 2006). Therefore, within a process of new product development sensory characteristics should not be overlooked, because they almost always have a significant weight in the final success (Combris *et al.*, 2009). Novel consumer sensory methodologies do not require consensus from the panel, which could potentially lead to some loss of information due to the fact that if the perception of the minority of the assessors differs from that of the majority (Albert *et al.*, 2011).

Sensory tests with consumers attempt to quantify the degree of liking or disliking of a product, which is called hedonic or affective testing (Lawless and Heymann, 1998). In studies about food acceptability, four critical questions arise: how consumers perceive the sensory characteristics of food; to what extent the variation in perceived sensory characteristics influences consumer response; how certain consumer habits, attitudes, or beliefs affect hedonic ratings and purchase intention and to what extent hedonic ratings are influenced by the expectations created by different types of information (Costell *et al.*, 2009). Innovation for mass markets is characterized by the lack of personal interaction between the innovator and the users or, at least, most users (Grunert *et al.*, 2008). Sensory evaluation and market research are two separate but related activities that can complement one another and rely on different testing methods (Resurreccion, 1998). The primary role of sensory analysis is to provide information about how the sensory characteristics of products, ingredients, or other related information and services relate to perceived quality characteristics and to consumer liking. Once the quality attributes important to the consumer have been determined, ap-

propriate design for systematic product optimization can be developed (Moskowitz *et al.*, 2006).

There are two approaches to consumer sensory testing, first is acceptance test, which is a valuable and necessary component of every sensory evaluation program; it measures consumer's acceptance or liking of a product (Moskowitz *et al.*, 2006). In contrast, preference tests measure the appeal of one food or food product over another (Stone and Sidel, 1993). In this research, the key characteristics for a dessert topping, that are accepted by the consumer, are evaluated with combination of different sensory techniques.

H1: Consumer initial response is not identical to the indicated preference.

H2: Consumer sensory test gives sufficient insight in key characteristics of dessert toppings.

2 MATERIALS AND METHODS

Experiment was divided into two steps, first an exploratory qualitative part, second quantitative part (Fig. 1).

In the first exploratory step of research, two qualitative methods were used, namely interviews and focus groups, which are the most popular qualitative research methods for a design stage (Costa, 2003). They are appropriate tools for the definition of critical properties of a new product, which can be modified and adapted during process of development (Resurreccion, 1998). In general, the qualitative methods are ideal in the early "fuzzy-front-end" of the innovation process, where the objective is to gain a deeper understanding of user needs (manifest or latent) in order formulate a product concept (Grunert *et al.*, 2011). However, knowledge about consumers' experience, their beliefs and understanding may also be valuable in later phases of product development. The qualitative methods generate oral-descriptive, non-numerical information, and are usually carried out within small groups of people (Costell *et al.*, 2009).

Method of semi-structured interviewing was used,

where questions are predefined, but one can adapt the flow of conversation to the situation (Kleef *et al.*, 2005). Moreover, in-depth and detailed responses can provide the researcher with new insights and ideas for the new product development process. The purpose of the focus group, which is one of the most widely used qualitative methods in consumer research is to acquire fundamental opinions, to clarify potential options, to get a reaction to ideas, to recommend a course of action, to make a decision, to plan or to evaluate (Krueger and Casey, 2000). As a pre-requisite for a quantitative phase, it is helpful to know the relevant sensory characteristics the new product needs to offer to please the targeted consumers (Raz *et al.*, 2008).

The final second step of survey was aimed at product fine-tuning with the application of consumer sensory tests of two types (preference test and acceptance test). Furthermore, additional insight related to consumer behaviour, opinions and preferences was acquired with the accompanying questionnaire, which consumers completed before the tasting.

2.1 NEW FOOD PRODUCT

The paper describes a process of product prototype optimization, which was done on the case of innovative sweet topping made from Slovenian wine Teran, which is perceived as a national specialty. Highly valued and appreciated wine Teran is produced from Refošk grapes grown in the Karst district, which is denominated by traditional appellation of geographic origin (Kozjak *et al.*, 2003). The foundation for the new product concept was the excellent image and positive perception of Teran wine and assumption was, that that would be transferred to a newly developed product. The prototype of product was prepared in an experimental laboratory based on personal preferences of the research group members. Besides Teran wine, the topping contains sugar, fresh balm mint, lime juice, orange extract, cinnamon and the alcohol level to be at around 2 %. The texture was slightly less thick than standard sweet toppings on the market, whereas the
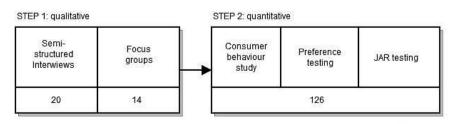
STEP 1: qualitative		STEP 2: quantitative		
Semi-structured Interwiews	Focus groups	Consumer behaviour study	Preference testing	JAR testing
20	14	126		

Figure 1: Methodology overview and number of consumers that participated
Slika 1: Pregled metodologije in število potrošnikov, ki je sodelovalo pri posameznem koraku

colour was rich ruby, which is one of the key characteristics of the Teran wine. Technology process combined different processing techniques; mixing the ingredients in precise order, not to lose the aroma from spices, cooking until the specified per-cent of alcohol, filtrating, adding the thickening agent and hot filling into bottles.

2.2 THE QUALITATIVE EXPERIMENTS

Based on a convenience sampling approach twenty respondents of both genders were interviewed on an innovation fair. The questionnaire was intended to get the first input for further research, with the main focus on the concept acceptance for the new food product. The aim is to explore and clarify key topics and issues that are important for new food concept.

The next empirical step of research was the execution of two focus groups. Within study, two sessions with total 14 consumers were carried out. The discussion was intended to get insight into the following opinions from the participants: perception of the Teran wine, buying and using behaviour for sweet toppings, attitude towards the food innovation and response towards the defined concept of the new product – the Teran topping. The sample of participants was acquired through the convenience approach and the sessions lasted about one hour each.

2.3 THE QUANTITATIVE EXPERIMENTS

The respondents consist of 126 consumers with gender and age in accordance to the quota sampling plan which corresponds to the national demographic data published by the Slovenian statistical office. Participants were ranging between 18 and 76 years, with the average age of 44.5 years and both genders were equally represented (50:50). The consumer test was conducted on three locations in Slovenia to reach people from different regions. We used a central location test approach (Resurreccion 1998) in two shopping malls, an enterprise canteen and a spa resort. In all of the premises the respondents were invited to specially arranged rooms which enabled a standardized use of the stimulus material.

Before the sensory evaluation of the products, consumers were asked to fill in the behaviour questionnaire about their eating habits. Six claims were designed aiming to identify three types of consumers, first those who have positive attitude towards traditional foods, second those consumers that have health and weight concerns and third consumers that are variety seekers. Consumers were asked to evaluate claims on 5-point Likert scale

(Table 1). Part of consumer behaviour study were also questions concerning dessert and dessert topping eating frequency, reasons not to consume dessert topping and availability of toppings on market.

A preference sensory test was conducted in which the participants were asked to evaluate the Teran topping along with four commercial toppings that are available on the market. The fundamental advantage of this method lies in the similarity to a realistic situation, which consumers are confronted with on the market (Kleef *et al.*, 2005). The toppings were served with a three digit fictitious coding and without sample information. The sequence of sample serving was randomized. The toppings were individually served on a small portion of neutral vanilla ice cream in transparent plastic cup with a spoon. Water was available for mouth rinsing. The participants had to evaluate each topping on a standard 9-point hedonic scale, which is recommended in comparable studies (Lawless *et al.*, 2010). Consumers were also asked to define the taste of each sample and to give corresponding associations.

Third phase of step two was acceptance and JAR testing. After preference testing, the Teran topping was presented again and evaluated separately on 9-point hedonic scale. Next, the acceptance sensory test applying the "just about right" (JAR) scale was performed with three sensory dimensions: sweetness, colour and thickness. The JAR scale measures the appropriateness of the level of a specific attribute, and is used to determine the optimum levels of attributes in a product (Lawless and Heymann, 1998). JAR scale gives information that can be diagnostic or explanatory if the overall product appeal is lacking and when combined with hedonic judgments, the potential impact of being off from the just right point can be estimated using penalty analysis (Lawless and Haymann, 2010). A seven point JAR scale was used, where one end point was labelled as "far too little", the other end point as "far too much" and the middle point as "just about right.

2.4 STATISTICAL ANALYSIS

Results from the hedonic preference sensory test were analysed using arithmetic means and standard deviation and applying parametric test for k-sample comparison of variance to determine if the difference in mean score of likeness between the dessert toppings is significant or not. Responses to the open ended questions, answered after the tasting of each topping, were qualitatively analysed using the Flash profile method (FPM) and the correspondence analysis. The FPM is a sensory descriptive method where each subject chooses and uses

his/her own words to evaluate the whole product set comparatively and then in the next step score each of description (Dairou and Sieffermann, 2002). For purpose of our study, we did the first step of FPM and we did not score stated associations separately. Next, we conducted a correspondence analysis to visualize the relationship between samples and descriptions acquired within FPM experiment. This method has the advantage that the liking scores as well as the motives for these scores are given by the same people and, more importantly, are stated in consumer language (ten Kleij and Musters, 2003). The approach gives comparable results as conventional profiling (Delarue and Sieffermann, 2004). Chi-square statistic was calculated for evaluating differences between consumer preferences. This technique enables identification of liked and disliked samples, as well as the attributes that drive their likeness (Ares *et al.*, 2010b).

Finally, the scores of the overall acceptance in hedonic test were compared with scores from JAR scales to evaluate the effect of sugar, colour and thickness on the consumers' overall liking of the product. Likeness was evaluated on 9-point hedonic scale and was compared to JAR seven point scale scores, using the penalty analysis. Statistical method applied is traditional penalty analysis (TPA) or also called mean-drop analysis (Plaehn, 2012). Penalty analysis is a tool used by market researchers and product developers to gain an understanding of the

product attributes that most affect liking, purchase interest or any other product-related measure (Plaehn, 2008) and to identify potential directions for the improvement of products.

Statistical analysis was made with software package SPSS 21 and Microsoft Excel 2010 with XLSTAT add-in.

3   RESULTS

3.1   RESULTS OF INTERVIEWS AND FOCUS GROUPS

Interviews gave us first input on the new research area. Discussions were short and spontaneous and were focused towards new food concept. The main goal was to clarify the key research topics that needed to be additionally explored. Based on the interview results we formed four specific topics that needed to be further analysed; opinions about desserts, dessert toppings, wine Teran and new food product Teran topping. These topics were forming key focus issues in the focus group discussion. We grouped answers according to dimensions that represent essential factors influencing food choices: intrinsic and extrinsic product characteristics, biological-physiological, psychological, situational and socio-cultural factors (Köster, 2009). For this research case, the biologi-

Table 1: *Results of qualitative research methods, semi-structured interviews and focus groups, formed into five dimension of food choice*
Preglednica 1: *Rezultati kvalitativne analize (delno strukturiranih intervjujev in fokusnih skupin), razporejeni v pet dimenzij, ki definirajo potrošnikovo izbiro živila*

Key topics / dimension	Desserts	Dessert toppings	Wine Tran	Terantopping
Intrinsic product characteristics	Not too sweet, fresh, natural.	Associating with artificial taste descriptions.	Good, red wine, rich flavour, intense, not sweet.	Intense colour, alcohol is not distracting.
Psychological factors	Different motives: happiness, award, sadness.	Curious to try new topping flavours – expressed neophilic behaviour.		Concept evokes pleasant, exciting feeling.
Situational factors	Different occasions: after lunch, celebration, snack in front of a TV. Lack of time: ready to eat desserts.	Used very rarely, few times per year. Request for topping when in confectionary.	Associating with seaside, vacations.	Lot of ideas for combining new topping with different dishes.
Socio-cultural factors	Desserts prepared home differ on season and region. Females like to prepare it.		Slovenian, traditional, regional.	Slovenian, traditional.
Extrinsic product characteristics	Packaging information: low calories, without additives, natural.	Not familiar with the offer on the market. Mainly recognize only one brand.	Highly valued brand.	Unknown brand. Suggesting glass packaging. Innovative.

cal dimension was not considered when designing main results (Table 2) because conversations in the interviews and focus groups were not focusing to this specific question. Consumers expressed a wish for fresh and natural desserts with low sweetness. Desserts are associated with happiness, consumers like to eat them when they feel down to improve their mood and frequently they use desserts as an award. Complexity of desserts differs on specific occasions, from ready to eat desserts as a snack in front of TV, to homemade dessert for celebrations and special events. Consumers are aware of extrinsic dessert characteristic, since they observe the calorie values, additives and descriptions claiming "natural" on the packaging. Dessert toppings are used very rarely, usually because they are associated with artificial taste descriptions. Consumers expressed neophilic (affinity for novelty) behaviour towards dessert toppings and a curiosity towards new topping flavours. Wine Teran is well known, perceived as Slovenian, traditional and highly valued brand.

Conclusions from the first two stages give qualitative data, which are highly encouraging, since the response of the consumers is supportive for the product concept and the expected market potentials are substantial. Consumers participating in interviews and focus groups are very enthusiastic about the new product. They consider the new topping being innovative and it is a great alternative for their dessert routine. The conclusion in this stage of research is that consumers are variety seekers on the field of dessert toppings and that there are opportunities for new products to enter the market.

3.2 RESULTS OF CONSUMER BEHAVIOUR STUDY

The descriptive statistical analysis of the questionnaire was used to determine consumer habits regarding food, desserts and dessert toppings. Almost three-quarters of respondents want to test new foods that they do not know. Another important factor when choosing a food product is the Slovenian origin, since two thirds of the respondents would choose food from Slovenian companies, if available. Concern for the body weight is not the most important factor when choosing food. Only 30 % of the respondents fully or partially pay attention to their weight. More than half of respondents have no bad conscience after eating a dessert.

Consumers eat dessert toppings very rarely; half of them only few times per year, one fourth of respondents are regular users, which consume dessert toppings several times a month and the other quarter almost never eat dessert toppings (less than once a year). The most common reasons not to consume dessert toppings are

that they forget to buy it, high additive content and high caloric value. Finally, consumers think that there are not enough offers in the market.

3.3 RESULTS OF PREFERENCE TEST

Results of preference test are shown in Table 2. The data corresponds to a sensory analysis where consumers have been asked to rate during the blind sessions the likeness of five different dessert toppings, on a 9-point hedonic scale. Chocolate dessert topping result provided the highest average score (6.86) and the new Teran topping result fourth, with a mean score of 5.28. All results have a high standard deviation, especially Teran topping, which shows the dispersion of ratings on a large scale around the arithmetic mean. Observed sample results are showing normal distribution and applied Levene's test for variance comparison of all five samples is showing that there is a statistical significant difference between the sample variances.

After tasting each topping, consumers had to describe the taste with their own language and give the taste descriptions. Those open end answers were then formed into 12 different categories shown in Table 3. The classification is performed manually considering word synonyms. Most of the descriptions are very simple and represent consumers' first impression after tasting the topping sample. Some of them are characterized as negative (not good, not intense, too sweet and too thick), some are characterized as positive (delicious, good, sweet) and the rest of them describe the basic taste component that was recognized (bitter, chocolaty, caramel, fruit, vanilla). With those descriptions, further understanding of preference is gained.

On the basis of open end questions data correspondence analysis was performed, which represents the

Table 2: Mean scores, standard errors of mean, standard deviations, Levene's test results and statistical significance of toppings from preference testing
Preglednica 2: Povprečje ocen, standardni odklon povprečja, standardni odklon, rezultati testa Levene in statistična značilnost testa preferenc

Variable	Mean	Std. error of mean	Std. deviation
Chocolate	6.857	0.191	2.149
Caramel	5.810	0.225	2.529
Cherry	6.817	0.190	2.137
Teran	5.278	0.236	2.652
Strawberry	5.230	0.209	2.347

F = 4.559 ; P = 0.001

Table 3: Results of the open-ended question after tasting each topping, with consumers own individual terms
Preglednica 3: Rezultati odprtega tipa vprašanj, po hedonskem senzoričnem testiranju

Category	Consumer descriptions	Topping					Sum	
		1	2	3	4	5		
		Chocolate	Cherry	Caramel	Teran	Strawb.		
Bitter	Bitter, coffee taste	3	1	5	1	0	10	3 %
Chocolaty	Like chocolate, cocoa	40	0	1	0	0	41	13 %
Caramel	Toffee	2	0	37	0	0	39	12 %
Delicious	Very good, Very nice, very tasty	6	1	3	1	1	12	4 %
Fruity	Raspberry, blubbery	1	46	1	29	17	94	29 %
Good	Good, tasty, nice	7	6	3	7	0	23	7 %
Not good	Not tasty, disgusting, spoilt, fatty	2	3	7	15	7	34	10 %
Not intense	Not enough flavour	1	0	0	6	3	10	3 %
Sweet	Pleasantly sweet	5	5	5	0	2	17	5 %
Too sweet	Sugary, too much sugar	1	2	2	0	5	10	3 %
Too thick	Like marmalade	0	1	1	0	27	29	9 %
Vanilla	Milky vanilla	4	0	3	1	1	9	3 %
	Sum	72	65	67	60	63	327	

descriptions that fit best to particular topping. The result of correspondence analysis is the perceptual map shown in Figure 2. The first two dimensions of the correspondence analysis explained 72.7 % of the variability of the experimental data. Using this technique row and column variables were spatially represented, which allow a visual representation of the data (ten Kleij, 2003). Calculated
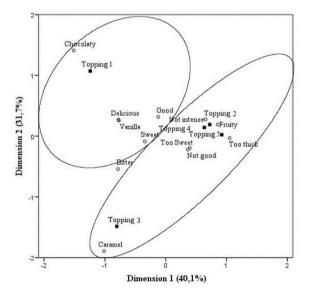

Figure 2: Graphical representations of correspondence analysis showing drivers of liking in different toppings
Slika 2: Predstavitev rezultatov korespondenčne analize, ki prikazuje elemente všečnosti posameznega desertnega preliva

chi-square value is high ($\chi^2 = 527.9$), which shows that there are statistical significant differences between the descriptions of topping samples (P < 0.000). Two groups were formed regarding the descriptions. The first group includes topping 1, which is associated with all positive descriptions delicious, good, sweet and two taste component descriptions, namely vanilla and chocolaty. The other group consists of the other four toppings and is described with all negative adjectives, not good, not intense, too sweet, too thick and with taste components fruity and caramel. These results are suggesting that chocolate and vanilla flavours are drivers for liking the toppings. Drivers of disliking the toppings could be lack of thickness, excess of sugar and not enough intense flavour. An explanation for least likable strawberry topping could be that it was too thick. New dessert Teran topping is commonly described as fruity, not intense and not good. In this stage, it can be concluded that even though consumers seek for variety in desserts topping they prefer the standard chocolate taste.

3.4 RESULTS OF JAR TEST

Comparison was made between 7-point JAR scale for measuring three sensory characteristics and 9-point hedonic scale measuring likeness. For each of three JAR scales shown in Table 4, consumers categorized as rating each scale above, below or in the just-about-right category. The mean hedonic score (9-point scale value) is then

Table 4: Penalty analysis and mean drops for Teran dessert topping
Preglednica 4: Rezultati "ravno prav" senzorične analize za teranov desertni preliv

Variable	Level	%	Mean of liking score	Mean drops	P-value
Sweetness	JAR	53.17	6.925		
	Too little	21.43	4.148	2.777	< 0.0001
	Too much	25.40	5.438	1.488	0.005
Thickness	JAR	65.87	6.277		
	Too little	25.40	4.969	1.308	0.019
	Too much	8.73	6.364	−0.087	
Colour	JAR	72.22	6.198		
	Too little	12.70	5.063	1.135	
	Too much	15.08	5.526	0.671	

calculated for each group. For groups above or below the JAR group, the scores are subtracted from the mean of the JAR group. This produces a "mean drop" score for each group. The percent of the consumer panel that fell into each category are plotted against their mean drops. Large mean drop and large percentage of consumers is a cause for concern and suggests the products modification in the appropriate direction (Lawless, Heymann, 2010).

There are statistical significant influences between likeness score and perception of too low sweetness, too high sweetness and too low thickness. For the colour, the mean drops test could not be computed for the both "too much" levels because the percentage of cases in this level is lower than the 20 % threshold set earlier. Category "not sweet enough" has both a high percentage of consumers and high mean drop, 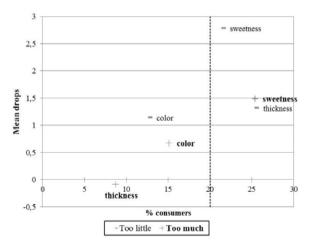suggesting a potential improvement with increased sweetness. The product development team might want to increase the sweetness and thickness level in a new concept of Teran topping. Colour perception of the new dessert topping is considered "just about right" for 72.2 % of consumers. Even though consumers indicated wish for "not too sweet" dessert toppings in the first qualitative stage of experiment, they still prefer slightly sweeter toppings.

Visualization of JAR scale results compared to likeness scale scores is shown in scatter plot of mean drops versus the percentage of total consumer panel in each of categories, sweetness, thickness and colour of new Teran dessert topping (Fig. 3).

Pearson correlation values from comparing hedonic scores with results of statements that were evaluated in consumer behaviour study before tasting the samples. There is a statistical significant relation between degree of liking of new dessert topping and degree of agreement with a statement, which indicates neophilia (affinity for novelty). There are significant results when comparing hedonic scores to degree of loyalty to Slovenian food industry as well as between statements describing personal characteristics; liking unusual foods and enjoyment for cooking. Statements from the questionnaire describing weight concerns did not show statistical significance.

Teran topping is based on traditional Slovenian wine Teran, which is highly valued among consumers and perceived as a national specialty. It is assumed that these positive elements of consumers' perception about wine Teran will be transferred to new developed product and will form central marketing elements. Results showed that new topping is not suitable for average population, which was initially set as the target population and it has to be lifted to a higher level to adapt to specific audience.

Figure 3: Relationship between mean acceptance score and perception of sweetness, thickness and colour for Teran topping
Slika 3: Prikaz odvisnosti povprečne hedonske ocene desertnega preliva s hedonsko oceno sladkosti, gostote in barve teranovega preliva

4 DISCUSSION

Especially during the last years, the Slovenian food industry, one of the main sectors in Slovenia, did not show significant progress, which could have effect on the whole Slovenian economy. The precise and knowledge-driven innovation with profound understanding of the market and consumer is a vital condition for business success in highly competitive and saturated food markets. When designing new food product all consumer preferences and wishes should be considered. Case study conducted in two research stages was made with newly developed Teran dessert topping. Results from the first part of the survey were very positive and enthusiastic, that is why it was decided to conduct the next step, consumer sensory techniques, to gain deeper understanding of motives that attract the consumers. It was found out that findings form a preliminary qualitative research can be used for development guidance and tool to set good questionnaire for quantitative research. A shortcoming of in-depth and detailed responses research is that the in-depth and idiosyncratic information obtained does not lend itself for direct use in subsequent analysis that is why categorization and quantification step is required on the basis of subjective interpretation on the part of the researcher (Kleef, 2006). Thus, consumers showed willingness to try new food and seek variety in sweet toppings; they still prefer standard tastes of toppings. Application of the consumer sensory test disconfirmed high expectations from the exploratory phase, since the average score in the preference testing was in lower end for the newly developed Teran topping, being surpassed by the standard topping tastes. The new product was likeable but not as much as chocolate flavour, which is the main driver of liking the topping. On the basis of previous qualitative phase research results, we assumed that Teran topping would score much higher. The final results indicate that the market acceptance of the new product is below the threshold to continue the outlined product development strategy without risking business failure. Therefore, the process of the product concept redefinition should be initiated in order to better respond to the specific consumer segment or marketing channel. Conclusion on basis of JAR test results is that the new redefined topping with slightly higher sweetness and thickness could have higher likeness score and higher acceptance on the market. Even though consumers expressed the wish for "not too sweet" desserts, they still prefer higher sweetness when it comes to dessert topping. Market is in rather highly mature phase with consumers behaving primarily habitually with low involvement in purchasing decision process. Market acceptance of the new product was therefore found to be below the threshold to continue the outlined product development and launching strategy without risking business failure. That is why the product concept redefinition is recommended. Further research can be made comparing consumer liking data with data obtained from trained sensory panel. Consumer liking data can be analysed without taking other data sets into account, but interest usually lies in understanding their relation to sensory attributes or other properties of product (Næs et al., 2011). Shortcoming of the research could be that there was a rather small consumer panel. Next marketing strategy would be evaluating a different distribution channel, like gastronomy and hotel business, catering companies, restaurants and confectioneries.

5 REFERENCES

Albert A., Varela P., Salvador A., Hough G., Fiszman S. 2011. Overcoming the issues in the sensory description of hot served food with a complex texture. Application of QDA®, flash profiling and projective mapping using panels with different degrees of training. Food Quality and Preference, 22, 5: 463–473, doi:10.1016/j.foodqual.2011.02.010

Ares G., Deliza R., Barreiro C., Giménez A., Gámbaro A. 2010a. Comparison of two sensory profiling techniques based on consumer perception. Food Quality and Preference, 21, 4: 417–426, doi:10.1016/j.foodqual.2009.10.006

Ares G., Giménez A., Barreiro C., Gámbaro A. 2010b. Use of an open-ended question to identify drivers of liking of milk desserts. Comparison with preference mapping techniques. Food Quality and Preference, 21, 3: 286–294, doi:10.1016/j.foodqual.2009.05.006

Combris P., Bazoche P., Giraud-Héraud E., Issanchou S. 2009. Food choices: What do we learn from combining sensory and economic experiments? Food Quality and Preference, 20: 550–557, doi:10.1016/j.foodqual.2009.05.003

Costa Almeida A.I. 2003. New insights into consumer-oriented food product design. PhD thesis, Wageningen University: 254 p.

Costa Almeida A.I., Jongen W.M. 2006. New insights into consumer-led foo product development. Trends in Food Sciece and Technology, 17: 457–465, doi:10.1016/j.tifs.2006.02.003

Costell E., Tárrega A., Bayarri S. 2009. Food Acceptance: The Role of Consumer Perception and Attitudes. Chemosensory Perception, 3: 42–50, doi:10.1007/s12078-009-9057-1

Dairou V., Sieffermann J.M. 2002. A Comparison of 14 Jams Characterized by Conventional Profile and a Quick Original Method, the Flash Profile. Journal of Food Science, 67, 2: 826–834, doi:10.1111/j.1365-2621.2002.tb10685.x

Delarue J., Sieffermann J.M. 2004. Sensory mapping using Flash profile. Comparison with a conventional descriptive method for the evaluation of the flavour of fruit dairy products. Food Quality and Preference, 15, 4: 383–392, doi:10.1016/S0950-3293(03)00085-5

Grunert K.G., Boutrup Jensen B., Sonne A.M., Brunsø K., Byrne D.V., Clausen C., Friis A., Holm L., Hyldig G., Kristensen Niels H., Lettl C., Scholderer J. 2008. User-oriented

innovation in the food sector: relevant streams of research and an agenda for future work. Trends in Food Science and Technology, 19: 590–602, doi:10.1016/j.tifs.2008.03.008

Grunert K. G., Verbeke W., Kügler J. O., Saeed F., Scholderer J. 2011. Use of consumer insight in the new product development process in the meat sector. Meat Science, 89: 251–258, doi:10.1016/j.meatsci.2011.04.024

Kleef Van E. 2006. Consumer research in the early stages of new product development. PhD thesis, Wageningen University

Kleef Van E., Trijp Van H.C., Luning P. 2005. Consumer research in the early stages of new food development: a critical review of methods and techniques. Food Quality and Preference, 16: 181–201, doi:10.1016/j.foodqual.2004.05.012

Kozjak P., Korosec-Koruza Z., Javornik B. 2003. Characterisation of cv. Refošk (*Vitis vinifera* L.) by SSR markers. Vitis, 42, 2: 83–86

Köster E. P. 2009. Diversity in the determinants of food choice: A psychological perspective. Food Quality and Preference, 20: 70–82, doi:10.1016/j.foodqual.2007.11.002

Krueger R.A., Casey M.A. 2000. Focus groups – A practical guide for applied research. 3rd edition. Thousand Oaks, SAGE: 213

Kuhar A. 2009. Pre and post- EU accession restructuring of the Slovenian food industry. Workshop proceedings of Agribusiness and agro-industries development in Central and Eastern Europe: 33–53

Lawless H.T., Heymann H. 1998. Sensory Evaluation of Food. International Thomson publishing

Lawless H.T., Heymann H. 2010. Sensory Evaluation of Food Principles and Practices. 2nd ed. Springer Science & Business Media: 596 p., doi:10.1007/978-1-4419-6488-5

Lawless H.T., Popper R., Kroll B.J. 2010. A comparison of the labeled magnitude (LAM) scale, an 11-point category scale and the traditional 9-point hedonic scale. Food Quality and Preference, 21: 4–12, doi:10.1016/j.foodqual.2009.06.009

Linnemann A.R., Benner M., Verkerk R., Van Boekel A.A. 2006. Consumer-driven food product development. Trends in food science and technology, 17: 184–190, doi:10.1016/j.tifs.2005.11.015

Lord B.J. 2000. New product failure and success. In: Developing new food products for a changing marketplace. A. Brody, B. J. Lord (eds.). Lancaster: Technomic Publishing: 55–86

Moskowitz H.R., Beckley J.H., Resurreccion A.V. 2006. Sensory and consumer research in food product design and development. ZDA: Blackwell publishing: 368 p., doi:10.1002/9780470277706

Moskowitz H.R., Hartmann J. 2008. Consumer research: creating a solid base for innovative strategies. Trends in

Food Science and Technology, 19: 581–589, doi:10.1016/j.tifs.2008.01.016

Næs T., Brockhoff P.B., Tomic O. 2010. Statistics for sensory and consumer science. Wiley: 300 p., doi:10.1002/9780470669181

Perry C., Cochet M. 2009. Consumer packaged goods product development processes in the 21st century: Product lifecycle management emerges as a key innovation driver. In: An integrated approach to new food product development. Moskowitz H.R., Saguy S.I., Straus T. (eds.). Boca Raton: CRS press, Taylor and Francis group: 113–131, doi:10.1201/9781420065558-c8

Plaehn D. 2012. CATA penalty/reward. Food Quality and Preference. 24, 1: 141–152, doi:10.1016/j.foodqual.2011.10.008

Plaehn D., Horne J. 2008. A regression-based approach for testing significance of "just-about-right" variable penalties. Food Quality and Preference, 19, 1: 21–32, doi:10.1016/j.foodqual.2007.06.003

Raz C., Piper D., Haller R., Nicod H., Dusart N., Giboreau A. 2008. From sensory marketing to sensory design: How to drive formulation using consumers' input? Food Quality and Preference, 19, 8: 719–726, doi:10.1016/j.foodqual.2008.04.003

Resurreccion A.V. 1998. Consumer sensory testing for product development. Gaithersburg, ZDA, Aspen publisher inc

Rodriguez Cano C., Carrillat F.A., Jaramillo F. 2004. A metaanalysis of the relationship between market orientation and business performance: evidence from five continents. International Journal of Research in Marketing, 21, 2: 179–200, doi:10.1016/j.ijresmar.2003.07.001

Solomon M.R., Barmossy G., Askegaard S., Hogg M.K. 2006. Consumer behaviour: a European perspective. Harlow (England) [etc.]: Financial Times/Prentice-Hall

Side C. 2002. Food product development based on experience. Iowa, Blackwell publishing company: 199 p.

Stewart-Knox B., Mitchell P. 2003. What separates the winners from the losers in new food product development?. Trends in Food Science and Technology, 14, 1–2: 58–64

Stone H., Sidel J.L. 1993. Sensory evaluation practices. Orlando, Academic Press: 311

Ten Kleij F., Musters, P.A.D. 2003. Text analysis of open-ended survey responses: a complementary method to preference mapping. Food Quality and Preference, 14, 1: 43–52, doi:10.1016/S0950-3293(02)00011-3