INTERPRETING SENSORY DATA OF CHEESE "KREMA" BY PRINCIPAL COMPONENT ANALYSIS

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Abstract: The report presents results of an analysis of data from an organoleptic evaluation of cheese "Krema". For the processing of the results is used "Principal component analysis". The organoleptic data are analyzed for 1st 15th and the 30th day of storage. For quality evaluation of cheese "Krema" are used the methods of sensory analysis and physico-chemical methods. The sensor analysis is applied in order to measure, analyze and interpret the specific characteristics of the cheese "Krema" that are perceived by the senses, vision, taste and smell. The influence is studied of the storage period on the organoleptic characteristics of the dairy product.

Keywords: Cheese "Krema", Organoleptic evaluation, Principal component analysis.

1. INTRODUCTION

Cheese "Krema" is produced from whole or skimmed cow's milk and cream with fat content of 25-30%. The original mixture has a fat content of 12 to 12,5%. The cheese is produced on the basis of acid-thermal coagulation. Under the action of the milk fat, which is formed during the fermentation of the milk sugar of lactic acid and aroma forming bacteria overcomes the capacity of the buffer action of the proteins, the active acidity is lowered near the isoelectric point of the coagulation of casein. As a result, at 21-22°C occurs coagulation. The oil part remains on the structure of coagulum [2, 5].

The cheese "Krema" is often spread on bread, bagels, crackers, etc., and used as a dip for potato chips and similar snack items, and in salads. It can be mixed with other ingredients to make spreads, such as yogurt-cream spread (five parts cream cheese, four part yogurt, whipped). Cheese "Krema" can be used for many purposes in sweet and savoury cookery, and is in the same family of ingredients as other milk products, such as cream, milk, butter, and yogurt. It can be used in cooking to make cheesecake and to thicken sauces and make them creamy. Cheese "Krema" is sometimes used in place of or with butter (typically two parts cream cheese to one part butter) when making cakes or cookies, and cream cheese frosting. It is the main ingredient in the filling of crab rangoon, an appetizer commonly served at U.S. Chinese restaurants. It can also be used instead of butter or olive oil in mashed potatoes and in some western-style sushi rolls [1, 10, 11].

For quality evaluation of cheese "Krema" are used the methods of sensory analysis and physico-chemical methods. The sensor analysis is applied in order to measure, analyze and interpret the specific characteristics of the cheese "Krema" that are perceived by the senses, vision, taste and smell. As a result of organoleptic analysis gives a quantitative assessment of user quality of cheese "Krema." Organoleptic assessments used in sensory analysis are the averages of the data in the sensor panel [1, 3, 8, 9, 12].

The sensor analysis differs significantly from physico-chemical methods in its fast, accurate, but subjective nature. By means physico-chemical methods identify indicators such as moisture content, pH, fat content, acidity and proteins that give us information on the quality of cheese "Krema". The results of the physical and chemical research is a valuable addition to sensory evaluation. The suitability of the instrumental methods should be evaluated on the basis of the results of sensory evaluations obtained by a commission consisting of tasters.

The purpose of this study is to perform principal component analysis of sensory data of cheese "Krema".

2. MATERIAL AND METHODS

To conduct the study were purchased commercially, seven cheeses "Krema" from different manufacturers. Samples were stored for 30 days under refrigeration conditions at 0-5°C [1, 4]. For the studied cheeses are identified: Moisture content,% - BNS 1109-89; Active acidity – Used potentiometric pH meter (Model MS 2011, Microsyst, Plovdiv, Bulgaria), equipped with an electrode (pH electrode Sensorex, Garden Grove, CA, USA); Fat content,% - by Gerber in accordance with ISO 2446 (ISO2446, 2008); Titratable acidity – BNS 1111-80; Proteins – by Kjeldahl, % (BNS EN ISO 5983-1: 2005); Organoleptic analysis – performed by five-point scale, rated are: Butter flavor, Graininess, Sour taste, Fatty after taste, Compactness. In the organoleptic analysis participate sensor panel of nine panelists who are not separated by gender and age. The results of organoleptic analysis are treated with Matlab software and method "Principal component analysis (PCA)" [5, 6, 7, 8, 12].

3. RESULTS AND DISCUSSION

Table 1 shows the mean values of some physico-chemical parameters defined in 1, 15 and 30 days in researched storage period. From the data it is seen that by increasing the duration of storage of samples of cheese "Krema", the moisture content is reduced and the amount of protein in them, while the acidity was increased insignificantly. The changes in the physico-chemical indicators define and the organoleptic evaluations of the analyzed samples of cheese "Krema."

Table 1. Physico-chemical parameters of cheese "Krema"

Parameter Day/ Sample		Water content, %	pH	Fat content, %	Acidity, %	Protein, %
day 1	S1	56,50	5,00	12,00	1,46	7,12
	S2	57,50	5,00	11,68	1,45	7,12
	S3	57,10	5,00	11,56	1,43	7,30
	S4	57,20	5,00	11,55	1,42	7,50
	S5	57,30	5,00	11,35	1,51	7,60
	S6	56,60	5,00	11,28	1,49	7,15
	S7	57,80	5,00	11,25	1,48	7,65
day 15	S1	55,10	5,00	12,10	1,61	6,85
	S2	56,15	5,00	11,69	1,61	6,81
	S3	56,12	4,00	11,60	1,65	6,98
	S4	56,10	4,00	11,62	1,63	6,92
	S5	55,15	5,00	11,52	1,68	6,95
	S6	55,10	4,00	11,38	1,58	7,05
	S7	55,65	5,00	11,35	1,63	6,98
day 30	S1	51,85	4,00	12,20	1,70	5,01
	S2	53,40	4,00	11,85	1,69	5,02
	S3	52,90	4,00	11,84	1,68	5,08
	S4	52,89	4,00	11,82	1,71	5,07
	S5	52,78	4,00	11,85	1,69	5,05
	S6	51,80	4,00	11,90	1,65	5,01
	S7	52,60	5,00	11,50	1,69	5,02

In Table 2 are shown the mean values of the assessments of organoleptic evaluation of the studied cheese "Krema". It is seen that with increasing duration of storage for samples 1, 2, 3, 4 and 6 increases organoleptic evaluation of butter flavor, consistency, sour taste and graininess. For samples 5 and 7 for the same period of storage are observed decreased the organoleptic assessments in these indicators.

Table 2. Mean values of organoleptic indicators of cheese "Crema"

Parameter Day/ Sample		Butter flavor	Graininess	Sour taste	Fatty after taste	Compactness
day 1	s1	1,90	2,80	2,90	3,20	0,95
	s2	2,90	3,90	2,80	4,55	1,90
	s3	3,10	3,70	3,90	4,10	1,90
	s4	1,90	4,00	4,00	3,30	1,80
	s5	3,90	1,90	3,90	3,30	2,90
	s6	4,00	1,80	3,90	3,80	3,80
	s7	2,60	2,70	2,80	4,30	3,20
day 15	s1	2,80	3,45	3,40	3,10	1,95
	s2	3,20	4,50	3,20	4,30	2,20
	s3	3,50	4,80	4,20	4,30	2,70
	s4	2,50	4,70	4,60	4,70	2,40
	s5	4,90	2,95	4,80	4,90	3,30
	s6	4,90	3,20	4,50	4,20	4,30
	s7	4,30	3,90	4,80	4,20	3,70
day 30	s1	3,15	4,20	3,85	3,15	2,80
	s2	3,60	4,90	3,50	4,80	2,50
	s3	3,90	4,80	4,70	4,90	3,30
	s4	2,70	4,90	4,70	4,90	2,60
	s5	4,90	3,70	4,90	3,30	3,70
	s6	4,90	3,30	4,90	4,50	4,60
	s7	3,70	4,70	4,10	4,70	3,70

Figure 1. Results for day 1

Figure 1 presents the results of analysis of samples of organoleptic evaluation on the first day of storage. The data shows that sample 2 has the best indicators fatty aftertaste and samples 5 and 6 are far from the indicators. The remaining samples 3, 4 and 7, have good Butter flavor, Graininess, Fatty after taste, Sample 1, according to data analysis is with degraded organoleptic indicators.

Figure 2. Results for day 15

Figure 2 presents the results of analysis of samples of organoleptic evaluation in the fifteenth day of storage. According to the analysis of samples 6 and 7 have the best indicators of graininess and butter flavor. The remaining samples are with deteriorated organoleptic indicators.

Figure 3. Results for day 30

In analyzing the samples in the thirtieth day of their storage at all there is a minor change in the organoleptic indicators. There is a slight increase in sour taste in the samples the most significant it was observed in first sample. The data of the results are presented in Figure 3. The sour taste is slightly increased for the samples 1, 3, 6 and 7.

The data shows that in the first day of storage of samples, all have high values of indicator fatty aftertaste. With increasing the storage time in the fifteenth and thirtieth day of storage, there is increasing performance butter flavor, compactness and graininess of the samples.

4. CONCLUSION

The analysis of the results of the study can be concluded as follows:

- ✓ It has been used method "Principal component analysis" for evaluation of sensory characteristics of cheese "Krema".
- ✓ The influence is evaluated of the storage period on the organoleptic characteristics of the dairy product and the results show that with increasing the storage time in the fifteenth and thirtieth day of storage, there is increasing performance butter flavor, compactness and graininess of the samples.
- ✓ In subsequent studies can be made analyzes based on the data referred to by the tasters and implement other methods of analysis as "Correspondence analysis", "Analysis of variance", "Multi-factor analysis".

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