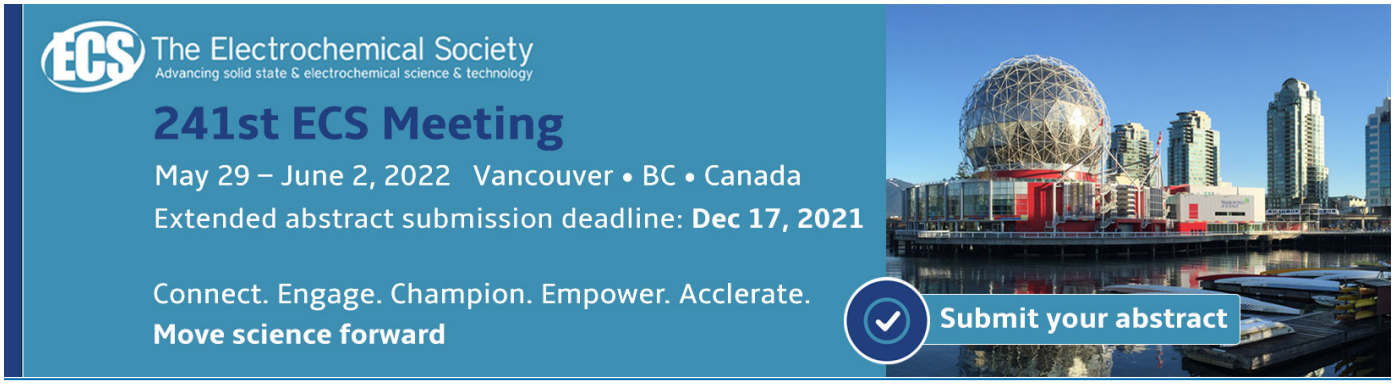
The influence of savory on colour, odour and taste of frankfurters



The influence of savory on colour, odour and taste of frankfurters

D Karan[1], M Lukic[1], V Djordjevic[1], N Parunovic[1], J Babic Milijasevic[1], J Jovanovic[1] and A Nikolic[1]

[1] Institute of Meat Hygiene and Technology, Kacanskog 13, Belgrade, Republic of Serbia

E-mail: dragica.karan@inmes.rs

Abstract. The aim of this paper was to assess the influence of savory on colour, odour and taste of vacuum-packed frankfurters during 28 days of storage. Powdered, dried savory (0.1%, 0.3% and 0.5%) was added to frankfurters, while control frankfurters were produced without herbs or spices. Assessment of colour, odour and taste acceptability of the frankfurters was performed by a panel of five assessors using a quantitative descriptive test, and the results of the ranking test were analysed statistically. When used at the levels of 0.1% and 0.3% in the sausages, savory did not have a negative influence on frankfurter colour, while quantities of 0.5% adversely affected frankfurter colour. Savory in the smaller amounts of 0.1% and 0.3% stimulated development of a pleasant odour and taste in the frankfurters, while 0.5% savory had an undesirable effect on these sensory attributes.

1. Introduction

Savory (*Satureja hortensis L.*) is a herb and belongs to the family Lamiaceae. Savory has a pleasant, aromatic odour. The taste is aromatic, warm. The smell and taste are similar to pepper and it is used as a substitute [1]. *Satureja hortensis L.* contains from 0.3% to 1.9% essential oil, of which the main ingredients are carvacrol, α- and β-pinen, camfen, γ-terpinen, etc. Savory is also known for its medicinal properties (stomachic, astringent, antiseptic) [2]. According to the literature data and our knowledge of current industry practice, savory is very little used in the Serbian meat industry, especially in pasteurised sausages. One of the reasons this herb is uncommon as seasoning in meat products is its content of the plant pigment chlorophyll, which can have undesirable influences on colour, odour and taste of the meat products [3,4].

The aim of this study was to assess the influence of savory on colour, odour and taste of vacuum-packed frankfurters during 28 days of storage.

2. Materials and methods

2.1. Raw material composition

Frankfurters were produced from beef meat (50%), pork fat (25%) and ice (25%). To 1 kg of stuffing, 18 g of nitrite salts and 3 g of polyphosphate were added. Powdered, dried savory was added to the

experimental frankfurters (0.1%, 0.3% and 0.5%), while the control frankfurters were produced without any herbs or spices. The frankfurter stuffing was filled in artificial cellulose casings. Frankfurters were thermally processed (72ºC in the centre of the product) and then cooled. After cooling, frankfurters were vacuum packed. All packages of frankfurters were stored in the same conditions at 4 ºC and on days 1, 7, 14, 21 and 28 of storage, sensory testing was performed.

2.2. Chemical analysis

The content of essential oils in the dried herb was analysed according to [5].

2.3. Sensory analysis

Sensory evaluations were performed by five trained panellists. Frankfurter colour was analysed using a quantitative descriptive test [6], with grading scale from one to five (1 – unacceptable colour; 2 – very low level of acceptability of colour; 3 – acceptable colour; 4 – good colour; 5 – exceptionally good colour).

Using a quantitative descriptive test [6], with grading scale from one to seven, the frankfurters' sensory properties of odour and taste were analysed (1 – extremely unpleasant odour and taste; 2 – very unpleasant odour and taste; 3 – unpleasant odour and taste; 4 – neutral odour and taste; 5 – pleasant odour and taste; 6 – very pleasant odour and taste; 7 – exceptionally pleasant odour and taste).

2.4. Statistical analysis

Results of the sensory evaluation ranking tests [7] were analysed statistically [8].

3. Results and discussion

The dried savory used in the frankfurters contained 1.6ml/100g essential oil. The minimum quantity of ethereal oils for savory is not prescribed under Serbian regulations [9].

Table 1. Sensory evaluation of the colour of vacuum-packed frankfurters during storage

Day	Percentage of savory in frankfurter	Sum of ranks	Differences in frankfurter colour according to percentage of savory		
			0	**0.1**	**0.3**
1	0	6.5			
	0.1	14.5	8		
	0.3	17.5	11	3	
	0.5	23.5	17**	9	6
7	0	9			
	0.1	10	1		
	0.3	17.5	8.5	7.5	
	0.5	23.5	14.5**	13.5*	6
14	0	6.5			
	0.1	12	5.5		
	0.3	17.5	11	4.5	
	0.5	24	17.5**	12*	6.5
21	0	6.5			
	0.1	14	7.5		
	0.3	16.5	10	2.5	
	0.5	23	16.5**	9	6.5
28	0	7.5			
	0.1	18	10.5		
	0.3	11	3.5	7	
	0.5	23.5	16**	5.5	12.5*

* $p \leq 0.05$ – statistically significant difference; **$p \leq 0.01$) – highly statistically significant difference

During storage, highly statistically significant differences ($p < 0.01$) were observed between the colour of control frankfurters and frankfurters with 0.5% savory.

There was a statistically significant difference ($p < 0.05$) between the colour of frankfurters with 0.1% savory and frankfurters with 0.5% savory on days 7 and 14 of storage. There was a statistically significant difference ($p < 0.05$) between the colour of frankfurters with 0.3% savory and frankfurters with 0.5% savory on day 28 of storage.

No statistically significant differences were detected between the other frankfurters studied.

Table 2. Sensory evaluation of the odour and taste of vacuum-packed frankfurters during storage

Day	Percentage of savory in frankfurters	Sum of ranks	Differences in frankfurter odour and taste according to percentage of savory		
			0	**0.1**	**0.3**
1	0	9			
	0.1	9	0		
	0.3	16	7	7	
	0.5	24	15**	15**	8
7	0	9			
	0.1	12.5	3.5		
	0.3	14.5	5.5	5.5	
	0.5	24	15**	11.5	9.5
14	0	13			
	0.1	12.5	0.5		
	0.3	16	3	3.5	
	0.5	18.5	4.5	6	2.5
21	0	8			
	0.1	17	9		
	0.3	12.5	4.5	5.5	
	0.5	22.5	14.5**	5.5	10
28	0	6.5			
	0.1	23.5	17**		
	0.3	13	6.5	10.5	
	0.5	17	10.5	6.5	4

* $p \leq 0.05$ – statistically significant difference; **$p \leq 0.01$) – highly statistically significant difference

There was a highly statistically significant difference ($p < 0.01$) between the control frankfurters and frankfurters with 0.5% savory on days 1, 7 and 21 of storage. The odour and taste of frankfurters with 0.1% savory and frankfurters with 0.5% savory were statistically significantly different ($p < 0.05$) on day 1 of storage.

The odour and taste of control frankfurters and frankfurters with 0.1% savory were highly statistically significantly different ($p < 0.01$) on day 28 of storage.

No statistically significant differences were detected between other frankfurters on this day.

The results obtained are in accordance with [10], where savory (at different concentrations) was added to dry fermented sausage, as well as with the results of the authors [11]. Savory at levels of 0.1% and 0.3% did not negatively influence the colour of dry fermented sausage, while 0.5% savory had a negative influence. According to [9], savory at the levels of 0.1% and 0.3% stimulated development of a pleasant odour and taste in dry fermented sausage, while 0.5% savory had an undesirable effect.

The results are in accordance with [10], where basil (at different concentrations) was added to frankfurters (basil also belongs to the family Lamiaceae*)*. Basil at 0.1% did not negatively influence the colour of sausages, while larger amounts, 0.3% and 0.5%, did adversely affect the sausages' colour. Basil at levels of 0.1% and 0.3% stimulated development of pleasant odour and taste of sausages, while 0.5% basil had an undesirable effect.

4. Conclusion

Savory at levels of 0.1% and 0.3% did not negatively influence the colour of frankfurters, while 0.5% savory did adversely affect frankfurter colour. Savory at levels of 0.1% and 0.3% stimulated the development of a pleasant odour and taste in the frankfurters, while 0.5% savory had an undesirable effect. In conclusion, frankfurter with 0.1% and 0.3% savory had desirable sensory attributes. The results show that there is a real possibility of using savory in spice mixtures for the production of frankfurters.

Acknowledgement

This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, according to the provisions of the Contract on research financing in 2021 year (No. 451-03-9/2021-14/200050 dated 05.02.2021).

References

[1] I Savić and J Danon 1982 Začini u preradi mesa (Spices in Meat Processing) (Belgrade: Association of Veterinarians and Veterinary Technicians of Yugoslavia)
[2] R Jančić, D Stošić, N Mimica Dukić and B Lakušić 1995 Aromatične Biljke Srbije (Aromatic herbs of Serbia) (Belgrade: Children's Newspaper)
[3] D Karan, S Saičić, S Vesković Moračanin, S Lilić and Đ Okanović 2008 *Meat Technol.* **49** (3–4) 117–21
[4] M Polić and Lj Nedeljković 1978 *Meat Technol*. **12** 59–63
[5] International Organization for Standardization 2012 Determination of essential oil content, SRPS EN ISO 6571
[6] International Organization for Standardization 2013 Sensory analysis – Quantitative descriptive test, SRPS ISO 6658
[7] International Organization for Standardization 2013 Sensory analysis – Ranking test, SRPS ISO 8587
[8] M Baltić 1992 *Kontrola Namirnica* (Control of Food) (Belgrade: Institute of Meat Hygiene and Technology)
[9] Serbian Regulation 2014/2015 Regulation on the quality of spices, extracts of spices and a mixture of spices *Off. Gazette R. S.* 72/2014; 23/2015
[10] M Milanović Stevanović 1999 MSc thesis (Belgrade: Faculty of Veterinary Medicine, University of Belgrade)
[11] M Milanović Stevanović, I Vukovic, T Kočovski and K Markovic, 2006 *Meat Technol.* **47** (1-2) 38–44
[12] D Karan, M Lukic, V Djordjevic, N Parunovic, J Babic Milijasevic, J Jovanovic, A Nikolic. The 60th International Meat Industry Conference MEATCON 2019. September 2019, Kopaonik, Serbia. IOP Conf. Series: Earth and Environmental Science 333 (2019) 012069. doi: 10.1088/1755-1315/333/1/012069