

THE IMPACT OF ROSE HIP EXTRACT ON THE VITAMIN AND MINERAL COMPOSITION OF HORSE MEAT SAUSAGES

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I. INTRODUCTION

In the modern food market, the natural food industry is actively developing, with a maximum reduction of synthetic additives. As a number of studies show, plants with high levels of certain biologically active compounds can be used to replace synthetic additives in meat products [1,2]. Previously, we conducted studies on the colour and texture characteristics, as well as the microbiological safety of sausages made from horse meat with partial and complete replacement of sodium nitrite with rosehip (*Rosa canina L.*) extract [2], which showed positive results when replacing 50% of sodium nitrite with a 13% concentration of rosehip fruit extract. The aim of this study was to investigate the effect of using rosehip (*Rosa canina L.*) extract to replace sodium nitrite in boiled sausages made from horse meat on their vitamin and mineral composition.

II. MATERIALS AND METHODS

Preparation of rosehip extract

Pre-cleaned and crushed dry rosehip fruits (Zerde LLP) were mixed with distilled water in a ratio of 1:4. The mixture was processed using an ultrasonic homogeniser (Ultrasonic Homogenisers HD 4100, Germany) and centrifuged for 10 minutes. The supernatant was poured into a flask and the process was repeated for the sediment.

Preparation of boiled sausages.

Four batches of sausages were produced. A control batch containing single-grade veneered horsemeat (90%), ghee (7%), wheat flour (3%), table salt (2.5%), sodium nitrite (0.1%), granulated sugar (0.09%), ground black pepper (0.07%), nutmeg (0.04%), water (25%). Experimental batches were developed with the replacement of 1.8 kg of water in the formulation with 8%, 13% rosehip extract (without the addition of sodium nitrite) and 13% rosehip extract with the replacement of 50% of the norm of sodium nitrite. Determination of vitamin and mineral composition. The content of vitamin E was determined according to GOST 55482-2013 using a potassium phosphate buffer solution [3], and the content of vitamin C was determined according to GOST 32307-2013 [4]. The mineral composition of the samples was determined according to the AOAC (2000) method [5].

Statistical analysis

The experiments were carried out in triplicate. The values of the residual standard deviation are defined for all measurements. Differences in the measurements of the experimental and control groups were calculated using analysis of variance (one-way ANOVA) using Tukey's test. We considered a P-value of 0.05 or less as statistically significant.

III. RESULTS AND DISCUSSION

The results of the determination of the vitamin and mineral composition of the control and experimental batches of cooked sausages are presented in Table 1.

Table 1. Vitamin and mineral composition of cooked horse meat sausages with the addition of rosehip extract (mg/100g).

	¹ Daily recommended (mg/day)	Control	² 8%	13%	³ 13-SN 50%	⁴ RSD	P-value
Vitamin E	15	0.26 ^a	0.33 ^b	0.42 ^b	0.51 ^c	0.01	<0.05
Vitamin C	90	0.18 ^a	0.19 ^a	0.37 ^b	0.38 ^b	0.02	<0.05
Potassium	1500-2500	298 ^a	305 ^b	312 ^a	317 ^a	1.50	<0.01
Calcium	800-1200	10.0 ^a	11.2 ^b	12.4 ^c	13.7 ^c	0.02	<0.001
Sodium	3000-5000	87.4 ^a	89.5 ^b	93.3 ^c	94.6 ^d	2.01	<0.001
Magnesium	300-400	27.7 ^a	29.0 ^b	30.2 ^c	31.7 ^c	0.04	<0.001
Iron	8-10 (for men) 15-20 (for women)	3.72 ^a	3.71 ^a	3.67 ^a	3.68 ^a	0.03	<0.01
Copper	0,9-2,3	0.10 ^a	0.11 ^a	0.12 ^b	0.13 ^b	0.02	<0.01
Zinc	10-15 (for men) 10-12 (for women)	2.28 ^a	2.25 ^a	2.19 ^a	2.11 ^b	0.02	<0.01
Phosphorus	550-1400	274 ^a	283 ^b	297 ^c	306 ^d	2.81	<0.001

The indicated values are: ¹ FAO/WHO [6], ² concentration of rosehip extract, ³13-SN 50% - rosehip extract concentration - 13% and sodium nitrite replacement - 50%, ^{a-d} values with different letters within a column indicate a significant difference between different batches (P <0.05), ⁴ RSD – residual standard deviation.

The inclusion of rosehip extract in the composition of sausages led to an increase in the content of vitamins and minerals, with the exception of iron and zinc. The most significant increase was observed in the content of vitamin E and potassium.

IV. CONCLUSION

The results of the study provide a basis for suggesting the potential use of rosehip extract in meat products to reduce the amount of synthetic additives. The analysis of the vitamin and mineral content showed an increase with the addition of rosehip extract, with the highest values corresponding to the experimental batch containing 13% rosehip extract with 50% replacement of sodium nitrite.

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REFERENCES

- Armenteros, M., Morcuende, D., Ventanas, S. & Estévez, M. (2013). Application of Natural Antioxidants from strawberry tree (*Arbutus unedo L.*) and dog rose (*Rosa canina L.*) to Frankfurters Subjected to Refrigerated Storage. *Journal of Integrative Agriculture* 12: 1972-1981.
- Tursunov, A. A., Zhumaliev, T. M. (2023). The influence of rose hip extract on the colour and texture indicators of sausages. *The Journal of Almaty Technological University* 1: 25-32.
- GOST R 55482-2013 (2014). Meat and Meat Products. Method for Determination of Water-Soluble Vitamins Content. Moscow: Standardinform.
- GOST R 32307-2013 (2014). Meat and Meat Products. Determination of Fat-Soluble Vitamins by High Performance Liquid Chromatography. Moscow: Standardinform.
- AOAC (2000) Official methods of analysis (17th ed.). Gaithersburgh: Association of Official Analytical Chemists.
- Human Vitamin and Mineral Requirements (2002) Report of a Joint FAO/WHO Expert Consultation. Bangkok, Thailand. Rome: World Health Organization Food and Agriculture Organization of the United Nations.