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## Sensory characteristics of lamb meat of three Zackel sheep types in Serbia

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### Abstract

Meat quality characteristics (*m. longissimus dorsi*) were evaluated in lambs of three types of autochthonous Zackel sheep: Sjenica sheep, Lipe sheep and Vlashko Vitoroga sheep, reared in traditional habitats in a sustainable management system. For the evaluation of sensory characteristics of lamb meat, quantitative descriptive analysis was performed, based on structural intensity scale of seven points (ISO 6564:1985). All Zackel meat samples had an overall acceptability, the most favorable being in Sjenica sheep, with detected differences between Sjenica and Vlashko Vitoroga sheep ( $p < 0.05$ ). Sustainable consumers appreciate sensory characteristics of lamb meat from agroecological farming system and prefer lamb meat as local food.

Keywords: local food, autochthonous Zackel sheep, ecosystem service, preserving biodiversity

### Introduction

The established criteria for strategic environmental, economic and social sustainability enhanced the importance of traditional nature conservation (ALLIEVI et al., 2011, EUROSTAT, 2011.). Nowadays, ecosystem services have an active role in good practice management of natural resources. Five principles for integrating livestock systems within the agroecology include: adopting management practices that aim to improve animal health, decreasing the inputs needed for production, reducing emissions, enhancing diversity within animal production systems to strengthen their resilience and preserving biodiversity by adapting management practices (DUMONT et al., 2013).

Many studies indicate that it is a human society faces with hunter-gatherers, agrarian societies and industrial societies prepared for transition towards sustainable society, fundamental re-orientation of society and the economy. Promotion of animal genetic recourses conservation get a new chance transforming materialist consumerism based on following attitudes like health-promoting lifestyle, recycling, organic food, water conservation, maintaining of civil society, favouring the eco-labelled products and using renewable energy resources (ARTO et al., 2011). Considering the importance of biodiversity for agriculture, global food and health security, the Republic Project was focused on supporting the biodiversity and the importance of autochthonous Zackel sheep and value-added animal products on the sustainable development of region (SAVIC et al., 2018). The active sustainable society approach promote the conservation and rational use of autochthonous and endangered Sjenica sheep, Lipe sheep

and Vlashko Vitoroga sheep, types of Zackel sheep reared based on grazing of native pastures in traditional habitat. The aim of this paper is to examine lamb meat sensory characteristics of three Zackel sheep types in Serbia as local food. Local food is one of indicators of environmental sustainability.

## **Material and Methods**

The study was carried out on 24 lamb carcasses of both sexes, eight lambs per each of three types of autochthonous Zackel sheep. The lambs were slaughtered at 90-100 days of age, mean weight of  $26.74 \pm 1.85$  kg,  $25.24 \pm 2.12$  kg and  $23.42 \pm 2.35$  kg for Sjenica sheep, Lipe sheep and Vlashko Vitoroga sheep, respectively. All Zackel type lambs were produced in an extensive, sustainable management system. Sjenica sheep is reared on the Sjenica-Pester plateau (900-1200 m altitude) in South Western Serbia, the Lipa sheep in grassland fields in lower Morava valley in Northern Serbia and the Vlashko Vitoroga type in the lowland pastures in South Eastern Banat region. Feeding systems were based on grazing of native pastures.

The selection and training of the evaluators were conducted in accordance with ISO 8586-2:2012 (Sensor Features - General guidance for the selection, training and monitoring of assessors; Part 2: Sensory assessors (experts). Quantitative descriptive analysis (evaluation of the acceptability-odour) was performed according to ISO 6564:1985, the structural intensity scale / eligibility of seven points, with the score of 7 being the maximum intensity / eligibility, and score of less than 3.5 marked the product as unacceptable. The odour intensity, flavour intensity, flavour quality and overall acceptability were scored. Colour and odour of the meat samples were analysed before thermal treatment. Before cooking the fat was removed from the *m. longissimus dorsi*. The samples of *m. longissimus dorsi* were grilled (70 °C internal temperature) and cut into thin slices. Sensory analysis was done by an 8 member trained taste panel professional commission.

Statistical analysis of the data was done by GraphPad Prism statistics 7.05 for Windows, GraphPad Software, San Diego California, USA. The tested parameters were presented by descriptive statistical method (mean value, standard deviation). One-way ANOVA with Tukey's multiple comparison test was performed to test the average value differences of sensory characteristics in lamb meat between three types of Zackel sheep.

## **Results and discussion**

Meat quality characteristics (*m. longissimus dorsi*) were evaluated in lambs of three types of autochthonous Zackel sheep: Sjenica sheep, Lipe sheep and Vlashko Vitoroga sheep, reared in traditional habitats. The sensory characteristics of lamb meat of Sjenica sheep, Lipe sheep and Vlashko Vitoroga sheep are presented in Table 1.

Table 1. Sensory characteristics of lamb meat of three Zackel sheep types

Sensory characteristic	Sjenica sheep	Lipe sheep	Vlashko Vitoroga sheep
	M±SD	M±SD	M±SD
	CV%	CV%	CV%
Colour	6.19±0.35 5.82%	5.50±0.26 4.86%	5.19±0.25 4.99%
Odour	5.93±0.32 5.40%	5.25±0.27 5.09%	6.18±0.37 6.01%
Juiciness	6.06±0.32 6.05%	5.81±0.37 5.80%	5.56±0.32 5.55%
Softness	6.18±0.26 4.18%	6.12±0.23 3.78%	5.31±0.25 4.78%
Odour and flavour (aroma)	6.12±0.23 3.87%	5.87±0.35 6.02%	5.81±0.37 6.40%
Overall appraisal	6.12±0.25 <sup>A</sup> 3.87%	6.00±0.25 <sup>a</sup> 4.45%	5.62±0.37 4.11%

A - indicates significant difference ( $p<0.01$ ) compared to Vlashko Vitoroga sheep; a - indicates significant difference ( $p<0.05$ ) compared to Vlashko Vitoroga sheep

The tested meat samples had a fine structure on cross section. Using quantitative descriptive analysis for sensory evaluation, it was determined that Sjenica lamb meat had the highest tenderness, juiciness, meat aroma and overall acceptability. All Zackel meat samples had preferable overall acceptability, the most favourable was in Sjenica sheep, with detected differences between Sjenica and Vlashko Vitoroga sheep ( $6.12 \pm 0.25$  and  $5.62 \pm 0.37$  respectively,  $p<0.01$ ), as well as between Lipe sheep and Vlashko Vitoroga sheep ( $6.12 \pm 0.25$  and  $6.00 \pm 0.25$  respectively,  $p<0.05$ ), but no statistical difference between Sjenica and Lipe sheep was detected (Table 1). The established results are in accordance with a number of studies. They have confirmed that the interaction between breed and nutritional regimens with specific grass composition of pastures in the traditional habitat, has a big impact on odour and flavour of lamb meat. Local sustainable consumers appreciate flavour of pasture fed lamb meat. "Towards sustainability" strategy supports consumers to favour local food, eco-labelled products, ecosystem conservation, vibrant small business and health-promoting lifestyle. This strategy is a good base for the promotion of Zackel lamb meat as a local food.

### Conclusion and recommendation

Recognizing that locally adapted animal breeds gained genetic resistance and adaptability through the evolutionary process, breeding strategies in sustainable farming practices today are far more attuned to the preservation and utilization of autochthonous breeds. Investigations of specific characteristics and added value of autochthonous sheep breeds, especially advanced characterization of the productive potentials and specific product characteristics are important topics for a sustainable conservation strategy and producing a highly appreciated local food.

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