Theses of the PhD Dissertation

Kaltrina Berisha

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Characterization of traditional foods of Kosova based on amino acid, biogenic amine and fatty acid composition

Kaltrina Berisha

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The Doctoral School

Name: Doctoral School of Agricultural and Food Sciences

Field: Food Science

Head: Dr. Melinda Kovács

Full Professor, DSc, MHAS

Hungarian University of Agriculture and Life Sciences

Supervisor: **Dr. Livia Simon Sarkadi**

Full Professor, DSc

Hungarian University of Agriculture and Life Sciences

Institute of Food Science and Technology

Department of Nutrition Science

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Approval of Head of Doctoral School Approval of the Supervisor

1. INTRODUCTION AND OBJECTIVES

Traditional foods in Kosovo represent an essential element of the country's cultural identity and nutritional heritage. They have been consumed for centuries and transmitted through generations, embodying collective knowledge on food production, preservation, and consumption that continues to shape both rural and urban communities. Beyond their cultural symbolism, these foods are dietary staples that contribute substantially to the nutritional well-being of the population. Their value derives not only from their sensory and cultural qualities but also from their biochemical composition, particularly amino acids, biogenic amines, and fatty acids. Amino acids serve as the building blocks of proteins, supporting muscle development, neurotransmitter synthesis, and metabolic regulation (Haug et al., 2007). Free amino acids also influence taste and aroma, enhancing consumer preference for traditional products. Biogenic amines, although essential in small amounts for physiological processes such as cell signaling and immune responses, can become hazardous at elevated concentrations, leading to allergic or toxic reactions (Linares et al., 2011; Ruiz-Capillas & Herrero, 2019). Fatty acids similarly play a dual role: they determine both the nutritional quality and the sensory profile of foods. The balance between saturated and unsaturated fatty acids is critical, as optimal ratios contribute to cardiovascular health and metabolic well-being (Pereira, 2014).

Despite their nutritional and cultural importance, systematic scientific research on the composition of traditional Kosovan foods remains limited. The Busha cattle breed, once widespread across the Balkans but now endangered, has received little scientific attention, particularly in terms of the amino acid, fatty acid, and biogenic amine composition of its milk (Bytyqi et al., 2013; Krasniqi et al., 2013). Traditional cheeses such as Sharri and Rugova, which occupy a central place in local diets, also remain poorly characterized. Scientific data on their nutritional and safety profiles are scarce, leaving gaps in knowledge about their role in supporting dietary quality and consumer health. Similarly, beef products such as dry meat, ham, and homemade sausages, which are consumed regularly across Kosovo, have not been evaluated thoroughly for their amino acid or fatty acid composition, nor for potential risks associated with biogenic amine accumulation. This absence of evidence makes it difficult to assess their nutritional contribution or their suitability for wider commercialization in regional and international markets.

The importance of local and traditional food systems has been highlighted in recent years, particularly during the COVID-19 pandemic. Global disruptions to supply chains emphasized the resilience of community-based production methods, which provided food security during times of scarcity (Deaconu et al., 2021). In this context, strengthening the scientific understanding of traditional Kosovan foods is not only culturally relevant but also practically important. Establishing reliable nutritional data will contribute to consumer education, inform public health recommendations, and support the integration of traditional foods into sustainable food systems. Furthermore, such studies reinforce conservation efforts for endangered livestock breeds like the Busha cattle, which represent both genetic resources and elements of cultural heritage (Bunevski et al., 2016).

Traditional food products also carry broader cultural and economic significance. They embody continuity of culinary traditions, reflecting accumulated knowledge of agricultural practices, processing techniques, and dietary adaptation across centuries (Rocillo-Aquino et al., 2021). In many societies, including Kosovo, traditional foods are deeply intertwined with identity, belonging, and heritage. Consumer studies have shown strong preferences for products perceived as authentic, free of artificial additives, and linked to traditional production methods (Peulić et al., 2023). Such perceptions not only support the preservation of traditional practices but also create opportunities for local producers to position these products in niche markets that value authenticity, quality, and cultural connection.

Given these nutritional, cultural, and safety dimensions, the lack of systematic studies on traditional Kosovan foods represents a significant knowledge gap. Addressing this gap is crucial for multiple reasons: preserving cultural heritage, supporting biodiversity, informing public health, and creating opportunities for economic development through certified traditional food products.

2. MATERIAL AND METHODS

2.1. Material

The nutritional composition of selected traditional foods from Kosovo, with a focus on Busha cattle milk, traditional cheeses, and beef products was investigated. These foods were chosen because of their cultural relevance, wide consumption, and the absence of systematic scientific characterization. Busha milk samples were collected from the Dukagjin area of Kosovo, specifically from Stellc in the Peja region and Rrenc and Xerc in the Prizren region, where the Busha breed remains more prevalent compared to other areas. Twenty 100 ml samples were obtained from two strains, Sharri and Dukagjini, following the guidelines of CODEX STAN 234-1999 to ensure proper representativeness and quality control. Traditional cheese samples were sourced from three local producers. These included soft cheeses prepared by spontaneous fermentation of unpasteurized cow, goat, and buffalo milk; Sharri cheese produced in the Sharri mountains using rennet and brine-based ripening; and Rugova cheese from the Peja region, produced with cow's milk and subjected to a 60-day ripening process. In addition, traditional beef products were collected from local processors. Dry beef was produced by salting and hot-air drying of lean muscle strips, beef ham through a combination of brine injection, curing, and thermal processing, and sausages from a mixture of beef, fat, spices, and natural casing, dried at 80 °C. For all food categories, three parallel samples were prepared to ensure reproducibility.

2.2. Methods

2.2.1. Moisture content and protein determination

The ISO1442:1973 method was used to determine the moisture content. The protein content was determined based on the Kjeldahl method (Kjeldahl, 1883).

2.2.2. Amino acid determination

2.2.2.1. Protein building amino acids

The composition of protein-building amino acids in milk. cheese and beef meat products was determined after HCl hydrolysis method described by Berisha et al. (2023). Samples were analyzed using an Automatic Amino Acid Analyser AAA400 (Ingos Ltd., Prague, Czech Republic) fitted with an Ionex Ostion LCP5020 cation-exchange column (22 x 0.37 cm).

2.2.2.2. Free amino acids

For free amino acids (FAA) determination 3 g of traditional cheeses and beef meat products was extracted with 10 ml 10% trichloroacetic acid for one hour at room temperature at 100 rpm using a Laborshake as described by Berisha et al. (2023). The same equipment was used as for the protein building amino acids determination.

2.2.3. Amino acid Score calculation

The World Health Organization calculation method, as given in equation 1, was followed in this study to determine the essential amino acid scores, also referred to as chemical scores. The scores were presented as either a unity ratio, as suggested, or as a percentage scale, following the guidelines from the (Food and Agriculture Organization Expert Working Group, 2018)

The reference protein quantities were divided into three age groups: 3-14 years, 15-18 years, and individuals over 18 years, as authorized by the (Food and Agriculture Organization Expert Working Group, 2018)

$$Amino\ Acid\ Score = \frac{\text{mg of amino acid in 1 g of the tested protein}}{\text{mg of amino acid in 1 g of the reference protein}} \qquad eq\ (1),$$

2.2.3.1.Essential amino acid deficiency index calculation

The essential amino acid deficiency index was calculated by dividing the essential amino acid content of the sample with that of the reference protein. If the disparity is positive, it means there is a lower proportion of the amino acid in the sample compared to the reference protein. A negative value indicates an excess of the amino acid. Therefore, positive values indicate a shortage. The essential amino acid deficiency index is calculated by adding up these positive differences.

2.2.4. Biogenic amine determination

The sample preparation for biogenic analysis is the same as explained above for free amino acids. Biogenic amines were determined with the same equipment using different ion-exchange column (Ostion LG ANB ion-exchange resin; 7.0×0.37 cm). Separation was carried out using Na+/K+ buffers system by stepwise gradient elution. Detection was performed at 570 nm (Berisha, et al., (2023a) Berisha, et al., (2023b)

2.2.5. Fatty acid determination

Sample preparation followed the Bligh and Dyer (1959) method, where samples were extracted using petroleum ether via a Soxhlet extractor.

The fatty acid ester preparation and the Gas chromatography determination was done according to (Berisha, et al., (2023a) for cheese samples and Berisha, et al., (2023b) for beef meat products.

2.2.6. Statistical analysis

The statistical analyses for this study were performed using IBMSPSS25 software (Peck et al., 2020). For Busha milk, significant differences between the means for conductivity were evaluated using a one-way analysis of variance (ANOVA) using Tukey's test with a significance level at $p < 0.05$. On the other hand, significant differences between the means for protein, lactose, fat, total solids, amino acids, and biogenic amines were determined by a multivariate analysis of variance (MANOVA), using Tukey's test at $p < 0.05$. The normality of the differences was accepted using the Shapiro-Wilk and D'Agostino tests, while Levene's test confirmed the homogeneity of variances.

The quality parameters were compared using MANOVA at a significance level of $p < 0.05$ for the traditional cheeses and traditional beef meat products. The normality of the differences was tested and accepted using the Shapiro-Wilk and D'Agostino tests. Additionally, Principal Component Analysis (PCA) was performed to categorize the traditional cheese and beef meat product samples based on their protein-building amino acids, free amino acids, and fatty acids composition. PCA was performed using XLSTAT Software (Addinsoft, 2022).

3. RESULTS AND DISCUSSION

3.1. Busha cattle milk

Milk obtained from Busha cattle (Sharri and Dukagjini strains) showed a stable and uniform composition, confirming good raw milk quality under traditional extensive farming conditions. The dry matter content ranged between 11.8 and 13.5%, while pH values were consistently within 6.55–6.75, indicating fresh milk without technological defects. Protein content averaged 3.2–3.6%, which is comparable to conventional cow milk. The results of this study demonstrated that Busha cattle milk shows marked nutritional variability between strains, with the Dukagjini strain exhibiting significantly superior compositional characteristics. Milk from Dukagjini Busha cattle contained higher dry matter (up to 13.86%), fat (up to 4.50%), and lactose contents compared to the Sharri strain, confirming its enhanced nutritional density. These values place Dukagjini Busha milk at the upper range of reported values for local cattle breeds and comparable to, or exceeding, those of several internationally recognized high-yielding dairy breeds.

Protein content of Busha milk ranged between 3.2 and 3.6%, and the protein-building amino acid profile confirmed its high biological value. Essential amino acids accounting for 42–45% of total amino acids. Among individual amino acids, glutamic acid (24.54%), proline (14.04%), leucine (9.37), aspartic acid (6.50), lysine (6.97) and valine (5.50%), while the minor ones were glycine (1.67%) and cysteine (0–0.58%). Branched-chain amino acids (leucine, isoleucine, valine) together contributed approximately 18–20% of total amino acids, underlining the high biological value of Busha milk protein. No essential amino acid deficiency was detected.

Biogenic amines in Busha milk were detected at very low concentrations. Among the biogenic amines, only spermine (0.11 mg /kg Sharri Busha; 0.07 mg/kg Dukagjini Busha) and cadaverine (0.18 mg /kg Sharri Busha; 0.15 mg/kg Dukagjini Busha) were detected in small quantities in the milk samples. These results confirm that raw Busha milk represents a low-risk matrix with respect to biogenic amine formation.

The fatty acid composition of Busha milk fat was dominated by saturated fatty acids, which accounted for 56.46% of total fatty acids. Monounsaturated fatty acids represented 40.26%, while polyunsaturated fatty acids contributed 3.29%. Palmitic acid (C16:0) was the predominant fatty acid (26–28%), followed by oleic acid (C18:1, 23–26%) and stearic acid (C18:0, 12–14%). The

presence of essential fatty acids, including linoleic and α-linolenic acids, though at lower levels (2–4% combined), reflects pasture-based feeding and adds nutritional value

3.2.Traditional Kosovan cheese composition

3.2.1. Composition of traditional soft cheeses cow, goat, buffalo

The traditional soft cheeses of Kosovo showed distinct and nutritionally valuable profiles depending on milk origin. Goat cheese exhibited the highest protein content (19.79%), followed by cow (17.13%) and buffalo cheeses (10.72%), confirming its role as a particularly rich protein source. Total free amino acid (FAA) content in soft cheeses ranged between 800 and 1,200 mg/kg, reflecting moderate proteolysis typical of fresh cheeses.

All soft cheeses were characterized by high concentrations of glutamic acid and proline, which together accounted for approximately 25–30% of total free amino acids. These amino acids contribute both to curd structure and umami taste perception. Essential amino acids represented 40–45% of total amino acids, with goat cheese showing the richest essential amino acid composition, particularly in leucine, lysine, and valine. These values are comparable to or exceed those reported in international studies for similar cheese categories. A notable finding was the presence of γ-aminobutyric acid (GABA) in all soft cheeses. Cow and goat cheeses contained particularly elevated GABA levels, reflecting active microbial metabolism during fermentation. GABA is associated with antihypertensive and stress-regulating effects, suggesting additional functional properties beyond basic nutrition.

Fatty acid composition clearly differentiated the cheeses. Cow cheese was particularly rich in oleic acid (≈24–26%), goat cheese contained higher proportions of caprylic and palmitic acids, while buffalo cheese showed elevated stearic and linoleic acids. Saturated fatty acids accounted for 60–68%, monounsaturated fatty acids 25–30%, and polyunsaturated fatty acids 3–6%, highlighting the nutritional diversity among soft cheeses.

Biogenic amines were detected only in Goat soft cheese at low concentrations, with total levels generally below 100 mg/kg. Histamine (468 μg/g) and tyramine (544 μg/g) remained well below levels associated with adverse health effects, confirming that traditionally produced soft cheeses in Kosovo are safe for human consumption from biogenic amine point of view.

3.2.2. Semi-hard cheeses: Sharri and Rugova Cheeses

Semi-hard Sharri and Rugova cheeses showed advanced proteolysis and distinct nutritional characteristics. Sharri cheese showed the highest proportion of essential amino acids (42.09%), with particularly high levels of lysine and arginine, making it a superior protein source compared to internationally known cheeses such as Cheddar and Gouda. Rugova cheese, although lower in total protein (12.17%), showed a balanced amino acid profile with notable enrichment in threonine and favorable essential amino acid scores.

Total free amino acid concentrations in these cheeses reflecting intensive ripening. Elevated levels of glutamic acid, leucine, valine, and GABA contributed both to flavor complexity and potential health benefits. The presence of GABA further enhances the functional food potential of these traditional cheeses.

Fatty acid profiles were clearly differentiated. Rugova cheese was particularly rich in oleic acid and monounsaturated fatty acids (MUFA up to 38.24%), suggesting cardiovascular benefits. In contrast, Sharri cheese contained higher proportions of polyunsaturated fatty acids, including linoleic and α-linolenic acids (PUFA up to 15.54%), supporting its classification as a nutritionally functional dairy product.

Biogenic amines were detected only in Rugova cheese, while no biogenic amines were detected in
g/g, cadaverine at 103 ± 9 μg/g, putrescine at 97 ± 6 μg/g, spermine at 245 ± 18 μg/g, and spermidine at 299 ± 19 μg/g. Despite more biogenic amines were observed compared those in soft cheeses, these values remain within levels reported as acceptable for fermented dairy products, indicating controlled fermentation and satisfactory food safety. The absence of detectable biogenic amines in Sharri cheese further confirms its excellent hygienic quality..

3.3.Traditional Kosovan beef products

Traditional beef products showed exceptional nutritional density. Dry beef meat and beef ham contained very high protein levels (49.00% and 44.12%, respectively), with essential amino acids accounting for more than 47% of total amino acids, exceeding values reported in many

international studies. Beef sausage, while lower in protein (36.74%), was particularly rich in leucine and alanine, amino acids critical for muscle protein synthesis and energy metabolism.

Free amino acid profiles varied significantly between products. Dry beef meat was dominated by glutamic acid and lysine, beef ham by alanine and aspartic acid, and beef sausage by alanine and leucine, contributing to distinct sensory profiles and nutritional diversity.

Contrary to expectations for fermented meat products, biogenic amines were detected only in very low concentrations, confirming high product safety. Histamine and tyramine levels remained well below toxicological thresholds, indicating good hygienic practices and controlled processing.

Fatty acid analysis of beef sausage revealed a nutritionally favorable profile, with oleic acid accounting for 34.37% of total fatty acids, alongside palmitic and stearic acids. The high oleic acid content enhances the cardiovascular profile of the product.

4. CONCLUSIONS AND RECOMANDATIONS

The present study represents the first comprehensive nutritional characterization of Busha milk, traditional Kosovan cheeses, and traditional beef products, providing novel information into their amino acid, biogenic amine, and fatty acid composition. The analysis of Busha milk confirmed its distinctive nutritional profile, particularly the high content of essential amino acids and a favorable fatty acid balance. These results underline the scientific and cultural importance of the Busha breed, which, despite its endangered status, offers significant nutritional value. Preserving this breed should therefore be regarded not only as an act of biodiversity conservation but also as a contribution to maintaining high-quality nutritional resources for future generations.

The determination of essential amino acid scores and deficiency indexes revealed that Busha milk possesses superior quality compared to several commercial dairy sources. This indicates its potential to play a key role in diversifying dietary options in Kosovo and beyond. Similarly, the comparative evaluation of traditional cheeses demonstrated substantial differences among varieties, with Rugova and Sharri cheeses emerging as particularly rich sources of essential amino acids. These findings highlight the functional food potential of certain cheese types, positioning them as valuable contributors to human health and nutrition. At the same time, the study of biogenic amines in cheeses revealed elevated concentrations of histamine and tyramine in some varieties, raising important food safety concerns. This underscores the need for regular monitoring and the establishment of quality control protocols to safeguard consumers without undermining traditional production practices.

The fatty acid composition of traditional cheeses was found to be generally favorable, with a higher proportion of unsaturated fatty acids, supporting the growing evidence that traditional dairy products may exert health-promoting effects when consumed responsibly. Likewise, the characterization of traditional beef products provided the first scientific profile of their nutritional value, revealing that homemade beef sausages possess higher levels of free amino acids and beneficial fatty acid ratios than other meat products. This suggests that these traditional products, when properly controlled for safety, may serve as high-quality sources of protein and essential nutrients. Taken together, these findings establish the first nutritional database for traditional foods of Kosovo, contributing not only to food science but also to cultural heritage preservation.

Based on these results, several recommendations can be made. Conservation and breeding programs for the Busha cattle breed should be strengthened to secure its survival and to preserve its unique milk composition. Food safety regulations need to incorporate systematic monitoring of biogenic amines in traditional cheeses, as elevated levels pose potential risks to consumers. At the same time, producers should be encouraged to adopt improved processing practices that reduce biogenic amine formation while maintaining sensory quality. Another important factor as the promotion of traditional cheeses, especially Rugova and Sharri varieties, as health-promoting foods could increase their market value and contribute to the economic sustainability of local producers. Consumer awareness campaigns should also be launched to emphasize both the nutritional benefits and the potential risks associated with traditional foods, thereby supporting informed dietary choices.

Further research is recommended to expand the scope of this study to other traditional Kosovan foods, to investigate seasonal and regional variations in composition, and to explore innovative technologies that ensure food safety without compromising traditional authenticity. The nutritional database established in this dissertation should be maintained and expanded, serving as a foundation for future scientific investigations, consumer education, and policymaking in food safety, nutrition, and cultural heritage preservation.

5. NEW SCIENTIFIC RESULTS

1. I found that Busha cattle milk, particularly from the Dukagjini strain, had significantly higher dry matter, fat, and lactose contents, making it nutritionally superior within the breed. I demonstrated that its fat and protein levels are comparable to or higher than those of international high-yielding breeds, while its amino acid profile, with notably elevated glutamic acid and proline, highlights its exceptional protein quality. I found that Busha milk contains a healthier fatty acid composition, with lower saturated and higher monounsaturated fatty acids, especially oleic acid, offering potential cardiovascular benefits. I also showed that the very low levels of biogenic amines confirm its safety and high quality. These results are important because they emphasize the genetic and nutritional value of preserving the Busha cattle population, not only as cultural heritage but also as a source of dairy products with potential health-promoting properties for modern consumers.

2. I found that the traditional soft cheeses of Kosovo, produced from buffalo, cow, and goat milk, have distinct nutritional profiles. I demonstrated that goat cheese had the highest protein content (19.79%) and the richest essential amino acid concentration, while cow cheese also showed a strong balance of proteins and amino acids, confirming their high nutritional value compared to international reports. I proved that all soft cheeses contained high levels of glutamic acid and proline, supporting both their structural stability and umami flavor. I also showed that they were particularly rich in health-promoting compounds such as GABA, with cow and goat cheese providing notable levels that are associated with blood pressure reduction and stress regulation. Furthermore, I demonstrated that the fatty acid composition of these soft cheeses was unique: cow cheese was especially rich in oleic acid, goat cheese had higher caprylic and palmitic acids, and buffalo cheese provided elevated stearic and linoleic acids, making each type nutritionally distinct. Importantly, biogenic amine levels were low, confirming that these traditionally produced cheeses are safe for human consumption.

3. I demonstrated that the semi-hard cheeses, Rugova and Sharri, also carry important nutritional benefits, with clear differences between them. I proved that Sharri cheese provided the highest proportion of essential amino acids (42.09%), particularly lysine and arginine, making it a superior protein source compared to many international cheeses like Cheddar and Gouda. Rugova cheese, while lower in overall protein, still demonstrated high-quality protein composition with

threonine enrichment and balanced amino acid scores, highlighting its nutritional significance. I also found that their fatty acid profiles were highly distinctive: Rugova cheese was especially rich in oleic acid and monounsaturated fatty acids, suggesting cardiovascular benefits, while Sharri cheese contained higher polyunsaturated fatty acids, including linoleic and alpha-linolenic acids, further supporting its role as a functional food. The presence of elevated GABA and other free amino acids in both cheeses enhances their potential health benefits and sensory diversity. These findings are important because they prove that traditional Sharri and Rugova cheeses are not only culturally valuable but also nutritionally competitive with internationally recognized cheeses, positioning them as promising dairy products for both local consumption and broader markets.

4. I found that traditional Kosovan beef products, including dry beef meat, beef ham, and beef sausage, are nutritionally rich and distinct in composition. I demonstrated that dry beef meat and beef ham had exceptionally high protein contents (49.00% and 44.12%, respectively) and superior essential amino acid proportions (>47%), exceeding values reported in international studies, while beef sausage, though lower in protein (36.74%), contained higher leucine and alanine, which are important for muscle synthesis and energy metabolism. I proved that free amino acid profiles varied significantly, with dry beef meat rich in glutamic acid and lysine, beef ham dominated by alanine and aspartic acid, and beef sausage containing elevated alanine and leucine, all contributing to flavor complexity and nutritional diversity. I also showed that biogenic amines were detected only in very low amounts, confirming product safety, while the fatty acid profile of beef sausage revealed high oleic acid (34.37%), a heart-healthy monounsaturated fatty acid, alongside palmitic and stearic acids. These findings are important because they demonstrate that traditional beef products of Kosovo are not only safe but also provide proteins of high biological value, essential and functional amino acids, and favorable fatty acid components, supporting both their nutritional relevance and their cultural heritage value.

6. PUBLICATIONS

Articles published in *International Journals related to PhD topic*

1. Berisha, K., Bytyçi, H., Mednyánszky, Zs., Kiss, E., Simon Sarkadi, L. (2021) Amino acid and biogenic amine composition of busha cattle milk. Acta Alimentaria, 50(1), 144-152.
2. Berisha, K., Gashi, A., Mednyánszky, Zs., Bytyqi, H., Simon Sarkadi, L. (2023) Nutritional characterization of homemade beef sausage based on amino acid, biogenic amines, and fatty acid composition. Acta Alimentaria, 52(3), 439-448, DOI: 10.1556/066.2023.00071
3. Berisha, K., Mednyánszky, Zs., Bytyci, H., Simon Sarkadi, L. (2023)Amino acid and fatty acid composition of soft cheeses. EC Nutrition, 18(9) 2023, pp. 1-12. https://doi.org/10.1007/s00217-025-04683-4
4. Berisha, K., Mednyánszky, Zs., Berisha, A., Tari, T., & Bytyqi, H. (2024).Evaluation of amino acid composition in different types of burgers with a meat patty and meat analog. Acta Agriculturae Slovenica, 20(4), 1–11. I: https://doi.org/10.14720/aas.2024.120.4.18282

Articles Published in International Journal (other)

5. Bytyqi, H., Berisha, K., Hamidi, A., Sylejmani, D., & Thaqi, M. (2017).A survey on traditional cheese production and diversity in Kosovo. Bulgarian Journal of Agricultural Sciences, 23(1), 42–48.
6. Berisha, K., Bytyqi, H., Mehmeti, H., Hamidi, A., & Sylejmani, D. (2018).Technological process of preparation of meat sheep in traditional way in Kosovo. Bulgarian Journal of Agricultural Sciences, 24(3), 515–520.
7. Berisha, K., Thaqi, M., & Bytyqi, H. (2018).Traditional Cottage Cheese production in Kosovo. Food Science and Applied Biotechnology, 1(2), 125–130. DOI: https://doi.org/10.30721/fsab2018.v1.i2.34
8. Adeniyi, O. O., Simon, R., Bytyqi, H., Kugler, W., Mehmeti, H., Berisha, K., Simčič, M., Magdy, M., & Lühken, G. (2022).Capturing genetic diversity and selection signatures of the endangered Kosovar Balusha sheep breed. Genes (MDPI), 13(5), 866. DOI: https://doi.org/10.3390/genes13050866
9. Hasani, A., Kokthi, E., Zoto, O., Berisha, K., & Miftari, I. (2022).Analyzing consumer perception on quality and safety of frozen foods in emerging economies: Evidence from Albania and Kosovo. Foods (MDPI), 11(9), 1247. DOI: https://doi.org/10.3390/foods11091247
10. Berisha, K., Mehmeti, H., Bytyqi, H., & Yilmaz, I. (2023).A traditional meat product of Kosova — Kaverma. European Journal of Science and Technology, 52, 64–70. DOI: 10.5281/zenodo.10256156

11. Hasani, A., Kuliçi, M., Ymeraj, A., Bytyqi, H., & Berisha, K. (2024). Nutritional status of children attending kindergarten in Kosovo. Food Research, 8(4), 420-428. DOI: https://doi.org/10.26656/fr.2017.8(4).336
12. Bytyqi, H., Kunili, I. E., Mestani, M., Antoniak, M. A., Berisha, K., Dinc, S. O., Guzik, P., Szymkowiak, A., & Kulawik, P. (2025). Consumer attitudes towards animal-derived food waste and ways to mitigate food loss at the consumer level. Trends in Food Science & Technology, 159, 104898. DOI: https://doi.org/10.1016/j.tifs.2025.104898

Articles published in international conference proceedings

1. Berisha, K., Mednyánszky, Zs., Bytyçi, H., Simon Sarkadi, L. (2020)
   Comparison of biogenic amines and amino acid composition in the fresh and dry traditional sausage of Kosovo. IV. Ifjú Tehetségek Találkozója – SZIEntific Meeting for Young Researchers conference. 7th December, 2020, Budapest, Hungary (online), ISBN 978 963 269 937 0**,** pp. 105-110.
2. Berisha, K., Mednyánszky, Zs., Bytyçi, H., Simon Sarkadi, L. (2021)

   Fatty acid composition of different soft cheeses. Proceedings of János Lippay - Imre Ormos - Károly Vas (LOV) Scientific Meeting, Eds. Fodor, M., Bodor-Pest, P., Deák, T., MATE Budai Campus, Budapest, 2022. pp. 104-108. ISBN 978-963-269-988-2

3. Berisha, K., Shala, T., Alushaj, F., Berisha, A., Bytyçi, H. (2021)

   Managing of household food waste to achieve sustainable food security – A review. *Proceedings of the 8th VUA YOUTH Scientific Session – Challenges of Nowadays in the Light of Sustainability*, Hungarian University of Agriculture and Life Sciences, Gödöllő, Hungary under the auspices of the Visegrad University Association on November 26, 2021 (online).

Abstracts of presentations published in international conference proceedings

1. Berisha, K., Bytyqi, H., Kiss, E., Simon Sarkadi, L. (2018)
   Amino Acid Composition of Milk Proteins of Busha Breed Cattle of Kosovo. Book of Abstract: 3rd FoodConf, International Conference on Food Science, Technology and Innovation, 29 November- 1 December, 2018, Budapest, Hungary. P108, pp. 86 (ISBN 978-963-269-794-9).

2.Berisha, K., Mednyánszky, Zs., Bytyçi, H., Simon Sarkadi, L**.** (2019)

   Comparison on Quality Parameters in Soft Cheeses. XX EuroFoodChem, Porto, Portugal 17-19 June 2019. Book of Abstract (eds. M. Beatriz P.P. Oliveira, Joana S. Amaral, Manuel A. Coimbra) ISBN 978-989-8124-26-5, CA_P26 pp.165

3. Berisha, K., Mednyánszky, Zs., Bytyçi, H., Simon Sarkadi, L. (2021)

Comparison of biogenic amines and amino acid composition in the fresh and dry traditional sausage of Kosovo. In: Fodor, M.; Bodor-Pesti, P.; Deák, T. (szerk.) IV. Ifjú Tehetségek Találkozója – SZIEntific Meeting for Young Researchers conference. 7th December, 2020, Budapest, Hungary, ISBN 987-963-269-937-0, pp.105-110.

4. Berisha, K., Mednyánszky, Zs., Bytyçi, H., Simon Sarkadi, L. (2021)

Determination of Protein Quality of Dried Beef Meat and Ham. III Young Researchers' International Conference on Chemistry and Chemical Engineering (YRICCCE III), Cluj Napoca, May 4-5, 2021 (online) Book of program and abstract pp. 42 (O26)

5. Berisha, K., Bytyçi, H., Mednyánszky, Zs., Simon Sarkadi, L. (2021)

Amino acid composition of Rugova Cheese, XXI EuroFoodchem, November 22-24, 2021, Book of Abstract, pp.78, ISBN 978-989-8124-34-0

6. Berisha, K., Mednyánszky, Zs., Bytyçi, H., Simon Sarkadi, L. (2022)

Fatty acid composition of different soft cheeses Lippay János - Ormos Imre - Vas Károly Scientific Conference, 29th November 2021, Budapest. Book of Abstract, pp.28, ISBN 978-615-01-3738-4

7. Berisha, K., Gashi, A., Mednyánszky, Zs., Bytyqi, H., Simon Sarkadi, L**.** (2022)

Fatty acid composition of traditional sausage produced in Kosovo. 4th FoodConf, International Conference on Food Science, Technology and Innovation Conference, 9-11 June, 2022, Budapest, Hungary. Book of Abstracts. Eds. Szalóki –Dorkó, L., Vatáné Vidács, I., Kumar, Pradeep, Pomázi, A., Gere, A. pp. 68. ISBN 978-615-01-5422-0

8. Berisha, K., Mednyánszky, Zs., Simon Sarkadi, L. (2023)
Amino acid composition of sharri cheese Magyar Táplálkozástudományi Társaság, XI PhD Konferencia, 2023. május 5. Budapest. Előadások összefoglalói (ISBN 978-615-5606-14-4) pp. 14.

9. Berisha, K., Mednyánszky, Zs., Bytyci, H., Simon Sarkadi, L. (2023)
Determination of protein quality of beef sausage. 4th Young Researchers' International Conference on Chemistry and Chemical Engineering (YRICCCE IV), 1-3 June, 2023, Debrecen, Hungary. Book of Abstract (ISBN 978-615-6018-16-8) pp. 34.

10. Berisha, K., Bytyqi, H., Mehmeti, H., Sylejmani, D., Hamidi, A. (2017)
Traditional cottage cheese production and its diversity in Kosovo. 8th International Balkan Animal Science Conference (BALNIMALCON 2017), 6–8 September, 2017, Prizren, Kosovo. Book of Abstracts, 1/184.

11. Berisha, K., Bytyqi, H., Mehmeti, H., Sylejmani, D., Hamidi, A. (2017)
Technological process of preparation of meat sheep in traditional way in Kosovo. 8th International Balkan Animal Science Conference (BALNIMALCON 2017), 6–8 September, 2017, Prizren, Kosovo. Book of Abstracts, 1/185.

12. Berisha, K., Hyseni, A., Hajdini, E., Bytyqi, H., Hamidi, A., Sylejmani, D. (2018).

Food diversity, nutritional value, and influence of socio-economic factors on the quality of traditional diets in Kosovo. International Conference on Sustainability, 23 April, 2018, Budapest, Hungary. Book of Abstracts, 1/23.

13. Berisha, K., Shala, T., Alushaj, F., Berisha, A., Bytyçi, H. (2021).
Managing of household food waste to achieve sustainable food security – A review. 8th VUA Conference – Challenges of Nowadays in the Light of Sustainability, 26 November, 2021, Gödöllő, Hungary. Book of Proceedings, pp. 89–94.

14. Gashi, A., Berisha, K., Pásztor-Huszár, K. (2021).
Effect of ripening period on the amino acid composition of Sharri cheese. Lippay–Ormos–Vas (LOV) Scientific Meetings, 29 November, 2021, Budapest, Hungary.

15. Hasani, A., Zogaj, M., Berisha, K., Hasani, E., Kovacs, Z. (2023).
The role of honey's botanical and geographical origin in its concentration of macro and micro minerals. 5th International Conference on Biosystems and Food Engineering, 9 June, 2023, Budapest, Hungary.

16.Gashi, A., Berisha, K., Kenesei, G., Mednyánszky, Zs., Simon-Sarkadi, L. (2023).
Effect of high hydrostatic pressure on free amino acids and biogenic amines in sausages during storage. XXII EuroFoodChem, 14–16 June, 2023, Belgrade, Serbia.

17. Mardjokic, A., Berisha, K., Koris, A., Vatai, G., Bánvölgyi, Sz. (2024).
Ultrasound-assisted extraction process as a novel technology for the extraction of bioactive compounds from olive pomace. 21st Wellmann International Scientific Conference, 18 April, 2024, Szeged, Hungary.

18. Berisha, A., Bán, R., Berisha, K., Skornyik, A. (2024).
Examination of the virulence and aggressiveness of Hungarian sunflower downy mildew (Plasmopara halstedii (Farl.) Berl. et de Toni) isolates. First International Student Conference on Agriculture, Food Sciences, and Veterinary Medicine, 12 July, 2024, Prishtina, Kosovo.

19. Vllasa, A., Hajdari, E., Ibrahimi, F., Ibrahimi, E., Berisha, K., Bytyçi, H., Gashi, A. (2024).
The impact of dietary habits on food waste in Kosovo. First International Student Conference on Agriculture, Food Sciences, and Veterinary Medicine, 12 July, 2024, Prishtina, Kosovo.

20. Ibrahimi, E., Ibrahimi, F., Hajdari, E., Vllasa, A., Berisha, K., Bytyçi, H., Gashi, A. (2024).
The relationship between dietary recommendations and food waste in Kosovo. First International Student Conference on Agriculture, Food Sciences, and Veterinary Medicine, 12 July, 2024, Prishtina, Kosovo.

21. Bytyçi, H., Ibrahimi, F., Ibrahimi, E., Berisha, K., Vllasa, A., Hajdari, E. (2025).

The role of shopping list planning in food waste: A Kosovo perspective. CA20133 Conference on International Sustainable Resource Recovery Strategies Toward Zero Waste (FULLRECO4US), 5–7 May, 2025, Basel, Switzerland.

22. Berisha, K., & Thaci, L. (2025).
Measuring and mitigating food loss and waste: A comprehensive review on quantification methods and preventative strategies. Second COST CA22134 FoodWaStop Meeting, 4–5 March, 2025, Córdoba, Spain.

23. Bytyçi, H., Hajdari, E., Ibrahimi, F., Ibrahimi, E., Berisha, K., Vllasa, A., Gashi, A. (2025). Food waste as a result of food product marking: A Kosovo perspective. Second COST CA22134 FoodWaStop Meeting, 4–5 March, 2025, Córdoba, Spain.

REFERENCES

Bunevski, G., Nikitović, J., & Saltamarski, Z. (2016). Conservation of the genetic material of Macedonian Busha cattle. Acta Agriculturae Serbica, 21(41), 17–24. https://doi.org/10.5937/AASER1641017B

Bytyqi, H., Vehapi, I., Rexhepi, S., Thaqi, M., Sallahi, D., Mehmeti, I., Bytyqi, H., Vehapi, I., Rexhepi, S., Thaqi, M., Sallahi, D., & Mehmeti, I. (2013). Impact of Bacterial and Somatic Cells Content on Quality Fresh Milk in Small-Scale Dairy Farms in Kosovo. Food and Nutrition Sciences, 4(10), 1014–1020. https://doi.org/10.4236/FNS.2013.410132

Deaconu, A., Sherwood, S., Paredes, M., Berti, P., López, P., Cole, D., Muñoz, F., Oyarzún, P., Borja, R., Aizaga, M., Estrella, E., April-Lalonde, G., Mercille, G., & Batal, M. (2021). Promoting traditional foods for human and environmental health: lessons from agroecology and Indigenous communities in Ecuador. BMC Nutrition, 7(1), 1–14. https://doi.org/10.1186/S40795 020-00395-Y/TABLES/4

Haug, A., Høstmark, A. T., & Harstad, O. M. (2007). Bovine milk in human nutrition – a review. Lipids in Health and Disease 2007 6:1, 6(1), 1–16. https://doi.org/10.1186/1476-511X-6-25.

Krasniqi, F., Bytyqi, H., Kamberi, M., Mehmet, H., & Kastrati, R. (2013, May). Milk production of bush cow breed kept in pasture. The 1st International Conference on "Research and Education – Challenges Towards the Future" (ICRAE2013).

Linares, D. M., MartÍn, M. C., Ladero, V., Alvarez, M. A., & Fernández, M. (2011). Biogenic amines in dairy products. Critical Reviews in Food Science and Nutrition, 51(7), 691–703. https://doi.org/10.1080/10408398.2011.582813

Pereira, P. C. (2014). Milk nutritional composition and its role in human health. Nutrition, 30(6), 619–627. https://doi.org/10.1016/J.NUT.2013.10.011 Pereira, P. M. de C. C., &

Peulić, T., Marić, A., Maravić, N., Novaković, A., Kalenjuk Pivarski, B., Čabarkapa, I., Lazarević, J., Šmugović, S., & Ikonić, P. (2023). Consumer Attitudes and Preferences towards Traditional Food Products in Vojvodina. Sustainability 2023, Vol. 15, Page 12420, 15(16), 12420. https://doi.org/10.3390/SU151612420

Rocillo-Aquino, Z., Cervantes-Escoto, F., Leos-Rodríguez, J. A., Cruz-Delgado, D., & Espinoza-Ortega, A. (2021). What is a traditional food? Conceptual evolution from four dimensions. Journal of Ethnic Foods, 8(1), 1–10. https://doi.org/10.1186/S42779-021-00113-4/FIGURES/2

Ruiz-Capillas, C., & Herrero, A. M. (2019). Impact of Biogenic Amines on Food Quality and Safety. Foods 2019, Vol. 8, Page 62, 8(2), 62. https://doi.org/10.3390/FOODS8020062