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SPECIFICITY OF GEOGRAPHIC AREA AS ONE OF THE PREREQUISITES FOR THE DENOMINATION OF THE GEOGRAPHIC ORIGIN

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ABSTRACT: Defined geographic area with their specifity regarding unique plant species and autochthonous breeds – Sjenica and Pirot Pramenka, among traditional cheese-making practice of local community, are prerequisite for protection of denomination of geographic origin of Sjenica cheese and Pirot kachkaval.
Sjenica cheese belongs to the group of soft, white cheeses in brine and it is produced as autochthonous product made of sheep milk, on the territory of Sjenica-Pester Plateau.
Pirot kachkaval is firm cheese of steamed curdle produced from mix of sheep and cow milk (1 : 2 ratio) on the territory of Stara Planina Mountain.
These are geographical areas where production takes place in village households/farms and on mountains in summer cottages (katun, bacija), which is characteristic of craft dairy processing. Specific traits of traditional manufacturing of Sjenica cheese and Pirot kachkaval derive from climatic conditions, characteristic grass associations of the specific mountain region and milk from autochthonous populations (Sjenica and Pirot sheep). In order to maintain the traditional manufacturing technology of these native products and to have organized production, it is necessary to protect the geographical origin of these products.
***Key words**: specificity of geographic area, Sjenica cheese, Pirot kachkaval*

INTRODUCTION

European Community, in its Regulation (EEC) No. 2081/92, has defined the concept of »Protected Denomination of Origins« (PDOs) – denomination of origin, and »Protected geographical Indications« (PGIs) – geographic indication for products whose quality derives from the uniqueness of the geographic area of their origin, including human and natural factors, and which are produced and processed in defined, unique geographic areas (Mijačević et al., 2005).
From this aspect we analyzed the specificity of thge geographic area, its pedological, climatic, floristic characteristics and breed structure in sheep breeding, for the purpose of obtaining of the denomination of the geographic origin for Sjenica cheese and Pirot kachkaval.

MATERIAL AND METHOD

Investigation included survey of the traditional production of Sjenica cheese and Pirot kachkaval, which comprised survey of 12 households/farms on the territory of Sjenica-Pešter Plateau and Stara Planina Mountain, randomly selected. Survey consisted of questions relating to main elements of traditional production of Sjenica cheese and Pirot kachkaval. On Pešter Plateau the following locations were selected: Štavalj, Karajukića bunari, Krstač, Breza, Leskova, and on the territory of Stara Planina mountain, the study was carried out in following villages: Dojkinci, Brlog, Jelovica, Visočka Ržana and Rsovci. Eventually, the following analyses of samples of Sjenica cheese and Pirot kachkaval were carried out:

- Determination of the water content in fat free matter of cheese by using the following calculation: %WFFMC=%H_2O/(100-%MM)x100
- Determination of the milk fat content by method according to Van-Gulik (Carić et al.,2000)
- Calculation of the milk fat content in dry matter (FinDM)
- Determination of pH value by using the pH-meter with combined electrode.

RESULTS AND DISCUSSION

Characteristics of Sjenica – Pešter Plateau and conditions for autochthonous production of Sjenica cheese

Sjenica – Pešter Plateau is located in the south-western part of Raška region and in the north it occupies smaller part of Old Vlah. In the east it borders with Novi Pazar low land and Donji Pešter, in the south with lower Kolašin, and in the west with central Polimlje. It is surrounded with mountain ranges of Golija, Javor, Jadovnik, Ozren, Žilindar, Ninaja and Pometenik. This area represents a unique mountain range, with numerous valleys, ravines, fields, which are located between 1000 and 1350 m above sea level. Pešter is an area with typical carst field and morphological forms which are characteristic of carst: places where rivers sink into earth, lost rivers, waters and caves – so called “pešters“.

This Plateau has continental climate of typical of mountain Plateaus, characterized by long retention of low temperatures between the surrounding mountains, and winters last very long time, because of poorly developed forest strips, with lot of snow and wind, with strong snow storms and great snow drifts. Summers are fresh, short lasting and windy with distinct difference in temperatures between day and night time. Geological foundation consists of gravel, sand and clay, which from the aspect of vegetation structure indicates that meadows and pastures are predominant.

In the area of Sjenica-Pešter Plateau, main branch of economy is agriculture, i.e. livestock production, dairy farming. Mainly sheep (approx. 18000 heads) and cattle (total of 16437 heads, of which 12000 are cows) are reared (Petrović, M. M, 1993). Dominant sheep breed is Sjenica sheep. This is the largest Pramenka, of triple production abilities, it has white colour fleece all over its body except on the face and lower legs. The body is medium-developed, deep with insufficiently expressed widths. Head is of medium length with typical black circles around eyes. Milk performance ranges from 80-130 l in lactation of 180 days. This sheep breed is suitable for rearing in all areas and systems, extensive and intensive, it can be used in production of milk and meat (Petrović, P. M., 2007).

Rearing of livestock is different in winter and summer. In summer, livestock grazes on meadows and pastures which are either state owned or in private ownership. After the vegetation period, from November to May, nutrition of sheep is based on hay from meadows (grass-leguminous mixtures), where high quality cultures are predominant such as Timothy grass, rye grasses, alfalfa, red clover, etc. In addition to hay, during winter, also concentrated feeds are used which livestock farmers prepare them selves by grinding the cereals/grain (barley, oats, wheat) produced on their own field crop surfaces. Structure of plant associations in this area has significant impact on the specific quality of Sjenica cheese. Table 1 presents floristic composition of pastures on location Vrujci, on Sjenica – Pešter Plateau, 1158 m above sea level.

Share of plants belonging to plant family Poaceae – grasses on this location was 48,40%, and shares of leguminous plants and other species were 9,60% and 42,00%, respectively. In case of grasses, the highest share was determined for plants of good and medium quality, from the aspect of livestock nutrition.

Table 1. Floristic composition of pastures on location Vrujci, on Sjenica – Pešter Plateau (Vučković et al., 2004)

Fabaceae,%	Poaceae,%	Other species,%
Genista sagittalis *Lathyrus latifolius* *Lotus corniculatus* *Trifolium pratense* *Vicia cracca* *Trifolium alpestre* *Trifolium panonicum* *Trifolium montanum*	*Cynosurus cristatus* *Anthoxantum odoratum* *Arrhenatherum elatius* *Briza media* *Danthonia calycina* *Bromus raceomosus* *Agrostis vulgaris* *Dactylis glomerata* *Festuca rubra* *Festuca ovina* *Phleum pratense*	*Achilea milefolium* *Alectrolophus minor* *Cirsium acaule* *Dianthus deltoides* *Filipendula hexapetala* *Galium verum* *Leucanthemum vulgare* *Moencia mantica* *Poentilla recta* *Ranunculus sp. Rumex acetosa* *Stellaria graminea* *Thymus serpyllum* *Leontodon autumnalis* *Silene vulgaris* *Stachus officinalis* *Plantago lanceolata* *Campanula patula*
Total,%	Total,%	Total,%
9.6	**48.4**	**42.0**

On defined/determined geographic area of Sjenica – Pešter Plateau, which is specific in regard to climate, phytocenological composition of pastures, sheep population and tradition, the Sjenica cheese is produced. It belongs to the group of soft, white cheeses in brine, and it is autochthonous cheese produced from raw sheep milk. Production takes place in households/on farms and also in the mountains in so called summer cottages (katuns, bačije), which is typical of home production and processing of milk. Since sheep are kept around these summer cottages from May to November, ripening process of Sjenica cheese lasts from 5 to 7 months. Low pH value and long ripening process prevent development of pathogen microorganisms and contribute to safety of this cheese. In Table 2, the chemical composition of Sjenica cheese is presented.

Table 2. Physical-chemical composition of Sjenica cheese

Parameters	**MFFB,%**	**FDM,%**	**pH**
Number of samples	12	12	12
X	73.32	58.42	4.47
SD	2.9	1.74	0.07
CV	4.30	2.30	1.5

Legend: **MFFB** *– water in fat free matter; FDM – fat in dry matter*

Data presented in Table 2 show the average water content in fat free dry matter of cheese (MFFB) of 73,32% %, hence it belongs to the group of soft cheeses, and in regard to content of fat in dry matter (58,42%), it belongs to the group of full fat cheeses (Codex Alimentarius, 2000). Average pH value was 4,47 indicating acid environment which is not suitable for development of pathogen microorganisms. Analyzed cheese samples had adequate sensory characteristics: cheese slices of adequate form, no deformities or damages, and typical white colour. Cheese slice was typical, medium firm, and cross section had moderate number of holes. Odour/smell was also typical, clearly indicating sheep milk, and taste was pleasant and dairy – sour. Since Sjenica cheese is characterized by a distinctive and recognizable

richness of the taste, aroma, odour, this product is in demand and appreciated outside the territory where it is produced.

Characteristics of Stara Planina Mountain and conditions of autochthonous production of Pirot kachkaval

Stara Planina Mountain constitutes far western branches of the Balkan mountain system, stretching from the Black Sea to Vrška čuka, the total length of 530 km. In Serbia, it extends with its slopes from Zaječar to Dimitrovgrad, covering the far eastern part of Serbia. In geological aspect, all formations are represented on this mountain, from Palaeozoic to the most recent formations. In completely defined geographic area/territory of Stara Planina Mountain (Pirot, Dimitrovgrad), in conditions of specific climate, phytocenological composition of pastures, Pirot kachkaval is produced using the milk from Pirot sheep.

Climatological picture of Stara Planina Mountain is very complex and, depending on the altitude, is represents transition between moderate continental and mountain climate. Diverse geological-petrographic, morphological, climatic, hydrographical and other factors have influenced forming of different pedological types of productive soil, with various physical, chemical and biological properties.

The diversity of geographical and ecological/environmental factors of Stara Planina Mountain has caused the specificity of its plant and animal life (Petrović, 1997).

Table 3 shows the presence/share of plant species in pastures of certain localities of Stara Planina Mountain.

Table 3. Presence/share of plant species in pastures of Stara Planina Mountain (Tomić et al., 2003)

Location (a.s.l.)	Fabaceae,% Leguminous plants	Poaceae,% Grasses	Other species,%
Rsovci, 700m a.s.l.	*Trifolium pratense* *Trifolium repens* *Lotus corniculatus* *Lathurus sativus* *Vicia sp.* **39,36**	*Festuca rubra* *Festuca ovina* *Lolium italicum* *Poa violacea* **45,81**	**14,83**
Vrelo, 750m a.s.l.	In traces	*Anthoxantum odoratum* *Festuca arundinacea* *Festuca ovina* *Lolium italicum* *Agrostis capillaris* **78,80**	**21,20**
Brlog ,800m a.s.l.	*Trifolium pratense* *Trifolium repens* *Lathurus sp.* *Vicia sp.* **42,40**	*Nardus strictae* *Festuca arundinacea* **44,00**	**13,60**
Dojkinci,900m a.s.l.	*Trifolium repens* *Trifolium pratense* *Trifolium campestre* **15,60**	*Festuca ovina* *Nardus strictae* *Agrostis capillaris* **47,80**	**36,66**

In the floristic composition of the pasture, leguminous plants represent the group of plants very important for animal nutrition and increase of production of milk and meat. The following useful leguminous plants determined in studied areas were most represented: Trifolium pratense, Trifolium repens, Trifolium campestre, Trifolium montanum, Lotus corniculatus, Vicia craca, etc., and their share ranged from 0 to 42,40%. Share of grasses ranged from 44,00-82,31%, whereas other plant species where presented in the range from 13,60-36,66%.

As the result of exceptional natural conditions, livestock production has centuries old tradition. In the structure of animal population, due to specific natural and ecological/environmental factors, sheep breeding has the leading position. The most famous products from this unpolluted area are: Pirot kachkaval, Pirot lamb and Pilot kilim (Petrović, P. M, 1993). First »wheels« of Pirot kachkaval set out into World were manufactured on Stara Planina Mountain (Petrović, 2007). Mastery of making kachkaval in this area dates from the time of nomad livestock keepers, so called «Crnovunci« who lived on the pastures of Stara

Planina Mountain from the end of the 19th century until the third decade of the twentieth century. Indigenous production of Pirot kachkaval is the result of many years of developing of the production technology through generations.
The specificity of this autochthonous product (Pirot kachkaval), in addition to climate, soil, botanical composition of pastures and meadows, is under the considerable influence of sheep population, whose milk is used as raw material for manufacturing of said products, as well as rearing conditions (Štimac et al., 2003). In regard to sheep breed structure, predominant breed is Pirot Pramenka. This is an old sheep breed adapted to conditions of Stara planina Mountain and Pirot area, which, in time, and due to improved nutrition and rearing, has realized significant genetic progress. Pirot Pramenka is breed of triple production ability, it has fleece of white colour all over the body, except its face and lower parts of legs. The body is medium-developed, with insufficiently expressed widths and depths. The head is of medium width and length. Hair covering the face is white or grey-spotted. Milk performance is good and it ranges from 70-100 l in lactation of 180 days. (Petrović, P. M., 2007). Quality of sheep milk among other things depends on the climatic conditions, grazing and variations caused by metabolic status of the sheep (Sevi et al., 2004). Also, yield and chemical composition of milk depend on the genotype, lactation stage and health condition of animals (Mioč et al., 2009). Pirot kachkaval is produced from mixture of raw sheep and cow milk (ratio 1: 2). Production takes place in settlements high in the mountains, so called »bačije« according to traditional technology. It is cheese from steamed curdle and technological procedure, in addition to standard stages (curdling, curdle treatment), there are also following stages: ripening and steaming of ripe curdle which takes place at t^0 85-90^{0}C, in duration of several minutes. This heat treatment of curdle prevents the development of undesirable microorganisms. The quality of Pirot kachkaval obtained in this way, expressed in physical-chemical parameters, is presented in Table 4.

Table 4. Physical-chemical characteristics of Pirot kachkaval

Parameters	**MFFB,%**	**FDM,%**	**pH**
Number of samples	12	12	12
X	47.07	48.43	5.46
SD	1.30	1.82	0.03
CV	2.70	3.20	0.50

Recently, number of cheese consumers who demand high quality exclusive products produced in small quantities and by implementation of „traditional“ technology has been increasing. Cheeses produced in this way have richer aroma compared to industrial cheeses produced according to strictly defined technology and in controlled production conditions, therefore the influence of raw material used, micro flora and creativity of the producer are reduced to minimum (Štimac et al., 2003). Therefore, indigenous production of Pirot kachkaval is of great importance for domestic and foreign market. In order to maintain and preserve the traditional technology and have organized production, it is necessary to protect the geographic indication of these products (Jovanović et al., 2004).

CONCLUSION

Determination of the geographic area of the Sjenica-Pešter Plateau and Stara planina Mountain, as well as specificity of these areas due to micro-climatic factors, terrain and geological characteristics, structure of the vegetation and phytocenological composition of the pastures, as well as breed structure and existing tradition in cheese making, are arguments for obtaining of the geographic indication of origin for Sjenica cheese and Pirot kachkaval.

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