CHAPTER 12

Food, nutrition, and health in Serbia

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12.1 Introduction

The Serbian food and diet were based on autochthonous and locally adopted breeds and plant varieties. With the progress of globalization over the last century, indigenous plant and animal species have lost their primacy and were replaced by exotic, which were admired mostly for the quantities they were capable to produce in local conditions. Many, especially younger people, have become accustomed to fast-food and widely available refined cereal products, although ethnic dishes prepared according to traditional recipes, which deserve attention as a part of cultural heritage, have never ceased to be a part of daily meals at homes and for special occasions. In addition to this, ethnic food has been, due to the favorable geostrategic position of Serbia, influenced by habits and preferences of conquerors for centuries, and thus, the selected and herein presented food recipes reflect the collision of the West and East.

12.2 Historical overview

As in other parts of the world, Serbian cuisine was mainly based on local, indigenous species until World War I when new foods were introduced and when intensive imports of ingredients that could be considered exotic for this region began. For instance, the well-known indigenous cattle breed Busha, which was dominant in almost all Balkan countries until the middle of the last century (Bunevski, Nikitović, & Saltamarski, 2016), nowadays modestly contributes just to local agritourism (Đorđević Milošević & Milovanović, 2013). Nowadays, the production of meat is based on high productive hybrids and exotic pig and cattle breeds in lowlands, as well as indigenous sheep and goat species, accompanied with more versatile local cattle crossbreeds in highlands. Busha has been replaced by more productive and specialized breeds, such as Simmental or Holstein-Friesian cattle. Similar to the countries in the region, the inhabitants of Serbia mostly use cow's milk, while sheep and goat's milk is also present, but in much smaller quantities.

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Over the last 20 years, large-scale farming has become more prevalent, yet small farms and green markets continue to play an important role in providing food in urban areas. The agriculture in Serbia is mainly based on imported selected hybrids, although around 200 autochthonic species of crops, vegetables, and fruits are still in use (Dajic Stevanovic & Djordjevic Milosevic, 2018). The import of high-yielding crop varieties and hybrids has led to the erosion of local biodiversity and the fact that ancient, indigenous species are nowadays sporadically grown in Serbia, occupying less than 1%–2% of the total agricultural land (Dajic Stevanovic & Djordjevic Milosevic, 2018). The areas under indigenous plant breeds continue to decrease due to the lack of public awareness and lack of plant genetic resources for management and conservation. In contrast to this, public awareness of the importance of animal genetic resources is surprisingly high, which is primarily the result of the government conservation program providing subsidies and encouraging activities of the media that has been promoting nutritional qualities and functionality of foods derived from certain breeds over the last two decades (Dajic Stevanovic & Djordjevic Milosevic, 2018).

12.3 Geography and the natural agricultural landscape

Serbia covers 88,499 km^2 of the Western Balkans, bordering with Bosnia and Herzegovina, Croatia, Hungary, Romania, Bulgaria, Northern Macedonia, Albania, and Montenegro. It consists of Central Serbia and two autonomous provinces—Vojvodina, and Kosovo and Metohija. According to the Statistical Office of the Republic of Serbia (2019), Serbia has 6,945,235 inhabitants belonging to different nations and religions, which to some extent have had an impact on the formation of nutrition patterns and local specialties. The major ethnic group in Serbia are Serbs (83.32%) and, accordingly, most of the population declare themselves as Christian Orthodox (84.59%).

The part of the territory of the Republic of Serbia covers the Dinaric, Carpathian-Balkan, and Scard-Pind mountain massifs, while its northern region lies in the Pannonian plain. The four rivers that cross the territory of Serbia, the Danube, Sava, Drina, and Morava represent the natural boundary of the gastronomic zones of Vojvodina, the Morava Valley, Eastern, Western and Southern Serbia. Ranging from the rich, fertile plains of Vojvodina to the rocky slopes on mountain terrains, agroecological conditions have been favorable for different agriculture crops and animals breeding.

12.4 Culture and traditions

As in other cultures and societies, eating habits of Serbian people considerably vary in different social classes in urban and rural surroundings, as well as during regular days, religious and public holidays. In the early 19th century, the household life in Belgrade was organized to suit the needs of men. As they spent most of the day outside, dinner

was the second and main meal, consisting of several hearty dishes. In every street in Belgrade, there was at least one bakery where people used to take casserole, moussaka, cheese pie or *gibanitsa*, lambs, and turkeys for roasting. They also used vegetables, such as onions, potatoes, cabbage, beans, green beans, chards, nettles, mushrooms, peppers, and cucumbers; bread was made of wheat, barley or corn flour, and using pork lard for cooking was restricted because the Turks did not allow pig farming in towns. During the meal, it was usual to have a coffee with Turkish sweets, such as baklava, vanilla cakes, Turkish delight, or fruit or rose petal preserves. Over the past two centuries, the poor in Serbia have fed on bread from oats, rye (NTOS, 2013), and later corn, onions, cheese and yogurt, and meat has been served only on holidays. In more indigent households, all family members have been eating from one dish. Meal patterns have been affected by seasons and agricultural production. A plenty of fresh vegetables and fruits have been eaten from late spring to early autumn, while in winter the diet has been more homogenous with a greater share of fats.

The Orthodox church expects its believers to fast, which is believed to contribute to physical change and spiritual recovery by its frequency (one or more days) and its quality. Religious fasting means abstaining from food of animal origin, besides fish. Fasting can last for a day, every Wednesday and Friday, or more days—the Great Lent before Easter, lasting for 7 weeks, or the Nativity Fast, lasting for 6 weeks prior to Christmas. Over the past two centuries, the diet of the poor and population living in rural areas during the fasts has consisted mostly of vegetables, corn bread, and lean beans, but with no oil, for oil has been expensive and used primarily for the preparation of *slava* (UNESCO, 2014) during a period of fasting. The wealthy families used to serve fish soup, fish stew, grilled fish and other specialties. Nowadays, especially in urban areas, fasting is equally practiced for both religious beliefs and health-related reasons (Stanišić et al., 2018).

Today, the majority of the older population in Serbia has its nutrition based on traditional dishes. Nevertheless, modern lifestyle, increased stress, lack of time to prepare food at home, globalization, bad habits, and lack of knowledge about proper nutrition, as well as a great number of fast-food restaurants and stands, have led to the situation in which younger generations consume fast-food, bakery products, and soft drinks more often, thus causing increased numbers of obese youth. It has also been recorded that traditionally prepared cooked meals are being substituted for processed, industrial food. Also, all age groups are being influenced by TV advertisements and the Internet. Citizens of Serbia most often buy grilled meat, mainly pork that accounts for 70%–80% of consumed meat, at numerous fast-food stands (Baltic et al., 2018).

12.5 Typical foods and food products

In the following few pages, several traditional Serbian recipes will be presented and the details regarding their origin and content will be considered.

12.5.1 Belmuž (Dish of corn and cheese)

History and origin of product: Milk and grain-based diets were common for communities living from livestock farming, such as those in the Balkan Mountains. The emergence of *Belmuž*, typical for Eastern Serbia, dates back to the 16th century when corn was introduced (Babic, Ivanovic, & Babic, 2012) and its local availability and use have increased since then. It is believed to have been spread within the Balkans by the Vlachs (migratory tribes) (Ivanovska et al., 2020). In the mountains where the Vlachs were not present, other similar milk-corn dishes were locally developed by the local inhabitants, such as *kačamak*, *cicvara*, etc.

Use: *Belmuž* used to be a main dish for shepherds and physically active, hard-working population in rural areas. Nowadays, it can be served as a warm appetizer, breakfast or a main course, mostly in traditional restaurants.

Composition and preparation: Belmuž is made of white corn "osmak" ground on a stone mill and whole fresh unsalted cheese curd. A protected version of *belmuž* from Svrljig (*Svrljiški belmuž*) is originally made of sheep milk curd and contains 5% of white corn and 10% of wheat flour with added salt. It is prepared by placing the ground cheese in a pan, allowing it to melt gently while being stirred, until it becomes liquid. Then the corn and wheat flour are added and *belmuž* is further boiled until the molten milk begins to release milk fat on the dough surface. When the dough becomes elastic, the dish is ready.

Nutritional aspects and effects on health: High saturated fat and carbohydrate content make *belmuž* high in energy. Therefore, it is not recommended for overweight people, diabetic patients and those who have cholecystitis and other gallbladder-related issues. Due to its fiber content, whole corn flour promotes digestion and helps people with constipation.

Ensuring authenticity while promoting global availability: *Svljig Belmuž* has protected geographic indication (GI; Intellectual Property Rights Office, 2019) and it is on the list of national cultural heritage (Ministry of culture and information, 2019).

12.5.2 Užička komplet lepinja (A flat bun with everything in it)

History and origin of product: *Komplet lepinja* was first served and sold in the first half of the 20th century by Dragan Lazić from Užice (Tasteatlas, 2020), a city that represents a political and cultural center of Western Serbia. Its name has been probably kept from the time masters used to send their students to buy them food and the very name suggests that it contains all the side dishes that were offered with the flat bun—eggs, milk cream, and gravy sauce drained from a roasted pig or lamb.

Use: *Komplet lepinja* can be considered a sort of Serbian fast-food (take-away food) mostly consumed for breakfast or as the most convenient replacement for regular meals. It is dominantly used in the Užice area, as well as in one of the most visited

mountain destinations in Serbia, Zlatibor, where it represents an inevitable part of the daily menu and regional gastronomic specialty, named *mountain breakfast*.

Composition and preparation: The flat wheat bun is cut horizontally, so that it looks like a plate. The bottom bun part is spread with *kaymak* (salted and fermented skimmed milk cream) and scrambled egg and baked in heated oven for 10 min or more, depending on the fact whether a customer prefers raw or crispy food. After closing the bun with its upper part, the bun is topped with hot salty dark brown gravy sauce, harvested from the roasted meat baked in traditional stove named *furuna*.

Nutritional aspects and effects on health: *Komplet lepinja* is an extremely caloric meal that is rich in saturated fat, making it unsuitable for people with metabolic disorders, cardiovascular and gallbladder issues.

Ensuring authenticity while promoting global availability: *Komplet lepinja* is not protected as a brand in Serbia, but having in mind its attractiveness that is related to mountain tourism and hospitality, the regional "Mountain breakfast" initiative is a step forward in the promotion of this food product.

12.5.3 Ajvar (Red Pepper Chutney)

History and origin of product: *Ajvar* is the name for the traditional cream/sauce made of pepper. The term originates from the Turkish word *havyar* meaning caviar. According to Ognjevic Tamara, gastroherotologist, *ajvar* was named by an inventive restaurant owner who wanted to attract the attention of visitors in the period between the two world wars (Raca, 2019). *Ajvar* is traditionally prepared as winter preserve throughout Serbia, but is particularly popular in the Southern and Eastern regions of Serbia, especially in Leskovac (GI protected version as Leskovac ajvar), Niš and Pirot, where plenty of myths and humorous songs about *ajvar* circulate.

Use: Ajvar is usually consumed as "meze" (Ottoman term for appetizer), but also as a side dish for grilled or any kind of meat prepared with potato, beans, rice, etc.

Composition and preparation: The original *ajvar* is prepared in Southern Serbia by mixing 100 red fleshy peppers, 400 mL sunflower oil, 2–3 tablespoons of vinegar (or alcohol), salt and sugar, but according to some recipes, garlic, eggplant or carrots in small quantities are also added. After being washed and well baked, peppers are placed in a metal pan for steaming, so that they can be easily pealed. After steaming and pealing, seeds are removed and peppers are drained in a net-sack overnight, and the next day they are ground by using meat mincing machine. The ground mass is then placed in a wider pan and, with the addition of sunflower oil, cooked at high temperature with continuous stirring using a large wooden spoon for about two and a half hours. After being cooked, *ajvar* is seasoned by adding vinegar and salt and poured into jars leaving about 1 cm to the top empty. The filled jars can be topped by heated oil and fried for two more hours in the oven and stored at dry and dark place. In Leskovac, *ajvar* (Intellectual Property Rights Office, 2019)

is made of special pepper sorts of ruby red color, with a characteristic flat and pointed shape that makes them ideal for grilling, while in Pirot and Bela Palanka local types of peppers are used because they are easily pealed due to their low water content.

Nutritional aspects and effects on health: *Ajvar* can be considered a part of healthy nutrition, if consumed in moderate amounts, mainly due to high dietary fiber content and high concentrations of carotenoids which are resistant to high cooking temperatures. Nevertheless, people with gastrointestinal issues should avoid spicy *ajvar*.

Ensuring authenticity while promoting global availability: *Ajvar* is globally available, yet the current issue refers to the protection of the generic name of *ajvar* in the European Union.

12.5.4 Paprika u pavlaci (Peppers in Milk Cream)

History and origin of product: Since the time of traditional caravan routes in the Middle Ages, milk producers and merchants tested and perfected milk processing in order to make safe product for marketing on distanced markets. The rural communities in the mountain areas of Sjenica, Pešter and Zlatar, rich in grasslands, have always been known for producing dairy and meat products of exceptional quality (Cooper et al., 2010). The production of peppers in sour milk cream has long tradition in this region. Similar food products can be found in some other parts of Dinaric mountains—in Montenegro and Albania.

Use: *Peppers in milk cream* are used mainly as appetizers.

Composition and preparation: Approximately 4 L of cow's milk are boiled, cooled to 38°C, and rennet is added to trigger fermentation that will last for 4 h. In the next 12 h, curd is drained under pressure; 1 kg of hot peppers are salted on the inside, then after 10 min, drained from released water and filled with prepared cream. The product matures at room temperature for 6−10 days until it reaches a pH of 3.8−4.5. *Peppers in milk cream* are stored at a temperature of 1°C−8°C until further distribution with a shelf life of 4 months.

Nutritional aspects and effects on health: *Peppers in milk cream* have a characteristic acidic-salty taste and are consumed in small quantities as an appetizer. Due to high content of saturated fats, the product is not recommended to people with metabolic disorders, cardiovascular and gallbladder issues.

Ensuring authenticity while promoting global availability: *Peppers in milk cream* are not protected in Serbia. So far only larger farms and artisan producers have managed to achieve the required food safety standards.

12.5.5 Slanina od mangulice (Mangalitsa Bacon)

History and origin of product: *Black mangalitsa* strain is a primitive, autochthonous pig breed, original for Serbia (Lutwyche, 2019, p. 190), the most common in the region

of Srem. Before World War II, *mangalitsa* was mainly produced in silvo-pastoral farming systems, in wet oak forests along the Sava River in the region of Srem and other areas of the Pannonian plains and exported to Hungary (Marić, 2018). After the war, however, *mangalitsa* was mostly replaced with modern crossbreeds. The Serbian Ministry of Agriculture introduced subsidies for conserving animal genetic resources at the beginning of the 21st century and *mangalitsa* production was rehabilitated.

Use: *Mangalitsa bacon* is mostly served as an appetizer or added to various dishes.

Composition and preparation: Bacon is made from sliced and salted pig bellies. Meat of a 2-year-old pig weighing about 150 kg should be salted for 2 weeks, cold smoked for 3–4 days and dried at −2°C to +5°C for over 1 month. In some cases, black pepper and dry milled red pepper are spread over.

Nutritional aspects and effects on health: *Mangalitsa* is characterized by high content of unsaturated fats, which makes its meat and bacon structure soft and tender. Cholesterol content of mangalitsa meat is 50%–75% lower compared to the regular content of pig meat. Consumers with gallbladder issues should avoid this product, while the moderate consumption is recommended to people with a low HDL level.

Ensuring authenticity while promoting global availability: *Mangalitsa bacon* is not protected in Serbia. A suitable protected designation of origin and protected geographical indication in the EU is already granted to products of similar origin from Hungary. Global availability is hardly possible due to the fact that extremely small quantities are produced.

12.5.6 Pihtije (Meat Jelly)

History and origin of product: *Meat jelly-pihtije* is considered to be a food of the poor, since it is cheap and abundant. Traditionally, meat jelly was prepared in all parts of Serbia on the day of Epiphany, January 18th, and was served upon returning from the church (Mondo, 2019), with *banitsa* pie, sauerkraut and cooked brandy.

Use: Meat jelly is served as a winter appetizer or for breakfast/dinner, usually with sour cabbage salad.

Composition and preparation: *Meat jelly* is made from pig or veal meat, legs, skin, joints, ears, tails, bones, with an addition of chicken legs, vegetables, spices, and water. Vegetarian jelly is made from broad beans, vegetable oil, tablespoons of ground red pepper, pieces of garlic, and salt. Quantities are not defined and depend on their availability.

Meat jelly is prepared by placing meat, skin and bones in a pot, pouring it with water to simmer. After boiling, the water should be changed, and the cooking continues until the meat is easy to separate from the bones. After that, soft parts should be separated and drained, placed in a shallow bowl, seasoned with garlic, salt, pepper, and red pepper, while the water used for cooking is poured over it.

Broad bean jelly is prepared by soaking beans in water and allowing them to swell overnight. In the morning, the beans are cooked with an addition of salt. After cooking, a few tablespoons of the cooking liquid should be poured over the beans and they should be cooled. In a frying pan, oil should be heated with an addition of ground red pepper and finely chopped garlic, and this sauce should be poured over the beans. The dish is kept in a cool place to tighten and cut into cubes before serving.

Nutritional aspects and effects on health: Collagen from jelly is believed to prevent osteoarthritis and rheumatoid arthritis.

Ensuring authenticity while promoting global availability: Products similar to *meat jelly* is available in various countries.

12.5.7 Pirotski kačkavalj (Pirot Kashkaval Cheese)

History and origin of product: *Pirot cheese* was initially made from sheep's milk in the 18th century, while the expansion of sheep farming and *kashkaval* cheese production reached its peak in the 1960s of the 20th century.

Use: *Pirot kashkaval cheese* is served as an appetizer with other milk products from the region, dried meat, corn dishes, and the local plum brandy.

Composition and preparation: The production of *Pirot kashkaval* cheese has three phases: (1) the preparation of curd (baskija), (2) the conversion of curd into cheese, and (3) the drying, salting, and maturation of cheese. Curd (*baskija*) refers to coagulated and pressed proteins from the mixture of 80% sheep's and 20% cow's milk. After being prepared, *baskija* is melted using hot water and the soft dough is dry-salted, kneaded by hand and placed in a round mold. After 1 day, cheese is extracted from the mold and dried for 10–15 days at 25°C for obtaining its final yellow color. The maturation process after drying takes at least 8 weeks. In the meantime, the cheese is dry-salted four times (Intellectual Property Rights Office, 2019).

Nutritional aspects and effects on health: *Pirot cheese* is high in energy and contains at least 45% of milk fat in dry matter, and thus, should be consumed in moderate amounts.

Ensuring authenticity while promoting global availability: *Pirot kashkaval cheese* is a product with protected GI at the national level (Intellectual Property Rights Office, 2019) and it is on the list of the protected national cultural heritage (Ministry of culture and information, 2019).

12.5.8 Slavsko žito—Koljivo (Koliva)

History and origin of product: According to archaeologists (Jevtić, 2011) wheat has been grown in Serbia from prehistoric times. *Koliva* is a specialty used for religious purposes since the ancient times, representing a link between the life on Earth and life after death. Honey or sugar is sometimes added to *koliva*, signifying the heavenly joy of morally right Christians after death.

Use: *Koliva* is served on a smaller or larger glass plate as an integral part of the traditional religious family celebration (*slava*).

Composition and preparation: *Koliva* is made by using ingredients in the following proportions: 200 g wheat, 200 g sugar, 200 g ground walnuts, 1 vanilla sugar, and powdered sugar. Cleaned wheat grains are washed in cold water and cooked for 20 min. After cooking, the pot is removed from the stove and left for the next 12 h at room temperature. Finally, drained wheat is mixed with ground walnuts and sugar or honey to get a homogeneous mass and the specialty is served cold.

Nutritional aspects and effects on health: Whole wheat is high in fibers, minerals, oligoelements and vitamins E and B. However, due to its high energy content and the addition of sugar or honey, it can be recommended for moderate use only. It contains gluten and should be avoided by people suffering from celiac disease.

Ensuring authenticity while promoting global availability: *Koliva* is not protected.

12.5.9 Punjena suva paprika and sarma (Stuffed Dry Pepers and Sarma)

History and origin of product: Stuffing of different vegetables with a mixture of rice and meat is common practice from the times of Ottoman conquest of the Balkans. Yet, paprika entered Serbia later in 17th century when it was usually stuffed with local vegetables, and wheat or rice. Sarma was first mentioned in Serbia in the 19th century (Artis Center, 2017), as an exclusive dish served during *Slavas*. It is specific for Serbia that almost exclusively old varieties of paprika are used for this dish. Vrtka pepper from Bela Palanka, East Serbia (Srbiju volimo, 2019), is the most common in the country, as much as Lakosnicka pepper and Pirot pepper.

Use: *Stuffed dry peppers and sarma* are served as a main course, although in certain forms they can be served as appetizers.

Composition and preparation: For the preparation of *stuffed dry peppers and sarma*, 2 onions, 2 slices of spring onion, and 2 garlic cloves are chopped and briefly fried. Additionally, 2 carrots and 3 potatoes are cut into small cubes, seasoned and stewed with 1 kg of minced red meat by adding oil, ground pepper, and salt. Everything is mixed with half a cup of long rice and chopped parsley leaves and used for stuffing 20 peppers or, in the case of *sarma*, used as a filling around which about 20 sour cabbage leaves should be rolled. Stuffed peppers and rolled *sarma* should bake in the oven for 35–45 min at 180°C–200°C.

Nutritional aspects and effects on health: Due to their high content of proteins and minerals, as well as to their fiber content, *stuffed peppers and sarma* can be considered part of a healthy menu.

Ensuring authenticity while promoting global availability: *Stuffed peppers and sarma* are not protected.

12.5.10 Srpska skara (Serbian Grill)

History and origin of product: Southern Serbia has long been known for grilled beef, pork and lamb meat that are offered as fast-food, and a number of grilled meat specialties are named after the city of Leskovac. A local cattle crossbreed named *Jablanica Simmental* is mostly used for meat production in Southern Serbia.

Use: *Grilled meat* or minced meat can be served with chopped fresh onions as a main dish in traditional restaurants or bought in traditional fast-food restaurants. *Pljeskavica* (i.e., grilled minced meat, salad, and ground red pepper sauce in a bun) is the most popular food of this type. In traditional restaurants, the offer mostly includes the famous *leskovački voz* (the Leskovac Train)—a specialty composed of differently prepared grilled meat, followed by *leskovačka mućkalica* (the Leskovac combined dish)—a spicy dish of meat and nonstarchy vegetables.

Composition and preparation: The *Leskovac Pljeskavica* (Intellectual Property Rights Office, 2019) is made by mixing minced beef meat, ground soya, salt, E300 (Ascorbic acid), and E341 (Calcium phosphates); soya and additives are used for GI protected version, while artisan Leskovac Pljeskavica is prepared from fresh meat without additives. The serving contains 5 (100 g) or 10 (200 g) meat rolls of 2 cm thick and 5 cm long (*ćevapi*). If conditions are favorable, *pljeskavica*, *ćevapi*, and other products are grilled on charcoal or over an open fire.

Nutritional aspects and effects on health: High quality meat accompanied by salad is a good source of proteins, vitamins, and minerals. Consumers with food allergies should pay attention to soya content.

Ensuring authenticity while promoting global availability: The *Leskovac Pljeskavica* is a food product with protected GI and a product on the list of the protected national cultural heritage.

12.5.11 Praseće pečenje (Roasted Pig Meat)

History and origin of product: *Roasted pig meat* was a common type of food for the Serbian people at the time when pigs were still hunted in the rich forests of Šumadija. The frequent use of *roasted pig meat* however became possible in the 19th century, when pig production became more intensive (Stojanović & Đorđević Milošević, 2003).

Use: A *roasted piglet* is a main dish or one of the main dishes at major religious and life events in Serbia. It is served warm or cold, with bread and fresh cabbage salad. For special occasions, roasted meat is combined with brandy, beer, and wine.

Composition and preparation: The whole pig is roasted on a rotating skewer, or its pieces are baked in the oven. Each of the roasting modes contributes to a different aroma and consistency to the meat depending on the way of heat transfer and the exposure of the meat to air and smoke flow.

In both cases, the skin is well cleaned and salted, and then roasted with or without eatable internal organs. Roasting on the rotating skewer begins over a moderate fire. After 4 h of roasting, beer is poured over the pig to make its skin more elastic and tastier. In the oven, the meat, mostly soaked in water, is roasted at 250°C, using the ratio of 1 h of roasting per 1 kg meat. The skin can be pierced with a fork in several places, to prevent it from cracking and enable the leaking of grease over the skin.

Nutritional aspects and effects on health: Consumption of *roasted meat* is mostly related to certain celebrations and occasions that include excess food, drinks and activities. Due to its high fat content, roasted meat can cause acute digestion problems and special caution is needed when it is consumed by people who, due to metabolic disorders and coronary problems, should avoid greasy food.

Ensuring authenticity while promoting global availability: *Roasted pig meat* is not protected.

12.5.12 Leskovačka mućkalica (Stew Made of Barbecued Meat)

History and origin of product: *Leskovačka mućkalica* refers to grilled meat and vegetable based dish that has been present in the whole Serbia for a long time. According to Mondo (2017), June 7 is the day of Leskovačka mućkalica in city of Leskovac, South East Serbia.

Use: *Leskovačka mućkalica* is mostly served as a main dish, with thin wheat bread *pogača*, cheese, and *šopska* salad (consisting of tomato, cucumber, onion, and cheese).

Composition and preparation: The vegetarian version of *leskovačka mućkalica* is called *prženija* and is prepared in almost every home in South Serbia, while original *leskovačka mućkalica* with meat is more often served in restaurants. Each kind of *mućkalica* contains significant amount of paprika. The 1 kg of pork neck meat and 200 g of fresh meat bacon are seasoned with dried vegetable spice mixture, then cut into medium-sized cubes and grilled. Meanwhile, in the oil, with the addition of warm water, 4–5 large finely chopped onions are cooked on light fire. Approximately 10 roasted, peeled, and chopped peppers, and 0.5 kg of peeled tomatoes, 2 chopped cloves of garlic, and salt are added to the completely softened onion. Cooking continues until the liquid evaporates and then the vegetable mixture is added to meat and it is further cooked for 1.5 h.

Nutritional aspects: The fat content of *leskovačka mućkalica* depends on quality of meat being used for preparation. Mixture of meat and vegetables provides proteins, minerals and vitamins in amounts that *mućkalica* can be considered a high quality meal.

Ensuring authenticity while promoting global availability: *Leskovačka mućkalica* is not protected.

12.5.13 Svadbarski kupus (Wedding Cabbage)

History and origin of product: Cabbage has been consumed in fermented version since Roman times and most often served with game, red meat, or poultry (Sultanija, 2017).

Use: For fairs, folk festivals and wedding celebrations, so-called wedding cabbage used to be served as a main dish along with flat wheat bread *pogača* or corn bread *proja*, and fresh white cheese. Brandy is good appetizer for this dish and beer goes great during the meal or after it.

Composition and preparation: *Wedding cabbage* is made of sauerkraut and dried and smoked meat. Firstly, the shredded bacon is placed on the bottom of the pot, preferably made of clay, covered by a head of cabbage cut into eight equal parts, a mixture of pork and beef meat and pork ribs, chopped onion, laurel leaves and ground pepper. This stacking of layers of cabbage and meat is repeated once more. The dish is poured with cold water and cooked on low heat, preferably on open fire, for 4–5 h. During cooking, the dish is not stirred, but the pot is occasionally shaken to prevent the cabbage from burning.

Nutritional aspects and effects on health: Traditionally prepared, *wedding cabbage* is slowly cooked on open fire or in a stone and clay stove, using firewood, which allows the ingredients to interact and develop a specific taste. However, the modern way of *wedding cabbage* preparation is shorter and the intense thermal process leads to the destruction of some valuable components. In terms of nutrition, *wedding cabbage* is high in fat and proteins, rich in fiber, vitamins, and probiotics, and represents a balanced meal which, if consumed in moderate amounts, is suitable for people of all ages.

Ensuring authenticity while promoting global availability: *Wedding cabbage* as a dish is not protected.

12.5.14 Vojnički pasulj (Soldier's Bean Soup)

History and origin of product: Beans have been introduced in the nutrition of Balkan population in the 17th century (Vranjenet, 2017) and since then it became one of the most appreciated food in Serbia. In long history of wars, due to its nutritional value, beans were the major part of the soldier's nutrition.

Use: *Soldier's bean soup* is served as a main dish or a side dish, accompanied with meat balls, roasted beef, pork, and bread. It also comes with cabbage, sour pickles, and paprika or tomato salad.

Composition and preparation: For preparation of *soldier's bean soup*, 120 g of clean beans are soaked in plenty of cold water for 1–3 h or overnight. After being drained, beans are placed in a pot, poured with cold water, and cooked. After 10–15 min, lightly fried onion, 1 g dried paprika, 10 g carrots, and laurel leaves are added, and cooking continues until beans are soft. Vegetable spice is added together with salt and *zaprška*, made of flour, garlic and ground paprika. The cooking continues for another 20–30 min.

Nutritional aspects and effects on health: Beans can be considered a complete food and a good choice of proteins and fibers. Bean shell is rich in pectin and other hardly digestible carbohydrates and is not recommended for people with gastric, intestinal and other disorders.

Ensuring authenticity while promoting global availability: *Soldier's bean soup* is not protected.

12.5.15 Šljivko (Plum Cake)

History and origin of product: *Šljivko* was first mentioned in written documents during the Ottoman Empire (Serbia was under Ottoman occupation between 1459 and 1804). In its original version, this plum cake is made of a local variety of plum, known for its high sugar content.

Use: Plum cake has a long shelf life and thus, was often exploited by soldiers and military forces during wars.

Composition and preparation: According to the simplest plum cake recipe, fresh plums are cooked for a very long time and then a certain quantity of corn flour is added just enough to enable shaping of a round cake. Cake is sun-dried, wrapped in blackberry leaves, and tied with a rope.

Nutritional aspects and effects on health: Plums are rich in antioxidants and contain a significant amount of fiber, vitamins, and phenols. Plums are recommended for people with constipation, but due to their high sugar content, only moderate amounts can be consumed without risk of exacerbating diabetes.

Ensuring authenticity while promoting global availability: Plum cake is not protected.

12.6 Sustainability and environment

Taking into account available resources for food production, Serbia has considerable potential for export, although political and economic circumstances in recent decades were affecting food production and export to a large extent. Economic sanctions as a result of political conflicts in the region decreased the chances for Serbian products to reach international markets. Nowadays, existing resources are not fully utilized, in particular mountain grasslands/lands that are frequently abandoned, due to rural to urban migrations. On the other hand, lowlands are productive and overly used. The productivity of the land is further compromised by malpractices, such as excessive irrigation, burning of biomass, lack of organic fertilizers, and intense and mono cultivation. Organic farming in Serbia is supported as an option to ensure the sustainability of small-scale farms.

Over the last two decades, the Serbian government had a proactive role in the conservation of agrobiodiversity (Dajic Stevanovic & Djordjevic Milosevic, 2018). Traditional products are promoted through tourism (Đorđević Milošević and Milovanović, 2013) and international platforms, such as Arc of taste (32 entries from Serbia, including drinks) (Slow Food, 2019a) and Presidia (1 Serbian entry so far) (Slow Food, 2019b) of Slow Food—an international organization established to prevent local food cultures and traditions from disappearing.

12.7 Present nutritional conditions

Eating habits are affected by the availability of food, but also by culture and tradition, social events, religion, education, socioeconomic status and family customs. In Serbia, as well as in western countries, contemporary life in the urban environment is related to long working hours and a lot of time spent in traffic, which is also reflected in changes in regularity and quality of daily nutrition. The national health data over the last two decades showed that the majority of total mortality in Serbia can be attributed to circulatory diseases (Stanišić Stojić, Stanišić, Stojić, & Džamić, 2016). A noticeable increase in malignancies and diabetes death rates that have been registered can be associated with modern eating habits. Studies published by the Institute of Public Health (2018a) have shown that the Serbian population rarely uses whole grain products and fish, but extensively consumes pork, veal, and chicken meat on a daily basis.

The use of sugar, sweet products, alcohol, and soft drinks has been increased lately and this is seen in the high rate of diabetes (every eight Serbian citizen suffers from diabetes) (Institute of Public Health, 2018a). The use of animal fat for cooking remained limited to rural areas. The majority of people living in Serbia have regular breakfast, but the morning meal is most often skipped in northern parts of Serbia. Furthermore, around 50% of the people living in Serbia consume at least one portion of dairy products and fruit, and the number of dairy consumers was on the rise over the last two decades (Institute of Public Health, 2018a). Although certain changes in public awareness and eating habits have been noticed recently, people of lower socioeconomic status and educational level, as well as rural residents in Serbia, do not consider health when choosing their food. In the general population, women tend to consume fruit and vegetables more often.

The consequences of irregular eating patterns are especially visible in Vojvodina, which is the main supplier of grain, sugar, beef, and pork, and the region with the highest registered number of people suffering or dying from noncommunicable diseases like heart diseases and blood vessels disorders (Institute of Public Health, 2018a). The young population in the period of growth and development is particularly susceptible to nutritional deficiencies. Similar to findings of studies aimed at investigating eating habits of the adult population in Serbia, the study of the Institute of Public Health (2018b) focusing on children and adolescents has shown that only half of the school children in Serbia have regular breakfast during working days, while no more than 40% of them have daily fruit intake. About 30% of school children take soft drinks once or more per day, and this percentage tends to increase with age. Obesity is most often registered among boys at the age of 12 and 13, and 26% of them can be considered overweight or obese (Institute of Public Health, 2018b).

12.8 Safety aspects

Traditional animal products could be representing a significant microbial or chemical food safety risk for the consumers (Kilibarda et al., 2018). Consumption of traditional products has been associated with different foodborne illnesses, some of them being caused by biological hazards like *Salmonella*, extremely cytotoxigenic *Escherichia coli* (VTEC), *Listeria monocytogenes*, and/or *Staphylococcus aureus*. The *Salmonella* risk is associated with the intake of dry fermented sausages produced from pork meat, while *E. coli* O157 intoxication is associated with the consumption of beef/lamb dry fermented sausages (Karabasil et al., 2018)

However, there is insufficient data on the prevalence of biohazards in traditional products. Serbia is traditionally an endemic area for parasite *Trichinella spp*. Human trichinosis occurs as a result of eating insufficiently processed meat containing live larvae, particularly from homemade dry fermented sausages (Petrović et al., 2012). *Trichinella* larvae can survive curing, fermentation, cold-smoking and drying of food products, which are the most used methods of conservation in the traditional food industry. Domestic pigs are a major source of trichinosis for humans. Pig breeds such mangalitsa, which are raised in silvo-pastoral systems, are particularly susceptible to this threat. Most often, people get infected by using pork or game meat, which is not adequately tested for the identification of *Trichinella* larvae.

According to data provided by Public Health Institute of Serbia "Dr Milan Jovanović Batut", in 2017 the number of people suffering from foodborne diseases in Serbia was 11,597 and the number of registered foodborne-related death cases was 48. In the territory of the Republic of Serbia, 1850 cases of salmonellosis caused by food of animal origin were recorded; other 591 cases of campylobacteriosis, 28 cases of shigellosis, 14 cases of yersiniosis, and 4 cases of botulism were also recorded (Institute of Public Health, 2018a).

Rabies is occasionally reported in domestic animals (e.g., cattle, sheep, goats), which can be infected by a wild animal's bite. The total number of rabies cases in Serbia has been reduced with the introduction of oral vaccination for wild animals in 2010 (Lupulovic et al., 2014).

Serbia has adopted the Law on Genetically Modified Organisms in 2009, which is fully in line with EU directives. According to Serbian regulations, food for human consumption containing GMOs in the amount of less than 0.9% is not considered genetically modified. Also, no commercial cultivation and marketing of genetically modified animals are allowed. Serbia has completely banned the production and marketing of genetically modified food and therefore has not provided the possibility of labeling GMO foods on declarations.

12.9 Food production and promotion

Serbia tends to approach the EU, in terms of GI development and support of small-scale production, which is the guardian of traditional values, as well as in terms of

support of High Nature Value Farming (HNVF) practices that integrate an interest for biodiversity conservation. At present, the national legislative framework for GI is not fully compliant with the EU Acquis (Kilibarda, Mizdraković, & Brdar, 2018).

At national level, there is no legal basis for the development of traditional specialty guaranteed quality schemes (Srbinovska, Crsinovi, Ilik, Pavlovska Gjorgjieska, & Mohr, 2020). Most of the GI products in the registry are without any registered users, which might be the consequence of the top-down approach to GI without the full involvement of producers and processors. This approach often arises from local patriotism instead of being a result of careful business planning in stakeholder partnership, established upon the shared interest of parties to use products of special and higher quality and share obtained economic benefits. It is necessary to include and motivate all stakeholders involved in food production at all levels, from individual producers, local communities to the highest instances.

12.10 Summary

Being under different influences, Serbian food, and nutrition have been dynamically changing throughout history. Serbian cuisine was mainly based on local, indigenous species until World War I when exotic animal breeds and new plant varieties and hybrids were introduced. Over the last 20 years, enlarging of farms was encouraged by the national agriculture policy in Serbia, yet the farm structure remains dual and small farms and green markets continue to play an important role in Serbian food supply chains (FAO, 2020), in particular for traditional dishes. Nevertheless, the modern lifestyle, globalization, and lack of knowledge about proper nutrition have led to the situation in which younger generations progressively more consume fast-food, thus causing increased numbers of health problem. The changed eating patterns became visible with the increase of a number of people suffering or dying from heart diseases and blood vessels disorders (Institute of Public Health, 2018b). A noticeable increase in malignancies and diabetes death rates that have been registered can be also associated with contemporary eating habits.

Yet, a lot of traditional food is abundant in saturated fats and high in energy, so the question of functionality and nutritional adequacy of some traditional food for the contemporary population with a sedentary lifestyle remains open. Serbian population also rarely uses whole grain products and fish, but extensively consumes pork, veal and chicken meat on a daily basis. Consumption of some fresh or dry traditional foods has been still associated with different foodborne illnesses (Petrović et al., 2012), such as *salmonellosis and trichinellosis* for instance.

Although traditional food is a part of everyday life, the importance of traditional food preservation is not equally recognized in all parts of Serbia. As a consequence of the intensification of agriculture, losing traditional farming practices and agrodiversity,

as much as land degradation and environmental pollution have decreased the availability of original high-quality ingredients for traditional Serbian cuisine. Furthermore, the traditional processing/gastronomy knowledge is influenced by globalization, so much so that the original taste and quality of traditional Serbian dishes might be soon completely replaced with their modified counterparts. In Serbia, the legislative framework for GI is not fully compliant with the EU Acquis to provide improved support to traditional foods. More appreciation for short and green food supply chains could help traditional Serbian foods survive and become globally recognizable through tourism.

12.11 Open questions

The importance of traditional food preservation and gastronomy tourism development is not equally recognized in all parts of Serbia. Traditional food is a part of everyday life, particularly in Eastern and Southern Serbia. Because many traditional foods are abundant in saturated fats and high in energy, the question of their functionality and nutritional adequacy for the contemporary population with a sedentary lifestyle remains open. Furthermore, the increased share of people who define themselves as vegetarians, as well as the increased awareness of the fact that living beings do not have to be the main source of food for humans do not support the extensive use of meat, which is an essential component of the majority of traditional meals (Stanišić et al., 2018). Finally, another question that remains open is related to the conservation of HNVF systems and development of ecological production, which will inevitably require regeneration of mixed plant-animal farming practices to keep both the quality of food and environment.

12.12 Future outlook

Certain ecological issues, such as losing traditional farming practices, HNVF (Cooper et al., 2010) and agrodiversity, land degradation and environmental pollution, which are following the intensification of agriculture in Serbia, might decrease the availability of high-quality ingredients for traditional Serbian cuisine. Furthermore, the lack of traditional processing/gastronomy knowledge is influenced by globalization and forthcoming generations will not be familiar with the original taste and quality of traditional Serbian dishes, but their modified, modern counterparts.

Serbian gastronomy is still traditional to a large extent, attached to small family farming and production of high-quality foods purchased on farmers' markets, despite big investments of large-scale production and big retail chains. Shortening the value chains could help Serbian traditional food survive while becoming globally recognizable through gastronomy and rural tourism, upgraded internet food marketing, direct marketing, and small farmers markets.

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