Physikalisch-chemische, hygienische und organoleptische Charakterisierung der Dauerwurst Slavonski kulen

Zusammenfassung

Slavonski kulen ist die traditionelle getrocknete Dauerwurst, die in Slawonien in Ostkroatien hergestellt wird. Sie wird aus der Mischung des gehackten Schweinefleisches hergestellt, u.zw. aus Rückenspeck, Gewürzen und Salz. Die Mischung wird in den Schweine-Blinddarm gefüllt. Nach der Füllung wird die Wurst kalt geräuchert und getrocknet und danach während einiger Monate gereift. In dieser Arbeit wurden einige physikalisch-chemische und organoleptische Eigenschaften der reifen Kulen-Wurst sowie die Sicherheit des fertigen Erzeugnisses analysiert. Es wurden Wurstmuster von einigen kleinen Herstellern (n=12) aus Slawonien analysiert. Folgende physikalisch-chemische Parameter wurden festgestellt: Feuchtigkeit 38,2 % ± 3,6, Protein 35,0 % ± 3,1, Fett 23,7 % ±4,6, Verhältnis Feuchtigkeit/Protein 1,1 ± 0,1, pH Wert 5,37 ± 0,23 und Wasseraktivität (aw) 0,82±0,02. Die durchschnittlichen sensorischen Resultate, auf der 5-Punkte-Skala, waren 3,7 ±0,6 für äußeres Aussehen, 3,4 ±0,6 für Oberflächengeruch, 3,8 ±0,5 für Konsistenz, 3,2 ±0,4 für Innengeruch, 3,0 ±0,7 für Qualität des Durchschnittes, 3,3 ±0,5 für Textur, 3,1 ±0,4 für Geschmack und Geruch, 3,0 ±0,5 für Aromabeständigkeit und 3,2 ±0,4 für Gesamtqualität. In Bezug auf die Sicherheit des Erzeugnisses wurden folgende Resultate (je kg) festgestellt: Histamin 330,8 mg ±126,3, 233,9 mg Tiramin ±124,7, Nitrite 6,55 mg ± 3,88 und Benz(a)pyren 0,05 g ±0,03. Bakterien Salmonella spp. und L. monocytogenes wurden in keinem Muster vorgefunden, während der Befund von S. aureus, Enterobakterien und Sulfit-reduzierenden Klostridien im Einklang mit mikrobiologischen Vorschriften war.

Schlüsselwörter: *getrocknete Dauerwürste, Slavonski kulen, physikalisch-chemische Eigenschaften, Sicherheit*

Caratterizzazione fisico-chimica, igienica ed organolettica del kulen di Slavonia

Somario

Il kulen è la tradizionale salsiccia secca che si produce in Slavonia, nella Croazia dell'est. Viene fatto da un misto di carne suina, della pancetta del dorso di maiale, i condimenti e le spezie, con il quale si riempie l'intestino cieco di maiale, dopo di che il kulen si affumica a freddo e matura durante parecchi mesi. In questo lavoro sono state analizzate alcune caratteristiche fisico-chimiche e organolettiche del maturo kulen di Slavonia, così come la sicurezza del prodotto finale. Sono stati analizzati i campioni (n=12) presi da diversi produttori minori dall'area di Slavonia. Sono stati determinati i parametri fisico-chimici come segue: umidità del 38,2% ± 3,6, proteine il 35,0% ± 3,1, grassi il 23,7% ± 4,6, percentuale umidità/proteine 1,1 ± 0,1, valore pH 5,37 ± 0,23 e attività d'acqua aw) 0,82 ± 0,02. I risultati sensorici erano in media, sulla scala di cinque punti 3,7 ± 0,6 per l'aspetto esterno, 3,4 ± 0,6 per l'odore superficiale, 3,8 ± 0,5 per la consistenza, 3,2 ± 0,4 per l'odore interno, 3,0 ± 0,7 per la qualità di sezione trasverzale, 3,3 ± 0,5 per la tessitura, 3,1 ± 0,4 per il sapore e l'odore, 3,0 ± 0,5 per la consistenza di aroma e 3,2 ± 0,4 per la qualità totale. Avendo esaminato la sicurezza del prodotto, sono stati ottenuti i seguenti risultati (per un chilogrammo): istamina 330,8 mg ± 126,3, 233,9 mg, tiramina ± 124,7, nitriti 6,55 mg ± 3,88 e il benzo(a)pirene 0,05 g ± 0,03. I batteri Salmonella spp. e L. monocytogenes non sono stati trovati in nemmeno un campione, e la presenza del tipo S. Aureus, gli enterobatteri ed i clostridie sulfid-riducenti era conforme ai criteri microbiologici.

Parole chiave: *salsicce secche, kulen di Slavonia, caratteristiche fisico-chimiche, sicurezza*

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Current state and trends in production of sheep meat in EU and Croatia

A.Kegalj[1], M. Krvavica[1], M. Vrdoljak[1], I. Ljubičić[1], M. Dragaš[1]

professional paper

Summary

Production of meat as a segment of sheep production developed at the beginning of the 19th century in intensive agriculture of western Europe and in the eastern part of the USA because of the increase in population and development of industry. In sheep breeding, more than in other branches of livestock-breeding, there are significant differences in production technology within the EU, which brings to local differences in meat characteristics. Production systems may be divided to extensive and intensive ones.Extensive prevails in Mediterranean countries, where small suckling lambs of small body weight are slaughtered. Intensive system is spread in northern European countries where lambs of larger body weight are appreciated. In recent years the production and consumption of sheep meat has been in decline, mostly because of foot root disease, and because of CAP (Common Agricultural Policy) reform and large import of sheep and sheep meat from New Zealand and Australia. Production and consumption of sheep meat in Croatia have also been in decline mostly because of the Homeland war in which the number of sheep was cut by half. According to statistical data from 2009, the number of sheep from 1991 has still not been reached. As well as in other Mediterranean countries, in Croatia it is also popular to slaughter suckling lambs which are consumed in one peace or chopped in 2-4 pieces. Two best known traditional cured sheep meat are kastradina andstelja, none of which is protected.

Key words: sheep meat, production, trends

Introduction

Sheep are polygastric animals that are able to transform voluminous fodder of different backgrounds and shape into high-quality products: meat, milk, leather and wool. The quality of sheep meat depends primarily on the breed and age, and then sex, method of feeding and breeding area. The meat of young animals (lamb and mutton) is bright, with gentle muscle structures, no marbling, with a white subcutaneous and internal fat. The meat is characterized by a very fine taste and smell. Connective tissue in the meat of young animals is not developed enough and the meat is soft and delicious, with no characteristic odor. The meat of older sheep is dark red, muscle fibers are thicker, and the structure of the meat is coarser with more intense flavor and aroma (Uremović et al., 2002).One of the goals of sheep breeding is to produce the meat which will meet the high demands of consumers considering its sensory properties and quality (Cvrtila et al., 2007). The requirements of consumers of sheep meat in the EU countries, according Bernués et al. (2003), are increasing and include not only duration and origin of products, but also information concerning the system of production, traceability of animals and products, and quality control.

Historical development of sheep-breeding in Europe

Domestication of the wild progenitors of today's sheep, according to the available data, began 9000BC on the western slopes of mountain Zagros on the border of the present-day Iraq and Iran. The evolution of domesticated species is primarily the result of artificial selection, and then natural selection. Migration of the population caused the spreading of sheep across Asia into Europe and Africa (Zygoyiannis, 2006). Today, because of their high flexibility, endurance and humility, sheep are spread all over the world, except the North and South Poles. Due to their ability of better utilization of nitrogen and water, most sheep (and goats) are bred in areas with sparse vegetation and in inaccessible mountain pastures (Mioč et al., 2007).

Sheep are animals used for production of four types of products: milk, meat, leather and wool. Historically, long time ago the sheep meat was produced as a byproduct of breeds that were bred primarily for wool production, or, as in most Mediterranean countries, for milk production. Sheep that were slaughtered for human consumption were old and worn, or in dairy herds, very young, still suckling lambs eliminated from rejuvenation of herds.

[1] **Andrijana Kegalj, BSc, Marina Krvavica, MSc, Marija Vrdoljak, BSc, Iva Ljubičić, DVM, univ. mag. med. vet., Marijana Dragaš, PhD**, professor; University of Applied Sciences "Marko Marulić" Knin, Kralja Petra Krešimira IV 30, 22300, Knin, Croatia; tel: ++385 (0)22 668 123; e-mail:akegalj@veleknin.hr

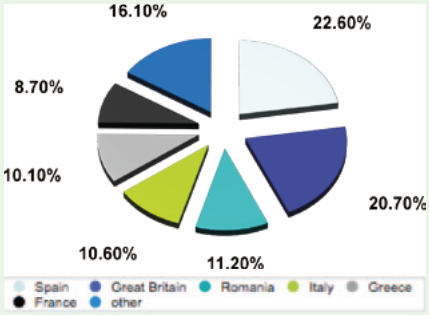
Production of sheep meat as a branch of sheep breeding had not developed until the early 19th century in the intensive agriculture of Western Europe and the eastern United States due to population growth and industrial development. The development of sheep breeding for meat production in the European Union began in the UK, from where it spread throughout Europe due to low wool prices and affordable meat prices (Brinzej et al., 1991).

Sheep-breeding, as a branch of animal husbandry is widespread across Europe and represents a significant source of income in rural areas. Moreover, in the less fertile areas that cannot be used for any other agricultural activity, sheep-breeding, and sheep, contribute to the balance of ecosystems and biodiversity conservation, water quality, as well as reduction of erosion, floods and fires.

Production of sheep meat in the European Union

According to Okumus and Mercan (2007) there are 629 breeds of sheep in Europe. They are bred mainly for milk and meat, and less for wool and leather. The largest producers and consumers of sheep meat in the EU are the United Kingdom, Spain, France and Greece, while in Germany and Italy people produce and consume sheep meat to a lesser degree. There are large regional differences in the consumption of sheep meat within Europe. Very little is consumed in Sweden, Italy and Denmark, while there is a great tradition of consumption of sheep meat in Iceland, Greece, Spain, Norway, France and Great Britain (Sañudo et al., 1998).

Since 2004 to 2008, the number of sheep in the EU fell from 73 million to 68 million per head. However, there are differences between countries, so the number of sheep in Greece has been growing, while in France, Ireland, Italy and the UK it has been in decline (Poux et al., 2001).Spain is the largest producer of sheep meat with 22.6% of total production in the EU-27 in 2008, followed by Britain with 20.7%, Romania with 11.2% and Italy with 10.6% (Figure 1).These four countries together held 65% of total sheep production in the EU-27 in 2008. (Anon., 2010a).



Graph 1 **Distribution ofsheep populationinthe EU-27 in 2008**
Source: http://www.hccmpw.org.uk/medialibrary/publications /Sheep% 20industry %20in%20the%20EU%5B1%5D.pdf

Table 1 **Countries with the largest number of sheep and their share in sheep meat production in the EU, 2008.**

Country	No of sheep, 000 head	% of sheeps	Quantity of sheep meat, t	Meat %
Spain	15 416	22.60	157 000	16.5
United Kingdom	14 077	20.70	325 600	34.2
Romania	7 597	11.20	58 300	6.1
Italy	7 210	10.60	57 300	6.0
Greece	6 904	10.10	72 700	7.7
France	5 931	8.70	110 500	11.6
Other	10 983	16.10	167 900	17.9

Source:http://www.hccmpw.org.uk/medialibrary/publications/Sheep%20industry%20in%20the%20EU%5B1%5D.pdf

Table 1 shows the countries with the largest number of sheep and their share in total production of sheep meat in the EU in 2008. In 2008 the gross production of sheep meat fell by 61 100 tons. Of the six largest producers of sheep meat in the EU-27, only the United Kingdom has increased its production in 2008 up to 900 t. The largest decline in production during this period was recorded for Spain (20%), followed by Romania with 13.1% confidence drop and Ireland with 10.9% confidence drop.(Anon., 2010a).There are many causes of output decline: most European countries have not yet recovered from the outbreaks of the infectious foot rot disease which appeared in 2001 in the UK and Ireland, where the number of head decreased from 20 to 16 million, or 25% (Poux et al., 2001). In addition, there were also the causes like the CAP reform (Common Agricultural Policy), changed premiums, reduced premiums on sheep breeding, a relatively low yield with the ever-increasing costs of food and energy, and the competition of cheap, imported lamb meat from New Zealand and Australia, being the largest exporters of lamb meat in the world.

Production and consumption of sheep meat in the European Union

France, Greece, Italy and Spain have more than 55% of the total sheep stock in EU-15, produce more than 55% of sheep meat, and consume more than 66% of its products.Ireland and Spain are the main EU exporters of sheep meat. Europe as a whole is the largest importer of sheep meat in the world- it imports nearly 50% of world production of sheep meat. The largest consumers of sheep meat are Spain and Britain, while Germany has a very low consumption of sheep meat. In sheep, more than in other livestock industries, there are large differences in the cultivation of sheep which is closely linked with cultural and historical specificities, feeding and holding, leading to local differences in the characteristics of meat (Sañudo et al., 1998). Breeding systems are different across Europe primarily due to differences in climate and agricultural practices. Different breeds of sheep are bred under different conditions of housing and feeding. Differences between the ways of sheep-breeding in the Mediterranean and Northern Europe were caused by climatic and environmental factors. Rainfall and temperature are the main factors that determine the quality of pasture, and thus the potential of animal and production costs. Breeds of the Mediterranean basin have lower fertility (number of lambs brought forth by each sheep per year), which amounts from 1.1 to 1.3 compared to the greater fertility of sheep of northern Europe, (1.5 to 2.5), which results in lower productivity (trunk kg / ewe / year) in southern countries (6-14 kg) compared to the north (22-36 kg) (Sañudo et al., 1998).

Furthermore, sheep are raised to the desired weight of the trunk according to local market needs. The ways of preparing meat also vary. In southern parts of the EU it is believed that a true, natural flavor of meat must be preserved, and lamb is mostly used for roasts and barbeques. In central and northern Europe they are more likely to cook stews where spices play an important role (Sañudo et al., 2007). Differences in preparation may be associated with the flavor of the meat.The biggest obstacle to the consumption of sheep meat is the intense, unique taste and smell of meat (Sañudo et al., 2006).

The meat of suckling lambs has more delicate taste, while taste of older lamb meat is more intensive. There are also differences in weight and carcass composition, and these factors affect the quality of the meat. In the Mediterranean area people prefer very young lamb, of pale or slightly pink meat, and smaller trunk weight: in Portugal up to 8 kg, Italy up to 9 kg, Spain and Greece up to 11 kg. In northern regions heavier lamb is more valuable, particularly of red meat and increased trunk weight: 25 kg in Denmark, 23 kg in the Netherlands, 21 kg in Ireland and Belgium. These differences in the trunk weight that have resulted in differences in meat quality are conditioned by local consumers' tastes, so that any change in weight leads to large differences in price. According to Sañudo et al. (1998), in Spain carcass prices may fall up to 50% if the trunk weight is increased by 36% from the desired.

According to Bouttonet (1999), each country or a region has a specific demand for sheep meat, which is the result of tradition (like sheep-herding and gastronomy). Lamb, which is highly valued by the regional consumers, is not necessarily appreciated in another region. In other words, the lamb that was bred in the Mediterranean region, would not have found a market in other parts of Europe (Jónsdóttir et al., 2001). Due to these specific needs, or demands, sheep meat is the most expensive meat in all developed countries except Australia and New Zealand. Meat prices vary throughout the year, depending on the season of production. In northern Europe the production season is spring, and in the Mediterranean it's autumn-winter.

Due to the differences in trunk weight, sheep meat in the Mediterranean is prepared in one piece or cut-open in 2-4 pieces, while in central and northern Europe, it is cut like pork or beef carcasses. In order to improve the market transparency, the classification standard for the carcasses of sheep and lambs has been made. It contains detailed rules for the implementation of classification procedures for the determination of market price of meat on the basis of the individual classes. (Vnučec et al., 2008). A classification system for lamb trunk contains two different schemes. The trunk heavier than 13 pounds is classified according to the EUROP classification into five classes (from E to P-good-bad), including the evaluation of thickness (1-5-skinny to fat). However, this method of classification is not applied in the Mediterranean area where the carcasses are lighter than 13 kg and of a naturally weak constitution. In this area, carcasses are classified into three categories according to weight (A≤7 kg, B=7.1-10.0 kg and C=10.1-13.0 kg). Each weight category includes two quality classes: quality 1 carcasses have pink meat and fatness score 2 or 3; quality 2 carcasses have red meat or fatness score 1 or 4.(Russo et al., 2003).

Production of sheep meat in the Mediterranean

Sheep breeding is a traditional branch of animal husbandry in most

Mediterranean countries and, in comparison to other branches of animal husbandry, is much more important than in northern Europe (Sanudo et al., 1998). In this part of Europe sheep (including goats) have played an important role in survival and nutrition of the local population. Small ruminants are the most economical source of meat and milk, and their manure has been exploited to enrich the poor areas of limited fertility. The ability of sheep and goats to move to remote areas in search of richer food led to the development of nomadic sheep farming in mountainous and Mediterranean countries. Seasonal nature of the sexual cycle of sheep is the result of evolution and coincides with the optimal conditions for survival in nature. Pastoral sheep breeding is influenced by the growing season of grass, with the largest number of lambs slaughtered in a very limited period of time. This method limits the economic efficiency of production in most systems of sheep production. The grass growing season in the Mediterranean region lasts from May to August. As a result, lambing takes place during the spring. Sheep obtain nearly 90% of the nutrients by grazing. Breeds in this area are adapted to severe climatic conditions such as high temperatures, prolonged drought and poor pastures (Anon., 1991).

The Mediterranean area is dominated by indigenous breeds, of a less muscular constitution and of a greater proportion of internal fat compared to subcutaneous, having a long reproductive life and being perfectly adapted to the poor environmental conditions. The genetic potential of these breeds resulted in the application of two production systems: meat / milk production including suckling lambs slaughtered at very low trunk weight and age, and meat production from slaughtered slightly older lambs of smaller trunk weight (Alfonso et al., 2001).

This area is prevailed by an extensive sheep breeding system which is dependent on state subsidies, although an intensive system has been gradually developingin more fertile areas of Greece and Spain. Intensive sheep breeding is connected to the intensive nutrition and high-quality forage, which requires greater financial investments, but achieves a high meat production, and reduces the amount of human labor. The sheep breeders in poor pastoral areas were forced to develop an extensive sheep herding system, or to nomadic and semi-nomadic sheep herding. Sheep spend most of the year on pastures, and concern for their welfare is reduced to a minimum. Pastures are used seasonally, herds stay in the valleys during winter, and in summer they are bred on mountain pastures and meadows within the area of 100 km, where sheep retain a short period of time within a particular place. Today, the extensive system is being slowly abandoned, especially the nomadic one, which mostly became a part of the rural tourism and transferred to semi-intensive or intensive system of sheep herding. Semi-intensive sheep herding is characterized by intensive feeding of sheep (sheep are given complementary foods in the form of abundant forage during the winter), and the movement of sheep is limited to a smaller space. Intensive sheep herding includes features of a breeding operation, modernization of technological processes and ways of keeping sheep (Brinzej et al., 1991).

In Italy, the demands for sheep meat are seasonal because most of it is consumed in Christmas and Easter specialties. Then they slaughter lambs 30-45 days old, of body weight 8-15 kg, and trunk weight 6-9 kg. Their own production and supply meet 65% of the requests, while the remaining 25% is provided by the slaughtering of older lambs (50-180 days), of body weight 16-35 kg and trunk weight 10-20 kg (Cifuni et al., 1999).

Greek sheep production (about 9 million heads) is based on milk production, while meat is a secondary product. They produce 670 000 t of milk and 82 000 t of meat annually. The share of sheep meat in the total meat production is 18%. Given that milk is the main product, lambs are early declined and slaughtered, already after 6 weeks of age. Trunk weight is very small, as in other Mediterranean countries, 6-10 kg. One of the reasons for such an early slaughter is the fact that the increase in the trunk weight of the combined indigenous breeds of sheep causes the increase in the proportion of body fats, and mostly saturated fatty acids (Skapetas et al., 2006).

Production of sheep meat in central and northern Europe

In central and northern Europe, where they grow heavier breeds of a more muscular constitution, an intensive farming system and very rich pastures have been developed (Safiudo et al., 1998). In this part of Europe (England, France and the Netherlands) people have developed a system of breeding sheep for meat production. Meat breeds have been created in England in the most intensive breeding conditions, which were facilitated by the mild climate and rich pastures suitable for high production of sheep meat (Brinzej et al., 1991). These are big and heavy sheep of early maturity, whose lambs weigh30-40 kg approximately at the age of only 100 days (Volčević, 2005).

Sheep breeding in northern parts of Europe is strongly influenced by climatic conditions or low temperatures and high rainfall. Although the area is rich in pastures, sheep require supplementation, with or without closure during the winter.

In all Nordic and alpine regions, due to prolonged snow and very cold temperatures during winter, it is necessary to keep animals in barns and provide food supplements. Extensive system with mountain pastures, which depends entirely on the climate, is rare, while the lowland areas are dominated by intensive systems, in many cases combined with other agricultural activities. However, there are differences within the region; for example, an extensive system is prevalent in Greenland and Iceland, while Denmark and the Netherlands are dominated by the intensive system. This area prevails in farms specialized for producing meat, wool or milk. Meat has become a major product, while wool and leather have been kept as by-products due to market demands. Herd size also varies, from a few hundred heads at specialized farms in Greenland, England, Scotland and Wales to a herd with less than a hundred heads in Norway, Finland, Belgium, Switzerland and Austria. Recently, consumption of lamb meat declines due to competition with cheaper meats such as chicken and pork, except in the countries with a growing number of Muslim immigrants (Dyrmundsson, 2006).

Table 2 **The number of registered breeding stock in 5 counties (2010)**

County	Number of breeding sheep	% of total
Zadar County	94. 376	17.74
Sibenik-Knin County	64.583	12.14
Lika-Senj County	63.197	11.88
Split-Dalmatia County	45.024	8.46
Osijek-Baranja County	43.753	8.22
Total number of breeding sheep in RH	531.981	100

Source: HPA, 2010

Protection of products

Today, indigenous products are highly valued, and most countries have invested significant efforts to protect and promote them. Many countries in the European Union have commercial labels that guarantee the quality of sheep meat in order to increase the market value compared to similar products.

In the Netherlandsthe Development of Region-Specific Products of Waterlandprotects the regional production of sheep meat and beef. Lambing must take place in Waterland, and lambs have to be grazing on rich pastures for at least half a year. Another typical Dutch product is smoked lamb prosciutto from the Texel breed, which is grown on salty pastures near the sea.

In the UK there are several protected products such as Northumbrian; Cheviot, Soay, and Ronaldsday lamb, Reesit mutton and Vivda.

In France, experts have prescribed rules (trunk weight, fatness, color of meat and fat, lamb age) to define the quality of meat, and a "label rouge"(red tape) is used as a sign of quality. Some of the brands are associated with the breeds like the lamb l'Ile de France, which is slaughtered at 40 kg of body weight, and some, like the County lamb, which comes from the lamb brought forth and bred in the Lot region and breast-fed for 60 days.

Spain is the most important exporter of sheep meat in the Mediterranean area. There are several protected brands on the market, and the lamb from Aragon (Rasa Aragonesa breed, Teruel, Roy Bilbilis) has a quality label for PGI (Protected Geograhical Indication).

In Italy, there are several commercial brands such as lamb from Maremma pastures and lamb from Siciliano pastures, while lamb Romano and Sardinian lamb have a quality label for PGI (Rubin et al., 1999).

In addition to fresh lamb, most of the countries are trying to protect their traditional smoked and cured sheep meat products. The Faeroe (Faroe) Islands make skerpikjøt, lamb dried in air (Jónsdóttir et al., 2001), Norwegian traditional product is pinnekjøt, salted, dried and sometimes smoked sheep's rib (Anon., 2011), and in Cyprus people make tsamarella-lamb dried in the sun, then salted and smoked (Anon., 2011a).

Production of sheep meat in the Republic of Croatia

Sheep have been bred in Croatia for centuries. Sheep breeding is a traditional branch of animal husbandry in the broader Dalmatian area dominated by inaccessible terrain and unproductive soil, mainly based on exploiting natural pastures where the sheep reside. Grazing is the best, and also the cheapest, food for sheep. Because of that, the process of breeding is subordinate to the maximum use of pastures,lambing takes place during the winter in order to stay on the pastures during the spring and summer together with their offspring (Garibović et al., 2006).

As in the whole Mediterranean area, sheep and goats were the main source of animal protein in the poor karst areas, and the main source of income. Sheep production in Croatia is characterized by small herds, poor housing conditions and insufficiently well-balanced diet, especially in winter. In summer people keep the sheep on the rich mountain pastures and in winter they bring them back to the villages where they are fed with prepared voluminous forage (hay, straw, corn stalks ...). In mountainous areas large sheep herds are grown, while hilly, lowland and coastal terrains are dominated by smaller herds. It is mainly arable land, so the sheep may have a balanced summer and winter diet due to the fact that this area

has more agricultural waste such as voluminous fodder, oats, barley and maize (Volčević, 2005).

According to 1991 statistics, Croatia had 750 000 heads of sheep. During the Homeland War that number was almost halved into 452 130 sheep (Miočet al., 2007). After the war, the livestock fundhad to be restoredfirstly, and then the future development could be planned. According to 2009 FAO data, in the Republic of Croatia there were bred 619 000 sheep, and 2300 t of sheep meat were produced. Table 2 shows that the largest part (50.2%) of the sheep has been bred in the four coastal counties of Zadar, Sibenik-Knin, Lika-Senj and Split-Dalmatia (HPA, 2010). The structure and herd size vary. Most farmers have small herds which settle their own needs, but lately there has been a growing interest in commercial sheep breeding (Mioč et al., 1999).

Coastal counties are dominated by the original breeds of sheep which are characterized by high resistance, modesty and easy adaptability to different breeding conditions and production objectives, namely: Dalmatian pramenka, Cressheep, Krk and Pagsheep and pramenka from Lika, while in the continental part mostly foreign breeds may be found (German merino sheep). Pramenka from Lika is the largest native Croatian breed; it is small, quite short sheep of late maturity, but very suitable for feeding and highly resistant to the relatively poor breeding conditions (Volčević, 2005).

Besides cigaja, which is bred for meat production, all other native breeds are combined for meat and milk. In Croatia, as in the whole Mediterranean area, the extensive sheep breeding system of transhuman or semi-nomadic type is still dominant. Transhuman animal breeding was characterized by "flats" (huts and corrals for cattle) near which the sheep were grazing in the summer. People used to milk the cattle twice a day-in, the morning and in the evening. Semi-nomadic herders in the mountains were transient travelers and they "always went for the better grass." In order to find better grazing, livestock herds were moved to the end of summer, and then went home (Garibović et al., 2006).

In Croatia, the sheep are bred mainly for meat production, and only 10-12% of them for milk production (Cvrtila et al, 2007). Consumption of sheep meat (including lamb) is very low, although it has shown a slight increase and is now 1.34 kg per capita. The main reason for that is probably the low purchasing power of the population (Senčić et al., 2010).

As in other Mediterranean countries, suckling lambsare also slaughteredin Croatia, which are consumed in one piece or chopped in 2-4 pieces as they are prepared on the island of Pag or in Istria.

In most parts of Croatia, lambs are usually prepared on the roasting-spit for which it is desirable to have trunk weight of 8-12 kg, so most of the lambs are slaughtered when they reach the weight of 20-25 kg (Garibović et al., 2006).

Two of the most famous traditional smoked and cured sheep meat products are kastradina and stelja. Kastradina is the smoked and cured meat product, made of the meat of older, barren ewes and male castrates which goes through the procedures of salting, brining, smoking, drying and ripening. It is traditionally produced in the wider region of Dalmatia, Lika and southern parts of Bosnia and Herzegovina (Krvavica et al., 2009). Stelja is a dried sheep meat that goes through the trunk cutting and removal of bones, and then it is salted, smoked and dried in the air.

Croatia has not yet protected any of the sheep meat products. To be entitled to use the label of quality protection, or the quality-designation of authenticity or geographical origin of lamb, it is necessary to meet certain standards. In order to determine these conditions, a project of the Ministry of Science, Education and Sports called "Meat qualities Croatian sheep breeds" was carried under the supervision of BoroMioč, Ph.D. Another project financed by the Ministry of Agriculture, Forestry and Water Management and called "Dalmatian kastradina-a native product in rationalization of karst animal husbandry", carried by the company Mataš-MN Ltd. and supervised by Marina Krvavica, Msc, also aimed at legal protection of indigenous products.

Conclusion

In European sheep breeding, more than in other branches of animal husbandry, there are large differences in the production, which are closely linked with cultural and historical specificity of breeding, feeding and keeping of sheep. This leads to local differences in the characteristics of meat. Producers who intend to produce sheep meat for export should be familiar with local habits in the consumption of sheep meat. Local habits vary considerably and therefore the characteristics of the product must comply with the wishes, needs and eating habits of customers. Doing so may cause a slowdown in the expansion of production, and thus lead to reduction in producers' revenues. Most of the developed European countries have protected at least one sheep meat product, and thus they have also protected their own sheep breeders. Croatia has neither protected any of those products, nor have we included them in our gastronomical offer. It is necessary to make the technology of smoked and cured sheep meat products standardized and protected, in order for it to become the exclusive right of the local manufacturers, and to stop the appearance of adulterated products on the market.

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Stand und Trends in der Erzeugung von Schaffleisch in der Europäischen Union und in Kroatien

Zusammenfassung

Die Fleischerzeugung als Zweig der Schaferzeugung entwickelt sich intensiver am Anfang des 19. Jahrhunderts in den westeuropäischen Ländern und im Osten der Vereingten Staaten Amerikas, u.zw. wegen der Vergrößerung der Einwohnerzahl und Industrieentwicklung. In der Schafzucht, mehr als in den anderen Viezuchtzweigen in der Europäischen Union, bestehen bedeutende Unterschiede in der Erzeugunstechnologie, was zu lokalen Unterschieden bei den Fleischcharakteristiken führt. Das System der Schäfererzeugung kann geteilt werden: in extensiveres – das in Mediteranländern überwiegt, wobei Säuglingslämmer von geringem Gewicht geschlachtet werden, und in intensives in nordeuropäischen Ländern, wo Lämmer mit einem höheren Gewicht geschätzt werden. In den letzten Jahren sind die Erzeugung und der Verbrauch des Lammfleisches im Sturz, größtenteils wegen der ansteckender Lahmheit der Schafe und wegen der Reform von ZPP (gemeinsame Landwirtschaftspolitik) sowie wegen der großen Einfuhr von Schafen und Schaffleisch aus Neuseeland und Australien. Aus denselben Gründen sind auch in Kroatien die Erzeugung und der Verbrauch von Schaffleisch niedriger geworden, zum Teil auch wegen des Heimatkrieges als die Schafzahl halbiert wurde. Laut statistischen Angaben aus 2009 ist die Schafzahl aus dem Jahr 1991 nicht erreicht worden. Wie auch in anderen Mediteranländern werden auch in Kroatien Säuglingslämmer geschlachtet, die ganz (in 1 Stück) oder in 2-4 Stücken konsumiert werden. Zwei bekannteste traditionelle Trockenfleischerzeugnisse sind „kaštradina" und „stelja", wobei keines der beiden geschützt ist.

Schlüsselwörter: *Schaffleisch, Erzeugung, Trends*

Situazione attuale e le tendenze moderne nella produzione di carne ovina nell'Unione europea e in Croazia

Somario

La produzione di carne come una parte di produzione di pecore vierne sviluppata all'inizio dell'800 nei paesi dell' Europa occidentale e all'est degli Stati Uniti, a causa della crescita di numero di abitanti e per lo sviluppo d'industria. Più che in tutte le altre parti dell'allevamento di bestiame, nell'Unione europea ci sono significanti differenze nella tecnologia di produzione, e perciò appaiono le differenze nelle caratteristiche di carne sul piano locale. Il sistema di produzione di pecore può essere diviso all'estensivo che prevale nei paesi mediterranei, dove vengono macellati gli agnelli lattanti di poco peso, e a quell'intenso nei paesi di Europa settentrionale dove vengono apprezzati gli agnelli di un peso più grande. Negli ultimi anni calano sia la produzione che il consumo di carne di pecora, perchè cresce il numero di pecore zoppe, ma anche per la PAC (politica agricola comune) e una grande importazione da Australia e Nuova Zelanda. Per le stesse ragioni scendono la produzione e il consumo di carne di pecora in Croazia, e non bisogna dimenticare la Guerra par la difesa nella quale il numero di pecore è stato ridotto a metà di quello di prima. La statistica dal 2009 dice che il numero di pecore non ha ancora raggiunto la sua quantità dal 1991. In Croazia, come negli altri paesi mediterranei, vengono macellati gli agnelli ancora lattanti che si consumano sia interi, o divisi in 2-4 pezzi. Due prodotti tradizionali più conosciuti di carne ovina sono la castratina (kaštradina) e la stelja, ma nessuno di essi è prottetto dalla legge.

Parole chiave: *carne ovina (carne di pecora), produzione, tendenze moderne*

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