

**QUALITY OF ANIMAL PRODUCTION AND
ANIMAL PRODUCTS IN SLOVENIA**

M. Čepon, S. Čepin, C. Varga

Summary

Quality of animal production and animal products is presented in the article. Some factors that influence the quality of production and our achievements in this field are exposed as well. The current quality of the most important animal products in Slovenia and a comparison with animal products in some EU member states is also discussed.

Key words: livestock production, animal products, quality, Slovenia, EU

Introduction

Being a small country, Slovenia is very sensible to vacillating conditions on domestic and foreign markets. Regarding the increasing demands for quality on the European market, Slovenia should tend for excellency of production and products, which could be sold in spite of sharp market conditions.

Quality of animal production and products

The quality of animal production and the quality of animal products are two main domains of our interest that can be discussed separately, even though they are mutually dependent. When the quality of production is discussed we usually think about the procedures and types of farming that provide animal-friendly environment, sustainability, circulatory system of substances in nature and acceptable traits of animal products. The quality of animal production is

Rad je priopćen na 6th Int. Symp. "Animal Science Days", Portorož, 1998., a tiskan u Zborniku Biotehniške fak. Univ. v Ljubljani, Kmetijstvo. Supplement 30(1998).

M. Sc., B. Sc. Agr. M. Čepon, Prof., Ph. D., B. Sc. Agr. S. Čepin, Univ. of Ljubljana, Biotechnical Fac., Zootechnical. Dept., Groblje 3, SI-1230 Domžale, Slovenia, Ph. D., B. Sc. Vet. Med. C. Varga, Perutnina Ptuj d. d., Potrčeva cesta 10, SI-2250 Ptuj, Slovenia.

therefore influenced by knowledge of genetics and selection, technology, ethology, ecology and marketing.

The quality of produced meat, milk and eggs is less clearly defined in comparison to production quality. It is understandable that animal products which are used fresh or which are reproduced should be hygienic irreproachable. The quality of animal products that are irreproachable for human health is difficult to be defined. It could be said that the quality of animal products can be measured by consumers' demands which require desired traits of products that are also produced according to technologies that are most acceptable by consumers. Market demands for types of farming and animal nutrition are strong. From the point of view of economics intensive production of animal products is related to ecology and ethology problems. Use of hormones and other growth stimulants that stimulate growth of muscles and inhibit fat tissue loading are becoming more and more approved. The effects on economics of production are incontestable but meat quality tends to worsen while health irreproachability of such meat has not been settled yet (Dikeman, 1991; Church and Wood, 1993). Meat consumers are strongly against any usage of growth stimulants.

Due to consumers' demands for environment and ethology friendly production some sustainable products have already appeared on the market. Such products cost more but many consumers are ready to pay for them (Petautsching, 1994).

Modern consumers' demands for animal products match the common agricultural policy of European Union. Slovenia should accept sustainable agriculture if it wants to subsist in the European community. Only sustainable agriculture will contribute to the maintenance of economically and socially active countryside and sale of animal products on Slovene and common European markets.

Basic characteristics of animal production in Slovenia

Slovenia is mostly covered by forests (54% of surface), only about 43% are arable lands and 65% of agricultural lands are covered by grass. The percentage of fields is humble (0.12 ha per inhabitant) (Statistical report of Slovenia, 1997). In Slovenia, most of the agricultural land (about 70%) is not suitable for mechanised production owing to land configuration (high altitude, steep slopes) and geological characteristics (44% of Karst; Plut, 1988). Due to sensibility of agricultural ecosystems to agricultural overloading (Karst, steep slopes, landslides, hydromeliorated surfaces, etc.) sustainable agricultural

development of Slovene animal production seems obliging and anticipates desired quality of animal products.

Slovenia unfortunately has one of the worst land-owning structure in Europe, the average farm size being 4.1 ha (Statistical report of Slovenia, 1997). Market position of most of the farms is weak so that farm income is very modest (one full work force per 4.4 ha of agricultural land, which is four times below the European average; Erjavec, 1995). Small and economically maladjusted herds are the result of unfavourable land-owning structure.

Number of cows per farm has been increasing, but too slowly. The percentage of farms with less than 5 cows for market production of milk decreased from 77% to 61% in the last decade. In the same period the number of farms with 10 to 14 cows increased by 29% with some oscillations, and the number of farms with 15 and more cows increased by 166%. Between the years 1986 and 1996 the average number of cows per farm was 3.12 and 4.52 cows for market milk production. In 1986 there were 55,359 farms in Slovenia, and they sold milk to dairies from 172,604 cows. In 1996 there were only 27,356 such farms with 123,644 cows. Number of farms that produces milk for sale diminished by 50.6 % in ten year times, and the number of cows that produced milk for sale diminished by 28.6%.

Average flock size in small ruminant production is small. Flocks that were included into milk production control had on average 52 sheep or 30 goats for milk production in 1997. Sizes of flocks for meat production were larger, 46 sheep and 31 goats on average.

Pig production and poultry are intensive, industrial way of production in agglomerations. More pigs and poultry are produced on farms now. In 1996 there were 50.4% of all laying hens and 58.8% pigs on farms. The percentage of breeding sows on the farms was higher, 62.4% in 1996. The percentage of produced poultry meat by private sector has been increased, too. It was 19.3% in 1994 and increased to 33.9% in 1997 (Statistical report of Slovenia, 1997).

Besides unfavourable land-owning structure in Slovenia and weak market competence of Slovenia in comparison to EU, animal production in Slovenia represents only a small share in comparison to EU. Beef production in 1997 in Slovenia augmented to 0.61% of common European production, and the number of slaughtered cattle represented 0.69%. The percentage of dairy cows included into market milk production was 0.62% of all dairy cows in EU while the percentage of produced milk was even lower, it augmented to 0.5%.

The percentage of pork production was 0.39% of EU production in Slovenia in 1997, while the percentage of slaughtered pigs was 0.38%. The percentage of laying hens was 0.48 % but the percentage of produced eggs

meant only 0.42% of production in EU. Only a bit higher percentage was achieved by poultry meat production, which was about 0.9%.

Above data should be considered in the ratio of Slovene surface to the EU, which is only 0.62%, while percentages of agricultural lands, grasslands and meadows and forests are 0.54%, 0.30%, 0.88% and 0.94% respectively. The Slovenes represent 0.51% of all inhabitants in EU.

Despite lower percentage of dairy cows, the purchased amounts of milk increased and reached about 400 million litres in 1997, which was 120% self supply. Beef production increased till 1990, followed by a decrease of production at 7.8% annual rate until 1994. In the last few years beef production increased and reached about 40 thousand tons in 1997. Due to decreasing beef consumption (BSE), production approximates self supply. Pork production has been constant for the last ten years and amounts to about 63 thousand tons which is 70% of self supply. Poultry production decreased between the years 1990 and 1994, followed by an increase and reached 60 thousand tons in 1997.

Low percentages of animal production in comparison to EU will not be advantageous in the negotiations about the common European market. Political and economical authorities should have in mind that larger and uncontrolled import of animal products could seriously strike animal production in Slovenia.

The most important factors of quality of animal production

Adequate quality of animal production can significantly affect the quality of animal products for use and processing as well as marketing and better prices of animal products. Besides estimations of quality of production from production point of view, macro economics estimation of animal production includes also ecological demands, animal-friendly environment, genetic properties of animals and interactive effects of genotypes and environment. In Slovenia, ruminant production has been changing and new specialised breeds, lines and genotypes has been introduced enabling specialised market-oriented production. Therefore interactions between genotype and environment should be studied in order to prevent unrealistic expectations of new production types.

Ecological views of quality animal production

Due to the fact that Slovenia has a considerable share of grasslands in comparison to other countries, production technologies that use grasslands are important. Sustainable agricultural technologies of animal production will

enable marketing of animal products on the common European market. In Slovenia some investigations of sustainable animal production have recently been finished.

An important change in pig production means displacement of pigs from big agglomerations to smaller family farms that fatten pigs with home produced fodder. Such farms have enough agricultural areas to use manure produced by pigs, which is an important ecological change. Animal production on floors with litter means environment friendly type of farming, which has been enforced by the regulation on input of dangerous matters and plant nutrients to the ground limiting the number of animals per ha of agricultural land (UL RS 68, 1996). The fact is that also larger farms have started to pay attention to environment protection (Jurkovič and Janežič, 1998).

Cattle production can be divided into three categories: cattle production for milk, for meat and for breeding. Dairy cows can be sustainable farmed on pasture and by increasing the percentage of produced milk from forage. Appropriate forage production enables production over 4,000 kg of milk, which has already been obtained in recorded herds.

In Slovenia production of breeding heifers can be based primarily on grazing technologies. Marginal grass lands will be used appropriately, and production of breeding animals will become sustainable. From the physiological as well as from the later milk production point of view such rearing technology is the most economic.

It should be stressed that grazing systems of cattle production for meat has already been introduced in Slovenia. A lot of investigations of grazing technologies for production of bulls and heifers for quality meat were carried out. Almost two decades have been dedicated to the investigations of suitable genotypes of cows and terminal breeds for foster and suckler cows. We also study some technologies for rearing of suckler and foster cows on pasture and during winter housing regarding the quantity and quality of produced meat (Osterc et al., 1985, 1995; Čepon, 1990). The influence of use of new specialised beef breeds and their crossbreeds fattened according to sustainable technologies will be interesting for some economically important traits of meat production.

Ethology views of quality animal production

Investigations of animal behaviour enable suitable environment in various types of farming and production systems. Only friendly environment provides the means for ethological needs of animals. Even though some domestic

animals (pigs) are more sensible to various stress factors than others all species need suitable environment. Sensibility to various stress situations does not depend only on species but also on type of farming. Higher the intensity of production is the more sensible animals are to environmental factors. Consumers of animal products demand information on type of farming (technology) when they purchase meat, milk, eggs, etc. Ethology is not important only from the point of view of marketing but also from the point of view of quality of production and products respectively.

Unsuitable environment causes stress situations in domestic animals that can endanger production quality in different periods (quality of production) and even after the slaughtering at processing carcasses (quality of products).

Ethology of domestic animals, especially pigs, cattle for meat production and small ruminants has already been investigated in Slovenia. Production parameters can be influenced by various factors of ethology. Štuhec et al. (1980) determined statistically significant effects of housing of weaning sows on behaviour at insemination and on insemination rate. He also (1980) determined statistically significant increase of percentage of meat and decrease of percentage of fat in ham in pigs with higher physical activity. The effects of various types of housing on daily gain of body mass during fattening were also studied by Štuhec et al. (1986).

Behaviour of suckler cows (number of aggressions, social rang) in free type of farming during winter was studied by Osterc et al. (1992). It is interesting that suckler cows with socially worse status had the worst physical condition at late winter calving that meant later starting of rutting, later pregnancy and longer period between two calvings. The mentioned factors cause worse usage of cheap pasture, larger usage of expensive winter fodder and lower economy of suckler cow production. Ethological studies are also important in foster cow production. Various models of appending a foreign calf to a foster cow have been studied as well as production indices of foster cows in comparison to suckler cows (Čepon and Osterc, 1986; Čepon and Polajnar, 1993).

Poultry producers consider ethology requirements of poultry. In Slovenia 10 to 15 chickens are kept per square meter (PP Ptuj). Also the management of poultry faeces has been proceeded (reproduction, compost).

Genetic views of quality animal production

Besides production parameters, types of farming also depend on genotype of animals that produce animal products. It is already known that English beef

breeds and their crossbreeds give excellent carcass and meat quality only by grazing without any extra feeding by food mixtures (Osterc et al., 1985, Čepon and Polajnar, 1993). Sustainable types of farming and the best qualities of animal products are no doubt types of farming that enable successful marketing. The most suitable genotypes of animals are necessary to achieve above objectives. In species in which industrial types of farming are prevalent such cases are few. Nevertheless we have hens (Prelux-G) that obtain excellent production results in sustainable types of farming (Holcman, 1998, personal communication). In Slovenia, world known poultry provinces as Ross, Cobb, Hubbard, Hybro and some others are used for poultry production.

Nowadays consumers look forward to such animal products that are produced by healthy and resistant animals that do not need special veterinary treatments. Resistance to various unpleasant effects was possessed by old native species of domestic animals. Therefore Ministry of Agriculture, Forestry and Nutrition supports a special project to maintain native Slovene breeds of domestic animals like sheep, pigs, horses, hens and cattle (Kompan et al., 1998). The maintenance of genetic variability in the largest sense can provide larger and more specific demands for food.

Within the breeds the selection to economically important traits has already been performed. Due to physiological and genetic antagonisms between reproduction traits and meatiness the effect of selection in dual-purpose breeds within the breed gives worse results than selection of specialised breeds (Zagožen and Ločniškar, 1987). Therefore traits for milk production in dual-purpose breeds are improved by use of foreign genotypes (Schmitz, 1997). Introduction of foreign genes does not change production traits only but also variability in economically important traits. From the point of view of selection variability can never be too high, but it is not in favour of production. The above facts can significantly affect the quality of animal production and products. In Slovenia in the last two decades Brown breed cattle improved by American Brown breed and intensive selection on milk production traits significantly worsened carcass and meat traits (Čepon, 1998).

In species that are fattened by forage, besides genotype of animal and environment, the interactive effect of genotype and environment can significantly affect production parameters and quality of animal production. The above interactions should be considered speaking about the quality of production. When foreign breeds and breeds and genotypes tested in other countries are introduced to Slovenia they should be tested in domestic production environment.

Quality of animal products

We are aware that only products of best quality can be sold on the common European market. Hence it is most important that all forces are aimed to achieve the best possible quality of end products. In Slovenia we are looking forward to following current and future demands of common European market. In the last few years the microbiological composition of milk has been significantly improved owing to new Slovene regulation on milk quality (Table 1) that is in accordance to EU standards.

The quality of milk can also be determined by cell count. In 1997 in Slovenia 80.35 % of all purchased milk contained less than 400,000 cells in ml of milk and only 3.59 % of milk contained more than 600,000 cells in ml of milk.

Table 1. - MICROBIOLOGICAL QUALITY OF MILK, % (CLASSIFICATION INTO QUALITY CLASSES)

Year	Cell count/ml			
	Up to 500,000	Up to 400,000	Up to 300,000	Up to 100,000
1992.	54.3			
1993			60.9	
1994		87.1		60.4
1995		93.2		78.9
1996		92.7		79.0
1997		94.7		82.8

Relatively expensive milk production in Slovenia could endanger our market position on the common European market. Hence besides better quality of milk, milk production and also milk products should be cheaper. Costs of cheese production can be decreased by higher percentage of milk produced by cows having BB or at least AG genotype for kappa casein. All breeding bulls of Brown and Black-and-White breed have been tested to genotype kappa casein for the last three years in Slovenia.

In the middle of the year 1994 the system of evaluation cattle carcasses at slaughter according to the EUROP system was introduced to Slovenia. The introduction of this relation has enabled the comparison of our carcasses with those from other countries. At the same the quality has been improved as well as market placements on the common European market (Table 2).

Carcass conformation of young bulls has always been high in Slovenia, 61% are in the E and U classes (Austria 38.2%, Great Britain 34.1%, Italy 47.4%, Belgium 82.1%. Fat content in carcasses is higher than in other European countries, which means a handicap for placements on the common European market. Regarding fat content only 12% of slaughtered young bulls has been in the second class while other European countries achieve better results. Extremely high content of fat in carcasses could be a serious handicap for beef sale on the common European market due to customers' requirements.

Table 2. - CLASSIFICATION OF YOUNG BULL CARCASSES (MB) AND HEIFERS (T) INTO QUALITY CLASSES, % IN 1995 IN SOME EUROPEAN COUNTRIES (COMMISSION EUROPEENNE, 1996, Žgur et al., 1998)

Country	Category	Quality class, %*					Total (2)
		E (E2)	U (U2)	R (R2)	O (O2)	P	
Belgium	MB	68.4(82.6)	13.7(72.3)	11.4(56.1)	6.3(47.9)	0.2	(75.9)
	T	42.5(66.7)	23.5(45.6)	18.5(43.6)	11.0(51.3)	4.5	(54.8)
Italy	MB	10.4(80.5)	37.0(65.6)	38.1(69.7)	13.4(77.1)	1.2	(70.3)
	T	6.9(88.9)	51.2(48.4)	30.6(38.7)	10.1(32.1)	1.2	(46.6)
Denmark	MB	1.4(73.9)	6.3(51.5)	15.4(36.0)	73.6(51.7)	3.3	(50.1)
	T	0.5(32.7)	7.6(20.4)	28.1(13.0)	58.0(16.2)	5.7	(17.4)
Great Britain	MB	1.7(27.2)	32.4(13.4)	28.3(14.9)	33.7(17.8)	3.9	(16.6)
	T	0.2(9.1)	9.5(2.5)	45.7(1.2)	43.3(2.5)	1.3	(2.0)
Germany	MB	2.4(34.7)	24.3(44.4)	39.1 (43.2)	30.3(40.7)	3.9	(39.6)
	T	1.2(28.4)	15.0(14.6)	42.7(18.9)	35.1(18.5)	5.9	(17.6)
Austria	MB	2.4(32.0)	35.8(37.8)	52.4(48.1)	8.6(58.8)	0.8	(44.9)
	T	0.9(4.2)	27.5(9.4)	59.2(19.7)	11.3(37.0)	1.1	(18.9)
Slovenia, 1997	MB	7 (4.1)	54 (7.5)	34 (17.1)	5 (37.1)	0	(12)
	T	2 (0.0)	43 (1.5)	47 (5.4)	7 (25.2)	1	(5)

* -E: percentage of carcasses in the class E, - (E2): percentage of carcasses E2 within the class E.

Contrary to the beef carcasses, conformation of pork carcasses has been delayed in Slovenia in comparison to the other European countries (Table 3). Compared to the EEC countries, the percentage of carcasses in the best quality classes S and E is low, they are mostly classified into lower quality classes U and R.

Not only quality of carcasses but also meat quality is very important on the common European market. Besides genotype, body mass and age at slaughter significantly affect the quality of meat. In cattle, higher age and body mass at

slaughter cause higher share force of meat at cutting (Zgubič, 1998), and meat becomes darker (Čepin et al., 1995). Beef traits can be improved by planned combined breed crossings (Čepin et al., 1998).

Table 3. - CLASSIFICATION OF PORK CARCASSES INTO QUALITY CLASSES, % (ALL SLAUGHTERED ANIMALS) (COMMISSION EUROPEENNE, 1996, Kovač et al., 1998)

Country	Year	Quality class, %				
		S	E	U	R	O
Belgium	1990	30.4	44.4	21.4	3.8	-
	1995	44.5	42.2	12.4	0.9	-
Denmark	1990	34.2	54.7	10.3	0.8	-
	1995	50.9	44.9	4.1	0.1	-
Germany	1990		46.5	37.5	14.3	1.8
	1995		62.0	31.8	5.6	0.5
Netherlands	1990	0.5	36.3	51.9	10.4	0.8
	1995	7.4	60.7	29.5	2.3	0.1
Great Britain	1990	19.6	58.3	18.5	2.8	0.5
	1995	31.5	57.0	10.5	0.9	0.1
Average EEC	1990	7.7	38.6	36.7	13.8	2.6
	1995	13.7	50.1	25.2	8.8	1.9
Slovenia	1997	3.6	23.0	46.5	25.1	1.8

Stress events in pre-slaughter period could significantly affect the quality of meat. Čepin (1988, 1995), Pem (1994) and their colleagues determined that unfriendly treatment of animals before slaughtering, bad transport conditions, length of transport and unsuitable waiting time negatively affect the quality of meat, which means that pH value of meat is too high ($\text{pH} \geq 6$) and beef is dark coloured. The same authors also reported that more intensively fattened animals are more sensitive to stress factors in pre-slaughter period.

Intensive selection of pigs increases the sensibility, to stress factors (Porcine malignant hiperthermia syndrome). Therefore in Slovenia genetic test for boars to test RYR1 frequency in breeds and farms was introduced in 1994 (Šalehar et al., 1998). By removal of homozygotes and heterozigotes the frequency of gene RYR1 can be lowered in population quite quickly, hence the quality of pork meat can be improved. Improving the content of meat in pigs, the traits of meat should not be worsened.

Dressing percentage and composition of poultry depend on genotype and sex of the equally old slaughtered animals (Holcman et al., 1995). Meat yield in chickens ranged between 69% and 74%. The percentage of breast muscle

has been increased lately and ranged between 15.02% and 17.4% depending on body mass of alive chicken. Purchasing eggs, consumers consider freshness and colours of yolk and egg shell. The mentioned traits, which most affect the marketing, depend primarily on egg producers (Holcman et al., 1996).

According to predictions the production of beef will have been diminished by 2.5% in EU before the year 2005, but consumption index per inhabitant will not change (18.9 kg). It is predicted that pork production will be increased by 5.8% and the consumption by 4.7% (44.2 kg) in the same period. According to Pork Facts (1997) the content of fat in pork has been diminished by 31% since 1983, caloric value by 14% and the content of cholesterol by 10%. Production of poultry will have been increased by 15.6% and consumption by 16.2 kg per inhabitant by the same year. Production of meat of small ruminants will not increase but the consumption will decrease by 2.8% (Long Term Prospects, 1995).

Meat consumption will depend on biological and energy value of meat in future. Adequate selection and farming technologies have helped to lower content of fat in beef and pork and in consequence the content of saturated fatty acids that are main source of cholesterol. Consequently, there are hardly any differences among beef pork and poultry regarding energy value and cholesterol contents (Baseline Projections, 1997).

Above mentioned tendencies and provisions should be considered at planning and directing animal production in Slovenia.

REFERENCES

1. Churh, P. N., J. M. Wood (1993): The manual of manufacturing meat quality. Elsevier Applied Science London and New York, 285 s.
2. Commission Europeenne Direction Generale VI Agriculture 1996. Ponderations sur base des abattages a utiliser pour le calcul des prix moyenes communautaires de marche poids carcasse (Abattages 1995 communiquees par Etats Membrcrs). VI. D 2/972792/001/LF.
3. Čepin, S. (1988): Influence of fattening technology on carcass and meat quality in young bulls. Proceedings of the 34th ICOMST, Brisbane, Australia. 29 Avg-2 Sept 1988, s. 45-46.
4. Čepin, S., M. Čepon, S. Žgur (1995): Analysis of some effects on pH and colour of beef. Proceedings of the 41th ICOMST. San Antonio. Texas. USA, 20-25 August 1995, s. 376-377.
5. Čepin, S., S. Žgur, M. Čepon (1998): Povečanje priraje in izboljšanje kakovosti govejega mesa z gospodarskim križanjem. V: Zb. posveta, Kmetijski inštitut Slovenije, Bled, 12.-13. 03. 1998, s. 517-524.
6. Čepon, M., J. Osterc (1986): Prirasti telet krav dojilj in rejnic. V: Zb. Biotehniške fak. Univ. v Ljubljani, Kmetijstvo (Živinoreja), 48(1986), s. 207-218.
7. Čepon, M., M. Polajnar (1993): Prirasti telet hereford-križancev pri dojiljah ir rejnicah. V: Znanost in praksa v govedoreji, 17. zvezek. Domžale, Oddelek za zootehniko BF, 1993, s. 91-98.

8. Čepon, M. (1998): Genetske spremembe klavnih lastnosti kot posledica oplemenjevanja rjave pasme v Sloveniji. V: Zb. posveta, Kmetijski Inštitut Slovenije, Bled, 12.-13. 03. 1998, s. 471-476.
9. Dikeman, M. E. (1991): Growth, Carcass Characteristics and Meat Quality. Proceedings of 37th ICOMST, Kulmbach, Germany, Sept. 01-06, 1991, Vol. 1, s. 1-15.
10. Holcman, A., B. Žlender, A. Kmecl (1995): Dressing percentage and the chemical components of meat of chickens from two-way selection for body weight. V: Zbornik Biotehniške fakultete, Kmetijstvo (Živinoreja), Supl. 22(1995), s.219-223.
11. Holcman, A., D. Terčič, M. Zajec (1996): Rezultati anketiranja potrošnikov o njihovih merilih ob nakupu jajc. Knjiga o prvem slovenskem kongresu o hrani in prehrani, vol. II. Bled, 21-25. April 1996, s. 717-720.
12. Jurkovič, J., Lidija Janežič (1998): Okolju prijazna farmska reja prašičev. V: Zb. posveta, Kmetijski inštitut Slovenije, Bled, 12.-13. 03. 1998, s. 483-488.
13. Kompan, D., A. Holcman, A. Šalehar, J. Rus, S. Žgur (1998): Ohranitev avtohtonih slovenskih pasem domačih živali. Poročilo o delu v letu 1997. Domžale. Oddelek za zootehniko BF.
14. Kovač, M., Š. Malovrh, M. Marušič, I. Ule, M. Krašovic, S. Pavlin, K. Kovačič (1998): Rezultati ocenjevanja mesnatosti na liniji klanja v letu 1997. UL, BF, Oddelek za zootehniko, Domžale, 1998, 34 s.
15. Long term Prospects: Grain, Milk & Meat Markets. Evropska Unija, 1995, 43s.
16. Osterc, J. M. Čepon, J., Ferčej, J. Čeh, S. Čepin (1985): Prireja mesa z lisastimi biki in križanci z aberdeen angus pasmo na paši. V: Znanost in praksa v govedoreji, 9. zvezek. Ljubljana, Živinorejska poslovna skupnost, 1985, s 57-9-69.
17. Osterc, J., I. Štuhec, S. Čepin, M. Čepon, J. Čeh (1992): Ocena primernosti tipov krav za dojljle in rejnice. V: URP: Etologija in tehnologija, št. C4-0575-402-92. Domžale, Oddelek za živinorejo BF, s. 31-41.
18. Pem, V., S. Čepin, S. Žgur, D. Škorjanc (1994): The influence of pre slaughter treatment on meat properties in heifers. Proceedings of the 40th ICOMST, The Hague, Netherlands, 1994, W-2.05.
19. Petautschnig, A. (1994): Das Styria-Beef- Programm. Simpozij Alpe-Jadran, Ljubljana, 1994-11-03/04, 7 s.
20. Plut, D. (1998): Slovensko kmetijstvo in sonaravni regionalni razvoj. Kmetijstvo in okolje, Zb. posveta, Kmetijski inštitut Slovenije, Bled, 12.-13. 03. 1998, s.29-36.
21. Pork facts 1997/98, 1997. <http://www.nppc.org>.
22. Schmitz, F. (1997): Die wichtigsten Milchleistungsergebnisse im Kontrolljahr 1995/96. Schweizer Fleckvieh, 1(1997), s. 2-7.
23. Statistični letopis 1997 (Statistical report of Slovenia). Zavod Republike Slovenije za statistiko, Ljubljana, 1997.
24. Šalehar, A., P. Dovč. M. Kovač, I. Ule. V. Štuhec, M. Marušič (1998): Frekvence genov RYR1 po pasmah v Sloveniji v letih 1994 - 1997. V. Preiskušnja prašičev na testni postaji v letu 1997. Domžale. Oddelek za zootehniko BF. s. 40- 47.
25. Štuhec, I., A. Šalehar, A. Orešnik, Vida Štuhec, Milena Kovač (1980): Vpliv načina vhlavitve odstavljenih svinj na obnašanje ob osemenitvi in na uspešnost osemenitve. V: Zb. Biotehniške fak. Univ. V Ljubljani, Kmetijstvo (Živinoreja), 35(1980), s. 25-40.

26. Štuhec, I., A. Šalehar (1980): Vpliv povečane telesne aktivnosti testiranih merjascev v fazi rasti od 60-100 kg na rezultate odbire pri 100 kg in obnašanje na začetku reprodukcije. V: Zb. Biotehniške Fak. Univ. v Ljubljani, Kmetijstvo (Živinoreja), 35 (1989), s. 65-75.
27. Štuhec, I., Z. Pliberšek, F. Zagožen (1986): Preučevanje vpliva pregrupiranj prašičev v času vzreje in pitanja. V: Poročilo URP: Etologija, ekologija in varstvo okolja v živinoreji. Domžale, Živinorejska poslovna skupnost Slovenije. 1986, s. 229-237.
28. USDA Baseline Projections (1997): Agricultural Baseline. Projections to 2005. Reflecting the 1996, s. 62-71.
29. Zagožen, F., F. Ločniškar (1987): Primerjava učinkovitosti selekcije kombiniranih oziroma specializiranih pasem. V: Zb. Biotehniške fakultete, Kmetijstvo (Živinoreja), 50(1987), s. 11-20.
30. Zgubič, E. (1998): Povezava med lastnostmi kolagena in drugimi lastnostmi mesa bikov rjave pasme. Magistrsko delo. Domžale Oddelek za zootehniko BF. 82 s.
31. Žgur, S., M. Drobnič, S. Čepin, M. Čepon, M. Kovač K. Kovačič, S. Pavlin (1998): Rezultati ocenjevanja govejih trupov in polovic na liniji klanja v letu 1997. UL, BF, Oddelek za zootehniko, Domžale, 1998, 18 s.

KAKVOČA ŽIVOTINJSKE PROIZVODNJE I ŽIVOTINJSKI PROIZVODI U SLOVENIJI

Sažetak

U članku je iznesena kakvoća životinjskih proizvoda i životinjske proizvodnje. Također su izneseni neki čimbenici što utječu na kakvoću proizvodnje i naša dostignuća na tom području. Raspravlja se i o sadašnjoj kakvoći najvažnijih životinjskih proizvoda u Sloveniji u usporedbi sa životinjskim proizvodima u nekim zemljama članicama EU.

Ključne riječi: stočarska proizvodnja, životinjski proizvodi, kakvoća, Slovenija, EU

Primljeno: 15. 2. 1999.