Quality of chicken carcass and meat of Croatian hen breed from organic fattening

Senčić[1], Đ., D. Samac[1], G. Kalić[2], M. Baban[1]

scientific paper

Summary

The quality of chicken carcasses and meat of 18 chickens of Croatian autochthonous breed of Croatian hen (dudica) per organic and conventional fattening group was researched. The chickens from the organic group were fed according to the Ordinance on organic production of animal products (Official Gazette No. 13/02). Both analyzed groups of chickens were fattened during 98 days. Average final body weight of chickens from the organic fattening was 0.769 ± 0.06 kg, and from the conventional fattening it was 0.883 ± 0.14 kg, whereas average mass of processed chicken carcasses was 0.528 ± 0.05 kg (organic group) and 0.605 ± 0.10 kg (conventional group). Carcasses of the chickens from the organic fattening had a significantly (p<0.05) higher share of breast (17.94%) in comparison to carcasses of the chickens from the conventional fattening (16.94%), whereas in terms of share of other parts in the carcass there weren't determined significant differences (p<0.05) between the analyzed groups of chickens. Breast and thigh of chickens from the organic fattening had a significantly lower share of skin, whereas in terms of shares of muscle tissue and bones in those parts there weren't determined significant differences (p<0.05) between the chickens from the organic and conventional fattening. The meat of the chickens from the organic fattening, in comparison to the one of the chickens from the conventional fattening had a significantly higher (p<0.05) pH1 value (6.46 : 6.24), and a very significantly lower (p<0.01) L value (62.06 : 63.87), higher a* value (12.01 : 9.79), higher b* value (19.64 : 17.14), less water (74.51 % : 74.97 %), more crude protein (24.32 % : 23.42 %), less fat (0.79 % : 1.37 %) and less ash (1.16 % : 1.19 %).*

Keywords: quality of chicken carcasses and meat, Croatian hen breed, organic fattening

Introduction

In the world, especially in the developed countries (EU, USA) there is an increasing demand for chicken meat from the organic production. Consumers are willing to pay a significantly higher price for such meat. The organic production of chicken meat is preferred not only due to a better quality but also due to maintaining biodiversity. That is one of the main goals of organic production. Many authors, like Hovi et al. (2003), suggested that slow-growing genotypes should be more represented in the organic production due to their better adaptation to poorer environmental conditions. Many European countries finance projects which lead to valorization of autochthonous poultry breeds in organic production, despite of their weaker productivity.

So, for example, Moula et al. (2009) reported on productivity of Belgian local breed Famennoise, Lariviere et al. (2006) on Belgian breed Ardennaise, Tixier-Boichard et al. (2006) on French breed Bresse. Castellini et al. (2002a) reported on Italian breed Robusta maculata, Pavlovski et al. (2009) on autochthonous Serbian breed Naked neck and others.

The goal of this work was to indicate to carcass traits of chicken of autochthonous Croatian hen (*dudica*) breed and in such a way contribute to its appreciation and preserving the breed from extinction.

Material and methods

The research was conducted on 18 chicken carcasses (9 male and 9 female) from the organic group (n=100) and 18 (9m + 9f) chicken carcasses from the conventional group of chicken from autochthonous Croatian hen breed, red type (variety). The organic group of chicken was fattened according to the Ordinance on organic production of animal products (Official Gazette No. 13/02). Both groups spent the first 28 days of fattening in a poultry house under controlled conditions and after that the chickens from the organic group were pasture-raised. 10 chickens were placed per each m^2 of the poultry house. In the first period of fattening, up to the 28th day, the chickens from both analyzed groups were fed a starter mixture with 21.74% crude protein and 11.97% MJ ME/kg, and after that period, up to the 98th day of fattening they were fed a finisher mixture with 20.12% crude protein and 11.97 MJ ME/kg. The feed for chickens from the organic group consisted of ecologically produced and permitted feeds. At the end of the fattening (98th day), the chickens from the organic group weighed 0.767 ± 0.06 kg, and the chickens from the conventional group 0.883 ± 0.14 kg. Chicken carcasses were processed according to the principle "Prepared for barbecue" (Regulation EC No. 543/2008) and after that they were cooled during the period of 24 hours at +4°C. Chicken carcasses were cut to basic parts and then the most valuable parts (drumstick, thigh and breast) were dissected to skin, muscle tissue and bones.

Meat quality was researched on *m. pectoralis* muscle. pH_1 value of meat was determined 45 min post mortem and pH_2 was determined 24 hours post mortem by the contact pH meter Mettler Toledo. Water holding capacity was determined according to the Grau and Hamm (1952) method, and color parameters of the meat (L*, a* i b*) were determined by the chromometer Minolta CR-410.

Crude protein content was determined according to the Kjeldahl method and fat content according to the Soxhlet method. Statistical analysis of research results was performed by the variance analysis – single classification. The differences between the means were tested by t-test, by the statistical analysis package (Stat.Soft.Inc.2008).

Results and discussion

Absolute and relative shares of basic parts in chicken carcasses (conformation) and mass of the processed chicken carcasses can be seen in Table 1. Processed carcasses of chickens from the organic fattening group had a significantly (p<0.01) lower mass. In terms of relative share of basic parts in the mass of chicken carcasses there weren't determined significant differences (p>0.05) between the analyzed groups, except for the share of breast which were in terms of quantity significantly (p<0.05) represented more in the carcasses of chickens from the organic fattening group.

Table 1 **Carcass conformation of the chickens from organic (O) and conventional (C) fattening**

Carcass part	Shares	Groups of chickens E (n=18) O (n=18) $\bar{x} \pm s$	Groups of chickens K (n=18) C (n=18) $\bar{x} \pm s$	Significant differences
Breast	g	95.06 ± 15.19	101.89 ± 16.21	NS
	%	17.94 ± 1.50	16.94 ± 1.52	*
Drumstick	g	67.00 ± 11.04	78.00 ± 18.16	*
	%	12.63 ± 1.32	12.71 ± 1.21	NS
Thigh	g	66.28 ± 10.89	79.06 ± 19.28	*
	%	12.52 ± 1.45	12.96 ± 1.49	NS
Wings	g	62.78 ± 9.10	70.78 ± 14.78	NS
	%	11.86 ± 1.23	11.66 ± 0.83	NS
Back and pelvis	g	154.67 ± 6.36	181.11± 3506	**
	%	29.26 ± 1.49	29.95 ± 3.14	NS
Liver	g	18.50 ± 4.18	22.33 ± 5.41	*
	%	3.55 ± 0.96	3.70± 0.67	NS
Stomach	g	33.00 ± 6.18	38.44 ± 6.63	*
	%	6.26 ± 1.15	6.44 ± 1.21	NS
Legs	g	31.61 ± 5.69	33.67± 6.72	NS
	%	5.98 ± 0.97	5.64 ± 1.10	NS
Carcass weight mass	g	528.90 ± 0.05	605.28 ± 0.10	**

*p<0.05; *p<0.01; NS-nije značajno/not significant

Table 2 **The composition of the essential parts of the carcass (breast, drumstick, thigh) of chickens from organic (O) and conventional (C) fattening**

Carcass part n= 18	Shares	Groups of chicken-s	Skin $\bar{x} \pm s$	Skin Significant differences	Muscle tissue $\bar{x} \pm s$	Muscle tissue Significant differences	Bone tissue $\bar{x} \pm s$	Bone tissue Significant differences
Breast	g	E	3.33 ± 1.33	**	67.06 ± 11.37	NS	24.67 ± 7.06	NS
		K	5.61 ± 2.72		69.50 ± 9.12		26.78 ± 9.00	
	%	E	3.56 ± 1.47	*	70.70 ± 6.15	NS	25.74 ± 5.67	NS
		K	5.50 ± 2.69		68.61 ± 5.02		25.89 ± 5.42	
Drum-stick	g	E	3.56 ± 1.76	NS	42.67 ± 10.63	NS	20.78 ± 2.76	**
		K	3.39 ± 1.46		8.89 ± 12.84		25.22 ± 6.25	
	%	E	5.40 ± 2.49	NS	62.97 ± 5.92	NS	31.64 ± 5.61	NS
		K	4.30 ± 1.22		63.00 ± 4.79		32.70 ± 4.55	
Thigh	g	E	4.44 ± 1.85	**	43.83 ± 7.87	*	18.00 ± 4.06	NS
		K	7.17 ± 3.47		52.11 ± 12.49		19.78 ± 5.94	
	%	E	6.62 ± 2.53	*	66.07 ± 4.78	NS	27.31 ± 4.99	NS
		K	8.73 ± 2.76		66.26 ± 5.95		25.01 ± 5.45	

*p<0.05; *p<0.01; NS-nije značajno/not significant

[1] **Đuro Senčić, PhD**, Full professor; **Danijela Samac, PhD**, senior assistant; **Mirjana Baban, PhD**, full professor,Department for Animal Husbandry, Faculty of Agriculture, Kralja Petra Svačića 1d, Osijek

[2] **Goran Kalić, M.Sc.** High School of Agriculture, Vinkovci, Hansa Dietricha Genschera 16, Vinkovci

Castellini et al. (2002b) determined that up to the 81st day chickens from the organic group, in comparison to those from the conventional group, achieved lower body mass and thereby had a larger share of breast (25.20%:23.50%) and drumstick (15.50%:15.00%), and a lower share of abdominal fat in a carcass (1.00%:2.90%).

Quantitative share (composition) of the most valuable parts of chicken carcasses (breast, drumstick and thigh) can be seen from Table 2. Breast and thigh from the organic fattening had a significantly ($p<0.05$) lower share of skin in comparison to the same parts of the carcass of the chickens from the conventional fattening. In terms of relative share of muscle tissue and bones in the listed parts of chicken carcasses, there weren't determined significant differences between the chickens from the organic and the conventional fattening groups.

Husak et al. (2008) determined a significantly ($p<0.05$) higher share of dark meat of drumstick and thigh in chickens from the organic fattening in comparison to the free range chickens and those from the conventional fattening (23.2%:21.5%:21.5%). The share of skin was significantly ($p<0.05$) lower in chickens from the organic fattening in comparison to free range chickens and those from the conventional fattening. Organic chickens had a higher yield in bones ($p<0.05$).

The quality of muscle tissue of chickens can be seen in Table 3. The meat of the chickens from the organic fattening had a significantly ($p>0.05$) higher pH_1 value in comparison to the meat of the chickens from the conventional fattening. Considering the pH_2 value, there weren't determined significant differences ($p>0.05$) between the meats of the analyzed groups. In research by Husak et al. (2008), pH value of meat from the organic fattening was also higher ($p<0.05$) in comparison to pH values of the meat from the free range and the conventional fattening. Raach-Moujahed et al. (2011) also determined significantly higher pH value of meat from the chickens from the organic fattening in comparison to the one of the chickens from the conventional fattening. Kim et al. (2008) did not determine differences in pH value of breast muscle of the chickens from the organic and conventional fattening, whereas Castellini et al. (2002b) determined a significantly lower final pH value of the chicken meat from the organic fattening.

Table 3 **The quality of muscle tissue (*m. pectoralis*) of chickens from organic (O) and conventional (C) fattening**

Indicators	Groups of chickens E (n=18) O (n=18) $\bar{x} \pm s$	Groups of chickens K (n=18) C (n=18) $\bar{x} \pm s$	Significant differences
pH_1	6.46 ± 0.26	6.24 ± 0.25	*
pH_2	5.76 ± 0.17	5.74 ± 0.13	NS
Water holding capacity, cm^2	4.40 ± 0.65	5.04 ± 1.32	NS
Color: -L*	62.06 ± 1.69	63.87 ± 1.77	**
-a*	12.01 ± 1.32	9.7 ± 1.60	**
-b*	19.64 ± 2.57	17.14 ± 2.05	**
Water, %	74.51 ± 0.22	74.97 ± 0.61	**
Crude proteins, %	24.32 ± 0.39	23.42 ± 0.69	**
Fat, %	0.79 ± 0.13	1.37 ± 0.39	**
Ash, %	1.16 ± 0.01	1.19 ± 0.01	**

*p<0,05; *p<0,01; NS-nije značajno

In terms of water holding capacity of meat, there weren't determined significant differences ($p>0.05$) between the chickens from the organic and conventional fattening groups. In research by Castellini et al. (2002b), the meat of the chickens from the organic fattening had a significantly ($p<0.05$) weaker water holding capacity (%) and a larger loss of mass (%) by cooking in comparison to the meat of the chickens from the conventional fattening.

Regarding color parameters of the meat, chicken meat from the organic fattening had a very significantly ($p<0.01$) lower degree of brightness (L*), then a higher degree of redness (a*) and yellowness (b*). Kim et al. (2008) also claimed that breast muscle of the chickens from the organic fattening has a very significantly ($p<0.01$) lower L* value, then higher a* and b* values in comparison to those from the conventional fattening. In research by Husak et al. (2008), in terms of color (L*), the chickens from the organic fattening had a significantly ($p<0.05$) darker meat of breast, drumstick and thigh and significantly ($p<0.05$) less pigments of yellow color (b*) in comparison to free range and conventional fattening chickens. In research by Raach-Moujahed et al. (2011), there weren't significant differences ($p>0.05$) in terms of color parameters (L*, a* and b*) of the meat of breast and drumstick between the chickens from the organic and conventional fattening.

The meat of the chickens from the organic fattening, in comparison to the one from the conventional fattening had a very significantly ($p<0.01$) higher content of crude protein and a lower content of fat and ash. In terms of water content in the meat there weren't determined significant differences ($p>0.05$) between the analyzed groups of chickens. In research by Husak et al. (2008), protein content in breast of the chickens from the organic fattening was higher ($p<0.01$) in comparison to protein content in breast of the chickens from free range and conventional fattening groups. In the meat of the chickens from the organic fattening, Castellini et al. (2002b) determined significantly higher content of water and less fat, whereas in terms of contents of protein and ash there weren't determined significant differences. Kim et al. (2008) did not determine significant differences considering the contents of water, protein and fat, but they determined significantly more ash in breast muscle of the chickens from the organic fattening in comparison to the ones from the conventional fattening.

Conclusion

Carcasses of the chickens from the organic fattening had a significantly ($p<0.05$) larger share of breast (17.94%) in comparison to the carcasses of the chickens from the conventional fattening (16.94%), whereas in terms of shares of other parts in the carcass there weren't determined differences between the analyzed groups of chickens ($p<0.05$). Breast and thigh of the chickens from the organic fattening had a significantly lower share of skin, whereas in terms of shares of muscle tissue and bones in listed parts there weren't determined significant differences between the chickens from the organic and conventional fattening.

Chicken meat from the organic fattening, in comparison to the one from the conventional fattening, had a significantly ($p<0.05$) higher pH_1 value (6.46 : 6.24), and very significantly ($p<0.01$) lower L* value (62.06 : 63.87), higher a* value (12.01 : 9.79), higher b* value (19.64 : 17.14), lower content of water (74.51 % : 74.97 %), more protein (24.32 % : 23.42 %), less fat (0.79 % : 1.37 %) and ash (1.16 % : 1.19 %).

Qualität der Rümpfe und des Fleisches bei Hennehühnern der Rasse hrvatica aus ökologischer Mast

Zusammenfassung

Es wurde die Qualität der Hühnerrümpfe und des Fleisches bei 18 Hühnern der kroatischen autochtonen Rasse hrvatica (dudica) untersucht, die aus der ökologischen und konventionellen Mast stammten. Die Hühner aus der ökologischen Gruppe wurden nach der Dienstvorschrift über die ökologische Herstellung der Erzeugnisse tierischer Herkunft (NN 13/02) gefüttert. Die Hühner aus den beiden analysierten Gruppen wurden während 98 Tage gemästet. Die durchschnittliche Endkörpermasse der Hühner aus ökologischer Mast war 0,769 ±0,06 kg, und aus der konventionellen Mast betrug sie 0,883 ±0,14 kg. Die durchschnittliche Masse der verarbeiteten Hühnerrümpfe war 0,528±0,05 kg (ökologische Gruppe) und 0,605±0,10 kg (konventionelle Gruppe). Die Hühnerrümpfe aus der organischen Mast hatten einen bedeutend ($p<0,05$) größeren Anteil der Brust (17,94 %) in Bezug auf die Hühnerrümpfe aus der konventionellen Mast (16,94 %), während in bezug auf andere Rumpfteile der analysierten Gruppen ($p<0,01$) keine größeren Unterschiede festgestellt worden sind. Brust und Oberkeule der Hühner aus der ökologischen Mast hatten einen bedeutend kleineren Anteil der Haut, während hinsichtlich des Anteils von Muskelgewebe und Knochen bei den angeführten Teilen keine bedeutenden Unterschiede zwischen den Hühnern aus der ökologischen und konventionellen Mast festgestellt worden sind. Das Fleisch der Hühner aus der ökologischen Mast in Bezug auf die Hühner aus der konventionellen Mast hatte einen besonders ($p<0,05$) größeren pH1 Wert (6,46 : 6,24) und einen sehr bedeutend ($p<0,01$) niedrigeren L Wert (62,06 : 63,87), einen größeren a* Wert (12,01 : 9,79), einen größeren b* Wert (19,64 : 17,14), einen niedrigeren Wasseranteil (74,51 % : 74,97 %) , einen höheren Anteil von rohen Proteinen (24,32 % : 23,42 %) und einen niedrigeren Fettanteil (0,79 % : 1,37 %) sowie einen niedrigeren Ascheanteil (1,16 % : 1,19 %).*

Schlüsselwörter: *Qualität der Hühnerrümpfe und des Fleisches, Hennerasse hrvatica, ökologische Mast*

Qualità delle carcasse e della carne dei polli della gallina di razza hrvatica da allevamento biologico

Sommario

È stata esaminata la qualità delle carcasse dei polli e della carne di 18 polli di razza autoctona hrvatica (dudica) proveniente da allevamento biologico e convenzionale. I polli dall›allevamento biologico sono stati ingrassati secondo il Regolamento relativo alla produzione biologica dei prodotti di origine animale. Entrambi i gruppi dei polli sono stati ingrassati nel periodo di 98 giorni. Il peso medio dei polli dell›allevamento biologico era 0,769 ± 0,06 kg, e dell›allevamento convenzionale 0,883 ± 0,14 kg. Il peso medio delle carcasse trattate dei polli era 0,528 ± 0,05 kg (allevamento biologico) e 0,605 ± 0,10 kg (allevamento convenzionale). Le carcasse dei polli di allevamento biologico hanno presentato una notevole diversificazione ($p<0,05$) dell›incidenza del petto (17,94 %) rispetto alle carcasse dell›allevamento convenzionale (16,94 %). Rispetto all›incidenza delle altre parti della carcassa, non sono stabilite differenze significative tra i due gruppi dei polli analizzati ($p<0,05$). La pelle del petto e delle sovracosce è risultata presente in percentuale maggiore nel gruppo d›allevamento biologico. Rispetto all›incidenza del tessuto muscolare e delle ossa delle parti indicate non sono rivelate differenze di rilievo tra i polli d›allevamento biologico e quelli d›allevamento convenzionale. La carne dei polli d›allevamento biologico rispetto a quella dei polli d›allevamento convenzionale ha presentato un notevolmente elevato valore di pH1 (6,46 : 6,24), un valore inferiore ($p<0,01$) di L (62,06 : 63,87), un valore più elevato di a* (12,01 : 9,79), un valore più elevato di b* (19,64 : 17,14), una minore percentuale di acqua (74,51 % : 74,97 %), un contenuto più elevato di proteina grezza (24,32 % : 23,42 %), un contenuto inferiore di grassi (0,79 % : 1,37 %) e un contenuto inferiore di ceneri (1,16 % : 1,19 %).*

Parole chiave: *qualità delle carcasse e della carne di polli, gallina di razza hrvatica, allevamento biologico*

References

Castellini, C., C. Mugnai, A. Dal Bosco (2002a): Meat quality of three chicken genotypes reared according to the organic system. Ital. J. Food Sci. (4), pp. 411-412.

Castellini, C., C. Mugnai, A. Dal Bosco (2002b): Effect of organic production system on broiler carcass and meat quality. Meat Sci. 60, pp. 219-225.

Grau, R., R. Hamm (1952.): Eine einfache Methode zur Bestimmung der Wasser bildung in Fleisch. Die Fleischwirtschaft, 4, pp. 295-297.

Hovi, M., A. Sundrum, S.M. Thamsborg (2003.): Animal health and welfare in organic livestock in Europe: current state and future challenges. Livestock Production Science 80, 1-2, 41-53.

Husak, R. L., J. Sebranek, K. Bregendahl (2008.): A survey of commercially available broilers marketed as organic, free-range, and conventional broilers for cooked meat yields, meat composition, and relative value. Poultry Science 87, 2367- 2376.

Kim, D. H., S.H. Cho, J.H. Kim, P.N. Seong, J.M. Lee, K.H. Hah, D.G. Lim (2008.): Differences in meat quality between organically produced broiler muscles. 54 International Congress of Meat Science and Technology, 10-15 August, Cape Town, South Africa.

Lariviere, J. M., P. Leroy (2006.): Genetic parameters of body weight in the Ardennaise chicken breed, Proceedings of the 8th World Congress on Genetics Applied to Livestock Production, Belo Horizonte, Minas Gerais, Brazil, 13-18 Aug., pp:7-23.

Moula, N., N. Antoine-Moussiaux, F. Farnir, P. Leroy (2009.): Evaluation of the production performances of an endangered local poultry breed, the Famennoise. International Journal of Poultry Science 8, 4, 389-396.

Official Journal of the European Union, COMMISSION REGULATION (EC) No 543/2008. …www.fsai.ie/uploadedFiles/Legislation/Legislation_Update/Reg543_2008.

Pavlovski, Z., Z. Škrbić, **M. Lukić, D. Vitorović, V. Petričević** (2009.): Naked neck – autochthonous breed of chicken in Serbia: Carcass characteristics. Biotechnology in Animal Husbandry 1-2, 1-11.

Raach-Moujahed, A., B. Haddad, N. Moujahed, M. Bouallegue (2011.): Evoluation of Growth Performances and Meat Quality of Tunisian Local Poultry Raised in Outdoor Access. International Journal of Poultry Science 10, 7, 552-559.

STATISTICA - Stat Soft, Inc. (data analysis software system), version 7,1, 2008., www.statsoft.com

Tixier-Boichard, M. A., A. Audiot, R. Bernigaud, X. Rognon, C. Berthouly, P. Magdelaine, G. Coquerelle, R. Grinand, M. Boulay, D. Ramanantseheno, Y. Amigues, H. Legros, C. Guintarad, J. Lossouarn, E. Verrier (2006.): Valorisation des races anciennes de poulets: facteurs sociaux, technico-economiques, genetiques et reglementaire. Les Actes du BRG, 6: 495-520.

….. Pravilnik o ekološkoj proizvodnji životinjskih proizvoda (NN 13/02)

Received: 12th July.2013
Accepted: 9th September 2013

Effect of floor type on carcass and meat quality of intensively reared Simmental bulls

D. Karolyi[1], A. Jakupec1, K. Salajpal[1], A. Radovčić[2], M. Konjačić[3], H. Čatipović[2], T. Jakopović[2], I. Jurić[1]

scientific paper

Summary

*This study investigated the effect of floor type on carcass and meat quality of intensively reared Simmental bulls. The animals were housed in common pens on a concrete slatted floor (SF group, n=15) or a full floor with straw bedding (FF group, n=15). The space allowance in SF and FF groups was 4.7 and 6.0 m2 per bull, respectively. Diet in both groups was given as total mixture ration composed from maize grain and stalk silage, super-concentrate and hay (average composition per kg: 599 g of DM, 76 g of crude protein and 4.59 MJ of ME as feed). After the slaughter at similar age (494±17 days) and final body weight (597.5±56.4 kg), the carcass traits (hot carcass weight, dressing-out %, EUROP classes distribution) were determined. Meat pH and colour (CIE L*a*b*) was measured at the Longissimus thoracis muscle 24 h post mortem at the level of the 8th rib. The same muscle was sampled for chemical analysis of dry matter, protein, ash, total iron and intramuscular fat content. Data were analyzed by Student's t-test. In general, there was no significant effect (P>0.05) of floor type on any of carcass or meat quality traits and chemical composition, except for meat pH24 value and ash content, which in SF group shoved respectively lower and higher results than in the FF group: 5.61 vs. 5.68 (P=0.0168) and 10.53 vs. 10.36 g/kg (P=0.0466).*

Keywords: *beef cattle, Simmental breed, type of floor, carcass traits, meat quality*

Introduction

In intensive beef farming in Croatia, bulls are mainly kept indoors in common pens on concrete slatted floor or full floor with straw bedding. At both floor types the animals are usually housed loosely and at high stocking rates. The housing of animals in pens with a fully slatted floor has the advantages because it does not need any bedding material and a lower labour input is required to remove slurry than in a solid floor system (Lowe *et al.*, 2001; Cozzi *et al.*, 2005). However, the slatted floors are less favourable from the animal welfare point of view, as they are often too slippery and hence connected with higher culling rates due to the more frequent locomotion problems, such as leg fractures and lameness (Cerchiaro *et al.*, 2005; Schulze Westerath *et al.*, 2007). Moreover, significant behavioural alternations of bulls, both in lying and standing behaviour, are more often noted in pens with slatted floor than in pens with a bedded lying area (Absmanner *et al.*, 2009). With regard to influence of floor type (slatted vs. bedding) on fattening performances and carcass and meat quality traits, the previous works reported less clear effects, particularly when the space allowance of bulls is similar (Gottardo *et al.*, 2003). In present work, the effect of floor type on carcass and meat quality traits was investigated on a sample of Simmental bulls reared under intensive beef producing system in Croatia.

Material and methods

Animals, housing and diets

The investigation was conducted in 2008 on 30 Simmental bulls produced under an intensive rearing system on two commercial beef farms with a different type of animals' housing: a) at full concrete floor with straw bedding (Farm A, FF group, n=15) and b) at fully slatted concrete floor (Farm B, SF group, n=15). The FF bulls were kept loosely at common pen in the barn with closed walls on three sides and an open section toward the outdoor feeding corridor. The pen box had a length of 6.3 m at the lying area and 2.7 m at excrementary corridor, with a width of 10 m. The lying area in relation to the excrementary corridor is lower by 50 cm. The average space allowance was 6 m^2 per bull. The utilization of straw for floor bedding was around 5-6 kg per bull daily. The dirty corridor is cleaned 2 to 3 times a week, while the lying area was not cleaned during fattening. The SF bulls were housed inside the barn on a fully slatted concrete floor (15.5 cm width of beams, with the distance between beams of 35 mm). The animals were also kept loosely in a common pen with the dimensions 7x10 m. The av-

1 **Danijel Karolyi, PhD**, Associate professor; ***Antonija Jakupec,*** MS student; **Krešimir Salajpal**, PhD, associate professor; **Ivan Jurić, PhD**, full professor in retirement, University of Zagreb Faculty of Agriculture, Department of Animal Science, Svetošimunska cesta 25, Zagreb

2 **Ante Radovčić, DVM**, **Hrvoje Čatipović, DVM**; **Tomislav Jakopović, B.Sc.**, Belje d.d., Industrijska zona 1, Mece, Darda

3 **Miljenko Konjačić**, Assistant professor, University of Zagreb Faculty of Agriculture, Department of Animal Science and Technology, Svetošimunska cesta 25, Zagreb,