

Carcass Quality of Slaughtered Cika and Brown Cattle in Slovenia

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Summary

The aim of the study was to compare carcass traits between Cika and Brown cattle of all slaughter categories. The data used were collected in Slovenian slaughterhouses from 2007 to 2010. After the slaughter carcass weight was recorded and carcass conformation and fatness were scored according to the EUROP system. Net daily gain was calculated. Data were analysed by GLM procedure of statistical package SAS/STAT considering breed, month of the slaughter and year of the slaughter nested within the breed as fixed effects. Cika bulls (under 24 months old) were two months younger at slaughter (20.2 months) and achieved lower carcass weight (266.7 kg) compared to Brown bulls (22.4 months, 330.0 kg). Also in all other categories except in calves under eight months old, Brown cattle had higher carcass weight. Bulls under 24 months old, steers, cows and calves over eight to 12 months old of Brown cattle were older at slaughter compared to Cika breed. Net daily gain was also higher in all slaughtered categories of Brown cattle. Even if the slaughtered Brown cattle had heavier carcass weight compared to Cika cattle there was almost no significant difference in carcass conformation. Carcasses of Cika bulls under 24 months old had conformation 6.4 while Brown bulls 6.3. Likewise carcasses of Cika calves over eight to 12 months had higher conformation score (5.7) than Brown (4.8) calves. Fatness was higher in Brown bulls, steers and heifers compared to Cika cattle, while Cika cows had higher fatness than Brown cows.

Key words

cattle, Cika, Brown, carcass quality

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Aim

Beef production with dual purpose cattle breeds has a long tradition in Slovenia. However, in the last decade the main income from the dual purpose cattle came from milk production. After introduction of milk quotas breeders decided to introduce more specialized milk breeds (Holstein Frisian). On the other side, there were breeders who finished with commercial milk production and started with cow-calf systems for extensive beef production. Also Cika (brachycerous origin), the only autochthonous cattle, are now due to low milk production mainly reared in the cow-calf systems. The population number of Cika (2,341) and Brown (44,408) differed very much on the base of data from 2010 (Department for the identification and registration of animals – Ministry of agriculture, forestry and food). Also the body size differs between breeds. Cika cattle are smaller body sized with cows wither height less than 125 cm (Žan Lotrič et al., 2010), while Brown cattle are larger sized, cows have 135 – 145 cm wither height (Čepon et al., 2004). The aim of this study was to compare some carcass traits between autochthonous Cika and traditional Brown cattle, two dual purpose breeds in Slovenia.

Material and methods

Data used in this study were collected in Slovenian slaughterhouses from the year 2007 to 2010. Slaughtered Cika and Brown cattle were reared on Slovenian farms using different production systems. There were large differences between and within breed rearing systems. We collected data of all categories of animals (bulls under 24 months, bulls over 24 months, steers, cows, heifers, calves under eight months and calves over 8 - 12 months). After the slaughter carcass weight was recorded and carcass conformation and fatness were scored according to the EUROP system into 15 possible classes, where E+ class means 15 and P- means 1, and fatness 5+ means 15 and 1- means 1 (Pravilnik ..., 2008). Net daily gain was calculated on the basis of carcass weight and slaughter age. Data were analysed by GLM procedure of statistical package SAS/STAT (SAS Institute Inc., 2001) considering breed, month of the slaughter and year of the slaughter nested within the breed as fixed effects.

Results and discussion

The rearing conditions differed very much among farms. Farms with Cika cattle are mainly located in the hills and in the summer time cattle are on all day grazing in the higher mountains. A lot of the farms have organic production system and the base fodder for the cattle represents only hay and maybe grass silage during the winter time (Simčič et al., 2010a). In a few farms Cika are still used for milk production, but the majority Cika herds are reared in the cow-calf systems for the extensive beef production. Likewise herds with the Brown cattle are divided on that with intensive milk production and others which rear Brown cattle more extensively for beef - milk production. Also the farms with Brown cattle are located on the different environmental conditions from lowlands to highlands. Only small number of bulls had been castrated and fattened like steers.

Table 1 shows large difference in the number of slaughtered Cika and Brown cattle. Slaughtered cattle were subdivided in seven categories, where the bulls under 24 months (A category)

represented the main part of slaughtered Cika (27.8%) and Brown (30.7%) cattle. Cika bulls in A category were on average two months younger at slaughter (20.2 months) and achieved significantly lower carcass weight (266.7 kg) compared to Brown bulls (22.4 months, 330.0 kg). Also net daily gain was significantly lower at Cika bulls in A category.

Several studies have been reported to characterize carcass traits of young bulls and calves belonging to the some European dual purpose and autochthonous breeds. Some of them considered typical production systems for fattening young bulls and calves of autochthonous breeds (Piedrafito et al., 2003; Serra et al., 2004), while others tried to intensively fatten young bulls, calves and steers of local breeds to show their potential for beef production (Albertí et al., 2008; Cozzi et al., 2009; Vieira et al., 2005; Vieira et al., 2007). Intensively fattened young bulls and calves of European dual purpose and autochthonous cattle breeds were in general much younger at slaughter and had larger carcass weight compared to traditionally fatten young bulls, calves and steers of Cika and Brown breed from Slovenian farms.

Čepin et al. (1998) found lower carcass weight (325 kg) as well as lower slaughter age (20.3 months) in 69 Brown bulls of A category from progeny test station that achieved higher (532.7 g/day) net daily gain compared to Brown young bulls (A category) from this study. Simčič et al. (2010b) included Cika young bulls in a trial where the effect of rearing technology (fattening vs. grazing) on carcass quality was studied. Fattened Cika young bulls (A category) had lower slaughter age (20.0 months) and higher carcass weight (291.8 kg) as well as net daily gain (488.4 g/day) compared to grazed Cika young bulls (23.5 months, 232.8 kg, 330.5 g/day), respectively.

Very similar slaughter age as Cika bulls in A category (605.6 days) found Piedrafito et al. (2003) in Salers bulls (582.1 days) that were traditionally fattened with grass and maize silage supplemented with concentrates and achieved for 150.4 kg larger carcass weight compared to Cika bulls in A category. Salers dual purpose breed in France were originally used for draught and milk production. Nowadays, they produce purebred and crossbred weaned calves for fattening. Likewise Piedrafito et al. (2003) found similar carcass weight to Cika (266.7 kg) and Brown bulls (330.0 kg) of A category in small to medium sized Morucha bulls (259.9 kg) and medium to large sized Pirenaica (334.5 kg) bulls of Spanish local (autochthonous) breeds. However the differences among Cika and two Spanish breeds existed in slaughter age.

Bulls older than 24 months (B category) represented 17.3% of slaughtered Cika and 19.9% of slaughtered Brown cattle. Cika bulls from B category were significantly older (30.1 months) than Brown bulls (27.7 months), but had lower carcass weight (313.4 kg) and lower net daily gain (355.9 g/day) compared to B category Brown bulls (348.5 kg, 424.2 g/day).

The smallest part of slaughtered cattle represented steers (Cika – 2.8%, Brown – 1.0%). Steers might be reared very extensively because they achieved significantly lower carcass weight (Cika – 234.9 kg, Brown – 297.9 kg) and net daily gain (Cika – 344.8 g/day, Brown – 369.6 g/day) compared to A and B category bulls. Cika steers at slaughter (23.3 months) were 5.1 month younger than Brown steers (28.4 months). Likewise Vieira et al. (2007)

Table 1. Carcass traits for all categories of slaughtered Cika and Brown cattle

Category	n		Carcass weight, kg (LSM ± SE)			Net daily gain, g/day (LSM ± SE)			Slaughter age, days (LSM ± SE)		
	Cika	Brown	Cika	Brown	p	Cika	Brown	p	Cika	Brown	p
A	391	11664	266.7± 3.3	330.0± 0.6	***	442.9± 4.5	500.8± 0.8	***	605.6± 4.1	661.1± 0.7	***
B	243	7559	313.4± 4.2	348.5± 0.7	***	355.9± 5.7	424.2± 1.0	***	903.4± 8.9	831.4± 1.5	***
C	39	383	234.9± 9.5	297.9± 3.3	***	344.8± 14.7	369.6± 5.1	ns	698.2± 65.1	851.1± 22.5	*
D	225	10741	243.7± 3.7	261.5± 0.5	***	-	-	-	2473.0± 93.2	2745.9± 13.5	*
E	100	2788	198.6± 5.9	249.7± 1.2	***	284.1± 9.2	327.5± 1.9	***	870.7± 57.2	861.1± 11.6	ns
V	307	4503	94.4± 1.4	88.9± 0.3	***	688.7± 13.0	743.4± 3.1	***	145.7± 2.6	126.8± 0.6	*
Z	100	342	136.7± 5.4	152.8± 2.7	**	461.5± 16.5	499.9± 8.3	*	297.3± 4.1	304.9± 2.1	ns

A - bulls under 24 months, B - bulls over 24 months, C - steers, D - cows, E - heifers, V - calves under eight months, Z - calves over eight to 12 months, n - number of animals, LSM - least square means, SE - standard error, *** - $p < 0.001$, ** - $p < 0.01$, * - $p < 0.05$, ns - non significant

Table 2. Conformation and fatness scores for all categories of slaughtered Cika and Brown cattle

Category	n		Conformation score (LSM ± SE)			Fatness score (LSM ± SE)		
	Cika	Brown	Cika	Brown	P	Cika	Brown	p
A	278	9250	6.4 ± 0.1	6.3 ± 0.1	ns	5.8 ± 0.1	6.4 ± 0.1	***
B	190	6004	6.8 ± 0.2	6.4 ± 0.1	*	6.1 ± 0.2	6.3 ± 0.1	ns
C	8	200	5.3 ± 0.6	5.6 ± 0.1	ns	5.4 ± 1.0	7.4 ± 0.2	*
D	163	7836	4.2 ± 0.2	4.0 ± 0.1	ns	6.9 ± 0.3	6.3 ± 0.1	*
E	73	2114	5.2 ± 0.2	5.2 ± 0.1	ns	6.9 ± 0.3	7.9 ± 0.1	*
V	163	3369	6.3 ± 0.2	6.0 ± 0.1	ns	4.3 ± 0.2	4.3 ± 0.1	ns
Z	44	213	5.7 ± 0.3	4.8 ± 0.1	*	4.2 ± 0.3	4.2 ± 0.1	ns

A - bulls under 24 months, B - bulls over 24 months, C - steers, D - cows, E - heifers, V - calves under eight months, Z - calves over eight to 12 months, n - number of animals, LSM - least square means, SE - standard error, *** - $p < 0.001$, ** - $p < 0.01$, * - $p < 0.05$, ns - non significant

studied carcass weights of fattened steers of Brown Swiss (557.5 kg) and Spanish local breed Asturiana de los Valles (499.3 kg). They found much higher slaughter age (42.0 months) at both included breeds compared to steers in this study.

The large difference in the share of slaughtered categories of Cika and Brown cattle were in slaughtered cows. Cika cows represented 16.0%, while Brown cows 28.3% of all slaughtered animals. On average Cika cows were slaughtered at 6.8 years with the average carcass weight 243.7 kg, while Brown cows at 7.5 years and 261.5 kg. The reason for the difference in slaughter weight of adult cows could be in larger body size of Brown compared to Cika cows. The share of slaughtered heifers was very similar at Cika (7.1%) and Brown breed (7.3%). Cika heifers had also significantly lower carcass weight (198.6 kg) compared to Brown heifers (249.7 kg), while the slaughter age did not differ very much (29.0 months vs. 28.7 months).

Since 2008 slaughtered calves were divided into two categories, V - calves younger than eight months and Z - calves older than eight to 12 months. More calves of both slaughtered breeds were in the youngest V category (21.9% Cika, 11.9% Brown) compared to Z category of calves where 7.1% of Cika were and the only 0.9% of Brown breed. Higher percentage of slaughtered Cika calves compared to Brown calves could be assigned to higher percentage of Cika cattle in cow-calf production systems. The Cika calves under eight months (V category) had significantly heavier carcass weight (94.4 kg) compared to Brown calves carcasses (88.9 kg), but were on average older at

slaughter (4.9 vs. 4.2 months). The average carcass weight of Z category calves (over eight months) were lower in Cika calves (136.7 kg) than in Brown calves (152.8 kg), which had also lower daily gain (499.9 g/day vs. 461.5 g/day).

Carcass conformation and fatness for all categories of slaughtered Cika and Brown cattle (Table 2) were scored according to the EUROP system with 15 possible scores. The average conformation score was the highest (6.8) in Cika bulls in B category. The differences in conformation between breeds were significant just in bulls over 24 months (B category) and calves over eight months (Z category). The lowest conformation had cows of both breeds (Cika - 4.2, Brown - 4.0). The differences in fatness were significant in young bulls (A category), steers (C category), cows (D category) and heifers (E category). The A and B category Brown bulls (6.4 and 6.3) had higher fatness scores than Cika bulls (5.8 and 6.1). The fattest were Brown heifers (7.9) and Brown steers (7.4) compared to Cika heifers (6.9) and Cika steers (7.4). Carcasses of Cika and Brown calves over eight months had the lowest fatness scores (4.2).

Simčič et al. (2010b) found higher conformation scores in carcasses of fattened Cika young bulls (7.13) compared to grazed Cika young bulls (5.20) and higher fatness score in carcasses of Cika fattened (5.38) compared to Cika grazed young bulls (3.40). Piedrafita et al. (2003) found similar conformation score 6.0 in carcasses of Morucha bulls (small to medium-sized Spanish local breed) to Cika and Brown A category bulls (6.4 and 6.3). Likewise fatness score were similar in carcasses of Spanish local breed Pireneica (5.5) compared to Cika A category bulls (5.8).

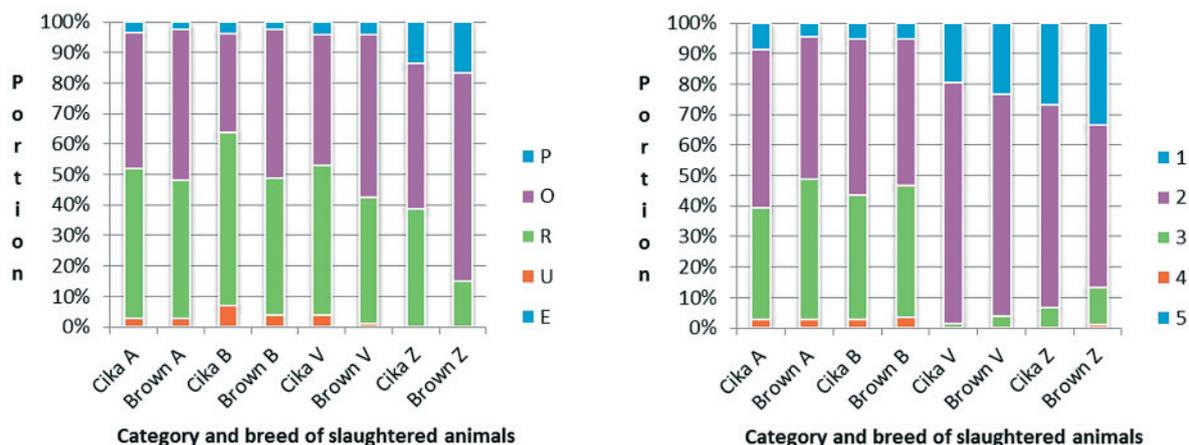


Figure 1. Portions of the conformation (EUROP) and fatness (1 – 5) scores for slaughtered animals (A - bulls under 24 months, B - bulls over 24 months, V – calves under eight months, Z – calves over eight to 12 months)

We decided to take a precise look on the portions of the conformation (Figure 1) and fatness scores of carcass sides belonged to bulls and calves, where we considered just five classes without subclasses of conformation and fatness scores. The majority of A and B category bulls as well as younger calves (V category) of Cika cattle were classified in R conformation class (48.9%, 56.8% and 49.1%) while the majority of A and B category bulls and younger calves (V category) of Brown cattle were classified in O conformation class (49.4%, 48.8% and 53.3%). The majority of older calves (Z category) of both breeds were classified in O class for conformation (47.7% - Cika, 68.1% - Brown).

The distribution of fatness scores (Figure 1) was more unique by breeds and categories. The majority of bulls and also calves were classified in fatness class 2. More calves than bulls of both breeds were classified in class 1 for fatness that is shown on the non-fattened animals prior to the slaughter.

Conclusions

Beef production with dual purpose cattle breeds has a long tradition in Slovenia. However, all categories of autochthonous Cika cattle had lower carcass weight than traditional Brown cattle. The lower carcass weight of Cika cows compared to Brown cows was explained with the smaller body size of adult Cika cattle. The conformation of Cika and Brown cattle for each slaughtered category was similar, while the fatness was lower in Cika cattle.

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