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The effect of a second grazing period on carcass traits of indigenous Cika and Simmental young bulls

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ABSTRACT

Carcass quality of Cika (20) and Simmental (19) young bulls either semi-intensively fattened indoors or finished indoors after a previous (second) grazing period was studied. There was no difference between breeds for carcass weight, dressing percentage, EUROP conformation, carcass length as well as the proportion of fore-stomachs and head. Only, fatness score and pelvic/kidney fat percentage were higher in Cika bulls compared to Simmental, while chest depth was higher in Simmental bulls. Bulls which have been finished indoors after a previous grazing period had significantly lighter carcasses, lower dressing percentage, lower EUROP conformation and fatness score but higher empty reticulo-rumen percentage compared to bulls fattened indoors. Breed x fattening technology interaction was significant for carcass weight, conformation, fatness, chest depth and empty reticulo-rumen, while slaughter weight affected only carcass weight, conformation and carcass length. The difference in the lean meat percentage between Cika and Simmental bulls was not significant. Cika bulls expressed higher fat and lower bone percentage compared to Simmental bulls. However, fattening technology did not affect the tissue percentages in the carcasses. Cika young bulls had more red and more yellow beef compared to Simmental. Bulls fattened indoors had slightly darker beef than bulls finished indoors after a second grazing period. However, carcass traits of Cika bulls were similar to those of Simmental bulls and a second grazing period could be efficiently set up in the growing-fattening scheme.
(Keywords: Cika, Simmental, young bulls, second grazing period, carcass traits)

INTRODUCTION

Nowadays indigenous Cika cattle (*Simčič et al.*, 2013) is considered a low milk productivity breed compared to popular commercial breeds and is mainly reared in herds with cow-calf system, despite the fact that in the past it was used mainly for milk production. On the other hand, dual purpose Simmental breed is the most widespread breed in Slovenia. Grazing season of suckler herds starts in the spring and lasts until late autumn when calves are weaned. Female calves are used for herd maintenance and preservation of endangered breed in the case of Cika. Male weaned calves are even slaughtered or fattened indoors (*Žgur et al.*, 2013). Usually the young growing fattening bulls are maintained indoors but a grazing period could be set up in the growing-fattening scheme, e.g., a first grazing season as calves in the suckler herds, a first indoor period as young stock, a second grazing season starting at 300–350 kg and a final finishing period indoors (*Dieuguz Cameroni et al.*, 2006). Regarding natural conditions

in Slovenia where cattle diet is based on the forage, the second grazing period for bulls could be easily adopted to the previously mentioned technology. The aim of this study was to investigate the effect of a second grazing period on the carcass traits of Cika and Simmental young bulls.

MATERIAL AND METHODS

Animals

The study was performed *in nature* and included 39 young bulls. Twenty Cika and 19 Simmental young bulls were bought from farms throughout Slovenia in November 2010 and housed in a feedlot with a closed barn with multiple pens for the winter time (178 days in average). During this period, all bulls were fed the same extensive total mixed ration based on maize and grass silage with a limited amount of concentrates. The experimental period started on May 2011. The young bulls of both breeds were divided into two subgroups according to their live weight. The first subgroup consisted of 10 Cika (initial weight 445.7 kg) and 9 Simmental (initial weight 392.4 kg) bulls that were fattened indoors with semi-intensive total mixed ration (S-INT) consisted of maize silage (66.0%), grass silage (16.5%), corn (9.5%), sunflower meal (7.1%) and mineral - vitamin premix (0.9%) that is commonly used for bulls fattening. Bulls were housed in four pens with a fully slatted floor, equipped with two drinkers to allow *ad libitum* water accessibility. Second subgroup included 10 Cika (initial weight 339.7 kg) and 10 Simmental (initial weight 312.5 kg) bulls that were put on all-day grazing in the pasture, divided in three paddocks, with *ad libitum* water and minerals access. Grazing period finished in October 2011, at the end of the vegetation season and lasted in total 131 days. Cika bulls were lighter (427.7 kg) compared to Simmental (434.5 kg) at the end of second grazing period. After that, bulls were housed in four pens and finished with the same S-INT total mixed ratio that the first subgroup also received. All bulls were weighted at the beginning of the experimental period and thereafter, once a month until slaughter time. The average daily gain (ADG) was calculated dividing the difference between final and initial live weight by the number of days of the period. All the bulls were slaughtered when they achieved appropriate commercial finishing according to Slovenian market requirements.

Carcass quality

Young bulls fattened indoors were slaughtered at an average slaughter weight of 674.4 kg for Cika and 668.9 kg for Simmental, while young bulls finished indoors after a previous second grazing period at 606.4 kg and 663.6 kg, respectively. During the slaughtering process, head (without skin and horns), full and empty reticulo-rumen and full omasum/abomasum, pelvic/kidney fat were weighted. After slaughter, hot carcasses were weighed and dressing percentage was calculated as hot carcass weight divided by slaughter weight. Carcasses were graded for conformation (EUROP) and fatness according to the European grading scheme. Carcass length was measured as a distance from the front edge of the pelvic symphysis to the middle of the front edge of the first rib. Chest depth was measured as the distance from the ventral edge of the spinal canal to the ventral edge of the broken sternum of the fifth rib. pH 24 was measured 24 h *post mortem* in the middle of cross section of *Longisimus dorsi* muscle between 6^{th} and 7^{th} rib. Beef colour was measured as a triplicate on the same LD cross section after 30 minute of exposure to the air by chromo meter (Minolta CR 300) and expressed as CIE L*a*b* values. After chilling, the right carcass side was separated into the main carcass

tissues (lean meat, fat, tendons, and bones). The total weight of separated tissues was used to calculate the percentage of four various tissues in the carcass.

Statistical analysis

Data was analysed using the GLM procedure in the statistical package SAS/STAT (SAS Institute Inc., 2001). The effect of breed (B), fattening technology (T), breed by fattening technology interaction (B x T) and slaughter weight as linear regression were included in the model. For carcass tissue composition and meat colour the B x T interaction and slaughter weight as co-variable were omitted from the model as they were not significant.

RESULTS AND DISCUSSION

The second grazing period is commonly used in extensive beef production with steers, for example of Rubia Galega, a local beef breed from Spain (*Varela et al*., 2004), dairy Holstein and Montbéliard breeds in France (Thénard et al., 2006) as well as Charolais x Friesian crossbreds in Ireland (*Keane and Allen*, 1998). Some of them are finished in the pasture others are finished indoors after grazing period. However, there is lack of literature studied bulls fattening in the pasture as a consequence of not commonly used bulls as grazing animals. An exception is a report from *Piedrafita et al*. (2003) about Aubrac bulls, an indigenous breed from France. After weaning, the Aubrac bulls were reared indoors during first winter, then put on the pasture until 19 months of age and then were finished indoors until slaughter at 29.2 months of age. Likewise, *De la Fuente et al*. (2009) studied Fleckvieh x Limousine crossed bulls raised in the pasture and finished indoors.

Simčič et al. (2010) studied carcass quality of Cika bulls finished in the pasture. At the slaughter age of 23.5 months they achieved only 232.8 kg carcass weight, conformation score 5.2 and fatness score 3.4. Regarding poor carcass quality authors recommended to finished Cika bulls indoors after grazing period to achieve larger slaughter weight and better conformation and fatness scores.

In this study, indoor fattened Cika bulls had only slightly lower ADG during the whole fattening (817 g/day) compared to Simmental (837 g/day) young bulls. On the pasture, the difference in ADG between both breeds was more pronounced. During grazing period ADG of Cika bulls was much lower (662 g/day) compared to Simmental (917 g/day) bulls. This difference diminished after bulls were housed and fattened again indoors. Cika bulls achieved 842 g/day while Simmental bulls 909 g/day. This much lower ADG in Cika bulls could be at least partly explained by earlier sexual maturity of Cika bulls and consequently more aggressive and sexual behaviour during grazing.

Among all included carcass traits, there were no significant differences between breeds for carcass weight, dressing percentage, EUROP conformation, carcass length as well as the proportion of fore stomaches (full reticulo-rumen, empty reticulo-rumen, and full omasum/abomasum) and head proportion. Only fatness score and pelvic/kidney fat percentage were significantly higher in Cika (6.18±0.18, 1.08±0.06%) compared to Simmental (5.21±0.19, 0.70±0.06%) bulls, respectively, whereas chest depth was significantly higher in Simmental (45.57±0.27 cm) compared to Cika (44.38±0.26 cm) bulls (*Table 1*). Carcass weight, dressing percentage and conformation score of Simmental bulls were similar to those reported by *Albertí et al*. (2008) but, due to the low energy content of S-INT finishing total mixed ratio, the animals were older at slaughter and carcass had a lower fatness score than the reported one.

Bulls which were finished indoors after a previous grazing period had significantly lighter carcass (356.67±2.20 kg), lower dressing percentage (54.62±0.34%), lower EUROP conformation (8.51±0.17) and fatness score (5.34±0.18) and higher empty reticulo-rumen proportion (1.78±0.04%) compared to bulls fattened indoors with S-INT diet (368.89±2.26 kg, 56.50±0.34%, 9.11±0.17, 6.05±0.19), respectively (*Table 1*). The pH 24 was also slightly higher in bulls that were previously grazed before indoors finishing.

De la Fuente et al. (2009) investigated Fleckvieh x Limousine crossed bulls raised in the pasture and finished on corn silage *at libitum* supplemented with soy and cereal meal during last six months. Bulls were slaughtered at 19–24 months and had a little higher carcass weight (382.4±41.1 kg) compared to indoors fattened bulls in this study. On the other hand, Aubrac bulls finished indoors after second grazing period achieved higher (451.0 kg) carcass weight and higher dressing parcentage (59.9) at higher slaughter age 722.8 days (29.2 months) compared to Cika and Simmental bulls in similar rearing technology. Likewise, conformation (9.5) and fatness (7.8) were higher at Aubrac compared to bulls from this study finished indoors after grazing (8.51, 5.34), respectively (*Piedrafita et al.*, 2003).

Table 1

Carcass traits of Cika and Simmental young bulls from different fattening technologies (LSM±SE)

Carcass traits	Effects							
	Breed (B)			Fattening technology (T)			B x T	SW
	Cika	SIM	p-value	S-INT	Grazing + S-INT	p-value	p-value	p-value
Carcass weight (kg)	359.86 ±2.15	365.70 ±2.21	n.s.	368.89 ±2.26	356.67 ± 2.20	0.001	0.041	<0.001
Dressing percentage (%)	55.12 ±0.33	56.00 ± 0.37	n.s.	56.50 ±0.34	54.62 ±0.34	0.001	n.s.	n.s.
EUROP conformation* (score 1–15)	8.73 ±0.16	8.90 ± 0.17	n.s.	9.11 ±0.17	8.51 ±0.17	0.022	0.040	0.035
Fatness (score 1–15)	6.18 ±0.18	5.21 ± 0.19	0.001	6.05 ±0.19	5.34 ±0.18	0.015	0.042	n.s.
Carcass length (cm)	138.32 ±0.61	138.90 ±0.63	n.s.	138.61 ±0.65	138.60 ±0.63	n.s.	n.s.	<0.001
Chest depth (cm)	44.38 ±0.26	45.57 ±0.27	0.001	45.01 ±0.28	44.95 ± 0.27	n.s.	0.043	n.s.
Pelvic/kidney fat (% SW)	1.08 ±0.06	0.70 ±0.06	<0.001	0.87 ±0.06	0.91 ±0.06	n.s.	n.s.	n.s.
Full reticulo-rumen (% SW)	9.18 ±0.34	9.05 ±0.35	n.s.	8.72 ±0.35	9.50 ±0.34	n.s.	n.s.	n.s.
Empty reticulo-rumen (% SW)	1.72 ±0.04	1.66 ±0.04	n.s.	1.60 ±0.04	1.78 ±0.04	0.006	0.041	n.s.
Full omasum/ abomasum (% SW)	2.63 ±0.07	2.63 ±0.07	n.s.	2.54 ±0.08	2.72 ±0.07	n.s.	n.s.	n.s.
Head (% SW)	4.38 ± 0.07	4.53 ± 0.07	n.s.	4.44 ± 0.07	4.48 ± 0.07	n.s.	n.s.	n.s.
pH 24	5.62 0.01±	5.61 ±0.01	n.s.	5.59 ±0.01	5.64 ±0.01	0.048	0.015	n.s.

SIM–Simmental; SW–slaughter weight; S-INT–semi intensively total mixed ratio; n.s.–p>0.05; *(E+ = 15, E◦ = 14, E- = 13, U+ = 12, U◦ = 11, U- = 10, R+ = 9, R◦ = 8, R- = 7, O+ = 6, O◦ = 5, O- = 4, P+ = 3, P◦ = 2, P- = 1)

Moreover, breed x fattening technology interaction in this study was significant for carcass weight, conformation, fatness, chest depth, empty reticulo-rumen and pH 24, while slaughter weight significantly affected only carcass weight, conformation and carcass length (*Table 1*).

In the carcasses, lean meat represented the largest percentage, but the difference between Cika (72.29±0.41%) and Simmental bulls (73.14±0.42) was not significant. Breed significantly affected fat and bone percentages. Carcass of Cika bulls contained more fat (11.60±0.32%) and fewer bones (14.48±0.22%) compared to Simmental bulls (8.79±0.33%, 16.31±0.22%). Fattening technology did not affect the percentage of the tissues in the carcasses (*Table 2*). Similar percentages of tissue composition estimated from the sixth rib (76.1% lean meat, 15.4% bones, 7.6% fat) found *Piedrafita et al.* (2003) in carcasses of Aubrac bulls finished indoors after grazing period.

Cika young bulls had more red (a*) and more yellow (b*) meat (27.03±0.52; 12.23±0.28) compared to Simmental (24.75±0.53; 11.02±0.28). However, bulls fattened indoors had slightly darker meat (35.51±0.36) than bulls finished indoors after a second grazing period (36.76±0.35) (*Table 2*).

Table 2

Proportions of main tissues in the carcass and meat colour of Cika and Simmental young bulls from different fattening technologies (LSM±SE)

	Effects					
	Breed (B)			**Fattening technology (T)**		
	Cika	**SIM**	**p-value**	**S-INT**	**Grazing + S-INT**	**p-value**
Lean meat (%)	72.29 ± 0.41	73.14 ± 0.42	n.s.	72.97 ± 0.42	72.45 ± 0.41	n.s.
Fat (%)	11.60 ± 0.32	8.79 ± 0.33	<0.001	10.02 ± 0.33	10.37 ± 0.32	n.s.
Tendons (%)	1.64 ± 0.04	1.76 ± 0.04	n.s.	1.69 ± 0.04	1.70 ± 0.04	n.s.
Bones (%)	14.48 ± 0.22	16.31 ± 0.22	<0.001	15.32 ± 0.22	15.47 ± 0.22	n.s.
L* value	36.15 ± 0.35	36.12 ± 0.36	n.s.	35.51 ± 0.36	36.76 ± 0.35	0.018
a* value	27.03 ± 0.52	24.75 ± 0.53	0.004	25.47 ± 0.53	26.31 ± 0.52	n.s.
b* value	12.23 ± 0.28	11.02 ± 0.28	0.004	11.35 ± 0.28	11.90 ± 0.28	n.s.

SIM–Simmental; S-INT–semi intensively total mixed ratio; n.s.–p>0.05

CONCLUSIONS

Carcass traits of Cika bulls were similar to those of Simmental bulls and should encourage breeders to fatten young Cika bulls for beef production and contribute to the maintenance of endangered indigenous Cika breed. A second grazing period could be efficiently set up in the growing-fattening scheme as it would not significantly decrease carcass traits except dressing percentage. Moreover, an improvement of growth performance could be achieved by increasing the energy level of the finishing diet, particularly for the Simmental bulls.

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