

MEAT TRAITS OF VEAL CALVES FROM DIFFERENT PRODUCTION SYSTEMS

S. Čepin^a, S. Žgur^a, B. Žlender^b^a University of Ljubljana, Biotechnical Faculty, Zootechnical Department, Groblje 3, 1230 Domžale, Slovenia^b University of Ljubljana, Biotechnical Faculty, Department of Food Science, Jamnikarjeva 101, 1000 Ljubljana, Slovenia**Key word:** veal meat, production system, carcass weight, meat quality**Background**

EU recommendation foresees uniform criterion for the classification of veal calves, with the age under six months and carcass weight under 150 kg. To the year 1994 in Slovenia veal meat was defined as meat from veal calves with carcass weight under 125 kg. Traditionally slaughtered veal calves were lighter still, with carcass weight around 70 kg. This meant less than half of the veal meat, that could be produced per slaughtered calf. Fattening of veal calves with concentrates to higher carcass weight under the cover of trademark for veal meat was therefore stimulated. This is very important, because 10 % of beef consumption in Slovenia represents veal meat, and so the same amount of veal meat could be produced with the slaughter of only half the number of veal calves.

Objective

The objective of this work was to compare meat traits of veal calves differing in live weight at slaughter from two different production systems.

Material and methods

In the control group 8 calves of Simmental breed fattened exclusively with milk were included. Age of calves at slaughter was about 2 months. The second group comprised of 15 Simmental calves, which were early weaned at 6 weeks and then fattened with concentrates according to trademark "Zlato zrno". Calves were slaughtered at about 5 months of age at around 200 kg live weight. After slaughter, carcass conformation and fatness were evaluated and carcass weight was recorded. 48 hours after slaughter carcasses were cut between rib 6th and 7th and meat pH, and colour was measured with Minolta chromometer CR300 on cross section of Longissimus muscle (LM). LM between 7th and 13th rib was taken for chemical and sensorial analysis and frozen at -20 °C prior to analysis. Shear force values were recorded with Instron instrument. Colorimetric analysis for hydroxyproline was used to determine the collagen concentration (Bergman and Loxely, 1963, adopted by Matissek et al., 1992). Collagen solubility was determined after 1h extraction at 77°C in ringer solution (Hill, 1966). Statistical analysis was performed by t-test procedure (SAS, 1989).

Results and discussion

In Table 1 the comparison between two groups of calves is represented. Veal calves fattened with concentrates had much higher carcass weight and better conformation at the same degree of fatness. Better evaluation of conformation was a result of better muscle development at higher weight. Similar results were reported also by Specht et al. (1994). Meat from heavier veal calves was darker and had increased redness and yellowness, but only the differences in a* and b* value were statistically significant (p<0.05). However, the difference between subjectively evaluated meat colour did not differ between two groups. Also Scheeder et al. (1999) reported darker and redder meat in concentrate and maize silage fed veal calves in comparison with milk fed veal calves. There were no differences in pH 48 hours post mortem and in chemical composition of lean meat, only water content exhibited tendency (p<0.09) of lower value in concentrate fed calves. Bigger difference was observed in collagen content. Concentrate fed veal calves had less collagen, where no difference was observed in collagen solubility between groups. Differences in collagen content between two groups were relatively larger and unaccountable. Scheeder et al. (1999) reported higher collagen content and collagen solubility in concentrate and maize silage fed veal calves than in milk fed veal calves. Milk fed veal calves tended (p<0.09) to have lower longitudinal shear force value and had lower (p<0.03) transverse shear force value. These differences were not confirmed with sensorial analysis, which showed no differences in subjective evaluation of tenderness and aroma. Nevertheless, the milk fed veal calves had superior juiciness.

Table 1: Carcass and meat traits of milk and concentrates feed calves

	Milk fed calves		Concentrate fed calves		p-value
	\bar{x}	\pm SEE	\bar{x}	\pm SEE	
Carcass traits					
Carcass weight, kg	81	1.96	128	2.52	0.0001
EUROP conformation ^a	3.0	0	3.7	0.25	0.0192
EUROP fatness	3.0	0	3.0	0	-
pH 48	5.70	0.06	5.68	0.02	0.6682
Meat colour L*	46.88	2.40	44.92	0.66	0.2725
a*	13.42	1.12	18.23	0.43	0.0002
b*	6.55	0.48	10.08	0.36	0.0002
Chemical composition					
Water, %	75.70	0.16	75.16	0.19	0.0930
Protein, %	21.06	0.23	21.44	0.15	0.1871
Intramuscular fat, %	2.12	0.21	2.23	0.16	0.6821
Ash, %	1.12	0.05	1.17	0.02	0.3282
Total collagen, %	0.42	0.05	0.29	0.02	0.0152
Soluble collagen, %	0.34	0.04	0.23	0.02	0.0282
Nonsoluble collagen, %	0.08	0.01	0.06	0.01	0.0372
Collagen solubility, %	20.25	1.50	20.86	2.29	0.8657
Physical meat traits					
Share force – longitudinal, N	37.5	5.2	48.1	1.4	0.0899
Share force – transverse, N	55.4	6.0	76.7	5.5	0.0297
Share force – average, N	46.4	4.0	62.4	3.2	0.0080
Sensorical meat traits ^b					
Subjective colour evaluation	4.81	0.39	4.77	0.20	0.9286
Tenderness	4.90	0.29	4.64	0.22	0.4907
Juiciness	5.55	0.08	5.18	0.09	0.0219
Aroma	5.64	0.20	5.92	0.05	0.2333

^a E=5, U=4, R=3, O=2, P=1

^b 1 - 1 is the worst and 7 the best score

Conclusions

From the comparison of milk and concentrate fed veal calves slaughtered at different age and live weight the following can be concluded:

- concentrate fed veal calves exhibited better conformation scores at the same degree of fatness.
- meat from concentrate fed calves had increased redness and yellowness, although no difference could be noted by subjective colour evaluation.
- no difference was found in chemical composition of veal meat, except in collagen content, where relatively larger and inexplicable differences between groups were noted.
- meat from concentrate fed calves had higher shear force value, but subjective evaluation of meat tenderness did not confirm these results.
- meat from milk fed calves exhibited better scores for juiciness, while no difference was found in aroma.

We can summarise that the differences between milk and concentrate fed calves slaughtered at around 2 and 5 months respectively were relatively small and also veal meat from heavier calves could be acceptable as veal for the Slovenian consumer.

References

- Specht, S.M., Faustman, C., Bendel, R.B., Malkus, L.A., Kinsman, D.M., Sison, C. (1994). Carcass composition of "bob" and "special-fed" veal and its prediction. *J. Anim. Sci.* 72: 10, p. 2635-2641
- Scheeder, M.R.L., Becker, B., Kreuzer, M. (1999). Veal colour and other meat quality characteristics in calves fattened on maize silage and concentrate. *Archiv Tierzucht* 42: 6, p. 535-553
- Hill, F. 1996 The solubility of intramuscular collagen in meat animals of various ages. *J. Food Sci.*, p. 161 - 166
- Matissek, R./ Schnepel, F. M./ Steiner, G. *Lebensmittelanalytik. 1992 Grundzüge - Methoden - Anwendungen*, 2. Auflage. Berlin - Heidelberg, Springer - Verlag, p. 107 - 111
- SAS 1989. SAS/ STAT User's, Version 6. Cary, NC, USA, SAS Institute Inc.