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ANALYSIS OF SOME EFFECTS ON pH AND COLOUR OF BEEF

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Keywords: carcass quality, beef, meat properties

INTRODUCTION

Market value of slaughter animals is most important influenced by carcass quality. Fleshness respectively carcass muscularity has the highest economic weight on evaluation of carcass quality. Quality properties of meat, such as pH, colour, marbling etc. are more and more important especially on more demanding markets. Unfortunately, these qualities consist slight heredity (Averdunk et al., 1990, Beck et al., 1992).

The purpose of research was the analysis of some influence on pH and meat colour with Brown bull breed from progeny testing in Slovenia.

MATERIALS AND METHODS

In analysis were included 74 Brown bulls from progeny testing station, offsprings of different sires. Carcasses were subjective and objective valuated. 24 hours after slaughter and chilling, pH and colour measurements were recorded on the longissimus muscle cross section among 7th and 8th rib. Colour was measured with FOP (Fibre Optic Probe) and Minolta CR 300 spectrophotometer.

Statistical analysis was performed by Least Square Method (Harvey, 1987). Sires of analysed bulls and date of slaughter as fixed effects and age of bulls at slaughter, percent of tallow and conformation index as objective measure of conformation (Čepin et al., 1992) as covariable, were included in statistical model.

RESULTS AND DISCUSSION

In Table 1 mean values and coefficients of variability of analysed traits are shown.

Table 1: Mean values, standard deviations and coefficients of variability of analysed traits.

Traits	x	sd	CV, %
pH	5.53	0.19	3.43
FOP	31.22	7.76	24.86
L	36.70	3.09	8.42
a	27.11	3.97	14.64
b	11.48	3.20	27.87

All of the mean values are in the normal frames. The least coefficient of variability was established for pH values (3.43 %) and the greatest coefficients of variability were established for FOP and Minolta b values (24.86 % in 27.87 %). The similar variability was found in the investigations up till now (Pem et al., 1994, Čepin et al., 1993).

FOP instrument had a very small objective, therefore the small parts of intramuscular tallow effected grater variability and make worse coefficient of repeatability.

In Table 2 the analyse of variance for pH, FOP and Minolta values is represented.

Table 2: Analyse of variance for pH, FOP and Minolta values - L, a and b.

		F - values				
Source of variability	D. F.	pH	FOP	L	a	b
Sire	13	1.23	1.30	1.62	1.80	1.60
Date of slaughter	13	1.25	2.61**	2.86**	3.41*	10.25**
% of tallow	1	2.12	5.50*	0.02	0.04	0.27
Conformation index	1	4.10*	1.65	0.56	2.05	1.78
Age at slaughter	1	1.08	6.72**	3.83*	3.14	1.70

* - P≤ 0.05, ** - P≤ 0.01

Sires of analysed bulls had no influence on pH, FOP and Minolta values. Similar results for effect of genotype on pH and colour of meat were found by Augustini et al. (1992), Čepin et al. (1993) and Dufey (1989).

The effect of date of slaughter had significant or high significant influence on FOP and Minolta values. It means, that psyhophisical status of animals in preslaughter period has important influence on meat colour. These environmental factors are first of all temperature, humidity of air, air pressure and maybe the position of moon. Also Jones et al. (1989) and Murray (1989) established significant influence of climatic factors at slaughtering on meat colour.

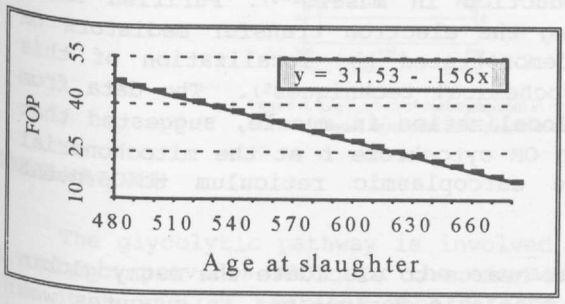
Percent of light separable tallow in carcasses had significant influence on greater FOP value. It means more light red colour of meat as influence of intramuscular fat - graph 2.

Carcass fleshness, which was estimated with conformation index, had positive influence on pH values of meat (b = + 0.0144).

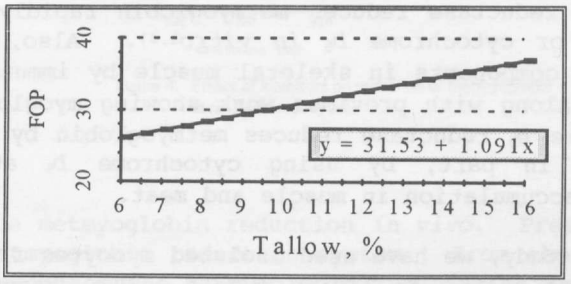
Age of bulls at slaughter had significant influence on meat colour. This effect is the most pronounced for FOP values - graph 1.

On measured values of meat colour by means of Minolta the influence of bull age at slaughter is significant for L value on 5 % level risk and for a value on 10 % level risk (P = 0.083) - Table 2.

A substantial variance part was clarified with all analysed properties by means of statistical model. Determination coefficients (R^2) were for pH, FOP, L, a, and b value 0.62, 0.62, 0.58, 0.63 in 0.84.



Graph 1: Regression: Age of bulls at slaughter on FOP value.



Graph 2: Regression: % of light separable tallow on FOP.

CONCLUSIONS

On the basis of research in which we established pH values and meat colour musculus longissimus dorsi with Brown bulls in Slovenia and on the basis of statistic analysis data we can conclude:

- Sires of analysed bulls had no statistically significant influence on pH value of meat nor on meat colour measured with the FOP instrument and with Minolta CR 300.
- With increasing carcass fleshness measured by conformation index, increasing of pH value of meat can be expected.
- Carcasses with a larger part of light separable tallow have lighter meat, but that applies only to measures with the FOP instrument. This statement does not confirm the measure of meat colour with Minolta CR 300.
- The date of slaughter does not influence on pH value of meat. On the other hand the influence of date of slaughter is statistically significant for meat colour measured with the FOP instrument as well as for L, a and b values measured with Minolta CR 300.
- The influence of bull age at slaughter for pH value of meat is not statistically significant. But the influence of bull age at slaughter on meat colour for FOP and L value is expected and statistically significant.

REFERENCES

Augustini, C./ Temisan, V./ Kögel, J. 1992. Investigations on suitable sire breeds for commercial crossbreeding with German Brown cattle. Züghtungskunde, 64, 2, p. 136-147

Beck, G.A./ Duerr, R./ Eichinger, H.M. 1992. Predictability of sensoric properties in beef by physicochemical measurements. Proceedings of the 38th ICOMST, Clermont-Ferrand, France. Vol. 5. p. 871-878