# COLLAGEN TRAITS AND OTHER MEAT PROPERTIES IN *M. LONGISSIMUS DORSI* OF BROWN BULLS

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## INTRODUCTION

Sensory traits of meat, like colour, juiciness and tenderness, are the most important meat quality traits for the consumer (Varnam and Sutherland, 1995). The later depend on quantity and solubility of intramuscular collagen and myofibril fragmentation (Sorensen, 1981; Bailey and Light, 1989). Collagen concentration does not change significantly during growth until slaughter weight (Cross et al., 1984; Person and Young, 1989), but collagen solubility decreases with increasing animal age (Bailey and Light, 1989, Gerrard et al., 1987). Collagen concentration and solubility differ between different breeds (Sorensen, 1981; Cross et al., 1984) and depend also on growth intensity in the last fattening period (Etherington, 1987; Micol et al., 1992).

The aim of the work was to test the influence of American Brown Swiss genotype percentage (ABS), sire and slaughter weight on collagen and meat traits in Brown bulls.

## MATERIALS AND METHODS

39 Brown bulls from progeny testing station, offsprings of 6 different sires were included in the analysis. pH and colour measurements were recorded on the *longissimus dorsi* muscle cross section between 7th and 8th rib. Colour was measured with FOP (Fibre Optic Probe) and Minolta CR 300 spectrophotometer. *M. Longissimus dorsi* samples for chemical, sensory and collagen analysis were taken between 8th and 13th rib and frozen at -20 °C and for collagen at -70 °C until analysis. Shaer force values were recorded with Instron. Colorometric 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 GLM procedure (SAS, 1989). Sires of analysed bulls and percentage of ABS genotype as fixed effects and body weight at slaughter as covariable, were included in statistical model.

## RESULTS AND DISCUSSION

Bulls were slaughtered at an interval from 501 to 658 kg live weight. Mean daily gain from birth to slaughter and age at slaughter was 1071 g/day and 514 days. In Table 1, results of variance analysis are represented. Bulls with 50 % or less ABS genotype had significantly ($P<0.05$) lower concentration of nonsoluble, soluble, total collagen and percentage of soluble collagen, and also lower shear force value then bulls with more then 50% ABS genotype. Sires had significant ($P<0.05$) influence on concentration of soluble collagen and percentage of soluble collagen, shear force value and meat colour. Live weight at slaughter had a significant ($P<0.05$) influence only on intramuscular fat and shear force (longitudinal) value. With increasing live weight, content of intramuscular fat ($b=0.017$) and shear force value ($b=0.109$) also increased. In Figures 1, 2, 3, 4 the influence of live weight at slaughter on collagen traits, Instron shear force values, sensory traits and meat colour is represented.

Table 1: LSQ means and variance analysis for analysed traits

| Traits | LSQ means | | P-values | | |
|---|---|---|---|---|---|
| | ABS genotype≤50% ±SE | ABS genotype>50% ±SE | %ABS | Sire | Live weight at slaughter |
| Nonsoluble collagen, mg/g | 5.54±0.25 | 4.29±0.21 | 0.0039 | 0.4997 | 0.7169 |
| Soluble collagen, mg/g | 0.44±0.03 | 0.24±0.03 | 0.0271 | 0.0120 | 0.1855 |
| Total collagen, mg/g | 5.98±0.27 | 4.53±0.22 | 0.0022 | 0.3272 | 0.6144 |
| % of soluble collagen | 7.43±0.56 | 5.37±0.46 | 0.0355 | 0.0148 | 0.4530 |
| Tenderness* | 4.73±0.45 | 5.66±0.37 | 0.2055 | 0.5432 | 0.6592 |
| Juiciness* | 5.78±0.19 | 5.87±0.16 | 0.7543 | 0.9920 | 0.9496 |
| Flavour* | 5.79±0.16 | 5.66±0.13 | 0.6201 | 0.9832 | 0.7920 |
| Intramuscular fat.% | 4.10±0.48 | 4.73±0.40 | 0.4239 | 0.0581 | 0.0105 |
| Shear force - transverse, N | 92.59±7.33 | 68.04±6.03 | 0.0441 | 0.0305 | 0.2095 |
| Shear force - longitudinal, N | 49.39±2.86 | 40.49±2.35 | 0.0601 | 0.0049 | 0.0062 |
| pH 24 | 5.67±0.06 | 5.60±0.05 | 0.4476 | 0.5104 | 0.3019 |
| FOP | 29.47±3.68 | 30.71±3.03 | 0.8348 | 0.9656 | 0.5296 |
| Meat colour L | 37.86±0.93 | 38.79±0.76 | 0.5338 | 0.0064 | 0.1046 |
| a | 20.91±1.02 | 21.56±0.84 | 0.6937 | 0.1028 | 0.0903 |
| b | 11.80±0.65 | 11.98±0.54 | 0.8577 | 0.0507 | 0.8606 |

* - 1 - is the worst and 7 the best note

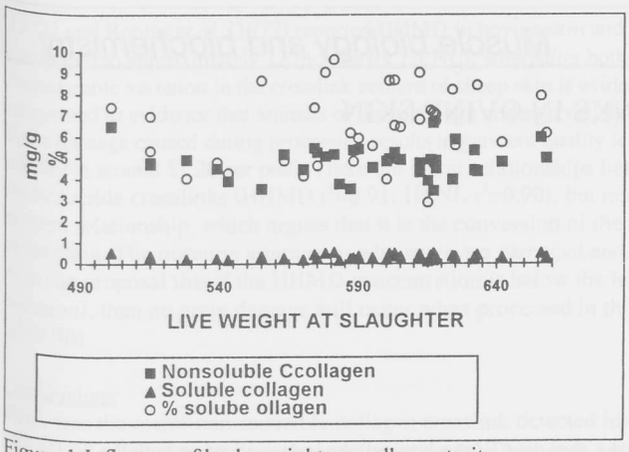


Figure 1:Influence of body weight on collagen traits

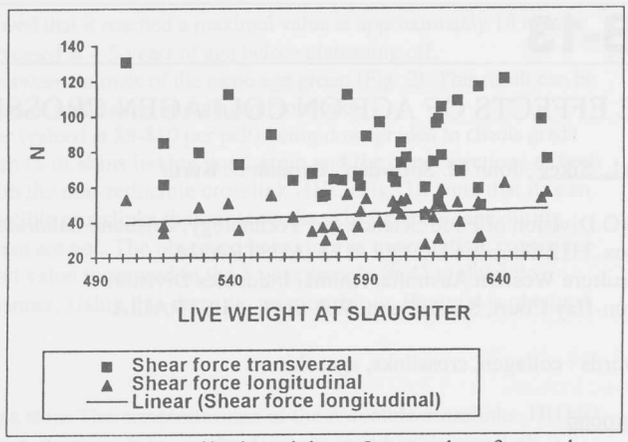


Figure 2:Influence of body weight on Instron shear force values

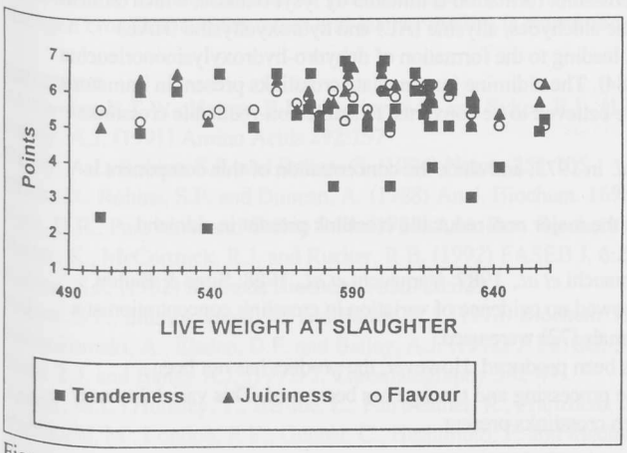


Figure 3:Influence of body weight on sensory traits

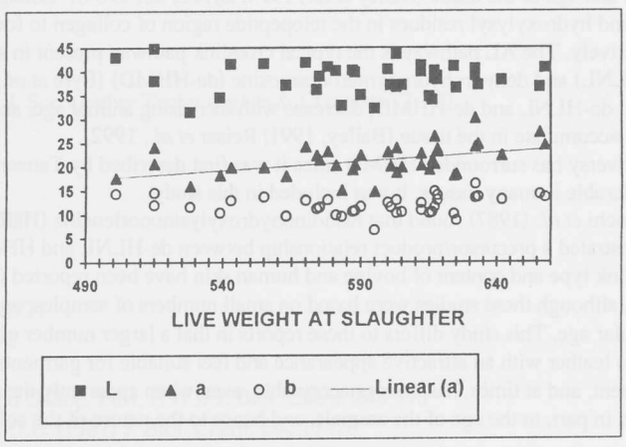


Figure 4:Influence of body weight on meat colour

## CONCLUSIONS

Genotype (% of ABS and sire) had significant ($P<0.05$) influence on collagen traits, shear force values and meat colour. These was not evident on sensoryal meat traits. Live weight between 500 and 650 kg did not significantly ($P<0.05$) influence most of the studied meat quality traits.

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