# 5-P24

EFFECT OF STORAGE TIME ON TENDERNESS AND COLOUR PARAMETERS OF STEERS AND COWS

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**Background:**

Consumers identify tenderness as one of the most important attributes of meat quality (Miller et al., 1995); being physical appearance another concern in consumer preferences. Boleman et al. (1995) demonstrated that consumers are willing to pay higher prices for tender meat and Savell et al. (1992) found that there is a strong relationship between price and tenderness among beef cuts. Colour is also an important attribute specially because is the first impression that a consumer has of any meat product (Boakye et al., 1995). Some researches indicate that colour parameters may be useful as beef tenderness predictors (Wulf et al., 1997; Jeremiah et al., 1991). Although many researchers found correlation between colour parameters and tenderness in steers (Wulf et al., 1997; Jeremiah et al., 1991; Picallo et al., 1998), there are few studies that reported about cow meat colour (Gerhardy, 1995; Diles et al., 1994). Thus it would be useful to find out if the relationship found in steers can also be verified for cows.

**Objetive:**

The purpose of the present work is to study the influence of sex in colour and tenderness parameters in order to determine if colour can be used as tenderness predictor in aged cow meat.

**Methods:**

Twenty one (21) steers representing Indicus breed and 21 cows of Hereford breed were selected from a commercial cattle population. *Longissimus dorsi* muscle was sampled at 10°-12° rib after 24 hours *post-mortem* and cut in three portions. Samples were vacuum packaged and randomly stored at chilling temperature (1.5±0.5 °C) during three different ageing times (7, 14 and 35 days). Tenderness was measured by WBS machine (Bratzler, 1932). For WBS analysis portions of LD muscle of 2.5cm thick were cooked in a heated pan without oil up to 40°C in the geometric centre of the piece, then turned to the other side and cooked until the temperature reached 70°C (AMSA, 1978). Temperature was monitored using T-type thermocouples attached to a data logger (Fluke, Hydra model 2625). Ten cores of 1.25cm were obtained from each cooked sample in the direction of muscle fibers and assayed for WBS. For objective colour evaluation (Cassens et al., 1995) blooming time was 30 minutes. For colour determination, slices of 4cm in diameter and 2.5cm thick were obtained from each sample and colour Hunter **L a b** parameters were determined with a BYK Gardner Colorimeter (Colorview model 9000, large view area, D65 illuminant, 10° observer, 45°/ 0° viewing geometry). The pH measurements were determined with a punction pH meter (Luftman) and normal meat pH values were obtained. Data were analysed by multivariate analysis repeated measures and univariate analysis using SAS Statistical Software (SAS System, 1996).

**Result and discussion:**

Table 1 shows the results obtained for tenderness (WBS) and colour parameters **L, a** and **b** for both groups. It can be observed that WBS values for steers and cows decreased along ageing time, but despite WBS value behaviour were parallel they were different along storage for both animal types ($p<0.05$). During the first 14 days of storage WBS values of steers and cows were classified as "somewhat tender" in a hedonic scale. No significant differences ($p<0.05$) were found in WBS between groups in this period; nevertheless, more ageing resulted in better results for steers. A quadratic function described WBS behaviours along time for each animal type (Figure 1). Kropf et al. (1959) reported for cows WBS values higher than those reported here. When Hunter **a** value was analysed, similar results to WBS were obtained. Gender types were significantly different ($p<0.05$) in **a** value at 35 days. When **b** value were compared between sex types at 35 days significative differences ($p<0.05$) were found, during storage **b** value also changed significantly ($p<0.05$) within each group. Hunter **L** parameter presented significative differences ($p<0.05$) along time but not between groups. The **L, a** and **b** parameters increased as storage time increased, this agrees with results of previous studies (Feldhusen et al., 1995; Boakye et al., 1996) and disagrees with other authors for different ageing periods (Shackelford et al., 1992). Hunter **L, a** and **b** values distribution along WBS are shown in Figures 2, 3 and 4, respectively. These results show that WBS, **a** and **b** values presented differences due to sex after day 14 of storage. Correlation coefficients between colour parameters and WBS are shown in Table 2. Significative differences ($p<0.05$) between correlation coefficients by group were found. However, lack of homogeneity in correlation coefficients of the results suggests that the analysis is not conclusive to stablish colour as a meat cow tenderness predictor.

**Conclusions:**

In the present study it was observed that steer meat tenderised sooner than cow meat. Colour parameters were higher for steers, yielding meat with a colour that usually is better appreciated by consumers. Further research should be done to clarify if colour can be used as a predictor for cow aged meat tenderness.

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**Figures and tables:**

**Table 1**

| Ageing storage (days) | Mean Shear Force (lb) Cows(a) | Steers(b) | Mean Hunter L value Cows | Steers | Mean Hunter a value Cows | Steers | Mean Hunter b value Cows | Steers |
|---|---|---|---|---|---|---|---|---|
| 7 | 8.52±1.85 a | 7.92±1.85 a | 27.05±2.82 a | 26.36±3.3 a | 11.53±1.14 a | 11.78±1.15 a | 8.21±0.97 a | 8.11±1.17 a |
| 14 | 7.53±1.10 a | 7.06±1.10 a | 26.94±2.62 a | 28.38±4.52 a | 13.76±2.33 a | 13.16±2.78 a | 9.18±1.34 a | 9.38±2.22 a |
| 35 | 7.32±0.94 a | 6.51±0.94 b | 27.36±2.26 a | 29.02±3.94 a | 13.82±3.04 a | 15.74±3.12 b | 9.41±1.48 a | 10.6±2.08 b |

a,b different letters within the same row indicate significative differences ($p<0.05$).

**Table 2.**

| Ageing storage (days) | r WBS vs L Cows | WBS vs L Steers | WBS vs a Cows | WBS vs a Steers | WBS vs b Cows | WBS vs b Steers |
|---|---|---|---|---|---|---|
| 7 | -0.204 | 0.204 | 0.180 | -0.097 | -0.065 | 0.151 |
| 14 | -0.275 | -0.351 | 0.268 | -0.308 | 0.021 | -0.340 |
| 35 | 0.073 | -0.390 | 0.102 | -0.323 | 0.148 | -0.427 |