THE M. PECTORALIS PROFUNDUS AS AN INDICATOR FOR THE ASSESSMENT OF THE COLOUR OF BEEF CARCASSES AT CLASSIFICATION.

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S-III.12

SUMMARY

Colour of the *m. pectoralis profundus* (PP) was compared to the colour of 5 major beef muscles: *mm. semitendinosus* (ST), *gluteus medius* (GM), *longissimus dorsi (thoracic part)* (LD), *rectus abdominis* (RA) and *triceps brachii (caput longum)* (TB). Colour (CIELAB) measurements were made on 30 carcasses (15 young bulls and 15 cows) at **(1)** 45 min post mortem (p.m.), **(2)** 24 h p.m. after a fresh cut and **(3)** 24 h p.m. (same cut) after 1 h blooming.
The L^*-values of RA and PP were similar ($P > 0.05$). The ST was lighter ($P < 0.05$) and the GM, LD and TB were darker ($P < 0.05$) than the PP. Muscles also differed significantly with respect to a^*- and b^*-values, but these differences were dependent on the time p.m. (significant muscle x time interaction). At 45 min p.m. all muscles showed significantly lower L^*-, a^*- and b^*-values than at 24 h p.m. Young bulls had significantly higher L^*- and b^*-values and significantly lower a^*-values than cows.
At 45 min p.m. correlations between L^*-values of the PP and the other muscles ranged from 0.64 to 0.86. The correlations for the a^*-values and b^*-values ranged from 0.37 to 0.58 and 0.59 to 0.73, respectively. In general, at 24 h p.m. the correlations were of the same order.
It was concluded that PP could be used as an indicator muscle to assess beef colour at classification (45 min p.m.).

Introduction

In The Netherlands, beef carcasses are classified for conformation and fat cover according to the EUROP-system (EU, 1981). The Dutch beef industry is interested to include beef colour as a characteristic in the classification, using a system similar to the colour scale developed for the classification of veal carcasses (Sterrenburg, 1992). Based on interviews with people of the meat industry, it appeared that the *m. pectroralis profundus* (PP) was for practical reasons the muscle of choice to evaluate the colour of beef carcasses. However, it is important to ensure that the colour of the PP is suitable to serve as an index of colour for the entire carcass. The aim of this study was to compare, at various times post mortem, the colour of five major muscles of the beef carcass with the colour of the PP.

Materials and methods

Thirty beef carcasses (15 young bulls and 15 cows) were selected at the end of the slaughterline (about 45 min post mortem), using the Minolta Chromameter CR-110 (Minolta, Maarssen, The Netherlands). Selection was based on the L^*-value to ensure that most of the variation of colour of the *m. pectoralis profundus* was evenly covered. Immediately after selection the following muscles were excised from the carcass: *mm. semitendinosus* (ST), *gluteus medius* (GM), *longissimus dorsi (thoracic part)* (LD), *rectus abdominis* (RA), *triceps brachii (caput longum)* (TB) and *pectoralis profundus* (PP). The colour (CIELAB) measurements were made with the Spectra Scan PR-650 (lightsource D65, standard observer 10°) (Landré-Intechmy B.V., Diemen, The Netherlands) at **(1)** 45 min post mortem (p.m.), **(2)** 24 h p.m. after a fresh cut and **(3)** 24 h p.m. (same cut) after 1 h blooming. Between measurements the samples were cooled at 2 °C.

Results and discussion

Means and standard deviations of colour characteristics for the various muscles are presented in Table 1. At 45 min p.m. the L^*-value of RA and PP were similar ($P > 0.05$). The ST was lighter ($P < 0.05$) and the GM, LD and TB were darker ($P < 0.05$) than the PP. The results for 24 h p.m. after a fresh cut or after 1 h blooming, were similar to those obtained at 45 min p.m. At 45 min p.m. the a^*-values of GM, LD, RA and TB were significantly lower ($P < 0.05$) and the a^*-value of ST was similar ($P > 0.05$) to the a^*-value of the PP. At 24 h p.m. after a fresh cut and after 1 h blooming the a^*-value of PP was similar ($P > 0.05$) to the ST, GM and LD and the PP was similar to the GM and LD, respectively. The a^*-values of the other muscles were significantly higher ($P < 0.05$). At 45 min p.m. the b^*-value of all muscles differed significantly ($P < 0.05$) from the b^*-value of PP. At 24 h p.m. after a fresh cut the b^*-values of ST, LD and RA and after 1 h blooming the b^*-value of ST and RA differed significantly ($P < 0.05$) from the b^*-value of PP. The differences between muscles in a^*- and b^*-values were dependent on the time post mortem (significant muscle x time interaction). Differences in colour characteristics between muscles have been reported earlier by Legras (1980) for veal, Matassino et al. (1975) for beef and Warner et al. (1993) for pork.

The colour of the various muscles changed during the first 24 h p.m. All muscles were at 24 h p.m. significantly lighter (higher L^*-value), more red (higher a^*-value) and more yellow (higher b^*-value) than at 45 min p.m. These colour changes are probably due to a decrease in translucency and an increase in scatter as a consequence of the post mortem metabolic changes. Correlation coefficients between CIELAB-values at 45 min p.m. and 24 h p.m. are presented in Table 2. High correlation coefficients were observed for the L^*-values ($r = 0.65 - 0.90$). Relationships between the a^*-value at 45 min p.m. and the a^*-value at 24 h p.m. for all muscles except for PP were very poor. The b^*-value at 45 min p.m. was slightly related to the b^*-value at 24 h p.m. Only the L^*-value at 24 h p.m. can be predicted at 45 min p.m. Young bulls had significantly ($P < 0.05$) higher L^*- and b^*-values than cows (not shown in the Tables). The sexes did not significantly differ in a^*-values. One has to bear in mind that samples were preselected. Schneijdenberg et al. (1990) reported higher L^*- and b^*-values and lower a^*-values for young bulls than for cows.

The correlation coefficients between CIELAB-values of PP and the other muscles are shown in Table 3. All correlation coefficients were significant different from zero ($P < 0.05$). High correlations were observed for the L^*- value at 45 min p.m. ($r = 0.64 - 0.86$), at 24 h p.m. after a fresh cut ($r = 0.67 - 0.84$) and at 24 h p.m. (same cut) after 1 h blooming ($r = 0.79 - 0.89$). At these various moments the correlation coefficients for the a^*-values varied from 0.37 - 0.58, 0.34 - 0.77 and 0.46 - 0.61, respectively. All correlation coefficients between the b^*-values of PP and the other muscles were > 0.54 at all times p.m.

Conclusion

The results show that PP could be used as an indicator muscle to asses beef colour at classification (about 45 min p.m.), even with respect to ultimate beef colour.

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Acknowledgements

The authors wish to thank WOLFF VLEES BV The Netherlands for their cooperation. Financial support was provided by the DUTCH PRODUCT BOARD FOR LIVESTOCK AND MEAT.