CONSEQUENCES OF USING DENTAL CLASSIFICATION AS INDICATOR OF MATURITY AND BEEF TENDERNESS

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Background

Usually decreased meat tenderness has been associated with increased cattle age (Tuma *et al*., 1963 and Wulf *et al*., 1996), this fact has led to include dental classification in current grading systems (Aus-Meat, 1998). Lawrence et al (2001 a) suggested that it was more accurate to assess maturity by sorting carcasses through the number of permanent incisors present at slaughter rather than by visual appreciation of ossification. However, Wythes and Shorthose (1991) and Lawrence et al. (2001 b) found that the dentition status of steers had no effect on Warner-Bratzler shear force and tenderness of *M. longissimus* assessed by sensory panel . Therefore, there exists some contradictory conclusions referred to the relationship between beef cattle maturity and meat tenderness.

Objectives

Our objective was to determine the relationship between tenderness and age, assessed by dentition status, of steers commercially produced in Argentina.

Materials and methods

Fifty five Angus steers were used, the number of permanent incisors were recorded previous to slaughter. Twenty animals had no permanent incisors, twenty had two and fifteen had four. Animals fell into two fat classes, having respectively 4 to 5 mm (class 1) and 6 to 7 mm (class 2) subcutaneous fat depth between the 12^{th} and 13^{th} rib, measured at the abattoir. Samples of *M. longissimus dorsi* were removed from each left carcass. Half of each sample was kept for 24 hours at $3\ ^0$ C previous tenderness determination and the other half, also kept at 3^0 C, was analyzed after 96 hours. Tenderness was measured with an Instron 4442 Universal Testing Machine (Canton, MA, USA) with a Warner-Bratzler shearing attachment on samples boiled for 50 minutes, in a water bath, to an internal temperature of $70\ ^0$C. Data were analyzed using GLM procedure of SAS (SAS Inst. Inc,. Cary, NC, USA).

Results and discussion

After 24 hrs in cold storage, meat from steers with two incisors was more tender ($p < 0.05$) (Table 1), than from those with no permanent incisors, differences were not detected ($p > 0.05$) neither between two and four nor between four and zero permanent incisors. After 96 hrs ageing, meat from all the dentition groups showed enhanced tenderness, meat from animals with two and four permanent incisors was more tender ($p < 0.01$) than meat from less mature steers. These results partially agree with Wythes and Shorthose (1991), who reported no differences among dentition groups attributed to contraction of myofibrils in unstimulated muscles. In our case, carcasses underwent electrical stimulation, but ageing period was shorter, it was at the very most 96 hours. Lawrence *et al*. (2001) in a very accurate experiment did not find, among five dentition groups, differences in tenderness of muscle *longissimus* aged for 14 days. They do not explain the possible causes of such finding. Our results contradict those reports and an indirect relationship is established between maturity and improved tenderness (Tuma *et al*., 1963, Shorthose and Harris, 1990 and Wulf *et al*., 1996). This leads to suggest that more research is needed to determine if dentition can be used as a reliable predictor of tenderness. Correlation between fatness and shear force was significant ($r = - 0.34$, $p < 0.05$).

Conclusions

Ageing improved tenderness irrespective of dentition group. After a short ageing period, meat from steers with two and four permanent incisors proved to be more tender than meat from those animals showing no permanent incisors.

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Table 1 Shear force (kg) at 24 and 96 hours, mean values followed by the standard error of the mean

	Incisors		
Ageing, hours	0	2	4
24	12.7^{a} (2.2)	10.4^{b} (2.6)	11.6^{ab} (2.7)
96	10.1^{a} (1.8)	8.0^{b} (1.7)	8.8^{b} (1.9)

Within a row, means lacking a common superscript differ ($p < 0.05$) for 24 hrs, and ($p < 0.01$) for 96 hrs.