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Full Length Research Paper

Is the pH drop profile curvilinear and either monophasic or polyphasic? Consequences on the ultimate bovine meat texture

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Abstract

In meat science, pH has always been considered as an important determinant of meat quality including juiciness and tenderness. Muscle acidification is generally believed to be a linear continuous and monophasic process. From examples provided in the literature, we showed that this was not the case and concluded that the pH profile is either exponential or sigmoidal but never linear. In addition these

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examples demonstrate that the profile is polyphasic. On this basis the pH drop profile was analysed in bovine *Longissimus* muscle from 100 animals of different age, gender and breed, a choice aiming at increasing the variability of the ultimate tenderness. The results clearly indicate that most if not all animals present one or two transient decreases in the rate of pH fall leading to the appearance of plateau-like discontinuities. These transient stability of the pH are always observed soon after death (<8-9h) and within a pH range of 6.2 to 6.8. In beef, ultimate toughness of *Longissimus* muscle from animals showing one pH stability step is significantly lower than that observed for animals showing two steps. Animals with one step further showed a lower initial rate of pH drop and a lower extent of pH fall. Animal age and sex affect tenderness which is higher for females and decreases with animal age. This relationship between the number of pH stability steps and the ultimate toughness of meat was confirmed using these other sources of variation in the ultimate quality of meat. Regarding the different groups of age, a significant and linear relationship was found between the ultimate meat toughness and the percentage of animals showing either one step or two steps ($r = 0.92$). Similarly, a significantly greater number of animals present one pH stability step in females than in males. Taken together, these results demonstrated that muscle from animals showing only one stability step will provide more tender meat irrespective of their breed, sex and age. The potential origins of the pH stability steps and their relationship with meat toughness were then discussed.

Key words: pH, muscle, pH stability steps, meat toughness, cell death.