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Effect of High Hydrostatic Pressure and Transglutaminase on Texture, Color and Sensory Profiling of Restructured Meat

Rosiane C. Bonfim¹, Amauri Rosenthal^{2,a*}, Rosires Deliza², Simone P. Mathias¹, Jos é C. S á Ferreira², William F. Leal Jr.²

¹DTA/UFRRJ, BR 465 – Km 07, CEP 23, Seropédica-RJ, Brazil

²Embrapa Agroindústria de Alimentos, Av., das Américas, CEP 23, Rio de Janeiro, Brazil

E-mail: ^aamauri.rosenthal@embrapa.br

Abstract: High hydrostatic pressure (HHP) in combination with transglutaminase or both separately may cause changes in texture of meat as a consequence of protein conformation modification due to crosslinking among amino acid residues, and may have an effect on beef tenderness. This study investigated the effect of HHP and microbial transglutaminase (MTGase) on color, texture (TPA), and sensory profiling of chuck tender bovine, a cut that would be more appreciated if it were tenderer. Cuts of chuck tender bovine were prepared following an experimental design by varying the level of MTGase (0.5%, 0.7% and 1.0%) with and without being pressurized (200MPa). After, the cuts were mixed with preservatives (water 3%, NaCl 1.5%, monosodium glutamate 0.15%), put in plastic casing where were kept for 5h, followed by slicing (2cm slices), yielding restructured meat. The slices were cooked to 72 °C (internal temperature) and analysed in relation to instrumental texture and color. Samples were also evaluated by 100 beef consumers using the CATA-Check-All-That-Apply-question, which contained descriptive and hedonic terms. Preference was used as supplementary variable in the statistical analysis. The texture profile analysis (TPA) has been widely applied to parameters such as hardness, springiness, cohesiveness and chewiness. Pressure application at 200MPa promoted an increase in parameter L (T1= 10.30 and T5= 50.35) and decrease of a*, b*, C and H°, showing a decreasing of red intensity. These results have possibly occurred due to structural modifications of myoglobin, which was observed in a complementary SDS-PAGE analysis. The use of HHP (200MPa) decreased the hardness parameter when compared with the control (T1= 25.31N and T5= 23.49N). Consumer's sensory profiling revealed that positive terms (such as nice flavour, juicy, and tender) were used by participants to describe samples T3 (0.7% MTGase) and T5 (200MPa). The results suggest that applying enzymatic treatment or high hydrostatic pressure separately can be an alternative to produce meat products with improved texture, which can be used by the meat industry. Further study should be carried out to investigate other MTGase/HHP combination effects on cuts of chuck tender.

Keywords: High hydrostatic pressure (HHP); Microbial transglutaminase (MTGase); Colour; Texture; Consumer