

**21 Effects of moisture enhancement, enzyme treatment and blade tenderization on the processing characteristics and tenderness of beef *semimembranosus* steaks.** Z. Pietrasik<sup>1</sup>, L. L. Gibson<sup>2</sup>, J. L. Aalhus<sup>2</sup>, and P. J. Shand\*<sup>1</sup>, <sup>1</sup>University of Saskatchewan, Saskatoon, SK, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Lacombe, AB, Canada.

The objective of this study was to determine the range of acceptable concentrations of two proteinases and to determine their effectiveness in combination with moisture enhancement and blade tenderization.

Twenty-four paired *Semimembranosus* (SM) muscles from young Canada Grade A carcasses were used. Each SM muscle was cut into six roasts (500 g). Roasts from one side were randomly assigned, controlling for muscle location, to one of six treatments, that is, non-treated beef, blade tenderized, injected with a water solution containing either ENZECO<sup>®</sup> neutral bacterial protease derived from *Bacillus subtilis* or aspartyl protease from *Aspergillus oryzae* to achieve 10 ppm and 20 ppm concentrations of enzyme preparation in the finished marinated product. Roasts from the other side received one of the following treatments: moisture enhancement, blade tenderized followed by moisture enhancement and combined moisture enhanced with enzyme treatments as described above. Selected roasts were blade tenderized by one pass through a Jaccard<sup>®</sup>, Model H # B4590 meat tenderiser. Roasts designated for enzyme treatment alone were injected to a target weight gain of 5% of the original mass while roasts designated for enhancement were injected to achieve 15% extension by weight and 0.5% sodium chloride and 0.25% sodium tripolyphosphate levels in the injected product. Following 48 hours of equilibration, steaks were cut, vacuum packaged and frozen for later testing. Thawed steaks were grilled on an electric grill to a final internal temperature of 71°C. An experienced 8-member sensory panel scored samples for initial and overall tenderness, juiciness, flavor intensity, connective tissue amount and off-flavor intensity using 8-point descriptive scales. Warner Bratzler shear force (WBSF) of 1.27x1.27x2.54 cm core samples was also determined on adjacent steaks.

Enhancement with the salt/phosphate solution significantly ( $P<0.01$ ) reduced WBSF values of SM steaks (by 10 N) and increased ( $P<0.05$ ) sensory scores for juiciness and tenderness. Blade tenderization of SM muscles was as effective as moisture enhancement in increasing tenderness as measured by WBSF and the sensory panel. Blade tenderization increased ( $P<0.05$ ) initial and overall tenderness and made the connective tissue less perceptible. Blade treatment typically resulted in the highest initial and overall tenderness scores, however enzymatic tenderization by both proteases was as effective in reducing WBSF values and increasing tenderness, particularly at 20 ppm enzyme level. Sensory tenderness of enzyme-injected steaks was increased without compromising other palatability attributes. With enzyme treatment or blade tenderization, sensory tenderness scores increased by 0.5 to 0.6 units and shear values decreased by 10 to 12 N. All tenderization treatments improved the frequency of steaks rated slightly tender or higher, with the combination of moisture enhancement with blade tenderization or with inclusion of the higher level (20 ppm) of protease from *Bacillus subtilis* being the most effective.

Moisture enhancement in combination with either blade tenderization or enzymatic tenderization can be effectively utilized to reduce variability and to improve the overall quality perception of the *semimembranosus* muscle as a fresh meat cut.