



MEAT YIELD AND QUALITY:

THE ACHILLES' HEEL OF BEEF TENDERNESS

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A recent paper by Koohmaraie et al. (1996) was entitled "Meat toughening does not occur when rigor shortening is prevented". It is something that many struggling to understand and control beef tenderness seem to have lost sight of, and it is a point which is critical to the beef industry. Despite representing a considerable proportion of the value of the beef carcass, the major steak muscle (longissimus thoracis et lumborum) is allowed to shorten with limited restraint in every beef carcass in Canada. If significant shortening occurs, one must wait patiently for the highly variable and poorly understood "aging" process to bring that muscle back into an acceptable tenderness range. Allowing this to happen is surely the "Achilles' heel" of the beef industry.

Traditional beef carcass suspension by the Achilles tendon allows considerable rigor-shortening and decreased tenderness in the major muscles of the back and hindlimb. However, aitch bone (hip) suspension applies tension to these muscles, limiting rigor contraction and improving tenderness. Unfortunately high throughput abattoirs have not been designed with aitch bone suspension in mind and implementation of this type of hanging would require costly renovations.

Recently, modifications to a procedure

(Tendercut™) developed by Norm Marriott and James Klaus were tested at the Lacombe Research Centre. On line altered suspension consisted of pre-rigor cuts through supporting vertebrae and connective tissue along the loin and in the hip, allowing the muscle to support more of the weight of the carcass.

Carcasses which were treated in this manner had a considerable improvement to tenderness; shear force was reduced by 1.5-2.5 kg in the loin, rib-eye and inside round. When assessed by a laboratory taste panel, loin steaks from treated sides were rated significantly better for initial tenderness, amount of connective tissue, overall tenderness and overall palatability. In addition, the proportion of unacceptable scores for initial tenderness, overall tenderness and overall palatability were significantly reduced. Unacceptable initial tenderness scores decreased from 28.3 to 7.5%, unacceptable overall tenderness scores decreased from 19.2 to 2.5% and unacceptable overall palatability scores decreased from 17.5 to 3.3%. Hence on-line altered suspension appears to have potential to improve tenderness in the major muscles of the back and hip (the major "steak" muscles).

Similar improvements to tenderness were seen in a further experiment designed to move the pre-rigor cuts away from the Canadian grade site (12th/13th rib). In this study, cuts were made above and below the grade site (6/7th thoracic and 5th/6th lumbar vertebrae). The result was bunching of the fat cover over the grade site (higher top, middle, bottom and grade fat depths) resulting in higher grade fat scores. As well, the increased tension on the rib-eye caused by severing the

supporting connective tissue reduced the rib-eye area and lowered muscle width, length and overall scores for grading. The combined effect of these changes resulted in lower predicted yield and a lower number of carcasses achieving a Y1 yield grade. In addition, quality grade was reduced due to a decrease in the amount of subjectively perceived marbling. The slower rate of heat dissipation caused by the increased fat depth over the grade site area was probably responsible for the lighter colour of the rib-eye (higher L*, hue angle and chroma values) and the reduced visibility of the marbling fat. Hence new grade criteria would need to be developed prior to implementing on-line altered suspension. Results of the first study were published in the Canadian Journal of Animal Science (79:27-34).

CURRENT ACTIVITIES

Frances Nattress, AAFC, Lacombe

The Western Group on Meat Safety and Preservation met on May 28 at Lacombe Research Centre. This group is comprised of representatives from industry, government and academia in western Canada. Several excellent presentations were made by staff and graduate students concerning the most recent developments in research into the safety and preservation of meats. Meetings are held semi-annually in different locations in the west. The group is coordinated by Dr. L. McMullin of the University of Alberta and if anyone is interested in attending, Lynn would be able to provide the most recent information.

The first meeting of Agriculture and Agri-Food Canada's Food Network was held June 10th and 11th at the Pacific Agri-Food Research Centre, Summerland, B.C. AAFC researchers from all of Canada attended this meeting which was primarily an introductory and planning exercise so that a viable Food Network aimed at sharing research successes, problems and experiences could be established. The group is divided into subgroups representative of AAFC activities related to food. At present attendance is limited to AAFC participants but this could expand in the future.

The 1999 Interagency Meeting on Food Safety and Nutrition Research will be held at the Canadian Science Centre for Human and Animal Health in Winnipeg on October 4th and 5th. The theme is "Meeting Food Research Challenges Through Collaboration". There will be oral presentations about programs and research as well as a poster session and meetings of small working groups. This meeting would be of interest to scientists, professional staff, program managers, inspection personnel and industry representatives. For further information contact Dr. Clifford Clark, Health Canada, Federal Laboratories for Health Canada and the Food Inspection Agency, 1015 Arlington Street, Winnipeg, Manitoba. R3E 3R2. E-mail: Clifford_Clark@hc-sc.gc.ca. Telephone: (204) 789-2094. Fax: (204) 789-2097