

# The Quest

## FOR TENDER BEEF

**PROJECT TITLE** Establishing Time/Temperature Aging Constants for Sub-Primal Cuts of Boxed Beef (2.12)

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Consumer research carried out by the Beef Information Centre has consistently shown that beef tenderness is highly desired by consumers. It has long been recognized by beef processors that aging increases the tenderness of beef. This is achieved as the beef's natural enzymes break down connective tissue in the muscle. The most common form of aging done in North America today is called wet aging where cuts of beef are vacuum-sealed in packaging and stored under controlled temperature conditions.

The majority of scientific studies on tenderness and how to improve it have examined the aging process in loin and rib-eye muscles. It was assumed that all muscles would react similarly; however, other studies indicated that not all cuts responded to the aging process with the same degree of increased tenderness as the loin and rib-eye cuts. This research project was undertaken to measure the effect of aging and the effect of the temperature at which aging occurs, on six different sub-primal cuts – the striploin, inside round, outside round, eye of round, blade eye, and chuck tender.

Two methods were used to judge tenderness – an objective (measurable) method and a subjective method (opinion). For

the objective method, a Warner-Bratzler shear force device was used to measure tenderness of each cut at different ages. Warner-Bratzler shear force assesses the tenderness of meat by measuring the amount of force in kilograms necessary to shear half-inch core samples from each cut evaluated. For the subjective method, a panel of individuals sampled cooked cuts at various stages of aging and gave their opinion on how the tenderness compared. The panel also judged the cuts of beef for juiciness and intensity of flavour and off-flavour.



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The six sub-primal cuts were evaluated at zero, six, 14, 21, 35, 42 and 56 days of aging at +5, +3, +1, or -1 degrees Celsius storage temperature.

The study confirmed that aging of different muscles does not consistently result in tenderness improvement. The blade eye, chuck tender, eye of round, and striploin were the most tender at 35 days of aging, and became less tender at longer aging times. On the other hand, the inside round did not benefit from aging at all, and the outside round became less tender with longer aging.

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**Aging should be adjusted for different muscle cuts in order to increase the consumer-desired quality of beef tenderness.**

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Although aging at higher temperatures (+3 and +5 degrees Celsius) resulted in some slight improvements in tenderness, the elevated temperature also contributed significantly to lower scores for beef flavour and higher scores for off-flavour. Therefore, lower storage temperatures during periods of extended aging were therefore recommended.

The study found that meat juiciness and flavour steadily decreased with aging; therefore it is recommended that aging only be extended to a point where the meat has reached an optimum tenderness. The results indicate that optimum

tenderness for each cut is reached at the following days of aging:

- outside round: 0 days
- inside round: 0 days
- blade eye: 14 days
- chuck tender: 21 days
- striploin: 35 days
- eye of round: 35 days

Every stage of beef production, from the cattle producer to the cook, impacts beef quality. This study provides beef processors and retailers valuable information on how aging should be adjusted for different muscle cuts in order to increase the consumer-desired quality of beef tenderness.



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