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Meat and Muscle Biology™

The Influence of Processing Method on Sarcomere Length and Proximate Composition of New Zealand Beef

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Objectives

Sarcomere length and proximate composition were analyzed to find differences of New Zealand beef muscles that were either conventionally chilled or hot boned.

Materials and Methods

Thirty-two beef carcasses were selected at harvest from an abattoir in New Zealand. Following slaughter carcasses were split, with sides being alternately assigned to hot boning (HB) or cold boning (CB). HB sides were fabricated within 90 min, while CB sides were chilled over night prior to fabrication. Five subprimals were removed from each side of the carcass and all accessory muscles were removed from these subprimals leaving only the *longissimus lumborum* (LL), *longissimus thoracis* (LT), *psoas major* (PM), *gluteus medius* (GM) and *semimembranosus* (SM). Muscles were fabricated into 2.5 cm steaks, and 1 steak was retained and frozen by d 3 from each subprimal for evaluation of sarcomere length and proximate composition. Data were analyzed as a split plot design using the GLIMMIX procedure of SAS (SAS Inst. Inc., Cary, NC) with chilling treatment as the whole plot fixed effect and muscle as the sub plot fixed effect. Carcass was included as a random effect. Treatment least squares means were separated using the PDIFF option ($P < 0.05$).

Results

Chilling treatment interacted with muscle to impact sarcomere length ($P < 0.01$). Chilled LL, LT. and PM muscles had longer ($P < 0.05$) sarcomere lengths compared to their HB counterparts. HB, GM, and SM had longer ($P < 0.05$) sarcomere lengths compared to CB, GM, and SM. The sarcomere length for the CB PM were the longest ($P < 0.05$) in the study, and were nearly 70% longer than the HB PM. The GM and SM had shorter ($P < 0.05$) sarcomeres than all other muscles in the study regardless of chilling treatment.

Chilling treatment did not interact with muscle to impact fat and collagen percentages ($P > 0.01$). Except for the LL, the CB muscle moisture percentages were greater ($P < 0.05$) in all muscles compared to HB muscles. Except for the PM, CB muscle protein percentages were higher ($P < 0.05$) in all muscles compared to HB muscles. Fat and collagen percentages were not effected ($P > 0.05$) by processing method.

Conclusion

These results show that the chilling treatments had an impact on sarcomere length of all muscles. Due to the fact that HB, LL, LT, and PM possessed shorter sarcomere lengths compared to their CB counterparts, it would not be beneficial for these muscles to be removed pre-rigor. However, there may be some benefit to pre-rigor processing of GM and SM muscles, as the HB GM and SM had longer sarcomere lengths. Beef processors may benefit from applying a duel processing system to allow for HB and CB. Practicing this method could allow for capturing added value from middle meats, such as the LL, LT, and PM, while allowing lower value end cuts, such as the GM and SM, to be processed more rapidly. Chilling treatment had an impact on proximate moisture and protein percentages. With the exception of the LL, CB muscle possessed greater moisture percentages. Additionally, with the exception of the PM, CB muscle protein parentages were higher than their HB counterparts. If processors are focused on the proximate composition of meat, chilled processing would be the most beneficial processing method.

