

2017 Reciprocal Meat Conference – Meat and Poultry Quality

Meat and Muscle Biology™



Determination of Objective Analysis of Juiciness among Multiple Beef Muscles and Quality Grades

K. M. Nyquist^{1*}, L. N. Drey², L. W. Lucher¹, J. C. Brooks¹, M. F. Miller¹, T. G. O'Quinn², and J. F. Legako¹

¹Animal and Food Science, Texas Tech University, Lubbock, TX, USA;

²Animal Sciences and Industry, Kansas State University, Manhattan, KS, USA

Keywords: beef, juiciness, muscles, quality grade, slice shear force, Warner-Bratzler Meat and Muscle Biology 1(3):79

doi:10.221751/rmc2017.073

Objectives

The purpose of this study was to use a developed objective juiciness analyses including corresponding tenderness measurements to determine the juiciness among multiple beef muscles of various quality grades.

Materials and Methods

Treatments were obtained from 5 different beef sub-primals: Strip loins (IMPS #180), inside rounds (IMPS #169), bottom rounds (IMPS #171B), shoulder clods (IMPS #114), and chuck rolls (IMPS #116). Sub-primals were also represented by 3 different USDA quality grades: Prime, Low Choice and Select; ($n = 10$ /quality grade). All sub-primals were vacuum packaged, aged for 21d then fabricated into 2.5 cm thick steaks from respective cuts: *Adductor (AD)*, *Biceps femoris (BF)*, *Chuck Eye (CE)*, *Infraspinatus (IF)*, *Semimembranosus (SM)*, *Serratus ventralis (SV)*, *Longissimus lumborum (LD)*, and *Triceps brachii (TB)*. The steaks were frozen (-20°C) until subsequent analyses. Several objective measures of juiciness and tenderness were evaluated on raw and cooked samples. Analysis techniques measured on raw samples included: pH and percentage fat, moisture, protein and collagen. Cooked techniques evaluated included: Warner-Bratzler shear force (WBSF), slice shear force (SSF), cook loss, and pressed juice percentage (PJP). For cooked analysis, each steak was cooked on a clamshell grill to a medium degree of doneness (71°C), and the fiber orientation (45 or 90°) was determined before sampling. Analysis of PJP was evaluated using a compression-based juiciness method. Following SSF, a 1cm thick PJP slice was removed parallel with predetermined muscle fiber orientation (45 or 90°) and compressed on filter paper at 8 g for 30s. Data were analyzed using the

GLIMMIX procedure of SAS (SAS Inst. Inc., Cary, NC; $\alpha = 0.05$). Subprimal was experimental unit, and muscle, quality grade, muscle \times quality grade were used as fixed effects. Carcass was used as a random effect.

Results

A muscle \times quality grade interaction ($P < 0.05$) was detected for each chemical proximate measurement, as well as pH. Fat percentage for SV was greater ($P < 0.05$) than all other cuts in all quality grades, but similar ($P > 0.05$) to IF in the Select grade. Within Prime and Low Choice, moisture was greatest ($P < 0.05$) for TB and similar ($P > 0.05$) to AD. The pH was lowest ($P < 0.05$) for AD in all grades. The IF was highest ($P < 0.05$) in Choice and Select, but similar ($P > 0.05$) to Choice TB, LD and Select TB. A muscle \times grade interaction ($P < 0.05$) was found for SSF. The BF across all quality grades was the toughest ($P < 0.05$). The SV was the most tender ($P < 0.05$) in Prime, however few differences were found in all other quality grades between muscles of AD, IF, LD, and SV. Quality grade and muscle affected ($P < 0.05$) WBSF and PJP. As quality grade increased, WBSF values decreased ($P < 0.05$). The SV and CE were more tender ($P < 0.05$) than AD, TB, and IF. The PJP was less ($P < 0.05$) for Prime and Choice than Select, while TB and SM were greater ($P < 0.05$) than IF and AD for the same trait.

Conclusion

Objective juiciness and tenderness measures among different beef cuts and quality grades cooked to the same degree of doneness indicated that there is a difference in the amount of juice that is released from various beef muscles.