

# Marbling relationship between Canadian and Japanese beef grading sites

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**Objectives:** Japan beef imports from Canada reached 5,600 tones in the last year (Canadian Cattlemen, 2021) maintaining the increasing trend in demand of Canadian beef by the Japanese market. Marketing beef carcasses to Japan is complex due to the differences between grading systems. In Canada, beef quality is established by assessing marbling on the *longissimus thoracis* (LT) muscle between the 12<sup>th</sup> and 13<sup>th</sup> rib, using United States Department of Agriculture (USDA) pictorial standards (CBGA, 2022). In contrast, Japanese beef quality grade is assessed between the 6<sup>th</sup> and 7<sup>th</sup> rib on the LT according to the Japanese Beef Marbling Standards (1 to 12) (JMGA, 2014).

**Materials and Methods:** A total of 209 experimental animals, from Yearlings and Calf-feds production systems, were used to determine marbling variability and pattern between the Canadian and Japanese grade sites. Animals were finished aiming to achieve top-quality Canada grades (Canada AAA or higher) that qualified for Japanese meat exports. Animals were slaughtered and processed at the federally inspected abattoir of the AAFC-Lacombe Research and Development Centre. After conventionally chilling carcasses at 2°C for 72h, left and right carcass sides were weighed to determine cooler shrink loss. Then, carcass sides were knife-ribbed at both the Canadian (12<sup>th</sup>-13<sup>th</sup> rib) and the Japanese (6<sup>th</sup>-7<sup>th</sup> rib) grade sites. Full blue tag Canadian grade data were assessed at the 12<sup>th</sup>-13<sup>th</sup> rib by a Canadian Beef Grading Agency (CBGA) certified grader. The assessments included ossification (Robertson et al., 2006), fat thickness (fat thickness over the rib), grade fat (minimum fat thickness over the rib in the 4<sup>th</sup> quadrant from the spinous process), ribeye area (REA, cm<sup>2</sup>), estimated total lean and retail cut yields (CBGA, 2022) and marbling, which was assessed subjectively using beef marbling USDA standards as reference points (USDA, 1989). At the Japanese grade site, marbling was assessed by applying both, the Japanese Beef Grading Association (JMGA, 2014; Gotoh et al., 2018) parameters (1 through 12) and the USDA standards at the LT muscle. Statistical analyses were performed using SAS 9.4 (2014). The PROC CORR, correlation model procedures, was used to evaluate the relationship of some variables.

**Results and Discussion:** The results in the present study showed a relative correlation between the USDA Marbling scores at the Canadian and the Japanese grade site ( $r=0.56$ ). In this sense, the analysis of the frequency distributions between Canadian and Japanese Marbling Grades suggested interesting results. Most of the carcasses graded as Canada AAA at the Canadian site were classified within the JMGA3 (48.4%) and JMGA4 (39.8%) Japanese marbling grades at the 6<sup>th</sup>-7<sup>th</sup> rib cross-section. Particularly, high Canada AAA grades (USDA Modest and Moderate pictorial standards/marbling scores of 500 and 600) were comparable to a high JMGA3 and/or low JMGA4. In turn, carcasses graded as Prime at the Canadian site were segregated mostly within the JMGA4 (51.9%) and/or low JMGA5 (33.3%) Japanese marbling grades. Dubesky et al. (1997) reported that Canadian AA and AAA quality grades were comparable to a low JMGA3 and to a high JMGA3 (or possibly low 4) Japanese marbling quality grade, respectively. Nevertheless, Dubesky et al. and previous studies at AAFC-Lacombe RDC were based on carcass ranges with limited numbers of top-end Canada AAA and Prime carcasses. The present study evaluated carcasses in the top end of the Canada AAA (85%) and Prime (6.9%) quality grades, which led to an increased percentage of carcasses classified as JMGA4 and low JMGA5 Japanese marbling grades at the 6<sup>th</sup>-7<sup>th</sup> rib cross-section.

**Conclusions:** These preliminary results suggest that Canada AAA quality grades are comparable to JMGA3 and JMGA4 Japanese marbling quality grades. In turn, carcasses classified within the Canada Prime quality grade were mostly comparable to a high JMGA4 and low JMGA5.

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**Key words:** Marbling, Canada grade site, Japan grade site, Quality Grades