MUSCLE FIBER TYPE IS ALTERED BY SELECTION OF SIRE FOR MAINTENANCE ENERGY

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As the costs of feed and production in beef cattle across the world are rising, beef producers are looking for ways to decrease production costs without creating any detrimental effects on meat quality. Thus, breeding selection strategies have been employed to increase efficiency of feed conversion. For example, selection of cattle with lower Maintenance Energy (MainE) values may improve the rates of gain for the same quantity of nutrients ingested, when compared to cattle with higher MainE values. The purpose of this study was to assess the impact of selecting for efficient cattle based on the MainE of their sire on the muscle fiber type of the *biceps femoris* (outside round) which is related to end-product quality. Muscle biopsies were collected from 42 animals (25 steers and 17 heifers), 2 months prior to slaughter then again from the 25 steers immediately post-mortem.

Our data suggest that selection of animals based on the sire MainE may influence meat quality as the relative proportions of muscle fiber type within the *biceps femoris* varied between the two groups of animals, calves born to a sire with a high MainE vs. those born to a sire with a low MainE. We found that in muscle samples taken from all 42 animals variations in proportion of fiber type between the two groups did not quite reach statistical significance but trended in the same direction as the data obtained when only the steers where included. Animals from a sire with a low MainE trended to have more oxidative type I fibers (33.1 ±1.2 vs. 28.9 ±1.4; p=0.07) and animals from a sire with a high MainE trended to have more glycolytic type IIb fibers (50.9 ±1.8 vs. 45.9 ±1.3; p=0.06). Whereas, analysis of the steer samples (excluding heifers) taken prior to slaughter showed that progeny from a sire with a low MainE expressed significantly more type I fibers (34.2 ± 1.7 vs. 26.8 ± 1.3; p=0.02). In contrast, steers from a sire with a high MainE had significantly more type IIa fibers (53.6 ± 1.6 vs. 44.2 ± 1.8; p=0.005). Fiber typing of post-mortem muscle biopsies confirmed our pre-mortem analyses results. Steers from a sire with a low MainE had significantly more type I fibers (23.9 ± 1.3 vs. 17.8 ± 2.1; p=0.02) while steers from a sire with a high MainE had significantly more type IIb fibers (60.4 ±2.9 vs. 51.6 ±1.9; p=0.02). There was no signifcant change in the proportions of type IIa fibers between the two groups at either sampling point. Higher proportion of type I and IIa fibers have been generally associated with an improvement in fresh meat quality since these muscle fibers are typically smaller in diameter and as such support improved meat tenderness values. It should be emphasized that muscle fiber type represents but one of the many contributing factors towards muscle tenderness. Our results indicate that beef cattle selected to be energetically efficient based on lower MainE's may produce a final product that has the potential to be more tender if all other contributing tenderness factors remain equal.

Figure 1. Relative fiber type proportions (mean ± standard error) from cattle selected based on high vs. low sire maintenance energy. *P < 0.05; **P < 0.01