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Potential Errors in Determination of Longissimus Muscle Area in Carcasses from Heifers Fed with or Without Zilpaterol Hydrochloride

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Objectives

The objective of this study was to evaluate the sources of potential error in determination of longissimus muscle area (LMA) between the 12th and 13th ribs of carcasses from heifers fed with or without zilpaterol hydrochloride (ZH).

Materials and Methods

There are 2 primary potential sources of error when determining LMA. First is the location of the cut between the 12th and 13th ribs. Second is the deviation of the cut from 90 degrees perpendicular to the long axis of the longissimus muscle. An additional potential source of error could come from feeding ZH. To evaluate the relative importance of each error source, rib-loin sections were cut caudal to the 13th rib and cranial to the 11th rib from 10 carcasses: 5 from heifers supplemented with ZH (8.33 mg/kg of dry matter) and 5 from heifers not supplemented with ZH (controls). Consecutive slices (3 to 4 mm thick) from each rib-loin section were cut at 90 degrees to the long axis of the longissimus muscle on a band saw. To ensure structural integrity, the sections were frozen and tempered so that the muscles remained firm during cutting. Each slice was placed on a stationary platform below a camera stand and images were captured using a digital Nikon D5100 camera (Lens: Nikon AF-S DX VR Zoom-Nikkor 55 to 200mm f/4 to 5.6G IF-ED). An image of a USDA beef ribeye grid was also obtained to ensure accurate calibration of LMA. The LMA was traced using a tablet computer, allowing image magnification to ensure accurate tracings

were made. The LMAs were determined for those slices that were cranial to the 13th rib and caudal to the 12th rib.

Results

Mean LMA was 99.4 sq. cm. The mean range in LMA between the 12th and 13th ribs was 8.9 sq. cm. There were no differences in the mean or range of LMA among carcasses from heifers fed ZH and controls ($P > 0.10$). Depending on the location of the cut between the 12th and 13th ribs, the LMA could be overestimated by as much as 9.0%. This equates to approximately 0.4 yield grade units. That is, a carcass that should receive a yield grade of 3.2 could present a LMA supporting a grade of 2.8. Additional inaccuracy could occur by cutting at a sharper angle than that described by the USDA. An angle of 68 degrees (22 degrees from the desired 90 degree angle) can be created by closely following the curvature of the 13th rib, potentially overestimating LMA by 7.9%. In this study, an incorrect cutting angle could overestimate LMA as much as 7.8 sq. cm, an additional 0.4 yield grade units. Collectively, both sources of error could alter LMA as much as 16.7 sq. cm (16.9%), the equivalent of 0.8 yield grade units.

Conclusion

These data reinforce the written directions of the USDA to separate the longissimus muscle between the 12th and 13th ribs by a cut as close to 90 degrees as possible. Failure to do so could result in an overestimation of LMA by as much as 16.9%. Feeding ZH to heifers had no effect on LMA variation between the 12th and 13th ribs.