

## 2017 Reciprocal Meat Conference – Undergraduate Research Competition

## Meat and Muscle Biology™



## Rate and Extent of Troponin-T Degradation in Loins from Pigs Selected for Low and High Residual Feed Intake

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### Objectives

It is well known that proteolysis of myofibrillar proteins such as troponin-T is linked to myofibrillar fragmentation and improvement of tenderness of fresh meat products. The objective of this research was to quantify the rate and extent of troponin-T degradation in chops, aged 1, 7, or 14 d, from the longissimus muscle (LM) of pigs selected for low residual feed intake (LRFI; more feed efficient) and high residual feed intake (HRFI; less feed efficient). Residual feed intake is defined as the difference between expected and observed feed intake based on ADG and backfat.

### Materials and Methods

Lines of LRFI ( $n = 6$ ) and HRFI ( $n = 6$ ) pigs, from generation 11 of the Iowa State University RFI project, were used for this study. Pigs were fed a commercial corn and soybean diet and were harvested at approximately 125 kg using standard industry procedures. Loins were removed and chops (2.54 cm) were cut from the LM 1 d postmortem, vacuum packaged, and aged 14 d. At the completion of aging, fresh (never frozen) chops were used to determine subjective color and marbling, Hunter L, a, b, and pH. Chops were cooked to 68°C for cook loss and star probe (kg) evaluation. Chops, from the LM (1.27 cm), for biochemical analysis were vacuum packaged and aged 1, 7, or 14 d. Samples were frozen in liquid nitrogen and homogenized at the end of the assigned aging period. Proteins were solubilized using whole muscle extraction buffer (10 mM sodium phosphate, pH 7.0, and 2% wt/vol sodium dodecyl sulfate). Densitometry analysis of immunoblots was used

to quantify troponin-T degradation products (28 to 30 kDa) that were resolved in the extracts from the aged samples. Degradation product abundance was normalized to the abundance of a reference sample on each gel and data were analyzed with fixed effects of line and days of aging and random effect of gel.

### Results

Hunter a and b values, pH, subjective color scores, and subjective marbling scores were not different between lines ( $P > 0.05$ ). There was a tendency for chops from LRFI pigs to have less cook loss (19.2%) than those from HRFI pigs (22.3%;  $P = 0.07$ ). Chops from LRFI animals exhibited lower Hunter L values (LRFI, 46.5; HRFI, 50.9;  $P < 0.01$ ) and lower star probe values (LRFI, 5.70 kg; HRFI, 6.15 kg;  $P < 0.05$ ). An explanation for lower star probe values in the chops from LRFI animals may be due to greater postmortem proteolysis of myofibrillar protein. Densitometry measurements showed significant effects of line, days aged, and a days aged  $\times$  line interaction ( $P < 0.01$ ). Troponin-T abundance was not different between lines in d 1 postmortem chops ( $P > 0.05$ ). The degradation product was more abundant in chops from LRFI animals at d 7 (0.64) and 14 (0.92) postmortem when compared to HRFI counterparts at d 7 (0.41) and 14 (0.80;  $P < 0.01$ ).

### Conclusion

Selection for improved efficiency was not detrimental to fresh pork quality. The results suggest that the explanation for improved quality in the loin chops from LRFI pigs is a greater rate and extent of troponin-T degradation during postmortem storage.