RESEARCHABSTRACT

pork checkoff

PORK QUALITY

Title: Characterization of Muscle Glycogen Storage and Utilization: Influence on Pork Quality **– NPB# 99-059**

Investigator: Steven M. Lonergan, Ph.D.

Institution: Iowa State University

Co-Investigator: Elisabeth Huff-Lonergan, Ph.D.

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ABSTRACT

Production of inferior quality pork has become a significant impediment to the competitiveness of the pork production industry in the United States. For several decades the pork industry has employed genetic selection strategies to make considerable improvements in efficiency of lean meat production. However, it has become increasingly evident that such advances have had costly side effect, especially regarding water holding capacity, color and texture of fresh pork. It is currently understood that variation in these traits can be significantly influenced by the muscle metabolism in the early postmortem period. One of the major changes in postmortem muscle is a mobilization of energy stored within muscle. This energy is mobilized from long chains of glucose molecules (glycogen) and converted to ATP by the glycolytic pathway. In the absence of oxygen, a by-product of the glycolytic pathway – lactic acid – begins to build up in muscle cells and causes a decline in pH. A typical pH decline is from a physiological 7.1 to approximately 5.7. The extent of lactic acid production and concomitant decline in pH depends primarily upon the glycogen content in the muscle at the time of slaughter.

Recently, a protein that serves as a primer and stabilizer of glycogen during glycogen synthesis - glycogenin- has been identified in muscle. The amount of glycogenin has been hypothesized to dictate the amount of glycogen in muscle. Our objective was to determine the existence of glycogenin in porcine muscle and ascertain the influence this protein had on glycogen content and ultimate pH in pork. A polyclonal antibody specific for glycogenin was utilized to identify the existence of this protein in porcine muscle. Pork loin samples varying in ultimate pH were used to determine the influence of the amount of glycogenin on ultimate pH. Our results demonstrate that pork with a greater abundance of glycogenin had a lower ultimate pH. This result is significant because variation in expression of this protein may explain some of variation in ultimate pH in pork. These results suggest that developing a more thorough understanding of glycogenin and glycogen metabolism in living muscle and in early postmortem muscle will aid our efforts to improve overall quality of fresh pork.