

**Title:** Comparison of red meat versus high carbohydrate diet as a means of preventing tissue-specific down-regulation of insulin receptors - **NPB #13-177**

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**Scientific Abstract:**

**Objectives:** The objective of this proposal was to accurately quantify insulin receptor concentration in muscle and adipose tissue through the use of quantitative polymerase chain reaction (qPCR) techniques.

**Materials and Methods:** Twenty-one gilts (Yorkshire × Duroc × Hampshire) born over a five-day period were provided *ad libitum* access to a low lysine diet (Lys = 0.45%) to promote hyperphagia and adiposity. Gilts were assigned to either a ground beef (**GB**; n = 5) or control (**CON**; n = 5) treatment upon reaching 3 cm subcutaneous backfat (**10BF**; 10/11th rib interface) and were fed for 84 d. The GB diet was 99.9% cooked ground beef (65:35 lean:fat) plus 0.1% calcium carbonate while CON comprised 70.55% ground corn, 15% vegetable oil, 8.5% DDGS and 4.25% soybean meal. Both rations met NRC requirements for gilts of this size and weight. Feed intake and orts were recorded daily. Body weights (**BW**) and blood samples were collected on d 0, 28, 56, and 84 for blood chemistry analysis. One gilt was removed from the GB treatment after d56 due to foot infection. Gilts were humanely euthanized on d 85 for tissue collections and body composition analysis. Samples of *Longissimus thoracis* muscle (**LT**; 10/11th rib interface), gracilis muscle (**GR**), 10BF, and liver tissues were snap frozen for IR qPCR analysis, and fixed in formalin for immunohistochemical evaluation of IR density.

**Results:** No differences were observed for mRNA expression of IR in the LT, GR, 10BF, and liver ( $P = 0.43, 0.2, 0.13, \text{ and } 0.19$ , respectively). Image analyses of photomicrographs of tissues stained for IR did not differ between treatments for IR density in 10BF or pooled muscle, however GB GR IR density was significantly greater ( $P = 0.04$ ) than CON GR, CON LT, and GB LT.

**Conclusion:** The higher density of insulin receptors in GR from ground beef-fed gilts could suggest the initiation of tissue-specific insulin resistance of that tissue. Further research is necessary to determine if consumption of a high calorie, high glycemic diet could lead to tissue-specific insulin resistance and to determine the specific metabolic role of the liver.

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