EFFECT OF GENETICS ON MEAT QUALITY AND SENSORY PROPERTIES OF PORK

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Background

The swine industry has achieved tremendous progress in genetic gains related to growth and feed efficiency as well as carcass fat reduction. As a consequence of these improvements there has been an increasing perception that the eating quality of pork has deteriorated over time. Some of these concerns are related to the reduction in fat content of muscle, i.e. intra-muscular fat, other concerns are related to the post-mortem biochemistry of pork, particularly the rate and extent of pH decline and the extent of myofibrillar proteolysis.

Objectives

Traits related to meat quality were investigated as part of a larger study, where overall carcass composition was studied in different PIC lines. Physico-chemical traits were compared between the different lines and related to sensory evaluations as well as correlated with each other. The literature provides us with many reports on the relationships between these predictive measurements and organoleptic parameters. However, this data set is quite unique in that it combines 10 different PIC lines of various phenotypic ranges.

Materials and methods

Animals came from the PIC genetic nucleus in Kipling Saskatchewan, Canada and was comprised of 30 market weight gilts from each of 10 lines for a total of 300 animals. The lines included the following basic genotypes: Landrace (Land), Large White (LW), Duroc (Dur), White Duroc (WDur), Berkshire (Berk), Hampshire (Hamp), Synthetic line (Syn), Crossbred Berkshire x Hampshire (BH), Pietrain hal negative (Piet-), Pietrain hal positive (Piet+).

Carcass Traits. Fat thickness (mm) and lean tissue depth (mm) were measured with a Hennessey Grading Probe at the 3rd/4th last ribs, 70 mm from the carcass mid-line approximately 40 minutes after harvest. Dissectible lean was determined as the weight of dissectible lean in the picnic, butt, loin, ham primal cuts plus the weight of the skinned trimmed belly and ribs as a percentage of cold side weight.

Muscle Quality Traits. The pH at 45 minutes (pH-45min) and 48 hours (pH-48h) post-slaughter, CIE L*, intramuscular fat (IMF), drip loss and shear value of the LT (*longissimus thoracis*) muscle were measured as described by Murray et al. (2001).

Sensory Traits. Perceived juiciness, flavor intensity, overall tenderness and overall palatability were assessed using a trained taste panel as described by Jeremiah et al. (1995).

Biochemical Measurements. LT muscle fiber types were determined by the combined SDH and myosin-ATPase method as described by Aalhus et al (1997). Samples, removed from LT muscles at 24 h post-harvest, were used to determine glycogen, glucose and lactate using a YSI Glucose-Lactate Analyzer and glucose-6-phosphate (Lang and Michal 1974). Glycolytic potential (GP) was calculated as (2*[glycogen + glucose + glucose-6-phosphate] + lactate) and is presented as μmoles lactate-equivalents per gram of muscle.

Statistical Analyses. Data were analyzed using the GLM procedure of SAS (2001) with statistical model slaughter day and line as classification variables. Least square means were compared by t-test. Correlation analyses made use of the CORR procedure (SAS 2001).

Results and discussion

Least squares means for meat and carcass traits are presented in Table 1. For most of the traits, Berk and Piet are at the two extremes. A number of line comparisons are highlighted below.