

**Title:** Influence of dietary DDGS and glycerol on pork loin and bacon quality – NPB #07-148

**Investigator:** Terry A. Houser Ph.D.

**Institution:** Kansas State University

**Date Submitted:** March 12, 2010

## Scientific Abstract:

Seventy-seven barrows (PIC genetics; initial BW = 31 kg) were used to evaluate the influence of feeding dried distillers grains with solubles (DDGS) and glycerol for 70-d on pork loin and belly quality attributes. The experiment had a  $2 \times 3$  factorial design with main effects of DDGS (0 or 20%) and glycerol (0, 2.5, or 5%) ( $n = 7$  replications each). Loins and bellies were removed from the left side of the carcass at 24 h postmortem, vacuum packaged, and stored at 4°C. Seven 2.54-cm thick loin muscle (LM) chops were fabricated from each loin on day 10 and were utilized for analysis of percentages of drip and cooking losses, pH, instrumental color ( $L^*a^*b^*$ ), visual color score, marbling score, Warner-Bratzler shear force (WBSF), fatty acid profile, and trained sensory panels. Bellies were evaluated for initial belly weight, green weight, injected weight, belly cooked weight, pump percentage, belly smokehouse yields, slice yields, belly length, belly thickness, belly flop fat side down, belly flop fat side up, bacon cooking yields, and proximate composition. Trained sensory panelists ( $n = 7$ ) evaluated LM for myofibrillar tenderness, connective tissue amount, overall tenderness, juiciness, pork flavor and off-flavor intensities. Bacon was evaluated for the sensory traits of brittleness, bacon flavor intensity, saltiness, and off-flavors. Purge, drip, and cooking losses percentages, pH,  $a^*$  and  $b^*$  values, visual color and marbling scores, and sensory juiciness and pork flavor intensity scores were not affected ( $P > 0.05$ ) by inclusion of DDGS or glycerol in the diet for LM chops. Pigs fed 20% DDGS had less tender ( $P < 0.05$ ) chops than LM from pigs fed 0% DDGS. LM from pigs fed 20% DDGS without added glycerol had more ( $P < 0.05$ ) off-flavors than all other treatments. There were no DDGS x glycerol interactions, DDGS, or glycerol main effects on sensory characteristics of brittleness, bacon flavor intensity, saltiness, or off flavors. There were no DDGS x glycerol interactions ( $P > 0.44$ ), nor glycerol ( $P > 0.08$ ) effects on initial belly weight, green weight, injected weight, belly cooked weight, pump percentage, belly smokehouse yields, slice yields, belly length, belly thickness, belly flop fat side down, belly flop fat side up, bacon cooking yields, or proximate composition. DDGS did not affect any measurements ( $P > 0.07$ ) except for the belly flop fat side down method ( $P < 0.04$ ) which showed a decrease in belly firmness. There were no DDGS x glycerol interactions ( $P > 0.05$ ), nor glycerol main effects on fatty acid content for either the LM IMF or belly samples. LM from pigs fed 20% DDGS had more ( $P < 0.05$ ) linoleic acid, eicosadienoic acid, and higher iodine values than LM samples from

These research results were submitted in fulfillment of the Nutritional Efficiency Consortium research projects.

Contributing organizations for 2007 include: Arizona Pork Council, DPI Global, Eli Lilly/Elanco, Iowa Corn Growers Association, Iowa Pork Producers Association, Illinois Corn Marketing Board, Illinois Pork Producers Association, Kansas Corn Commission, Kansas Pork Association, Lucta USA, Minnesota Pork Board, Missouri Pork Producers Association, Monsanto, Mississippi Pork Producers Association, Montana Pork Producers Council, National Corn Growers Association, North Carolina Pork Council, Inc., National Pork Board, Nebraska Pork Producers Association, Inc., Ohio Pork Producers Council, Pioneer Hi-Bred International, Inc., Utah Pork Producers Association and the Wisconsin Pork Association.

This report is published directly as submitted by the projects principal investigator. This report has not been peer reviewed.

For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • pork.org

pigs fed 0% DDGS. There was less ( $P < 0.05$ ) palmitoleic acid in LM from pigs fed 20% DDGS than those from pigs fed 0% DDGS. Inclusion of 20% DDGS decreased ( $P < 0.01$ ) myristic acid, palmitic acid, palmitoleic acid in belly samples compared with 0% DDGS. Adding 20% DDGS increased ( $P < 0.01$ ) stearic acid, oleic acid, vaccenic acid, linoleic acid,  $\alpha$ -linolenic acid, eicosadienoic acid, total monounsaturated fatty acids ( $P < 0.01$ ), total trans fatty acids, unsaturated: saturated fatty acid ratios, polyunsaturated: saturated fatty acid ratios, and iodine values in belly samples. Thicker bellies correlated with greater smoke house yields ( $R > 0.54$ ), greater slice yields ( $R > 0.52$ ), and firmer bellies ( $R > 0.94$ ). Bellies that had larger (firmer) flop skin down scores were correlated with greater smokehouse yields ( $R > 0.67$ ) and slice yields ( $R > 0.60$ ). It is notable that the belly flop skin side up method did not significantly ( $P < 0.05$ ) correlate with any of the data collected throughout this study. Pork producers with growing and finishing operations can make effective use of economical DDGS and glycerol from the ethanol and biodiesel industries with minimal or no reduction in pork loin or belly/bacon quality at levels tested.

**Keywords:** dried distillers grains with solubles, fatty acids, glycerol, off-flavor, palatability, pork quality, tenderness, bacon