

May-June, 2017

Research Review

Researcher: Dr. Jay Harmon, Iowa State University

Evaluating Transport Conditions on Weaned and Feeder Pig Performance

Weaned Pigs Require More Care in Transport



In this project, researchers reviewed data from more than 7,000 loads of weaned and feeder pigs, looking for possible mortality relationships and the long-term impact of transport stress on piglets and the environmental characteristics within the trailer.

Researchers found that weaned pigs had significantly greater death loss during transport than did feeder pigs (0.0333% versus 0.0243%), likely due to the combined stress of weaning and transport. In addition, weaned pigs were more susceptible to transport stress during hot weather (above 77 degrees F) than feeder pigs. More specifically, the longer the travel distance, the higher mortality was in weaned pigs. Elevated death loss was highest in feeder pigs that traveled the longest distances. For both classes of pigs, mortality rates during shipping were lowest in mild weather (59 to 77 degrees F). Therefore, greater measures to reduce heat stress for weaned pigs may be necessary.

There was a holdover affect, as weaned pigs that faced transport stress tended to have higher death loss in their second week in the finisher. During the first week, mortality rates were 0.050%, 0.050% and 0.045% for cold, mild and hot weather transport respectively. In the second week, mortality rates were 0.354%, 0.300% and 0.272% for cold, mild and hot transport. This may be due to starve-out of pigs that failed to thrive in the first week, but succumbed in the second week. Researchers noted the cause/effect linkage to transport environment is not clear cut and other effects are certainly involved. [Click here for more details.](#)

Researcher: Dr. Charles Stark, Kansas State University

Cold Pelleting Can Maximize Feed Efficiency, Nutrients and Economic Return

May Improve Nursery Pig Performance



Pork producers continue to grind feed to very fine particle sizes, resulting in diets with high levels of fine powder. The fine particles (less than 150 microns) create problems during feed manufacturing and delivery, as well as on-farm feeder management. While removing fine particles will improve the diet's flowability, they must be incorporated back into the feed at some point during manufacturing to prevent feed-mill shrink.

Pelleting is one option to prevent particle issues. However, traditional pelleting requires a substantial investment in equipment to produce the pellets and for the steam required for the conditioning process. This is where cold pelleting is different. It's an alternative method that does not require using steam or a boiler. This somewhat novel technology provides an economical and practical option for pelleting fine particles removed from ground grains or even complete diets.

This study, designed to evaluate the economic returns of using cold pelleting showed that removing particles less than 150 microns improved flow ability in mash diets. Researchers found cold pelleting to be a viable option for pelleting complete animal feed, and it could optimize the performance of nursery pigs consuming pelleted feeds. [Click here for more details about the study.](#)

Researcher: Dr. Hans Stein, University of Illinois

Energy and Nutrient Digestibility in Wheat-Midds

"Red Dog" Proves Superior

Wheat middlings and "red dog" are the high-fiber leftovers from wheat flour production. Each year, U.S. mills produce an estimated 6 million tons of these wheat coproducts, which many pork producers use in swine diets.

In this study, researchers conducted two experiments to evaluate the ileal digestibility of amino acids (AA) in 10 wheat-midds sources collected throughout the U.S. and in one red-dog source. They determined digestible energy (DE) and metabolizable energy (ME) concentrations in wheat-midds and developed equations to predict DE and ME concentrations.

Results showed that red dog has greater AA digestibility and contains more DE and ME than wheat-midds. All wheat-midd sources had relatively low lysine digestibility, indicating the use of high heat during processing. Red dog also had greater digestibility of all fiber than did wheat-midds. Red dog's higher DE and ME concentrations are likely because it contains twice as much starch and much less fiber than wheat-midds. This composition difference also may be the reason for red dog's higher AA digestibility. Consequently, red dog offers more nutritional value in pig diets versus wheat-midds. Data from this research provides the first robust estimates of digestibility values for AA and energy in wheat-midds and for one red dog source. These values may be used in formulating pig diets. [Click here for more details.](#)

Researcher: Dr. Connie W. Bales, Duke University

Protein Intake and Weight Reduction Responses in Obese Women

Subjects Show Improved Function with Weight Loss

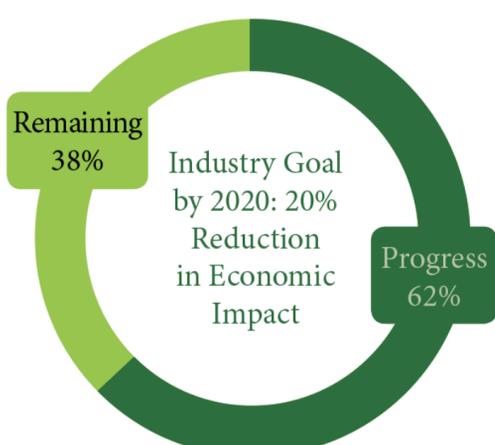


Women have higher rates of obesity than men have and develop more pronounced functional deficits as a result. Yet, researchers know little about how obesity reduction affects these women's functional status, including whether their responses differ when protein intake is enhanced.

Researchers enrolled women ages 45 to 78 years, (58.8% white) in a weight-loss study and randomly placed them into a control-weight-loss group or a high-protein weight-loss group. Primary outcomes were measured by a 6-minute walk test and lean mass at 0, 4 and 6 months. In both groups, reduced calorie intakes and body weights and feasibility of the high-protein weight-loss intervention was confirmed. The 6-minute walk results improved at 4 months in the high-protein group and at 6 months in both groups. Both groups improved function by several other measures while slightly decreasing lean mass.

Weight loss was greater in white women compared to black women at both 4 and 6 months, and tended to be positively related to age. Researchers concluded that a clinically important functional benefit of reducing obesity was confirmed in both groups, with no significant group effect. The findings determined that there were racial differences in response to the intervention and a potential influence of participant age. These factors support the need for more studies to explore the interaction of race and age with functional responses to reduce obesity in women. [Click here for more details.](#)

Checkoff Facts: Did you know?



The impact of PRRSv has declined by \$83 million annually compared to the 2010 study.

Adjusted for changes in prices and the size of the national herd since 2010

Veterinary Diagnostic and Production Animal Medicine, ISU College of Veterinary Medicine

Researcher: Dr. John Patience, Iowa State University

Carcass Fat Quality Response to Dietary Fats of Different Iodine Values

How to Improve Fat Quality in Finisher while Maximizing Returns

In this study, researchers fed 50 pigs one of 10 treatment diets for 82 days. There were three dietary fat withdrawal times (21, 42 or 63 days) by three dietary fat sources (5 % animal/vegetable blend, 2.5% corn oil or 5% corn oil). A control diet contained no added fat. Pigs were weighed on days 0, 21, 42, 63 and 82. Fecal samples were collected and subcutaneous fat samples from the jowl were collected by biopsy three times. Finally, the pigs were harvested on day 82 and carcass measurements collected.

The researchers found that withdrawing dietary fat prior to harvest significantly lowered carcass iodine value (IV). IV was improved by lengthening the withdrawal time of unsaturated dietary fat prior to market, yet it did not improve belly firmness, weight, depth or fat color. Withdrawing dietary fat lowered the linoleic acid concentration (18:2) — the primary fatty acid measured when evaluating pork fat quality. [Click here for more details.](#)

Researcher: Dr. Crystal Loving, USDA-ARS, National Animal Disease Center

Live-Animal Assay to Identify Cross-Protection for SIV Vaccines

Pros and Cons of Maternal Immunity



Researchers have found that experimental live-attenuated influenza virus (LAIV) vaccines delivered into the pig's nose provide more protection against swine influenza virus infection than traditional inactivated commercial vaccines. These vaccines also protect piglets that have suckled from sows with influenza-specific immunity. Because some sow vaccines are inactivated, piglets that receive an LAIV also are likely to have maternal-derived immunity (MDI). This makes it important to understand MDI's impact on LAIV vaccine efficacy in piglets, especially since data suggests that measuring antibody from LAIV-vaccinated piglets with MDI may not effectively measure their ability to mount an immune response and have disease protection.

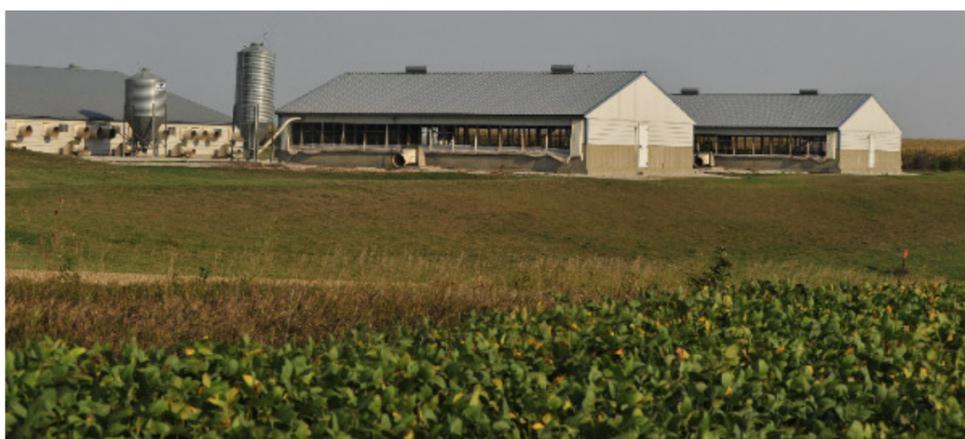
The researcher's goal was to validate a live-animal assay to use as a predictor of vaccine-induced immunity and protection following LAIV vaccination in both MDI-positive and MDI-negative piglets. She bought sows; bred them on-site and vaccinated them three times with either LAIV or WIV (wild influenza virus). In addition, she bought naïve, non-vaccinated, bred sows with similar farrowing dates.

At three days of age, the researcher vaccinated the groups of piglets intranasally with LAIV or left them unvaccinated. At 42-days post vaccination blood, she collected nasal wash and oral fluids to evaluate the piglets' influenza-A-virus immunity. The piglets were challenged with influenza mismatched to the vaccine strain and vaccine efficacy was evaluated by measuring lungs and virus shedding in the nose, trachea and lungs.

In the end, the researcher found that piglets were protected against influenza even when vaccinated with maternal immunity present, but the transferred maternal immunity impeded the ability to evaluate vaccination status. [Click here for more details.](#)

Researcher: Dr. Xu Li, University of Nebraska-Lincoln

Manure Land Application Impact on the Transport of Manure Constituents in Soil



Researchers designed this study to provide key information on the quantity of nutrients, antimicrobials and antimicrobials and (AMR) genes in soil following land application of swine-manure slurry. Another key objective was to determine how application timing in relation to rainfall affects the persistence and retention of manure constituents in soil.

Li and his colleagues used plot-scale experiments using a commercial manure applicator to broadcast or inject swine slurry from a commercial wean-to-finish farm. They simulated three 30-minute, rainfall events (24 hours apart) on the manure-amended plots at 1 day, 1 week, 2 weeks or 3 weeks after the manure application. They collected soil cores before and after the rainfall simulation and analyzed for nutrients using standard methods, for antimicrobials and for AMR genes.

Broadcast manure application resulted in higher soil nitrate concentrations than did injection. Regarding application timing, three of the four nutrient compounds tested (nitrate, water-soluble phosphorus and Bray 1 phosphorus) did not show a significant drop in broadcast plots during the three weeks after manure application. However, ammonium concentration dropped significantly in the third week.

Simulated rainfall events significantly lowered the nitrogen species concentrations in top soils and showed minor impacts on phosphorus species. Antimicrobial concentrations in broadcast plots were higher in top soils than in injection plots. For broadcast plots, chlortetracycline was detected in both the top and bottom of the soil cores before and after rainfall events. Lincomycin and tiamulin were detected only in the top of soil cores. Antimicrobial concentrations in top soils decreased with time after manure application, although the trend is significant only for lincomycin.

AMR gene levels in top soil were not affected by land-application methods. For broadcast plots, length of time between manure application and rainfall had no significant effects on the abundance of three of the four AMR genes tested. The exception was *tet(Q)*, which increased in week 3. AMR gene levels in soil were not affected by the simulated rainfall. The only treatment factor showing significant effect was soil position—the AMR genes were more abundant in the top portion than the bottom portion of soil cores collected. [Click here for more details.](#)



Pig
Welfare
Symposium

Submit Your Abstracts for the Pig Welfare Symposium

Professionals and students interested in submitting abstracts for a technical poster presentation should visit www.pork.org/pws. All submissions due by June 15, 2017.

For more information, contact Sherrie Webb at SWebb@pork.org

Take the PEDV Producer Survey!

With just a few minutes, you can help the National Pork Board learn more about how producers prevent, manage and control porcine epidemic diarrhea virus (PEDV). Researchers at Kansas State University are conducting this Checkoff-funded study. Producers should respond by June 6 to [take the survey](#).

Questions? Please contact Dr. Megan Niederwerder at mniederwerder@vet.k-state.edu.



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