

Frank's Note

Producers invest a lot of time, attention and money to get pigs to market weight, but decisions and actions in the late-finishing stage, as well as during animal handling and transport, can sabotage the final product outcome.

It starts inside the barn with the pen size and layout. With ever-increasing productivity, more pigs per litter requires more grow/finish space. Then add in the fact that pigs are growing to heavier market weights today. These changes occur subtly over time, and soon there are 5 percent or 10 percent more pigs weighing 300+ pounds in a space that was meant for fewer 270-pound pigs. This all adds stress and can lead to increased mortalities, fatigued pigs and poor-quality pork.

As with pen sizes, larger pigs need wider aisles, which is hard to change in an established barn. So, this requires extra attention when moving pigs. Taking four to six pigs at a time and moving them with a sort board in a slow, calm manner will complete the job quicker than hurrying them down an aisle or up a loading chute. Establishing a sort pen makes all this easier, and it provides pigs with a spot to rest and recover before loading the trailer and moving to market.

The time and attention given to pigs in that last marketing stage pays off by minimizing stress and delivering quality hogs to the packer.

Farmweld can help you lay out pen configurations, accommodate fast alleys, determine aisle width and address a wide range of other pork production needs. Simply give us a call at 800-EAT-PORK (328-7675) or visit farmweld.com.



Frank Brummer
President
Farmweld, Inc.

Understanding Your Role in Pork Quality

Keeping pigs healthy and growing is a clear priority on hog farms; less clear is how on-farm actions impact pork quality.



Everyone on a hog farm is working toward the same end goal — to produce high-quality, nutritious pork. While much pride goes into raising healthy pigs efficiently, not everyone maintains a connection to the product that appears in the meat case.

Pigs that are dead on arrival at a packing plant, those that must be euthanized and carcasses requiring trimming are all clearly relayed back to the farm in lost payment. But less clear is the impact of poor lean-muscle quality.

“Producers get limited feedback on fresh-meat quality,” says Matt Ritter, PhD, senior vice president, research and development at United Animal Health. “Niche producers and vertically integrated producers stand to gain the most as they receive premiums for pigs sold or are capturing additional value via export sales.”

Yet, many of the factors that influence pork quality also impact animal well-being and mortality risks. More subtly, the quality of pork in the meat case not

only determines consumer satisfaction but also repeat purchases and pork's ability to compete with other proteins. Pork quality also affects packer yield and their satisfaction with your market hogs.

What Defines Pork Quality?

“Pre-harvest stress has important implications for managing variation in pork quality and, in particular, the rate and extent of postmortem muscle pH decline,” Ritter says.

After pigs are harvested, oxygen is no longer available to the muscle. Carbohydrates stored in the muscle (glycogen) are used to produce energy via anaerobic glycolysis, of which the byproducts are lactic acid and heat. Lactic acid and heat build-up in muscle causes muscle pH to drop and carcass temperature to increase, respectively.

“High carcass temperature and/or low muscle pH can then negatively impact the ability of muscle proteins to bind water and myoglobin — the protein responsible for meat's red color — and can result in pork with pale color and high drip loss,” he adds.

Defining Transport Loss

According to a large industry survey, approximately 0.9 percent of all market pigs transported either die or are non-ambulatory at the packing plant.

“Transport losses are a multi-factorial problem,” says Matt Ritter, PhD, United Animal Health. “It’s well established that transport losses are increased by aggressive handling with electric prods, crowding pigs during transport and extreme weather conditions.” Here are common losses.

- **Dead on arrival (DOA)** – A pig that died during transport.
- **Dead in yard (DIY) or dead in pen (DIP)** – A pig that died after unloading, usually in the lairage pen.
- **Non-ambulatory pig** – An injured or fatigued pig that refuses to walk or keep up with others. Fatigued pigs are without obvious injury, trauma or disease. Packers may have different names, such as subjects, slows, suspects, cripples and stressors.
- **Transport losses** – The sum of dead and non-ambulatory pigs at the plant.
- **Carcass bruising and trim** – This has animal-welfare and economic implications because the packer must trim out the bruised area. It can be caused by rough handling, poorly maintained facilities, overcrowding during transport and fighting when mixing unfamiliar pigs.



Matt Ritter, PhD,
senior vice president, research and
development, United Animal Health

Lean muscle falls under three post-harvest quality categories:

- **RFN or Normal** — Reddish pink, firm, non-exudative (limited water loss). The muscle pH declines gradually over 3 hours.
- **PSE** — Pale, soft and exudative (high water loss). This is a result of stress immediately ahead of slaughter. It produces elevated body temperature and high lactic acid in the muscle, causing rapid decline in pH. By 24 hours, pH is near normal, but the damage is done.
- **DFD** — Dark (purplish), very firm and dry. Caused by long-term stress/exertion, the muscle has a normal pH decline, but low muscle-glycogen stores result in a high ultimate pH. The meat tends to have a shorter shelf life.

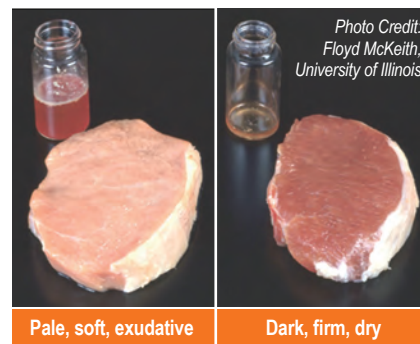
A comprehensive pork-quality chart is available through Pork Information Gateway Factsheets at porkgateway.org.

How Producer Actions Impact Pork Quality

Ritter has conducted significant research on animal handling, transport and pork quality, and he cites some producer actions that can impact pork quality. Naturally, some play a greater role than others, and they can have an additive effect.

Genetics leads the list of factors influencing baseline pork quality. For years, the stress gene (porcine stress syndrome; HAL-1843) drove the outcome for PSE pork. In the late 1990s, an industry-wide movement worked to eliminate the stress gene, but that doesn’t mean PSE pork has been eliminated.

Market weight can influence lean-muscle quality — not to the same degree as genetics, but “it’s something to note as you start making management decisions,” Ritter says. Weights also can impact the pigs’ stress levels due to crowding and present challenges when handling and moving pigs.



A 2017 Kansas State University review showed some slight declines in muscle pH as weights increased. The muscle’s a* value or redness was higher in heavier weight pigs, which is positive. The L* values or lightness, drip loss and tenderness results were inconsistent.

Feeding strategies to improve pork quality have been widely researched, but answers remain elusive. Furthermore, some of the approaches may reduce growth performance, add costs and/or only work for a short period before harvest.

For example, to increase ultimate pH, a low-carbohydrate diet can limit the amount of muscle glycogen, thereby limiting lactic acid production. Feeding alternative energy sources such as creatine and carnitine may help slow the rate of pH decline. Antioxidants such as vitamin E, vitamin C and selenium can benefit lean color.

However, one proven strategy is to withdraw feed for 16 to 24 hours, including time on the farm, in transport and lairage. This can reduce body temperature, lower muscle-glycogen stores and improve loin-muscle ultimate pH, Ritter says.

It’s critical that feed is withheld only from pigs heading to market, because repeated out-of-feed events can lead to poor performance and gastric ulcers. Equally important is that pigs have access to water up to loading time and at lairage.

“One consideration is how the producer is getting paid,” Ritter notes. “If it’s on a live-weight basis, a 24-hour feed withdrawal will reduce live weight by emptying the gut but will not impact carcass weight.”

He points out that feed withdrawal can save about 5 pounds of feed for each market hog, which equates to 65 cents to 73 cents per pig with late-finishing diets costing \$260 to \$290 per ton.

Feed withdrawal also can reduce transport losses and motion sickness. As for effects on pig behavior, handling and aggression, Ritter says the jury is still out.

Facility design is key to minimizing long- and short-term stress, thereby impacting the animal's welfare, productivity and eventual pork quality.

Large pens with a pre-sorting space versus traditional pens of 25 pigs offer more room to move, making it easier to move them down an aisle when needed. A pre-sort pen also makes it easy to withdraw feed, and the pen should be located to minimize the distance to the loading chute.

"Pigs moved longer distances have higher body temperature and blood lactic acid values, and are at higher risk of becoming fatigued during loading," Ritter says. Research also has shown that larger pens with pre-sorting reduces loading stress

and transport losses at the plant.

Aisle width impacts the ease of moving market pigs and their stress level. Pigs tend to walk side by side, so the aisle should accommodate two pigs. As market hogs have gotten bigger, this challenge has increased.

"You can't change aisle widths overnight, but a practical solution is to take fewer pigs to the truck at a time," Ritter notes. "The typical mindset is 'if I move eight pigs at a time, I can load a truck two times faster than if I take two groups of four.'" Yet, data shows that reducing group size from eight to four pigs reduces loading time and transport losses.

The loading chute is the final facility piece to consider. The ramp angle from the ground to the trailer should be no more than 20 degrees. Other considerations include adequate chute width and lighting.

Loading and transport conditions have a major impact on pork quality and fatigued pigs. "Loading is generally considered the greatest stressor," Ritter notes. "But optimal transport and lairage conditions

can trump loading stress by allowing time for the pig to rest and recover. At the same time, suboptimal transport and lairage can override low-stress handling at the farm."

Aggressive handling — crowding pigs, moving rapidly and using electric prods — during loading sets the stage for PSE pork, DFD pork and fatigued pigs. Most fatigued pigs will recover if allowed 2 to 3 hours of rest, which can occur during transport and/or at the plant if stressors are removed.

Load only four to six pigs at a time. "Using a sorting board is the single most effective tool to move pigs," Ritter says. Paddles are a second choice; an electric prod is a last resort and must be limited to no more than two shocks per pig from the barn pen to the trailer. Do not load any obviously stressed or fatigued pigs; instead, let them recover in the sort pen.

Transport conditions are influenced by temperature, pig stocking density and distance to the plant. Do not mix unfamiliar pigs, although that's not always feasible. "Mixed groups may fight, increasing the

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risk for transport losses, carcass trim and DFD pork,” Ritter notes.

Adjust load size for pig weight, trailer length and weather. Too often, pig numbers are not adjusted for 310-pound versus 270-pound pigs. Crowding increases the risk for dead and non-ambulatory pigs, especially during summer. Ritter advises loading densities of no more than 58 pounds per square foot.

For summer heat, shower pigs with water and get the trailer moving. “Once pigs are on the truck, heat builds up rapidly, so you want to keep the truck moving and avoid unnecessary stops,” he says. Elevated body temperatures increase the risk of PSE pork.

For winter and cold stress, provide dry bedding and board up the trailer. “Pigs shiver to produce heat, which reduces muscle-glycogen stores and increases the risk for non-ambulatory pigs and DFD pork,” Ritter notes.

As for the trailer, Ritter did a study evaluating straight-deck and pot-belly trailers, using the same loading and unloading crews. The study showed that pigs were harder to unload from pot-belly trailers, required more electric-prod use and exhibited more stress during unloading.

For transport distance, short and long hauls both can have negative effects. During a short haul (1 hour or less), pigs don’t have time to recover, so transport

stress can be additive to loading stress, which results in greater risk for transport losses and PSE pork.

A long haul (8 hours or more) increases dehydration and carcass bruising risk for pigs. An extended feed withdrawal will reduce muscle-glycogen stores and increase the risk of DFD pork.

During a medium haul (2 to 4 hours), with optimal transport conditions, pigs will have time to recover from loading stress.

Managing the late-finishing and marketing stages to minimize potential stressors is a balancing act. But it’s worth the effort to limit dead and fatigued pigs and maximize your pigs’ lean-quality potential. **F**

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