



# Pork Prose

by  
**Kenneth B. Kephart**

Penn State Extension Swine Specialist

## PORCINE STRESS SYNDROME

The PSS/PSE can of worms has been open since the 1960s, when our industry began turning the production crank for meat-type hogs.

This admirable response to consumer needs, unfortunately, turned out to be a nightmare — sudden death in the pig, and pale, soft, and exudative (PSE) pork. So we discovered, the hard way, that we couldn't have our cake and eat it too.

Our next major discovery was that the problem is not all genetic. Environmental influences, such as feeding, handling, and weather, play an important role as well. And now, another breakthrough has been unleashed, this one so prevailing that the final solution to the PSS problem is within reach. This tool, the DNA blood test, does nothing more than identify stress positive pigs and stress carriers.

But with that knowledge, we're finally in a position to control our own destiny. If it were only that simple. A part of the industry sees the test as a means to eliminate the gene. Others are using to test to keep the gene for its lean-meat benefits, with the hope that careful control of breedings will minimize the PSE problem.

**Incidence**  
An extensive survey of pork quality was sponsored by the National Pork Producers Council (NPPC) during the summer of 1991. Led by Bob Kauffman at the University of Wisconsin, a team of four scientists evaluated more than 10,000 hams for quality characteristics. Sixteen percent of the hams were PSE.

**What Happens In The Pig**  
Pigs known to be stress positive are, in genetic terms, homozygous recessive (nn) for the stress gene. Because of their unusual metabolism, stress (castration, loading, hauling, mating) can trigger a five-fold increase in calcium concentrations in the muscle cell. The high level of calcium then activates a prolonged muscle contraction, which rapidly uses glyco-

gen, a type of carbohydrate stored in the muscle.

Because of the prolonged contraction, oxygen can't get to the muscle fast enough, so the glycogen is metabolized anaerobically (without oxygen). Two by-products of the event are heat and lactic acid. The heat quickly raises the body temperature, while the lactic acid is involved in the pale, soft character of pork from PSS pigs.

About 80 percent of stress positive pigs will have PSE pork. Related to this scenario is strong evidence that PSS hogs have more or larger "alpha-white" muscle fibers than normal hogs. The alpha-white fiber, which becomes predominant after genetic selection for heavily muscled hogs, has the biochemical machinery for rapid break-down of glycogen.

What you see in the pig is a rapid increase in body temperature — often as much as 10 degrees in a matter of minutes. Red and purple blotches on the skin often accompany this rise in temperature. The lactic acid increases the acidity of the blood (blood pH drops) and leads to an increase in respiration rate — an automatic mechanism used by all animals for correcting low blood pH. This is one reason pigs suffering from PSS will breath very rapidly.

Normal animals (NN) may also have PSE meat under some condi-

tions, but the incidence is apparently very low (less than 3 percent). Carrier animals (Nn) evidently show no signs of PSS during stress, but they often have PSE qualities in the pork.

Research at Lacombe and Denmark suggests the carriers produce 60 percent PSE pork. Dr. Austin Murray, meat biochemist for Agriculture Canada, estimates a lower incidence, around 30 percent, of PSE pork in carrier pigs. But the point is, even though the carrier pig may not show outward signs of PSS, the pork quality will be less than ideal.

This is further evidenced, by a study at the University of Minnesota:

Table 1: Effect of PSS Gene on Carcass Composition and Quality

	Normal	Carrier	Positive
Backfat, in	1.50	1.41	1.37
Loin eye area, sq in	3.91	4.68	4.85
Color	3.00	2.33	2.00
Firmness	2.83	1.67	1.00
Marbling	2.17	1.33	1.00

Adapted from Shurson (1992). Color: 1=pale, pinkish gray; 5=dark purplish red. Firmness: 1=very soft; 5=very firm. Marbling: 1=devoid; 5=moderately abundant.

Although the pigs in this study are a bit fat, two points are evident. First, pigs positive for the PSS gene are leaner and have more muscle. Second, they have muscle

that is paler, softer and without marbling.

**PSE Effects On Pork Processing**  
Because of the rapid drop in pH, PSE muscles lose their ability to retain juices. Muscles take on a mushy, pale appearance. The problem is most apparent in the loin and outer ham muscles, and often leads to a two-toned color in the ham cuts.

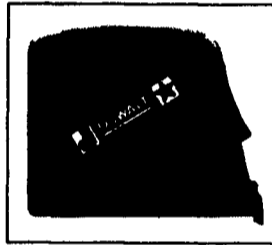
Fresh cuts lose more water and nutrients, are less attractive to consumers, and have a shorter shelf life. Processed products shrink excessively (about 3 percent above normal). Frozen cuts lose more

moisture during thawing. Obviously PSS can be a problem for producers. But PSE, a direct result of the stress syndrome, is a problem for both packers and consumers.

**Causes Of PSS And PSE**  
There is little question that  
(Turn to Page C5)

## Your Feedroom Expert Really Measures Up!

To get the most out of your feedroom setup, you need the Feedroom Expert. Invite him to your farm now, and not only will you get the best advice available, but something else, absolutely free: this high quality Lufkin® Power Tape. Made in the U.S.A., it features an easy-to-read blade in a high visibility case with handy belt-clip.

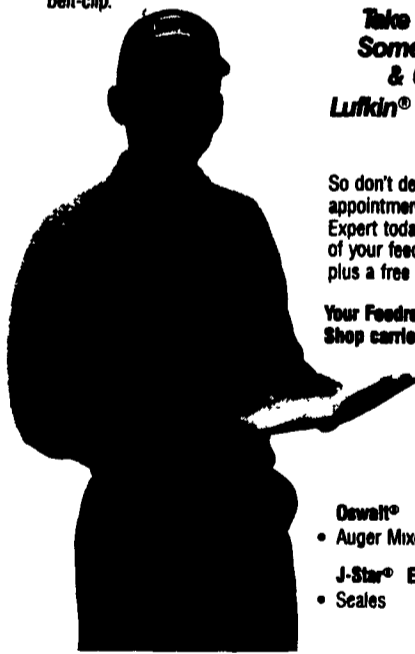


Take Advantage of Some Free Advice, & Get a FREE Lufkin® 25' Power Tape

So don't delay — set up an appointment with your Feedroom Expert today and get more out of your feedroom setup plus a free Lufkin Power Tape!

Your Feedroom Expert's One-Stop Shop carries a complete line of:

- Jamesway®
  - Feeders
  - Conveyors
  - Silo Unloaders
  - Electric Forage Carts
- Oswalt®
  - Auger Mixers
  - Drum Mixers
- J-Star® Electronics
  - Scales
  - EZ Series Indicators



# YOU'LL NEVER GET OFF THE "HOOK"!



If you're after dependable replacement chain that won't cost a lot and you can trust to last a long time, look no further. Jamesway® totally forged Hook-Link™ chain is reinforced with extra steel at every wear point and thoroughly hardened. The 1/4" thick

steel paddles feature reinforced wear shoes, a broad top face and wider weld for added strength. It really is a better chain ... at a better price. So stop in soon before your old chain finally gives up at just the wrong time — or did it already?



Better chain ... At a better price.

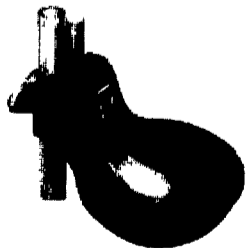
KEN CLUGSTON  
(717) 665-6775

## CRAFT-BILT CONSTRUCTION INC.

FARM-HOME BUILDING  
1242 Breneman Road  
MANHEIM, PA 17545  
PH: (717) 665-4372

BUILDING & REMODELING FOR —  
DAIRY RESIDENTIAL  
SWINE POLE BUILDINGS  
BEEF STORAGE

## BLUE MAGNUM WATER BOWLS



Rugged water bowl is constructed of high quality cast iron with an attractive durable, rust-resistant finish.

- 3/4" Brass connection elbows
- Conforms to non-siphoning regulations
- 60 PSI
- Frost resistance
- SS Nose Plate

## HUBER'S ANIMAL HEALTH SUPPLIES

810 Tulpehocken Rd., Myerstown, PA  
717-866-2246

Mon., Thurs. & Fri. 7:30 AM to 8 PM  
Tues. & Wed. 7:30 AM to 5 PM; Sat. 7:30 to Noon



## See One Of These Dealers For Details...

- PENNSYLVANIA**
- ERB & HENRY EQUIPMENT INC.  
New Berlinville, PA 19545  
215-367-2169
  - HARRY TROOP  
Cochranville, PA 19335  
215-593-8731
  - PRINGLES FEED STORE, INC.  
Greenville, PA 16125  
412-588-7950
  - LAPP'S BARN EQUIPMENT SALES & SERVICE  
Gap, PA 17527  
717-442-8134
  - STAR SILOS  
Myerstown, PA 17067  
717-866-5708
  - ROVENDALE AG & BARN EQUIPMENT  
Watsonstown, PA 17777  
717-538-8564  
OR 717-742-4226
  - DONALD R. NISSLEY  
Willow Street, PA 17584  
717-786-7654
  - JAMES L. HOSTETTER  
McVeytown, PA 17051  
717-899-6386
  - GNEG Y SURGE SERVICE  
Washington, PA 15301  
412-222-0444
  - SOLLENBERGER SILOS CORP.  
Chambersburg, PA 17201  
717-264-9588
  - SOMERSET BARN EQUIPMENT  
Somerset, PA 15501  
814-445-5555
  - HOOVER EQUIPMENT  
Tyrona, PA 16686  
814-684-1777
- MARYLAND**
- GLADHILL TRACTOR MART  
Frederick, MD 21701  
301-663-6060
  - MD & VA MILK PRODUCERS ASSOC.  
Frederick, MD 21701  
301-663-6552
  - GEORGE COLEMAN  
Elmer, NJ 08318  
609-358-8528
- NEW JERSEY**
- VIRGINIA**
- VALLEY IMPLEMENT SALES  
Harrisonburg, VA 22801  
703-434-9961