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Technical Topics

Pork Quality Issues

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Declining lean quality of pork is a major concern of the pork industry. Lean value programs have driven selection toward the production of lean, heavy muscled hogs while quality is often ignored. As a result, the percentage of pork carcasses with quality defects has been estimated as high as 30%. The most important pork quality defect is pale, soft, and exudative (PSE) lean. Other quality defects are red, soft, and exudative (RSE) lean, and dark, firm, and dry (DFD) lean.

Pale, Soft, and Exudative. This quality defect condition is characterized by a lean that has a very pale color, soft texture, and low water-holding capacity. These traits are caused by a very rapid pH decline immediately postmortem, a lower than normal ultimate pH of the muscle (5.1-5.2) compared to 5.6 for normal, or a combination of these factors. These abnormal pH levels are caused by genetics and/or stress. There are two genetic conditions that cause high rates of PSE lean, the halothane or porcine stress syndrome gene, and the Rendement Napole (RN) gene. However, even pigs carrying these genetic conditions must be stressed at or near the time of slaughter for quality problems to be manifested.

Red, Soft, and Exudative. Normal color and low water-holding capacity are the characteristics of RSE lean. The RSE condition is likely an incomplete formation of PSE lean. This lean has a pH that is 0.1 unit lower than normal lean, and a drip loss percentage comparable to PSE.

Dark, Firm, and Dry. This condition could be thought of as the opposite of PSE. Lean that is DFD has a darker than normal color, and a high water-holding capacity. This is the result of a high pH (6.0 - 6.1). This high pH is due to incomplete breakdown of glycogen, which provides energy for living muscle, or by depleting glycogen in the muscle during transportation and handling before slaughter.

These quality defects each adversely affect the processing characteristics and eating quality of pork in some way. Pork that is PSE has extremely poor processing characteristics due to its low water-holding capacity. Even the addition of phosphate does not improve the ability of PSE lean to hold water sufficiently. In addition, PSE lean has lower palatability traits, as consumers find it is drier and tougher than normal pork. The RSE lean is similar in that it will not hold water in processing as well as normal pork, reducing its processing value. Dark, firm, and dry lean is considered by consumers to be “too dark” and therefore less desirable. DFD lean also has a shorter shelf life due to its higher pH, which allows for easier microbial growth.