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Effects of ambient temperature and transportation distances on the resulting pork quality

Abstract: Factors beyond the farm gate can affect the quality pork product, among them temperature and amount of time for transport. This study examines how these factors affect producers selling in the niche pork market.

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MARKETING

Q Do handling protocol and hauling temperature impact the meat's final pH levels, and therefore impact meat color and quality?

A The levels of pH and pork meat color have long been observed to be affected by stress; including heat related stress. However, it has proven difficult to isolate specific producer related methods which could be shown to have measureable improvement on carcass pH. Variables include handling facilities, trailer condition and size, weather conditions including humidity; hauling distance, rations, access to water and specific genetics of the hogs. The study was not specifically looking at genetics as it was hoped that a specific management practice or set of practices would emerge to benefit producers of high quality pork. Prudent handling to avoid stress remains a commonsense recommendation consistent with Pork Quality Assurance standards. But, the results of this study did not find a statistically significant cause and effect. It now appears more likely genetics will play a major role in identifying a discrete solution to variable cutting characteristics such as pH and pork color.

Background

Niche pork marketers emphasize the quality and consistency of their products. Specific factors (temperature and time on the truck) have been identified in other studies as potential causes of product variability and lower quality. Also, Berkshire hogs frequently are chosen for niche production, and little research has been conducted on this breed.

In order to identify opportunities to more effectively manage product variability, this project was structured to test and control for the ways temperature and travel times can affect product quality. The investigators attempted to evaluate the combined effects on pork quality of the ambient weather and transportation distance. Niche-marketed hogs from Eden Natural producers were used in the study.

Approach and methods

The study evaluated 14,857 Berkshire hogs raised by 26 producers, most in Iowa but also from farms in Illinois, Wisconsin, and Kansas. Pine Ridge Farms (PRF), a harvest facility in Des Moines, assisted with the study. The average live weight of the hogs at the harvest facility was 291 pounds.

Among the measurements:

- Distance from the Des Moines facility to each producer's farmstead:

- Weather conditions each time the pigs were sorted, loaded and hauled:
- Weights of hogs checked at PRF and after slaughter; and
- Inspection of carcasses and evaluation of pH, back fat, and muscle and fat color.

Data collection periods were chosen to include both very hot and very cold periods with moderate weather included as a base for comparison. A spreadsheet was designed for collecting data related to these two variables. Additional data was monitored for any other exogenous effects that might skew portions of the core data or identify additional specific management factors for future study.

Results and discussion

The average pH of the Berkshire market hog loin evaluated by this study was 6.38 and seasonal effects were observed. Lower pH readings occurred in the summer and higher pH ratings were found in the winter. The pH readings were not influenced by the miles traveled to market, transportation method used, or the length of time feed was withheld. The finishing facility, the load-out facilities or an additional stop at a buying station did not affect pH readings.

Loin defects are a matter of concern and 83 loins were rejected during the study for a variety of reasons. Some were too light in color, some were subject to cutting errors at the plant, and others had spinal defects that affected loin trimming. Each bone-in loin is worth $60 ($120 per pig) in the Eden Natural pricing system, and the loss of both loins can have an economic effect on all producers who marketed their hogs that week. All producers are paid equally for their hogs, based on live weight. The Eden Natural board voted to penalize each identifiable producer who delivered pigs with loin defects.

Conclusions

The ultimate pH of Berkshire loins appears to be relatively stable, despite the stresses of sorting and shipping procedures prior to slaughter. However, management practices to ensure the health of the animals will help generate the quality pork that niche marketers want to produce.

It is not easy to pinpoint specific ways to improve pork quality within the value chain. While ambient temperature is a factor in porcine stress, the way the producer responds to this and other stress factors is more critical. Gathering data that isolate individual factors is challenging, and within this study proved unsatisfactory to ISU scientists who examined the data sets. It appears that the outcomes of stress are more of a “syndrome” than single elements of easily traceable cause-and-effect mechanisms.

Producers need to plan for the effects of weather extremes in their hog management set-up. As producers, such as those in Eden Natural, gain ownership of the downstream transactions, it is in their best interest to understand the incremental management responses that mitigate stress and reduce costs.

Impact of results

Niche pork operations must successfully balance production management skills, product value and consumer satisfaction. This study of the impact of ambient temperature and transport time on carcass quality is a beginning attempt to provide producers with objective measurements of factors that can affect product condition and profitability. Good handling facilities and procedures can help ease the impact of extremes in weather or transportation arrangements.

Education and outreach

Results, conclusions, and continued research based on this project have and will continue to be shared with participants in the Pork Niche Market Working Group of swine production professionals.

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