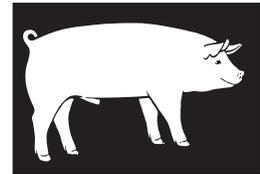




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Loading and Transportation Management of Market Hogs

Tom Guthrie, Extension Education, Pork AoE, Jackson, MI; Jerry May, MSU Extension - Pork, Gratiot County, MI

As the swine industry progresses forward, more demands are being placed upon producers in regard to animal care guidelines. Animal welfare is certainly a high priority for all pork producers as well as other segments of the swine industry. Improving handling techniques, loading procedures and transportation practices will decrease losses in revenue and exhibit a pro-active approach to animal welfare concerns.

In a review of her work and others, for the 2005 Banoff Pork Seminar, Madonna Benjamin estimated that pork industry losses during transportation and pre-harvest handling approached one percent of all hogs destined for processing (1 /1,000 during transportation, 1 /2,000 in pens at the plants and 3- 5 / 1,000 stressed or fatigued hogs) (Benjamin, 2005). The National Pork Board calculated that annually \$25,000,000 worth of hogs never make it to their slaughter destination (National Pork Board, 2003). Pork Board estimates also show that meat quality defects, such as pale soft and exudative (PSE), dry firm and dark (DFD) and bruising may cost the industry over \$200,000,000 per year. While poor handling during transportation is not the lone cause of these losses, improved handling may significantly reduce them.

The National Pork Board’s guidelines for the Trucker Quality Assurance (TQA) program were developed

with transporters in mind. However, many of the animal handling principles of the TQA program apply to on-farm handling as well as off farm transportation. Reducing pork industry losses during load out and transportation will require a team effort between producers, handlers and transporters.

TQA program principles applicable to on farm handling of market hogs include:

Animal well being

The well being of the animal is the primary concern. It is the position of the National Pork Board that all ill, significantly injured or animals unable to walk should not be loaded. All animals unlikely to recover should be humanly euthanized at the farm. Ontario Pork offers a useful chart to assist with the determination if a pig should be loaded or euthanized on the farm. This decision tree for loading hogs is available on line at: <http://www.ontariopork.on.ca/issues/animalcare/DecisionTree.pdf> (Ontario Pork, 2005)

Minimize or eliminate the use of electric prods

Over use of electric prods is one of the main factors in rough handling of hogs. Completely eliminating prods may not be feasible in all conditions but identifying when they may be appropriate should reduce their dependence during loading and unloading. As one producer describes, it is ok to lightly prod a hog when it has come to a stop, is headed in the correct direction, and restrained such that it will not just flip around. It is inappropriate to prod a hog repeatedly, use a prod to turn a hog around, in the pen while sorting or when the hog is moving at a reasonable pace in the correct direction. Learn to depend on boards, paddles and large rattles to encourage hogs to move.

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This newsletter is edited by:
Ronald Bates, MSU Extension Swine Specialist
(517-432-1387) batesr@msu.edu
& Kathy Lau, MSU Animal Science Office Assistant III

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As part of their core guidelines for handling hogs the American Meat Institute provides the following guidelines for electric prod use (Table 1).

Table 1. Ratings in relation to percentages of animals prodded

Rating	Frequency of prod use
Excellent	10% or less
Acceptable	25% or less
Not Acceptable	26% to 79%
Serious Problem	80% or more

Source: Grandin, 2005

While these guidelines were developed for employees in processing plants they are also standards that load out crews should aim to follow.

Design facilities for easy during loading and unloading.

Slopes on ramps should be no more than 20 degrees on stationary chutes (25 degrees on adjustable chutes) and cleats should be no more than eight inches apart for market hogs. Pigs are escape artists and will try to fit through small openings, therefore chutes should be well maintained with solid sides. Obstructions and protruding objects should be eliminated to reduce the incidence of bruising.

Move hogs in groups of three to five animals.

Remember, if the group stops moving you want to be able to lean forward and encourage the lead hog to move ahead. When large groups of hogs stop moving forward it is impossible to reach the lead hog and encouraging hogs in the rear only results in piling.

Learn the early warning signs of fatigued pigs.

Hogs exhibiting open mouth breathing and blotchy skin are showing signs of fatigue. A fatigued hog should be given the opportunity to rest and recover before proceeding to load it, even if that means leaving the animal until the next time pigs are loaded. If the hog is not allowed to rest and recover it may

fail to survive shipment to the plant. Fatigued hogs that are loaded and do survive transportation have a high incidence of PSE or DFD, contributing to the industry's transportation losses.

Driver responsibility

It is the responsibility of the driver to know the legal weight limits of his equipment and the acceptable load limits at the destination plant. Never force the driver to haul over weight loads or loads in excess of the limitations established by the plant.

Never load animals showing signs of distress. As pointed out earlier, hogs that are unlikely to recover should be euthanized on the farm.

During the recent Michigan Pork Industry issues identification session animal welfare was identified as a key issue with a high education priority. Based on this key identification the MSU Pork AoE Team will be emphasizing programs that reflect the industries welfare concerns. Initially the Pork Team will be investigating other research programs to identify those areas where the team may have the greatest impact. Currently, Team members are addressing transport losses through the TQA program. Team members are prepared to deliver the TQA program to transporters, as well as growers and load out crews. Contact Beth Franz, Tom Guthrie or Jerry May for additional information on the TQA program.

Sources:

Benjamin, M., 2005, Pig Trucking and Handling – Stress and Fatigue Pig, 2005 Proceedings Banff Pork Seminar.

Grandin, T., 2005, Recommended Animal Handling Guidelines and Audit Guide for Cattle, Pigs, and Sheep, American Meat Institute Foundation.

Ontario Pork, 2005, Online at: <http://www.ontariopork.on.ca/homepage.htm>

National Pork Board, 2003, Trucker Quality Assurance Program Manual, National Pork Board, Des Moines, IA.

The Case Against Evening-Up Litters Until Weaning

Duane E. Reese, Swine Specialist,
Univ. of Nebraska and
Barbara E. Straw,
Extension Swine Veterinarian, MSU

A literature review on the effect of fostering or moving individual piglets from one litter to another after they are 24 to 48 hours of age was conducted. Late fostering disrupts nursing, increases fighting, and impairs the growth rate of the adopted and resident piglets. Pig body weight has been reduced 13 to 24% in extensively fostered litters vs. those where no piglets were fostered after 48 hours of age. For the greater good of all pigs in the farrowing house, producers are encouraged to resist the urge to even-up litters or foster individual piglets after they are 24 hours old. Piglets that fall behind or grow slower than littermates after the initial fostering is done should be transferred to nurse sows where an entirely new litter(s) of older pigs is made. Milk replacers can also play a role in providing fall-outs more milk.

Introduction

Fostering or moving piglets from one litter to another is commonly practiced in swine operations to equalize litter size for the purpose of reducing preweaning mortality. Many farrowing managers and employees know all fostering should be completed before the piglets are 24 to 48 hours old for best results. However, in some operations moving individual piglets between litters or “evening-up” continues until

weaning. Some farrowing house personnel hate to see one litter with 10 pigs and the one next to it with 7. Also, some believe that a piglet in one litter that is falling behind littermates would be better off living in another litter of more similar-sized piglets, especially if there are fewer piglets in the recipient litter. Basically the goal is to have all litters in the farrowing area uniform or look like “peas in a pod”. This paper will review the literature on fostering to clarify the issue for people who continue to even-up litters until weaning. Also, options for accommodating fall-outs or piglets that grow slower than littermates before weaning will be presented.

Research summary

Michigan State University researchers conducted a study with 80 litters on a farm where extensive transfer of pigs between litters was being done on a daily basis until weaning. In forty litters the usual practice of continuous fostering until weaning was continued. In another 40 litters fostering was limited to the first two days of life.

The effect of extensive fostering on pig body weight and standard deviation of body weight at weaning and preweaning mortality is presented in Table 1. As expected extensive fostering resulted in a lower average within-litter standard deviation of pig body weight at weaning (i.e., pigs were more uniform in size within litter); however, it also reduced pig weaning weight by 2.2 lb or 20%. Mortality was not significantly different between treatment groups, although it was numerically higher on the continuous fostering treatment. These researches demonstrated that continuous fostering results in more uniform litters at weaning, but at the expense of growth rate and possibility survival.

Table 1. Effect of limited vs. continuous fostering on pig performance during lactation^a

Item	Limited fostering ^b	Continuous fostering
Average within-litter standard deviation of body weight at wean in lb ^c	2.0	0.7
Weaning weight, lb ^c	11.6	9.4
Mortality, %	8.0	8.8

^aStraw et al., 1998.

^bFirst two days of life only.

^cP<0.008.

(Continued on page 4)

The effect of fostering on pig body weight during the course of the trial is shown in Figure 1. There was no significant difference in body weight between piglet types at birth or just before fostering. However, at every time period after fostering a significant difference in body weight between fostered (adopted + resident) and control litters was observed. Within the fostered litters the body weight of adopted piglets

was significantly reduced compared to that of the resident piglets at each period. In conclusion, fostering had a marked effect on the growth rate of adopted piglets such that they gained only 76% of the weight of those in stable litters. While supporting the results of the Michigan State study, this research further demonstrated that adopted piglets may continue to be smaller after weaning.

Figure 1.

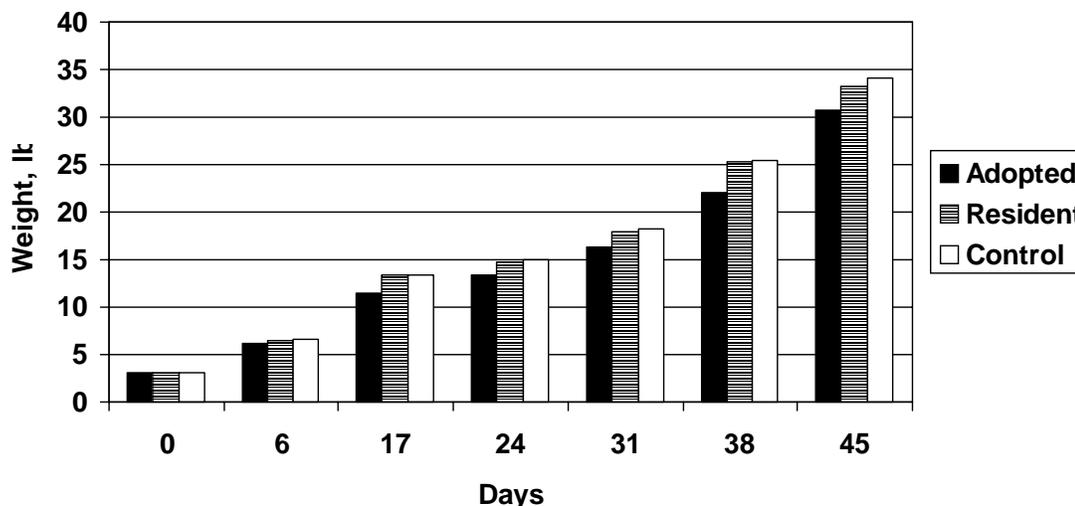


Figure 1. Effect of fostering on day 6 ± 1 of lactation on piglet body weight before and after weaning (day 18 ± 1). ^aBody weight between fostered (adopted + resident) and control litters differed (P < 0.05); ^bBody weight between adopted and resident piglets differed (P < 0.05). Adapted from Giroux et al., 2000.

In another Canadian study the behavior and growth of 13 control and 14 fostered litters was compared. Once every 3 days (from day 1 to 16 of lactation) all piglets were weighed and three piglets were switched between two fostered litters. Thus, there were three types of piglets in the study; adopted (piglets that were exchanged), resident (piglets that were not exchanged but were littermates to the adopted piglets), and control (no fostering). Behavior was observed for 2 hours after weighing and (or) fostering and during one nursing period 24 hours later.

Fights were significantly more frequent in the fostered vs. control litters during and between nursings at all fostering periods except on day 1. Fighting was significantly more common between resident and fostered piglets except on day 1. While nursing, piglets in fostered litters fought significantly more

than those in control litters 24 hours after fostering except on day 1 and 16. Failed nursings and snaps by the sow toward piglets were significantly more frequent in fostered vs. control litters. Moreover, sows rearing fostered litters spent 15 to 30% less time lying on their sides at day 4, 7, 13 and 16. Adopted piglets weighed 13% less than controls at weaning; resident piglets were significantly heavier than adopted piglets, but smaller than controls.

This study provided insight into why continuous or late fostering reduces piglet weight gain. The presence of alien piglets in the litter disrupts nursing and therefore milk intake, not only as a result of fighting between piglets, but the sow is less accommodating to the nutritional and comfort needs of her litter. The study also confirmed that fostering is appropriate through the first day of life.

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Better management options

It's common for one or more piglets in a few litters to fall behind or grow slower than littermates during lactation. These piglets are commonly called fall-outs, fall-backs, or runts. Many fall-outs will flourish once they have the opportunity to receive more milk. Producers can use other sows (i.e., nurse sows) and/or milk replacers to provide fall-outs more milk.

Nurse sows

Nurse sows can be created and utilized two ways. The preferred method is to identify a well-milking sow(s) to raise fall-outs that are collected from other sows. The procedure involves finding a newly farrowed gilt, i.e., one that finished farrowing 6 to 12 hours ago. It is better to use a gilt, because she has smaller teats that are easier for piglets to grasp. Being newly farrowed is an advantage, because she doesn't know that the pigs she is about to receive aren't her pigs. Identify 8 to 10 fall-out pigs at 5 to 7 days of age and move them to the freed-up gilt. This moves them to a younger age group, but they are likely just starving and not sick. To be sure fall-outs are just starving and not sick, check their littermates to see if they are healthy. Also, observe if fall-outs are being crowded out due to the vigorous nursing activity of their littermates. You do not want to move sick piglets, because that spreads disease around. The difficulty with this method is having enough spare sow capacity to take care of the gilt's original litter. It is important to wait 6 to 12 hours after the gilt has finished farrowing before her piglets are fostered to other sows to ensure all her piglets receive a good dose of colostrum. Remember to foster the gilt's piglets to other sows that are nursing similar-aged piglets.

The other procedure, commonly called "bump weaning", involves moving fall-outs to a later lactation, good milking sow until they reach the normal weaning age for the farm. For example, assume there are three good-milking sows: sow A has lactated for 3 days, sow B has lactated for 8 days and sow C has lactated for 14 days (5 to 7 days before she will be weaned). Sow C's piglets are weaned and Sow B's piglets are moved to Sow C. Sow A's piglets are moved to Sow B. Sow A is given 2 to 3 day-old fall-outs collected from several litters to raise. The main disadvantage with this procedure is that too often one or two adopted piglets per litter gets injured by vicious sows. Ultimately,

however, the detriment to the bumped pigs is probably outweighed by the benefit to the fall-outs (which were likely to die without some food). For these reasons, bump weaning should be used as a last resort instead of a routine procedure. Bump weaning ensures that no piglets will be weaned later than the age limit set for the farm and that entire rooms of sows and litters can be weaned at the same time. Note that pigs are always moved forward and not backwards in the system. Also, the key to making bump weaning work is to identify candidate pigs early in lactation (2 to 3 days of age) rather than later.

Milk replacers

Milk replacers offer another way for fall-outs to obtain more milk. Milk can be provided free choice in plastic milk feeders or baby bottles. Or you can place the fall-out in a plastic bin containing a feeder while it drinks. This method ensures the fall-out is not competing for milk and you can be sure it drinks. Initially the fall-out must be trained to drink from a bottle, but after a few feedings it catches on and takes advantage of the additional milk without competition. Fall-outs can also consume milk from a pan or bowl; some will need to be trained, however. To train fall-outs to drink from a bowl place their snout in the milk for a few seconds every hour until they appear to have learned to drink on their own. Use bowls or a pan that attach to or are held down to the floor so they cannot be knocked over.

Some producers place a deck or pen containing a milk feeder in each farrowing room (1 deck per 12 crates, for example) to manage fall-outs. The best milking sow that has lactated for about 10 days is identified and her pigs are weaned and placed in the deck and fed milk replacer. Eight to 10 fall-outs are collected from various litters in the room and placed on the newly weaned sow.

Conclusion

For the greater good of all pigs in the farrowing house, resist the urge to even-up litters or foster individual piglets after they are 24 hours old. Piglets that fall behind or grow slower than littermates after the initial fostering is done should be transferred to nurse sows where an entirely new litter(s) of older pigs is made. Milk replacers can also play a role in providing fall-outs more milk.

Green and White Show Meat Quality Evaluation, 2005-2006

Ronald O. Bates, Jerry May, Thomas Guthrie, Elizabeth Franz, Dale Rozeboom,
Pork AoE Team^a

Introduction

There has been interest in determining the meat quality of pigs that are exhibited in shows. Pigs in shows are transported from the farm to a show facility, shown and then transported to market. This sequence of events does disrupt a pig's normal routine and can become stressful for the animal. Animals under stress often modify their behavior and may not eat or drink to the extent they may have when housed in their normal surroundings. These behavior modifications can elicit biochemical processes within the animal, which may cause poorer meat quality once the animal is harvested. In addition the trend within pigs shows has been selection for very lean and heavily muscled animals, which normally tend to have poorer meat quality. This trend for leaner, heavier muscled pigs along with how pigs at shows are handled before harvest may cause poorer meat quality in show pigs.

Green and White Show Evaluation

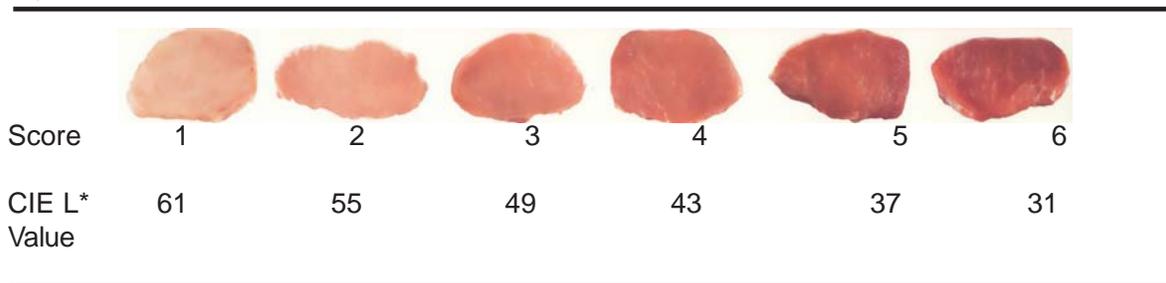
In an attempt to determine pork quality of pigs exhibited at pig shows, a representative sample of randomly chosen pigs were evaluated from the 2005 and 2006 Green and White Show. From the 2005 show, 92 pigs from the 248 head shown were

evaluated for meat quality. From the 2006 show 80 of the 237 shown were measured. Pigs from the 2005 show were moved to Manchester, MI and held at the United Producers Inc. sales facility after the show and provided free access to water and feed for two days. The pigs were then transported to Routh Packing, Sandusky OH and harvested. Pigs from the 2006 show were transported directly to Routh Packing, rested for one day with free access to water and harvested. These carcasses were chilled for 18 hours and evaluated for meat quality as carcasses were processed into wholesale cuts.

Meat Quality Evaluation

The characteristics evaluated were CIE L*, pH, color score and marbling score. CIE L* is measured with equipment that determines the reflectance of light on a pork chop. Higher L* values indicate that there is more light reflectance and indicates the meat is pale in color. Lower L* values indicate there is less light reflectance and suggests that the meat is dark in color. Related to CIE L* is subjective color score. The subjective color score is a 1 to 6 score in which a "1" represents very pale meat and a "6" indicates very dark meat. In Figure 1 is a representation of the color scoring system and the possible associated L* values with particular color scores. For the U.S. market it is believed that most consumers prefer pork to have a color score of 3.

Figure 1. Standard Color Scores^a



^aThe Pork AoE Team would like to thank United Producers Inc. and Routh Packing for their cooperation and assistance with this project.

(Continued on page 7)

Marbling score is also subjective in nature. It follows a similar guide as that of color score. The marbling scoring system used for these evaluations is found in Figure 2. Each score indicates what the possible intramuscular fat may be in percentage units. For instance a marbling score of “2” indicates that a chop may have 2% intramuscular fat. A marbling score of “3” would indicate that intramuscular fat may be 3%. It is believed that within the U.S. market, the desired level for marbling score is 2 to 3.

To measure pH, a pH meter was used in which a probe was inserted into the loin muscle and pH determined. A pH measurement is a measure of meat acidity with ranges typically observed from 5.0 to 6.8. A pH value of 7.0 is neutral. Lower values suggest meat has a higher acid content from the breakdown of glycogen to lactic acid after harvest occurs. This causes meat to lose water and be less juicy with poor eating characteristics. Higher pH values indicate that meat is less acidic and more able to hold water. Meat with higher pH is more apt to be juicy after cooking, and probably more tender as well.

Figure 2. Standard Marbling Scores^a



^aAdapted from the NPB Pork Quality Standards.

PSE The term PSE stands for *Pale, Soft and Exudative*. Pork that loses water readily (exudative), is gray in color and very soft, is often considered PSE. The PSE condition is one that is both undesirable from both a fresh and processed pork standpoint. Fresh pork that is PSE has an undesirable color in the meat case. In addition it will exude or leak water into the package. Consumers typically avoid fresh pork with these characteristics. Pork that is PSE is also discounted by pork processors who market smoked and cured pork products. Pork that is PSE does not take up curing solutions easily, is difficult to cure and does not maintain shape very well. Cured PSE pork products will not have a desirable color and flavor can often be variable due to its inability to “hold” or maintain curing solutions. These products can also be watery.

DFD This term DFD stands for *Dark, Firm and Dry*. Pork that is very dark in color (dark red) with high pH (greater than 6.0) is often considered to be DFD. Pork that is DFD has very high water holding capacity and is very firm to the touch and often appears to have a dry surface, even though the surface is no drier than

normal pork. Pork that is DFD has both good and bad fresh product characteristics. Fresh pork that is DFD can be discriminated by consumers due to its dark color. However, after cooking it is typically very juicy and tender. Unfortunately due to its high pH, it may have less shelf life as a fresh product, since microbial growth will tend to be higher on products with high pH versus those with lower pH. Yet, dark fresh pork is very desirable in many Asian countries and is often exported as fresh pork. Pork that is DFD is good for pork processing. It does absorb and hold curing solutions very well and the color is acceptable after smoking. However, shelf life may be shorter due to better conditions for microbial growth.

Green and White Meat Quality Results

In Table 1 are the averages for the meat quality characteristics measured in 2005 and 2006. For both years the L* value, which is a mechanical measure, was similar. This suggests that on average the pork loins from 2005 and 2006 were of similar color and acceptance for color. However, the subjective color score was significantly lower in 2006 when compared to

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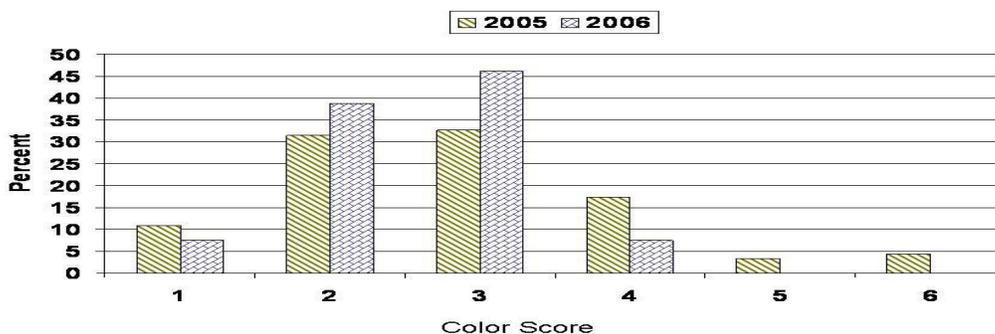
2005. Figure 3 provides greater detail about color score from both years. In 2005 there were more loins which graded as a color score “1” than in 2006. However, there also were a greater percentage of loins with a color score of “4” and higher in 2005 than in 2006. This indicates that there was greater variability in 2005 than in 2006. From the loins evaluated in 2006 there was a greater percentage that graded either a “1” or “2”

compared to 2005. This indicates that on average pork loins were similar for both 2005 and 2006; however, further examination shows that a greater percentage of the pork loins were in the lowest two color categories in 2006 than in 2005. This indicates that the variability in meat quality in show pigs can be quite large for color and a relevant portion can have marginal acceptability in respect to color.

Table 1. Means for Meat Quality Performance of Pigs Exhibited at the Green & White Show.

Item	2005	2006
CIE L*	51.7	51.7
pH	5.7	5.4
Color Score	2.8	2.6
Marbling Score	1.9	1.7

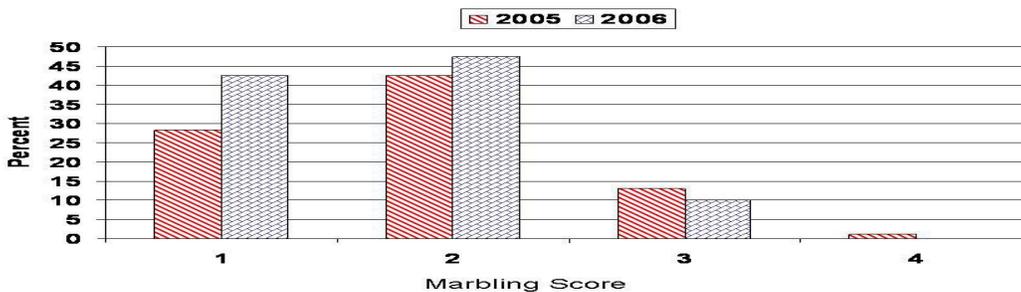
Figure 3. Pork Loin Color Score



The average marbling score for pork loins was lower in 2006 than in 2005. On average, pork loins evaluated in 2006 were 0.2 scores lower than in 2005. The distribution of marbling scores can be found in Figure 4. A greater percentage of pork loins

had a value of “1” in 2006 when compared to 2005. In fact there was a 50% increase in the percentage of loins with a marbling score of “1” in 2006 compared to 2005. This is undesirable within today’s fresh pork market, suggesting that loins such as these could be discounted within the market place.

Figure 4. Pork Loin Marbling Score

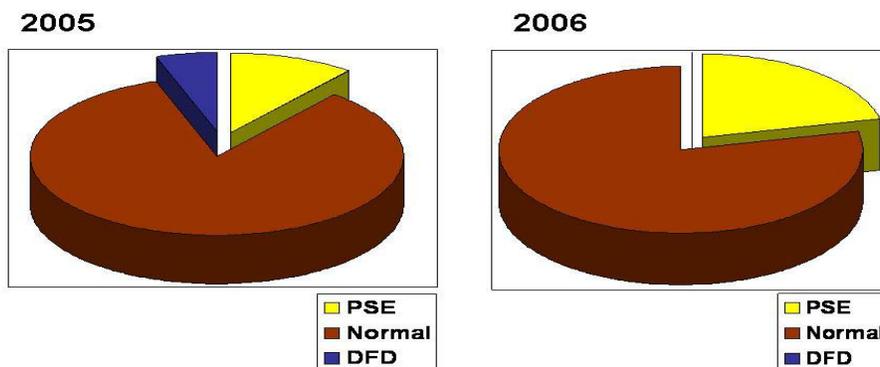


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Using the pH values and the color information, loins were then classified into the categories of “PSE”, “NORMAL”, or “DFD” (Figure 5). In 2005, 83.7% were classified as normal, 10.9% were PSE and 5.4% were DFD. In 2006 there were no pork loins classified as DFD while 78.7% were classified as normal and 21.3% were classified as PSE. Reports from surveys conducted in U.S. packing plants would indicate that

incidence of PSE pork can range from 1 to 10%. The incidence of PSE in pigs harvested from the 2005 show was marginally larger than what may be considered acceptable while the incidence of PSE was twice as great in 2006 compared to 2005. Thus the amount of PSE observed in the 2006 pigs would be considered unacceptable by industry standards.

Figure 5. Overall Pork Loin Assessment



Summary A majority of the loins from pigs evaluated from the 2005 and 2006 Green and White Show were in the acceptable range for U.S. standards for color, marbling and overall acceptability. However, the high incidence of PSE and low marbling is a concern when marketing pork for either fresh pork markets or for further processing, particularly from pigs evaluated from the 2006 Green and White show. An important point of consideration for this meat quality evaluation was that the pigs evaluated from the 2005 show were rested for two days, with access to water and feed before harvest. This would allow pigs to recover from the stress of exhibition and replenish water and nutrients. This management strategy has been shown to improve meat quality characteristics, and is a contributor to the differences in meat quality observed between the pigs evaluated in 2005 and 2006.

and overall acceptability. However, there can be large extremes in meat quality characteristics. This variability in meat quality among show pigs can increase the difficulty in marketing wholesale cuts for either fresh pork or further processing. Harvest groups comprised of show pigs with a high incidence of PSE and poor marbling, as what was observed in these evaluations, can cause pigs from shows to be discounted by pork processors. Show management and exhibitors must work together to develop means for pigs to be rested and rehydrated before harvest in an effort to improve pork quality from pigs exhibited in youth shows.

This demonstration does illustrate that pigs from shows can have meat quality within typical ranges for color

Valuing the Nitrogen in Manure

Natalie Rector, Extension Manure Management Field Specialist,
Cahlhoun Co., Marshall
Dale Rozeboom, State Swine Specialist, Michigan State University

Swine producers, who inject manure, have done so in the past primarily to control odors. But today, an even more valuable reason to inject manure may be to maximize the value of manure nitrogen with timely application to the coming crop. Injection or incorporation within one day of surface application will retain 90% of the ammonium N in manure. Generally, hog manure has a high percentage of total N in the ammonium form. The best use of nitrogen is to apply it as close as possible to the time of the crop needing it, or during the growing season. Generally, producers will see a difference between fall and spring applied manure, with the spring applications providing more plant-available nitrogen.

Some producers believe that spring applied manure does not become available in time to impact crop growth. But since the majority of swine manure is already in the ammonium form, it is readily available to plants. Even some of the organic form of N will be released in time for early season crop response.

The nitrogen content of hog manure varies greatly from farm to farm, depending partially on diet formulation and type of manure storage

facility. It is important that producers take manure samples every year to monitor the manure nitrogen and other nutrients. Samples taken after agitating and during loading and hauling will be the most representative of the manure going to the field. Some hog producers only haul manure twice a year, so there are limited opportunities to take representative samples. Other manure management variables also impact the amount of plant-available nitrogen per acre, including agitation, application method, application rate, soil type, and weather.

The significant amount of plant available nitrogen in hog manure presents both a challenge and a blessing. The challenge is spreading manure at low enough rates with current equipment and the blessing is the savings in purchased nitrogen fertilizer.

Researchers have shown that a well-timed sidedress application of fertilizer is more effective for crop production than pre-season or at planting. The Presidedress Soil Nitrate Test (PSNT) is a soil nitrate test done to help make an estimate of the amount of nitrate in the soil. This test works well for measuring the plant available nitrate released from manure applications. A PSNT can be worth about \$60 per acre this season, based on current nitrogen fertilizer prices (Table 1). There

Table 1. Value of manure applied to corn.

Nutrient	Applied	Needed	Lbs valued	\$/lb	Value/Ac
N	160	160	160	0.40	\$64.00
P ₂ O ₅	80	51 (removal value)	51	0.29	\$14.79
K ₂ O	88	38 (removal value)	38	0.19	\$7.22
Total					\$86.01

Assumptions: manure is injected at 4000 gallons per acre; each 1000 gallons of manure contains 40 pounds of available N, 20 pounds of phosphorous and 22 pounds of potassium; corn yield potential is 140 bushels per acre and require 160 pounds of nitrogen.

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are two things that the PSNT will insure for producers. It will insure the yield potential is achieved when the PSNT indicates there is not enough manure nitrogen available and there is still time to sidedress fertilizer. Second, it will indicate if there has been an over application of manure nitrogen. Over application of manure nitrogen is risky to the environment and also a missed opportunity for the producer. The excess nitrogen would have been more economical if applied on another field. Applying manure based on crop needs is cost effective and should be the justification for manure spreading plans. Remember that manure also has phosphorus which should be managed by state standards and valued as a replacement for commercial fertilizer. Consider these pointers for getting the most value out of manure and a PSNT:

- **Timing:** Take the soil test about 5 to 14 days ahead of sidedress. Samples taken too early will not be as accurate since the soil is releasing nitrate continually in the spring.
- **Prioritize fields to test:** Test fields that will be corn or other high nitrogen demand crops. Test fields that have been manured this year or last year and fields which were in alfalfa, clover or beans the prior year. These rotations will provide the greatest chance of nitrate credits.
- **Cautions:** The PSNT will not be accurate in measuring soil nitrate if fertilizer nitrogen has already been applied (i.e. plowed down, broadcast at greater than 40 pounds per acre at planting, or applied with pre-emerge herbicides). Nitrogen placed in a starter band can be avoided during sampling whereas broadcast applications cannot.
- **Taking the sample:** Soil samples should represent no more than 20 acres. The sampled area should be consistent for past crop, soil types and manure applications. Probe the soil 12" deep if possible, taking

15 to 20 cores per field. Indicate the sampling depth on the soil lab forms.

- **Handling samples:** Air dry samples as soon as they are taken. Do **not** put damp soil samples in plastic bags. If the soil samples cannot be dried right away, keep them cool, less than 50° F.
- **Delivering samples to the lab:** Hand deliver samples to a soil testing lab to speed results or express-mail air dried samples.
- **Using the MSU Soil and Plant Nutrient Lab:** Cost for nitrate soil samples is \$9/sample, plus one dollar if you have all the results faxed to you rather than mailed, which is encouraged. The fee must accompany the samples. The lab is open 8-5, Monday through Friday. For sample bags and forms, contact your local MSU Extension office. Other commercial labs are also available.

Visit www.rootzone.msu.edu for more information on manure nutrient value.

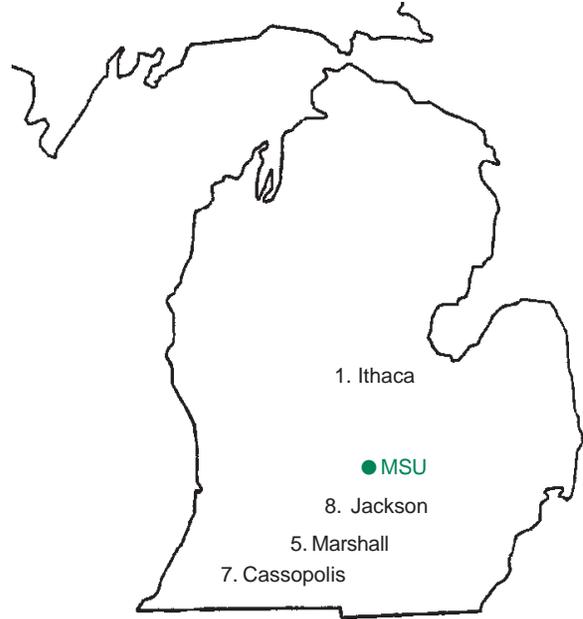


Sharon Williams, MSU Extension technician, takes nitrate soil samples in a plot field to test for the plant available nitrate released from a previous manure application

1. **Jerry May, North Central Swine Educator**
Farm Records, Productions Systems
(989) 875-5233
2. **Ron Bates, State Swine Specialist**
Michigan State University
(517) 432-1387
3. **Dale Rozeboom, Swine Extension Specialist**
Michigan State University
(517) 355-8398
4. **Barbara Straw, Extension Swine Veterinarian**
Michigan State University
(517) 432-5199
5. **Roger Betz, Southwest District Farm Mgt.**
Finance, Cash Flow, Business Analysis
(269) 781-0784
6. **Tom Guthrie, Southwest Swine Educator**
Nutrition and Management
(517) 788-4292
7. **Beth Franz, Southwest Swine Educator**
Value Added Production; Youth Programs
Michigan State University
(269) 445-4438

All comments and suggestions should be directed to:

MICHIGAN STATE
UNIVERSITY
EXTENSION



PORK TEAM WELCOMES NEW MSU ASSISTANT SWINE FARM MANAGER



Dr. Karen Plaut, MSU Department of Animal Science Chairperson and Alan Snedegar, MSU Swine Farm Manager announced that Kevin Turner of Prescott MI, has accepted the position of Assistant Manager at the MSU Swine Farm and began his new position on April 10. Kevin graduated from MSU with a B.S. in Agricultural Business Management in December, 2004. After graduation, Kevin has been employed with Iowa Select Farms, Clarion, IA. As a Breeding Department Manager at Iowa Select, Kevin supervised 5-7 technicians as they conducted estrous detection, artificial insemination and pregnancy detection. As an Assistant Manager with MSU, Kevin will work with Al Snedegar in the implementation of the teaching, research and outreach/extension mission of the farm and oversee the day-to-day management of the farm. The Pork Team welcomes Kevin back to MSU and looks forward to his contribution to the MSU Swine Program.