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# West Michigan PRRS Area Regional Control Project Update

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## Introduction

Porcine reproductive and respiratory syndrome (PRRS) is an economically significant disease in swine herds that has been estimated to cost the US pork industry approximately $560 million dollars a year. Farms that have been exposed to the virus have documented costs of up to $260 per sow, as result of virus presence in their herds. The estimated profit difference for farms selling pigs without the virus is $12 to $15 dollars per pig. The combinations of these economic differences, producer desire to produce high health pigs and the need to improve productivity has prompted Michigan State University Extension to coordinate a PRRS Area Regional Control (ARC) project in West Michigan, focusing on stabilizing the area and eradicating the virus.

## History

In September 2008 local veterinarians and Michigan State University Extension staff introduced the concept of area regional control for the PRRS virus in West Michigan. With the help of local producers, allied industry, veterinarians and MSU Extension, this project has continued to make progress and is making strides in the area of regional control. The West Michigan ARC project was initially awarded a USDA/NPB grant to help identify and map farms in the Allegan/Ottawa county project area, document the prevalence of the disease in this area and help support veterinary assistance for developing herd health plans. Currently the project has been awarded a PRRS CAP II/USDA grant to continue the work towards regional control of the disease. The project has also garnered support from Boehringer Ingelheim, Hamilton Farm Bureau and the Michigan Pork Producers Association, along with strong collaboration with local producers.

## Project Milestones

As the project moved forward specific steps were accomplished by those involved with the project. A producer led steering committee of 10 producers was formed to help guide the project and make recommendations for all producers in the area. This committee meets 6 times a year to help give direction to the project and make decisions concerning the methods in which regional control can be accomplished. The continued surveillance and documentation of the PRRS status of farms in the area is also being conducted by producers and local veterinarians. Project coordinators, with the assistance of Boehringer Ingelheim are able to correlate this information with a GIS mapping system, which gives visual illustration of the disease prevalence and transmission of the virus and is beneficial to producers when deciding what disease control methods to use. Utilizing producer

### What's In This Issue...



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and veterinarian input, the steering committee has developed recommendations for the frequency of testing as producers' complete surveillance of the disease during their herd clean-up.

The steering committee has also been working to identify areas of education that will benefit the project. It has been determined that a major emphasis will be placed on biosecurity education components for producers and swine farm employees. Efforts to provide educational opportunities for producers have been made; including a recent PRRS biosecurity and transmission presentation by Dr. Scott Dee from the University Of Minnesota. Local producers also had the opportunity to complete a Production Animal Disease Risk Assessment Program (PADRAP) to gain a better understanding of the biosecurity risks present for their facilities. This information was summarized and an explanation of the regional PADRAP results was presented by Dr. Laura Batista from Boehringer Ingelheim. Individual assessments are available for each participant to review with their consulting veterinarian. Plans for a vendor training on biosecurity protocols are being made for summer 2011 by the project coordinators and efforts will be made to standardize protocols for venders servicing the area.

**Additional Resources**

As the West Michigan PRRS ARC project moves forward, other resources have become available to swine producers. The American Association of Swine Veterinarians (AASV) and the United States Department of Agriculture PRRS-Coordinated Agricultural Project recently released standardize terminology for the PRRS virus in an effort to enable communication between producers, veterinarians and industry members and to aid in the regional control efforts. A combination of diagnostic results and information from production records provide the support material to classify herds.  The absence of clinical signs in a herd can help characterize a status but must be combined with testing results to support a negative herd status.

For breeding herds there are four possible classifications. These classifications are summarized in the tables below; tables are taken from Holtkamp et al., (2011) recently published in the Journal of Swine Health and Production:

***Figure 1: Breeding-herd classification for porcine reproductive and respiratory syndrome virus (PRRSV) according to shedding and exposure status.***

| **Herd category** | **Shedding status** | **Exposure status** |
|---|---|---|
| Positive Unstable (I) | Positive | Positive |
| Positive Stable (II-A) | Uncertain | Positive |
| Positive Stable (II-B) (Undergoing Elimination) | Uncertain - undergoing elimination | Positive |
| Provisional Negative (II) | Negative | Positive |
| Negative (IV) | Negative | Negative |

The herd classifications for the PRRS virus are determined by taking into consideration both the exposure status of the herd and instance of shedding the virus.  The preferred testing method to determine shedding is by polymerase chain reaction (PCR) and exposure instance can be determined by antibody testing, enzyme-linked inmmunosorbent assay (ELISA).  The PRRS virus shedding status is classified as positive, negative or uncertain. A positive shedding status can be documented by diagnostic evidence and clinical signs in the herds.  A herd in which the shedding status has yet to be determined is also labeled as positive.  If a farm is considered to have a negative shedding status, the diagnostic information confirms the absence of viral shedding in the herd.  If a herd is currently involved in a clean-up program to eliminate the PRRS virus on their farm or if a negative shedding status has not been confirmed with appropriate sampling and testing instances, the herd is then classified as uncertain.

Farms that only have growing pigs follow a different classification table, which is seen below:

*Table 3: Criteria for and summary of supporting evidence required for growing-pig herd classification for PRRSV*

| **Herd category** | **Criteria** | **Supporting evidence required** |
|---|---|---|
| Positive | Any virus detected on the site, along with clinical signs consistent with PRRS. Herds that do not meet the criteria for Negative are Positive by default. | None required. Non-tested herds are Category I by default. Detection of virus in any tissue and presence of clinical signs would confirm status. |
| Negative | None positive by ELISA after ruling false-positives | Test serum from growing pigs by ELISA. No positive results, after ruling out false-positives, and no clinical signs consistent with PRRS observed in growing pigs |

PRRS(V) = porcine reproductive and respiratory syndrome (virus).

Herd can be defined as positive or negative. Positive herds have a positive shedding status and/or have been exposed to the virus. This also becomes the default classification if there is not enough diagnostic evidence to qualify the herd as negative. A negative growing pig herd has a negative shedding and exposure status.

**Future Direction**

As the West Michigan ARC PRRS project continues to gain momentum and becomes more focus on the goal of eliminating the PRRS virus in the Allegan and Ottawa county area critical steps that need to be taken have been identified by producers, allied industry, consulting veterinarians and MSU Extension. Producers have been requested to start forming herd health clean-up plan with their veterinarians that designate short and long term goals for their herds. Emphasis on increased biosecurity education and the development of regional protocols are areas in which the project will focus on. The project is also committed to gaining a further understanding of the trucking routes, methods and issues for the area, along with increasing the knowledge about aerial transmission of the virus. Finally, surveillance and monitoring of the disease will have increased importance as the project progresses and producers work to stabilize and eliminate the virus in their herds. If you have any questions about the project or would like more information about the ongoing work in Allegan and Ottawa counties, please contact Beth Ferry, Michigan State University Extension educator at franzeli@anr.msu.edu or 269-445-4438.

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# What is Reactive N and Why Should I Care?

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Nitrogen is an important component for all plant and animal growth, essential for the development of proteins and important in other living functions. In our environment, N exists in many forms. In its inert gaseous state, $N_2$, it is very stable and makes up over 70% of the earth's atmosphere but is unavailable for plant and animal growth.

The many other forms of N in the environment, including ammonia ($NH_3$),ammonium ($NH_4$), nitrite ($NO_2$) and nitrate ($NO_3$), nitric oxide (NO) and nitrous oxide ($N_2O$) are collectively referred to as reactive N or $N_r$. These forms of N are all interrelated and are constantly in flux in the environment. Learning to recognize and manage these changes has future implications for agriculture. (see chart 1)
Through the conversion of $N_2$ to $NH_3$ and $NH_4$ (ammonia and ammonium), N becomes available for life uses. This conversion of $N_2$ to its ammonia forms takes place under two natural processes: 1) $N_2$ is converted to $NH_4$ by bacteria living in the nodules of legume plants (clovers, alfalfa, beans, peas) and 2) a burst of energy from a bolt of lightning converts $N_2$ to $NH_4$. (Vitousek et al., 1997). In the early 20th century the advent of the Harber (or Harber-Bosch) process for converting $N_2$ to $NH_3$ was commercially adopted and the manufacture of commercial N fertilizers began. Each process requires significant inputs, either bacterial or energy, to complete the conversion.
The burning of fossil fuels releases fixed N in the fuel and to a smaller degree provides high temperatures necessary for the conversion of $N_2$ to $NH_3$. The release of N from biological pools such as clearing forested land also contributes to $N_r$ in our environment (Vitousek et al., 1997).

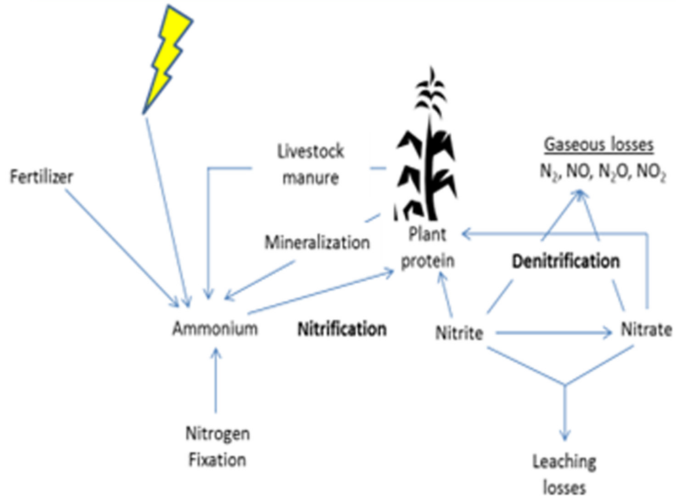
**The nitrogen cycle**
Prior to adopting the use of commercial N fertilizers, farmers depended on lightning storms, crop residue, animal manure and N fixation by legumes to produce the N needed for plant growth. A portion of the N fixated by legumes is removed in harvested crops for use by animals and humans. The remainder is left in the field either as organic N in crop residue or in the soil as nitrate and nitrite. Denitrifying bacteria that line in anaerobic conditions in soil, riparian areas and wetlands, convert a portion of the $NO_2$ and $NO_3$ back to their inert state ($N_2$) and to a lesser extent $N_2O$ (Vitousek et al., 1997; Killpack and Bucholtz, 1993).

Increased human activity, including burning fossil fuels, clearing land and manufacturing commercial N fertilizers, has made significant contributions to the $N_r$ in the environment. Prior to the increased release of reactive N associated with human activity the amount of $N_r$ in the environment was held in balance by the denitrification process. Human activity has had positive and negative impacts on the denitrification process but to what extent is not well understood (Vitousek et al., 1997). The net effect has been a significant increase in the reactive forms of N in our environment.

**Increased use of nitrogen fertilizer**
Chart 2 shows the growth in commercial fertilizer use in the United States from 1960 to 2008. Phosphorus as $P_2O_5$ and potash as $K_2O$ use has stayed constant since the early 1990's. These two components of soil fertility are chemically bound to soil particles (phosphorus more so than potassium) and, if not used by one year's crop, remain in the root zone and available for the following year's crop.

During that same time span N use has increased over 300%. Unlike $P_2O_5$ and $K_2O$, if N is supplied beyond crop needs for a single growing season the N not utilized by the crop may be bound by organic matter, leach from the root zone, be lost through surface water runoff or it may volatilize into the air prior to the next year's crop. Fertilizer use in the United States is indicative of other growing regions throughout the world. This annual in-

Chart 1: Nitrogen cycle




Adapted from "Utilization of Nitrogen by Plants", Purdue University

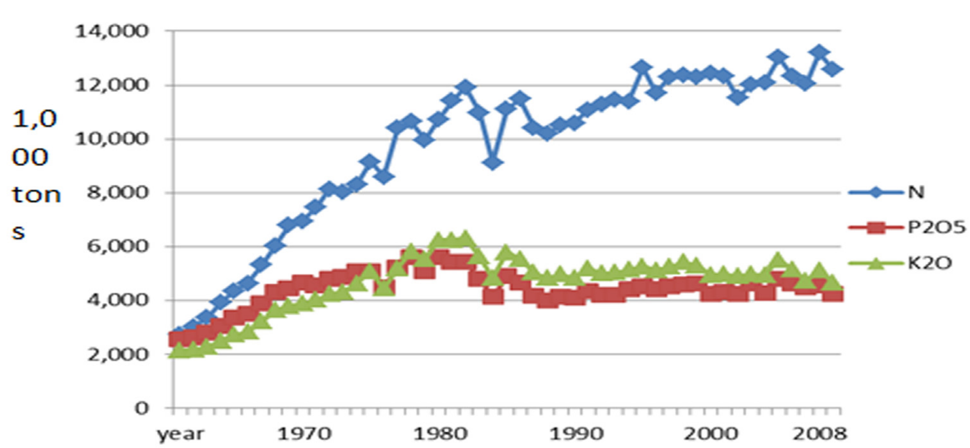
put of commercial fertilizer worldwide is a significant contributor to the reactive N in our environment.

**Why is the increasing amount of reactive N a concern?**

This increase release and conversion of N has positively impacted all of our daily lives. The nitrogen used in agriculture has made it possible for farmers to meet the world wide demands of a growing population's daily needs for food, fiber and shelter. Fossil fuels create energy for virtually all of our daily processes that we consider routine but are often as basic to others as warming their homes. Limiting $N_r$ in the environment becomes more challenging when the importance of these daily activities is considered. The increasing levels of reactive N are leading to environmental concerns.

Nitrate, $NO_3$, has long been a concern in ground water. High levels of nitrates in ground water have been directly linked to increased cases of blue baby syndrome, a health concern in infants under six months old and issues for the elderly. The United States Environmental Protection Agency (EPA) has an established safe drinking water standard of 10 mg $NO_3$-N per liter water (EPA, 2009). In 1998, EPA reported finding $NO_3$ levels exceeding

Chart 2: Annual United States use of N, $P_2O_5$ and




Source: USDA ERS

the 10 mg/L standard in 40% of the reporting hydrogeologic settings but only 1% of the tested drinking water sources exceeded the limit (EPA, 1998).

Excess $N_r$ ends up in streams, rivers and lakes through tile line flows and in organic matter and top soil erosion. It contributes to eutrophication and algae blooms in lakes and coastal areas that receive waters from nutrient enriched rivers (EPA, 2011[1]). Nitric oxide (NO), and nitrogen dioxide ($NO_2$), collectively referred to as $NO_x$, contribute to smog and haze and have been linked with asthma in children and adults (EPA, 2011[2]).
Nitrous oxide ($N_2O$), is a greenhouse gas that also contributes to acid rain (EPA, 2010).
Ammonia deposition has been associated with the undesirable changes in forest growth (Pitcairn et al, 1998).
The US EPA is studying the positive and negative impacts of $N_r$ on a national and regional basis. The agency has contributed to the development of a National Ecosystems Services Atlas. This atlas, due out in 2011, is intended to identify the ecosystem systems, and drivers, impacted by reactive N (EPA, $2011_1$).
What is agriculture's role?

Agriculture is considered a major source contributor of excess $N_r$ and therefore the industry will be looked to for solutions. When one considers the increasing cost of N inputs, contributing to the solution may actually be a win-win situation for the producer, agriculture and the environment.
Practices that may reduce $N_r$ associated with agricultural production include:
- Apply the N source close to the time of crop uptake
- Avoid surface applied N fertilizers, especially on high pH soils and hot/dry conditions
- Avoid nitrogen fertilizer applications in the fall for next season's crops
- Take all reasonable N credits from past cropping practices, reducing purchased N accordingly
- Increase use of cover crops to maintain nutrients in the root zone during the non-cropping season
- Reduce ammonia losses from manure storage
- Explore new technologies that hold and retain N in the soil
- Increase use of conservation measures to reduce topsoil losses and retain nutrients in the root zone
- Formulate monogastric diets based on amino acid levels rather than total protein content and couple with increased use of synthetic amino acids.

$N_r$ in the environment is an emerging issue. Because of agriculture's dependence on nitrogen for continued yield improvements it is an issue the industry will want to monitor as the impact of $N_r$ in our environment is explored.

In 2006 the U.S. EPA convened the Science Advisory Board Reactive Nitrogen Committee. The most recent draft report (164 pages) from that committee containing the committee recommendations was posted in January 2011. That report can be found at: http://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/69B45FA395DAC4AC8525780D006D0D33/$File/INC+Report_Quality+Review+Draft_1_20_11.pdf

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# Can You Extend the Length of Gestation?

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**Introduction**

There are several products available within the swine industry to assist in reproductive management of the sow herd. Products like P.G.600® can synchronize onset of estrus among non-cycling females. Matrix® will synchronize estrus in cycling gilts and products like Lutalyse® and Prostamate® will induce farrowing for females about to farrow. However the question does come up, "Can you "hold" a sow from farrowing?" In other words, "Can some product be used to delay the onset of farrowing"? This could be useful when there are more sows to farrow than farrowing stalls to put them in. An extra day or two may allow a farm to either early wean or crossfoster enough litters to open up stalls to put sows into before they farrow.

Matrix is synthetic progestagen that acts like progesterone in pigs. Progesterone is the primary signal that maintains pregnancy. It can be used to synchronize estrus or heat in cycling gilts by "fooling" the gilt to "think" it is pregnant. When Matrix is no longer fed the gilt's biological system takes over and the gilt comes into heat. However, the question comes up from time to time if Matrix can be used to delay the onset of farrowing. The product elevates plasma levels of progesterone like compounds so it does make sense that it could be used to "fool" the gilt and not allow the gilt's biological system to begin the farrowing process as farrowing day approaches.

There have been several studies to show that this is possible. A recent study (Foisnet et al., 2010) investigated feeding altrenogest (Matrix) from Day 109 to Day 112 or 113 of gestation and determined how it impacted the length of gestation, along with several other litter performance characteristics. In this study 20 mg/day of altrenogest was fed to pregnant gilts starting on Day 109 of gestation. One group of gilts was fed altrenogest for 4 days including Day 112 of gestation while another group was fed altrenogest for 5 days through Day 113 of gestation. These two treatment groups were compared to an untreated control group of gilts. Sows were not induced to farrow. Litters were kept with their birth mother for the first 24 hours and then crossfostered to standardize litter size at 12 piglets. Farrowings were attended and piglets were weighed at birth, at 24 hours and at weaning. Piglets that had not nursed within 40 minutes of birth were assisted. Colostrum yield during the first 24 hours after farrowing was estimated. Litters were weaned at approximately 25 days of lactation.

The altrenogest treatment was successful in delaying farrowing (Table 1). Gestation length for control sows was 114. 7 days, while those fed altrenogest from Day 109 to Day 112 and Day 113 had gestation lengths of 115.8 and 116.3 days, respectively. It appears that sows farrowed 2-3 days after altrenogest was no longer fed. Duration of farrowing appeared to be shorter for sows fed altrenogest compared to controls; however, this was not significant.

An interesting result was that the time for pigs to nurse after they were born was influenced by treatment (Table 1). Piglets from gilts that were fed altrenogest to Day 113 of gestation took approximately 12 minutes longer, on average, to begin nursing after they were born than piglets from control gilts or those fed altrenogest to Day 112. Colostrum yield was also influenced by treatment. Gilts fed altrenogest from Day 109 through Day 113 of gestation had slightly less colostrum yield than control gilts or those fed altrogest through Day 112. Even though piglets from sows fed altrenogest to Day 113 of gestation took longer to nurse, treatment did not influence piglet weight 24 hours after birth and averaged 3.2 lb. Average piglet weaning weight (15.8 lb) also was not influenced by treatment.

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# Should the Underlines of Neonatal Gilts be Taped? A Standard Operating Procedure Briefing

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**Introduction**

The ability of sows to produce and nurture large litters is vital for successful production in the swine industry. Hence, when replacement sows are selected, their capacity to nurse large litters is considered; those with underline defects such as blind or inverted teats will be discriminated against. Therefore, producers who are raising replacement females have an interest in preserving the underlines of their gilts.

**Discussion**

*Neonatal Teat Necrosis*

According to Stevens (1984), there is a significant correlation between underline defects observed at the time of replacement gilt selection and the previous incidence of neonatal teat necrosis. This teat necrosis occurs when the newborn's teats suffer abrasion from her environment, generally in the first 24 hours of life. The teat end reddens from the trauma, and then transitions to black as the teat sphincter dies, scabs, and sloughs off (The PigSite, 2010). The teat eventually heals, but its potential for normal function is severely impaired and sometimes eliminated.

There are multiple factors influencing the occurrence of neonatal teat necrosis; some are inherent to the piglet and others are external. Knowledge of these allows consideration of either active or passive measures to prevent necrosis and subsequent underline losses. Passive measures of prevention consist of addressing the aggravating factors and decreasing or eradicating them.

**Inherent factors**

Breeds or lines with prominent teats at birth are predisposed to teat necrosis (Lemmon, personal communication), as are those born from sows who have consumed feeds containing mycotoxins (Lemmon, Strittmatter; personal communications). The mycotoxin zearalanone elevates estrogen levels in the sow, and some of the hormone is transferred to the piglets around parturition. This causes abnormal estrogen levels in the piglets as well, creating swollen teats with increased exposure and subsequent risk of injury. To prevent this, gestating sows nearing parturition should be fed only high quality feeds.

**Irritation**

Environmental factors which can be controlled include irritants that initiate swelling or increase the sensitivity of the teats. Common culprits are excessive amounts of disinfectants used in farrowing room washing leading to residues on crate surfaces and piglet drying agents containing lime (Strittmatter, personal communication). Valid preventative measures will address these details.

**Flooring**

One of the biggest environmental contributions to teat necrosis occurrence, however, is crate flooring. In a study backed by Agriculture Canada, 333 sows raised litters on heated concrete crate floors and 325 sows raised their litters on plastic coated flooring. Teat necrosis in the piglets was assessed at 3 days of age; the rates of the litters were 17.5% and 3.4%, respectively. This significant difference allowed the researchers to conclude that if producers switched from concrete to plastic coated flooring, an 80% reduction in teat necrosis could be expected (Stevens, 1984). The current consensus among producers also is that flooring type is critical, and that plastic coated, woven wire or tribar flooring are adequate alternatives to concrete (Higbee, Strittmatter, Tafs; personal communications). Because flooring type can have the largest impact on the incidence of teat necrosis, it should be the primary consideration of producers looking to decrease underline defects.

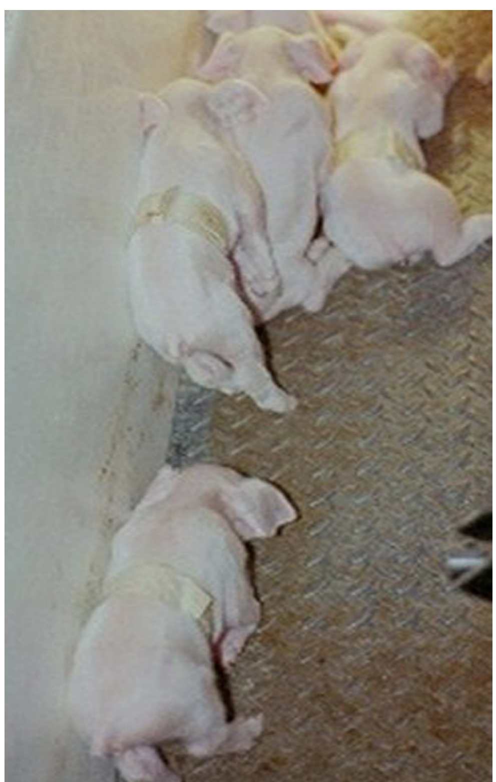
There are also secondary flooring factors to consider, including heated (Stevens, 1984) and wet, slippery floors (Strittmatter, personal communication). Heated concrete encourages the piglets to lie directly on the abrasive concrete. Ensuring that the crate floor is dry and that piglets have a comfortable micro-zone with suitable flooring will help prevent teat necrosis.

**Other Factors**

Finally, excessive competition among piglets for milk increases the "wear time" of their teats (Lemmon, personal communication), and small litter size can also increase teat necrosis (Stevens, 1984) as there is less piling among the piglets and more underline contact with the floor. Ensuring that the sow is producing a sufficient quantity of milk for the number of piglets she is feeding and evening litter sizes through cross fostering can help minimize underline damage.

**Taping**

Active measures of neonatal teat necrosis include covering the piglets' teats by placing tape on them or by covering each of the teats with a tar based glue for a few days postpartum. In the former, the gilts are dried, and a length of tape (i.e. 2" masking tape) is wrapped around their middle to keep teats from rubbing against the floor or other piglets (Lemmon, personal communication). Taping is advantageous because it is quick and easy. Early attention is key, however, as most teat damage occurs within the first 72 hours after birth (Strittmatter, personal communication). Because the effectiveness of taping is proportional to how soon it is done after birth, this short time frame necessitates that personnel be available to carry out the procedure soon after birth. Another consideration is that if the gilts are taped, the tape must be removed after a few days (Tafs, personal communication).



## Cost Analysis

A cost analysis of taping, when done in conjunction with additional piglet processing procedures, shows an increased cost of about half a dollar to a dollar per litter of five gilts. This estimate was calculated with one foot of 2-inch masking tape per gilt and 2 minutes of labor per litter at a labor rate of $7.40 per hour (Tafs, personal communication). However, it does not account for the resources that must be used to train personnel on the procedure and it also assumes a 100% tape efficiency use. Finally, if the taping is not done at the same time as other processing procedures, labor, and consequently the cost per litter, will be higher.

A 1984 evaluation of how much revenue replacement producers could lose due to poor underlines on their potential replacement gilts placed losses at $360 per sow per year. The analysis used gilt premiums of $100 with 40% of possible replacement gilts not being qualified for one due to unacceptable underlines (Stevens, 1984).

## Conclusion

Because neonatal underline abrasions diminish the value of replacement gilts, it is undeniable that replacement gilt producers must take measures to prevent neonatal teat necrosis. Whether or not this prevention should be passive or active, however, is debatable, and the answer will be farm specific. Passive measures addressing environmental factors such as flooring and sow feed quality are easily incorporated and should be the first steps taken so that unnecessary production costs from active prevention are not incurred.

If teat necrosis occurrence remains high despite these changes, or if converting from concrete to an alternative flooring is not practical due to investment costs, the economics favor utilizing an active measure of prevention such as taping as well. Granted, the economic value of taping will vary between operations, depending on factors such as whether or not an employee is already present at farrowing to dry (and tape piglets) or if untapping can successfully be incorporated into the existing processing schedule. However, it will at least remain positive regardless of the operation. In summary, taping is a worthwhile and valuable management tool which should be employed to reduce high rates of neonatal teat necrosis.

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# Length of Gestation...

*Continued from page 7.*

**Conclusion**

Altrenogest (Matrix) can be used to delay the onset of farrowing if circumstances dictate such a management intervention, such as a lack of open farrowing stalls for sows ready to farrow. Gilts that were fed altrenogest from Day 109 to Day 113 farrowed piglets that took longer to begin nursing. However, piglet weight at 24 hours after farrowing and at weaning was similar across treatments.

**Final Thoughts**

The dosage used in this study (20 mg per day) is 5 mg higher than what is the recommended dosage to be used among cycling gilts to synchronize estrus. The label dosage for synchronizing estrus in gilts, may not yield the same results that were observed in this study. It should also be mentioned that farrowing was supervised intensively and piglets that did not nurse within 40 minutes were assisted to consume colostrum. If farrowings had not been assisted, the mean time from birth to initial nursing, for pigs born to gilts fed altrenogest to Day 113, may have been greater. This also could have influenced pre-weaning mortality, which was similar across treatments. Producers considering using this product to delay the onset of farrowing, must consult with their veterinarian regarding this off-label use.

***Table 1. Influence of Feeding Altrenogest in late Gestation.***[a]

| Item | Control | Day 109-112[b] | Day 109-113[b] |
|---|---|---|---|
| Gestation Length, days | 114.7[c] | 115.8[d] | 116.3[d] |
| Duration of farrowing, minutes | 238.0<br>(1 hr, 59 min.) | 157<br>(2 hr, 37 min.) | 189<br>(3 hr, 9 min.) |
| First time to nurse, minutes | 25[e] | 18[e] | 34[f] |
| Colostrum yield first 24 hours after farrowing, lb | 9.3[c] | 10.5[c] | 8.3[d] |
| Average piglet weight on Day 1, lb | 3.2 | 3.4 | 3.0 |
| Average piglet weight at weaning, lb | 15.8 | 16.1 | 15.6 |

[a]Adapted from Foisnet et al., 2010

[b]Altrogest was fed from Day 109 of gestation to either Day 112 or Day 113.

[c,d]Means within a row with different superscripts differ ($P<0.10$).

[e,f]Means within a row with different superscripts differ ($P<0.05$).

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*Continued from page 10.*

# Review of Local Disasters: Motivation to Prepare

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Most people are aware of the national and regional scale animal catastrophes in North America in the past decade: avian influenza outbreaks in Virginia, British Columbia, Maryland, and Delaware; hurricanes Katrina and Rita; flooding in the Midwest; and oil spills in the Gulf of Mexico and the Kalamazoo River. These have resulted in mass disposal of poultry, livestock and wildlife.

Equally massive, but less familiar to most people, are the more frequent and more numerous farm-scale catastrophes: facility fires, rangeland wildfires, power outages, ventilation failure, prolonged heat stress, blizzards, feed poisoning, manure gas poisoning, and building collapse. We searched the web in order to find news stories about "local" North American animal emergencies in the past two years. We wanted to learn about how often farm-scale disasters happen (see accompanying table) and to try to learn how people and communities managed or handled the emergency. Interestingly, a substantial portion of these emergencies occurred in the winter months.

How effectively animal emergencies are managed is frequently not well-known. Typically, news stories give time, place, animal type, and immediate responses. Few other details about animal euthanasia, depopulation, carcass disposal, and clean-up are found in popular press. We could not find any follow-up articles about the effectiveness of responders and the costs of clean-up.

Responsibility for disaster management and the resources available for animal emergencies depend on scale and cause. Local level catastrophic animal losses are almost always managed locally by the farmer and surrounding community, utilizing their knowledge, capabilities, and resources. These disasters can overwhelm the farm if planning for such was lacking and if people involved do not know where to access physical and information resources. Preparation for and prompt response to emergencies decrease the time taken to solve problems, increase the speed of purposeful reactions, quickly connect local farmers and responders, and provide them with access to resources to improve the effectiveness of their response. Emergencies cannot be predicted and therefore everyone ought to take time to prepare.

***Table 1. List of local level North American animal emergencies in the past two years.***

| Event | Mortality | Locality | Date | Reference |
|---|---|---|---|---|
| Barn fire smoke inhalation | 7,000 turkeys | Stalwart, Saskatchewan | March, 2011 | Shire, 2011 |
| Barn fire | 150 dairy cows | New York | February, 2011 | DTN Progressive Farmer, 2011 |
| Barn fire | 100 chickens, ducks, peacocks | Paw Paw, Illinois | February, 2011 | WHBF, 2011 |
| Snow load barn collapse | 100 cows | Northumberland, New York | February, 2011 | WPTZ, 2011 |
| Snow load barn collapse | 159 dairy cows | Morris, Minnesota | February, 2011 | Morris Sun Tribune, 2011 |
| Barn fire | 300 hogs | Wakeshma Township, Michigan | January, 2011 | WWMT, 2011 |
| Snow load barn collapse | 85, 000 layers | Hartford, Connecticut | January, 2011 | MSNBC, 2011 |
| Barn fire smoke inhalation | 17,000 chickens | Harrisonburg, Virginia | January, 2011 | AGWEEK, 2011 |
| Barn fire | 1,800 pigs | Melvin, Iowa | January, 2011 | Hayworth, 2011 |
| Barn fire | 6,000 pigs | Dwight Township, Michigan | January, 2011 | Hessling, 2011 |
| Tornado | 50,000 chickens | Cincinnati, Arkansas | December, 2010 | Boyd, 2011 |
| Snow load barns collapse | 12 dairy cows | Wisconsin and Minnesota | December, 2010 | Sheehan, 2010 |
| Avian influenza | 8,200 turkeys | Manitoba | November, 2010 | Lambert, 2010 |

*Table 1 Contd.: List of local level North American animal emergencies in the past two years.*

| | | | | |
|---|---|---|---|---|
| Barn fire | 7,500 pigs | Manitoba | May, 2010 | CBC News, 2010a |
| Barn fire | 450 dairy cows | Manitoba | May, 2010 | CBC News, 2010b |
| Barn fire | 90 hogs | New Prague, Minnesota | April, 2010 | Walsh, 2010 |
| Barn fire | 70 cattle, goats, pigs, chickens | Sandwich, New Hamshire | January, 2010 | WMUR, 2010 |
| Roof collapse from snow | 50 cattle (not injured) | Adrian, Minnesota | December, 2009 | Buntjer, 2009 |
| Barn fire | 15,000 hogs | Calgary, Alberta | August, 2009 | Moharib, 2009 |
| Blizzard | 1,759 calves/cows; 501 lambs/sheep among 152 farmers | Montana | March/April, 2009 | Thackeray, 2009 |
| Avian influenza | 60,000 turkeys | Abbotsford, British Columbia | January, 2009 | Nordqvist, 2009 |
| Avian influenza | 12,000 chickens | Abbotsford, British Columbia | January, 2009 | Calgary Herald, 2009 |

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# Time-to-Suckle in Cross-Fostered Piglets

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The importance of piglets receiving enough good quality colostrum shortly after birth is well known. At birth, piglets have no circulating antibodies to protect them from potential disease causing pathogens in the environment. Therefore, the sow must provide these antibodies to her litter via her colostrum, which provides them with passive immunity. Neonatal viability shows a positive correlation with the degree of passive immunization and levels of circulating immunoglobulins (antibodies). Passive immunity provided to piglets by sows is required until their active immune system matures, usually about 3 weeks of age. Piglets are dependent upon the transfer of antibodies and other immune modulating factors which are present in colostrum. Besides antibodies, colostrum also contains lymphocytes, cytokines, nucleotides, and various growth factors which may affect the post natal development of the immune system. The amount of antibodies available in colostrum, as well as the ability of the piglet to absorb them, diminishes rapidly after farrowing. After 6 hours, the antibody content of colostrum is reduced by one third and, by 12 hours, is reduced by two thirds. Further, although the piglets have the ability to absorb antibodies and immune cells until "gut closure" at about 24 hours following the first suckle, after about 6 hours following their first suckle, their ability to absorb these molecules and cells is reduced to about 50% and progressively declines even further during the following 6 to 12 hours. It is crucial to piglet survival to ensure consumption of sufficient colostrum as soon as possible after birth and before gut closure to maintain passive immunity. Failure to provide adequate passive immunity results in relatively poorly protected pigs that are more susceptible to earlier colonization by potential pathogens. Such colonized pigs can carry the pathogens and shed them in the nursery.

The issue of colostrum management has gained a new importance because of the realization that serious diseases such as Porcine Reproductive and Respiratory Syndrome (PRRS) and Porcine circovirus associated disease (PCVAD) are at least partly controlled on a herd basis by ensuring solid immunity among the suckling piglet population. Control programs for PRRS and PCVAD are examples of two major health challenges where ensuring adequate colostrum uptake to maximize passive immunity is emphasized. In the case of PCVAD, the earlier in life pigs are infected the more likely that severe disease will result. Maternal vaccination studies suggest high levels of passive immunity can prevent or reduces disease even into the grower phase. Taken together, it is clear that any practice that interferes with colostrum intake must be avoided. With respect to cross-fostering management, it has been suggested that fostered piglets may take several hours to start suckling their new sow. However, if these piglets have already suckled their own sow, the gut-closure clock is running and any delay in resuming suckling on the new sow may impair their passive immunity.

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To see if this did occur, we employed 36 Yorkshire sows and their litters at the Michigan State University Swine Research Center. Sows ranged from 1-6 parities and were housed in farrowing crates. Warming mats and heat lamps were placed in the crates for newborn piglets. Sows were observed during 16 hour intervals over 3 days to determine time of farrowing. To be used in the study, paired sows were selected for cross-fostering that had farrowed within an hour of each other. At about 5 to 6 hours after the start of farrowing two piglets from each of the paired sows were cross-fostered onto the other sow of the pair. Instances of piglet aggression and time from fostering to first suckle were recorded and compared to non-fostered resident control piglets. Cross-fostered piglets were returned to their original sow after nursing the foster sow.

Recorded observations indicated that despite obvious efforts of newborns for locomotion and direction, the cross-fostered piglets almost immediately attached to a foster-sows' teat and began nursing with resident piglets. The range of times recorded for piglets to nurse following placement in the new farrowing crate was 1-12 minutes. There was no observed aggression by piglets or by the foster sow toward the cross-fostered piglets. There were a few cases where the fostered piglets seemed to need a little time to establish direction but from then on they were intent on accessing a teat.

Our results were positively surprising and suggest that cross-fostering, if done correctly, need not interfere with the ingestion of adequate colostrum and acquisition of passive immunity by cross-fostered piglets. Piglet survival continues to be an area that requires attention, especially as we continue to increase sow productivity. Efforts to increase neonatal survival using appropriate cross-fostering techniques could ensure adequate colostrum intake and result in increased pigs out the door which may translate into greater producer profits.

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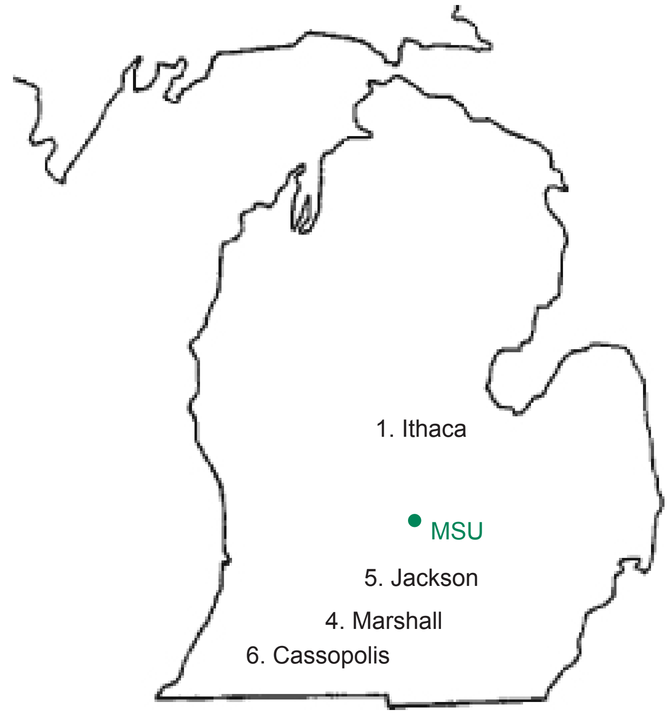


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