



IOWA **Pork Producer** *Headlines*

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Providing a Safe Work Environment

Every day, producers and those involved in the swine industry strive to demonstrate care and concern for how pork is produced. This is acknowledged through the We Care ethical principles of pork production. A vital component of those principles is providing a safe work environment for all those involved.

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- Manure Structure Safety
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- Manure Foam Safety Measures

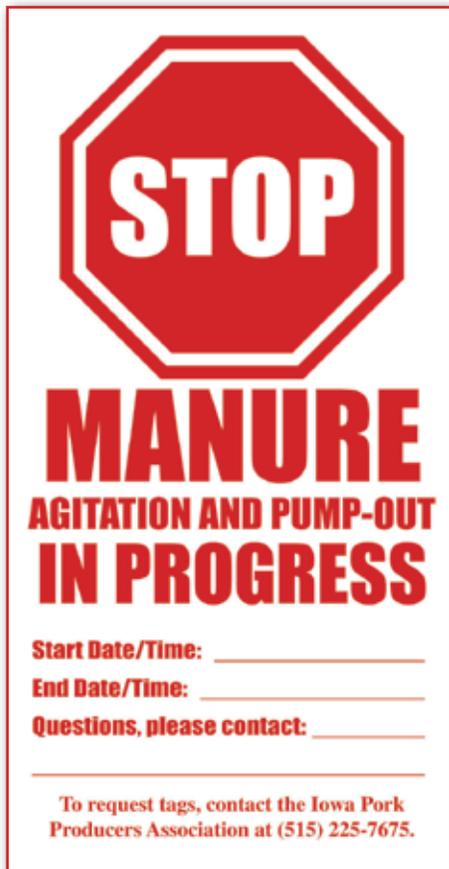


Employee safety benchmarking and training

Employee safety is incredibly important to producers across the state. That's why the Iowa Pork Producers Association continuously provides updated resources for producers to make sure that they're maintaining the safest environment for their employees. It's important to make sure your employees receive training and understand measures for safe manure management. Below are some tips on how to make sure your employee safety is in tip-top shape.

- **People should NEVER enter a building that is being pumped.** Add an additional physical barrier to entry doors – such as caution tape or lockout tags. The Iowa Pork Producers Association provides lockout tags and other warning signs for you to post at entrances of buildings during these events.
- **Ensure that all people are out of the building before you begin agitation and pumping.** Clearly tag all doors and lock all walk-in doors to prevent human entry.
- **During pumping, someone should be at the site at all times. Preferably the site owner.** Never leave a building that is being pumped unattended. This person should also have a copy of your emergency action plan and emergency contact information for the site.
- **Manure storage structures should only be entered by trained personnel equipped with suitable self-contained breathing apparatus.** Never assume gas levels are safe at any time.
- **If a rescue becomes necessary, call your local fire department. Do not attempt rescue on your own.** Be sure all employees have local emergency contact numbers in their phone.
- **Avoid smoking/any open flame in the barn or near manure storage structures.**
- **If you suspect that you or your employees have been exposed to high levels of ammonia, hydrogen sulfide or carbon dioxide, consult your physician immediately.** Knowing the symptoms of hydrogen sulfide poisoning or other health risks associated with these gases is important to increase employee safety.
- **Review your emergency action plan with all workers and have emergency contact numbers available at the site.** Periodically reviewing your emergency action plan with employees will potentially decrease the size and damage should an emergency occur. National Pork Board offers Emergency Action Plan templates for producers through their website.

These are only a few ways to increase employee safety. For more information about employee safety, to receive lockout tags, to order foam safety door decals or to sign up for PQA Plus trainings, contact the Iowa Pork Producers Association at (800) 372-7675.



MORE INFORMATION

- <http://www.extension.umn.edu/agriculture/swine/>
- <http://www.mnpork.com/>
- <http://www.agronext.iastate.edu/immag/>
- <http://www.pork.org/employee-safety-pork-production/safe-pig-handling/>
- <http://www.pork.org/employee-safety-pork-production/about-employee-safety-toolkit/>
- <http://www.pork.org/benchmarking-employee-safety/>

Confined space/manure structure safety



Managing manure is the subject of ever increasing focus from the public. Properly managing swine manure is important to demonstrate we are good stewards of the environment and communities we work in. There are many steps producers can take to increase deep pit structure safety.

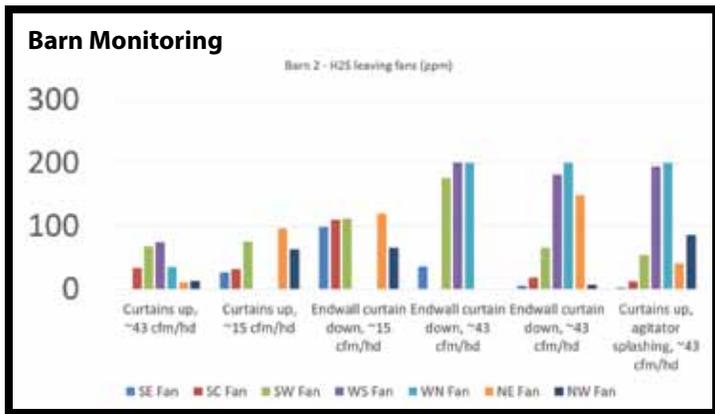
- Carefully monitor the manure level in the pit. It should never reach within one foot of the bottom of the slats. Planning is required to make sure you have enough capacity to make it to the next manure application season.
- Ensure covered manure storages are continually ventilated with a minimum of the variable one pit fan to prevent the accumulation of all hazardous gases. This applies even when there are no animals in the facility.
- Any leaks or discharges during storage or application must be reported to the Iowa Department of Natural Resources at (515) 725-8694.
- Any leaks or discharges require immediate repair and cleanup under the direction of the Iowa Department of Natural Resources.
- Each facility should have an emergency action plan completed and should be easily accessible on the site.
- Before agitating/pumping a deep pit facility, remove all livestock, if possible. If not possible to remove livestock, increase ventilation as much as possible.
- Routinely check that your normal ventilation inlets, curtains or ventilation pivot-doors are open and operating properly, to help ensure good air distribution throughout the barn.
- Any openings not being used for agitation or pumping should be sealed off.
- Make sure to use the maximum amount of ventilation when work in barn requires welders, grinders, and torches. Pit ventilation is the preferred method.
- Use a welding blanket below work area to prevent sparks and flames from dropping into pit when work in a barn requires welders, grinders, or torches.
- Make sure all employees are familiar with your emergency action plan and basic deep pit structure safety.



Spill Hotline (515) 725-8694

These guidelines are recommended by Iowa State University and Mike Brumm Swine Consultancy. Following these guidelines, when agitating or pumping deep pits, will help minimize the risk of injuries, suffocations and flash fires.

Pit Foam Research Update



Pit foam has become an evident challenge within modern hog production. That's why Iowa State University, University of Minnesota and the University of Illinois Champaign/Urbana are researching this topic and how to reduce it, with exclusive funding from the Iowa Pork Producers Association.

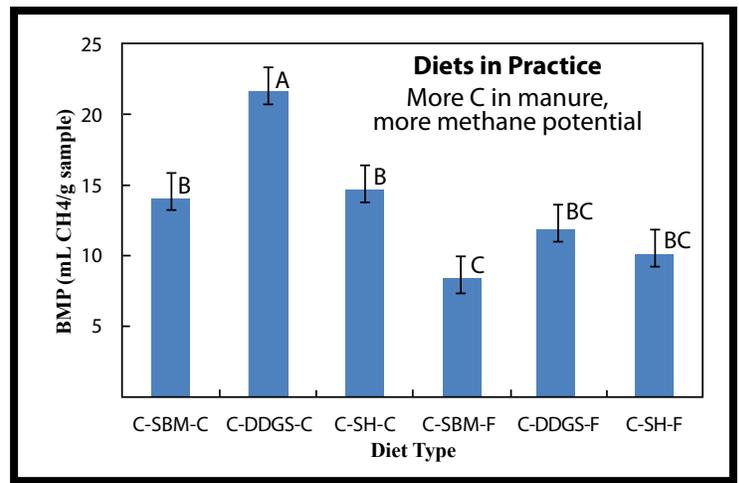
In order for foam to be created, you need three things: biogas, surfactants and stabilizers. With an increase in fiber within pigs' diets, there is an increase of carbon in manure. This also increases the potential for methane in manure. Protein in manure acts as the stabilizer to increase the steadiness of the biogas bubbles. Surfactants are any materials that change the surface tension of the manure.

There is an increase in methane production rates in barns with foam, rather than barns without foam. This is due to a distinct difference in microbial materials. When looking at this difference, it is in part due to feed that pigs eat. An increase in fiber in the diet has a higher chance of foam on the manure.

Protein is another vital part when looking at the chemistry of pit foam. Protein acts as a stabilizer for the biogas. It's been shown that the removal of protein strongly reduces foaming capability and stability. This means that there could be a way to potentially treat manure to reduce the protein.

"By knowing how (foam) is made, we can work on how to tear it apart," said Iowa State University researcher Dr. Dan Andersen.

One other topic researchers have been looking toward is hydrogen sulfide concentration levels and their role in explosions. Ten years ago, sulfur concentration was approximately 3 lbs./1000 gallons. Today, concentration levels are about 10 lbs./1000 gallons. This is due in part to the increase of distillers dried grains with solubles in feed. There is a high farm-to-farm variation when looking at sulfur concentration, so it's advised to treat each barn with caution. Iowa State University researchers are currently testing where sulfur goes as it leaves the barn in order to protect worker safety.



In the meantime, taking precautionary measures will help to reduce the factors that contribute toward this issue. By checking conditions often, especially when barns are empty, you can track the changes of manure and if foaming is occurring. Also, providing a gas monitoring system in barns will help to detect dangerous levels of hydrogen sulfide. Keeping good ventilation throughout your barn and being vigilant of conditions in barns are great precautionary measures to take.

Precautionary Measures

Any attempt to break-up foam WILL release explosive levels of methane. Therefore...

1. All ignition sources OFF (i.e. pilot lights, welding),
2. Set ventilation at 30 cfm/space minimum,
-Use open curtains if > 5mph wind, OR,
-Use fans* + ceiling inlets if calm
3. Make sure ceiling inlets operational,
4. Vacate barn, then finally,
5. Foam/pit can be disturbed.

Pit foam and manure pit explosions are becoming an increasing problem for producers across the state. That's why researchers across the nation are working on understanding this issue and working toward creating a solution and safer environment for all.

Preparing for an emergency



“I want to see all of you back here next year, so that’s why I’m so passionate and vocal about the importance of this issue,” said Leon Sheets at the 2016 Iowa Pork Congress about manure pit foam and explosions. This was after Leon shared his story of surviving a flash fire in one of his barns two years ago.

Leon uses his story to inform other producers of the issue of pit foam but also to stress the importance of being ready for an emergency. In Leon’s case, he was only in the barns to do a quick rinse to prepare for pressure washing, which would follow the next day. However, his plans drastically changed when a flash fire happened and he received second and third degree burns over 20 to 30 percent of his body.

Leon advises other producers to “make looking down” a part of your daily checks. By “looking down” and checking your manure levels, you can help prevent an incident such as Leon’s.

If such an event does happen, having an emergency action plan could reduce the

impact of that emergency on your operation. The first part of your emergency action plan details your operation information. This states your business description as well as site names, locations, managers and phone numbers. The next part of your emergency action plan is a comprehensive list of all contact information. This includes contacts for site managers, manure spills and system failure contacts. A hazard plan is the third part of your emergency action plan. This includes the hazard type, assessment of the hazard and your plan of action. Finally, to end your emergency action plan, there is a maintenance and training calendar. This shows daily, weekly, monthly and annual tasks to be completed.

In order to have an effective emergency action plan, it’s important that all staff members understand the plan before an emergency occurs, as you may not have time to read the plan during an emergency.

To create an emergency action plan specific to your operation, visit www.pork.org/emergency-action-plan/ to find a printable plan. Also, for more information on preparing for an emergency, visit www.iowapork.org or call (800) 372-7675.

EMERGENCY ACTION PLAN SITE CONTACTS

This document should be created for each individual site.

Site Name	Site Operator
Phone	Premises ID
Address	Directions

Enter contact person names and phone numbers if applicable:

Rescue	Fire Dept
Poison Control	Doctor
Sheriff/Police	Veterinarian
Insurance	Hospital
Others	

MANURE SPILL CONTACTS

State Environmental Protection Agency	Earth Moving
Pumping	Hauling
Equipment	Quality Engineer
Others	

SYSTEM FAILURE CONTACTS

Electricity	Plumbing
Ventilation	Heating
Animal Hauling	Feed
Mortality Disposal	Other

EMERGENCY ACTION PLAN OPERATION INFORMATION

The information required here refers to the overall operation. Below, you can refer to production sites within the operation. The information you provide here will appear as an introduction to your completed emergency plan.

Operation	
Owner	
Phone	
Office Address	
Business Description	
Development and Responsibility of this Plan	

EMERGENCY ACTION PLAN SITE INFORMATION

List the individual sites for which you will be creating emergency action plans.

Site Name	Site Manager
Phone	Address
Site Name	Site Manager
Phone	Address
Site Name	Site Manager
Phone	Address
Site Name	Site Manager
Phone	Address
Site Name	Site Manager
Phone	Address

EMERGENCY ACTION PLAN HAZARD PLAN

This document should be created for each individual site and each individual hazard type.

Site Name	Site Operator
Phone	Premises ID
Address	Directions

Describe the hazard or potential emergency in terms that site personnel would understand. Think through a potential emergency situation and what actions you can take now, or what actions should be taken during the emergency to ensure the safety of the people on-site, ensure the safety of the animals and reduce or prevent damage to the facilities. Describe, in detail, the danger or emergency associated with each risk. What might happen in the worst case scenario?

Hazard Type	
Risk Description	

ASSESSMENT

Who is at risk, and what is the potential severity?	
What is the risk to the animals and the potential severity?	
What is the risk to the facilities and the potential severity?	
What special considerations need to be taken when addressing this hazard?	

Manure foam safety measures

Explosions or flash fires have occurred in livestock buildings with manure pits in the Midwest. In order to limit these occurrences, agricultural engineers, animal scientists and industry consultants have come up with recommendations to help producers. According to Iowa State University Extension agricultural engineers, these events show the caution needed when pumping and agitating manure pits.

Many gases are released into the air when liquid manure is agitated to suspend the solids so that the slurry can be pumped. Some of the gases released, such as hydrogen sulfide, are hazardous to people and animals. Among these gases is methane, which is very flammable. The explosion threshold of methane is 4 to 5 percent. If the methane concentration within a barn reaches its explosion threshold and there is an ignition source (such as a heater), an explosion will likely occur.

As a producer, there are steps you can take to minimize the risk of injuries and flash fires.

- **Provide continuous ventilation to prevent gas build-up.** During pit agitation, increase ventilation to quickly disperse released gases. In order to keep the methane concentration below the explosion threshold, it's important to have sufficient ventilation. Run your ventilation fans at maximum speed to keep methane and other gas levels low. While agitating and pumping manure pits, a sufficient air exchange in a barn is two to three times the minimum ventilation rate.

- **If your pit is full or nearly full, don't rely just on your pit fans for ventilation, as they may be restricted.** Use wall fans to supply air exchanged while agitating or pumping the barn's manure pit, since methane gas is lighter than air.
- **Routinely check that your normal ventilation inlets, curtains or ventilation pivot-doors are open and operating properly, to help ensure good air distribution throughout the barn.** This will help to prevent animal deaths (if animals must be present in barns) during agitation and pumping of manure pits. The part of the pit being agitated is where gasses will build up first in these areas. Move animals as far away from these areas if you have to pump with pigs in the barn.
- **Turn off heater pilot lights and other non-ventilation electrical systems that might provide an ignition spark.** This may be problematic for cases when there are no animals in the barn or there are only small animals that require warmer temperatures. This may require that you only pump manure from the barn on warmer days or a warmer part of the day.

Foaming in manure pits is a growing concern that could be related to explosion incidents. "Foaming" or extensive bubbling has been reported to occur on the manure surface before the explosions. The Iowa Pork Producers Association has funded extensive research to determine causes and solutions to manure foam. There are no consistent causes or approved solutions to this complex challenge as of yet.



Agitation Strategy Checklist

- o Consider minimal or no agitation until the manure level is at least 1-foot to 1 1/2-feet below the support lintel at the pumpout/fan ports.
- o Avoid aggressive agitation when animals are in the building (no rooster tailing).
- o Do not direct agitator nozzles toward pillars or walls.
- o Use only the bottom agitator nozzle.
- o Stop agitating when bottom nozzle is less than 6" below the manure surface.
- o Do not uncover pumpout ports unless necessary for agitation and manure load out.
- o Use a tarp to cover the pumpout opening around the agitator to reduce/minimize this opening as a fresh air inlet into the animal space.

Ventilation Strategy—Curtain-sided Barns

- During warm weather:
 - o When winds exceed 5 mph, open curtains and run all exhaust fans.
 - o If winds are calm, leave sidewall curtains closed and operate all exhaust fans.
 - o If 50% or more of the pit fans must be idle due to the pumping procedure, curtains should be open regardless of wind speed.
- During cold weather:
 - o For bigger pigs, leave curtains closed and run all exhaust fans.
 - o For smaller pigs, provide at least 25-30 cfm/pig during pumpout. In most wean-to-finish or grow-finish facilities, this is generally all of the pit fans plus at least one wall fan.
 - o Reduce static pressure in the animal space by opening ceiling inlets and/or curtains slightly so less air draws from pump out port openings into the animal space. Air distribution may be compromised in the animal zone since velocity will be reduced at ceiling inlets.
- Stir fan usage:
 - o The use of stir fans will prevent/reduce concentrated pockets of gases in the pig zone that may result from pit agitation. Use caution with downward-directed stir fans—these may blow air through the pit and back into the pig zone. Parallel-directed fans are preferred for this reason.

Continue to ventilate at an elevated level for 1-2 hours after pumpout.

Ventilation Strategy—Tunnel-Ventilated Barns

- During cold weather:
 - o At a minimum, run all pit fans plus the 36" fan. Open the tunnel curtain 6-12 inches so air is pulled the length of the barn by the 36" fan.
 - o If ceiling inlets are powered, partially close the inlets so air must also enter from the tunnel curtain.
 - o Reduce static pressure so the inlet velocity at the tunnel curtain is 300-400 fpm versus the customary 800-1000 fpm.
- During hot weather:
 - o Run all pit fans and at least two tunnel fans
 - o Manage the ceiling inlets and tunnel curtain similar to the cold weather recommendation.

Continue to ventilate at an elevated level for 1-2 hours after pumpout.



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This issue of *Headlines* was edited by Maggie Jennett, 2016 IPPA Checkoff intern. Maggie grew up on a family farm near Clearfield in southwest Iowa. With swine being a large part of her family's farm, Maggie has developed a passion for the agricultural industry. She will be a senior at Iowa State University with a major in journalism and mass communications and a minor in agricultural communications. Upon graduation, Maggie plans to do communications work for an agricultural organization or publication.

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Mission Statement

The Iowa Pork Producers Association is an industry inclusive organization whose mission is to provide a unified voice to promote and educate for a sustainable, socially responsible, profitable and globally competitive pork industry.

