

ENVIRONMENT

Title: Air Management Practices Assessment Tool – A Producer Guide to Comparing Mitigation Strategies - **NPB: #12-006**

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Industry Summary

Swine producers strive to be good stewards of natural resources with or without regulations and air mitigation technologies may help to achieve that goal. Environmental and legal pressures may also deem it necessary for swine producers to adopt air mitigation strategies which will allow producers to continue operating or chose a production site that might not otherwise be accepted. Producers need assistance in making informed choices of appropriate mitigation strategies. The National Air Quality Site Assessment Tool (NAQSAT) (<http://naqsat.tamu.edu/>) was developed to allow producers to assess their current management practices and the areas where the greatest potential for reductions in air emissions exist. A complementary tool, the Air Management Practices Assessment Tool (AMPAT), (<http://www.agronext.iastate.edu/ampat/homepage.html>) was updated and further developed to help fill this need for information to make informed decisions by providing producers with a suite of options to address air emissions issues. These options will provide the producer with information on how the technology works, management requirements, effectiveness and costs so that they may more wisely evaluate and narrow their options.

AMPAT is unique in that it is set up to compare mitigation technologies from animal housing, manure storage and handling or land application. These technologies are scored for pollutant removal efficiencies and cost in a central table that can help to narrow the options before providing more information on individual technology pages. Educational resources, including fact sheets, video presentation, and note pages, are available not only to a producer looking for information, but also for educators. Additional links are provided for those seeking higher levels of information.

Keywords: Air Mitigation, Air Quality, Odor, Emission

Scientific Abstract:

Swine producers strive to be good stewards of natural resources with or without regulations and air mitigation technologies may help to achieve that goal. Environmental and legal pressures may also deem it necessary for swine producers to adopt air mitigation strategies which will allow producers to continue operating or chose a production site that might not otherwise be accepted. Producers need assistance in making informed choices of

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Introduction:

Increasing environmental pressure is being placed on swine producers in regards to air emittants. A recent report (Copeland, 2010) by the Congressional Research Service stated that agricultural operations have been treated differently from other businesses under numerous state and federal laws including the Clean Water Act, the Comprehensive Environmental Response, Compensations and Liability Act (CERCLA) and the Emergency Planning and Community Right-to-Know Act (EPCRA). They go on to state that questions regarding the applicability of these laws to livestock operations have been controversial and drawn congressional attention. Because of this attention, it is likely that greater regulation and scrutiny will be placed on swine producers. This is further evidenced by the establishment of the National Air Emissions Monitoring Study (NAEMS) by EPA in 2006 to establish baseline emissions data on a variety of livestock and poultry farms. In 2010 the Iowa DNR developed a workgroup to gather input and explore approaches to implementing the EPA National Ambient Air Quality Standard (NAAQS) which establishes a standard for PM2.5. Agriculture was included in the industries which were examined. In addition to regulations on gaseous and particulate emissions, odor nuisance lawsuits also have been a concern for the swine industry.

Producers strive to be good stewards of natural resources with or without regulations and air mitigation technologies help to achieve that goal. Environmental and legal pressures may also deem it necessary for swine producers to adopt air mitigation strategies which will allow producers to continue operating or chose a production site that might not otherwise be accepted. Producers need assistance in making informed choices of appropriate mitigation strategies. The National Air Quality Site Assessment Tool (NAQSAT) (<http://naqsat.tamu.edu/>) was developed to allow producers to assess their current management practices and the areas where the greatest potential for reductions in air emissions exist. A complementary tool, the Air Management Practices Assessment Tool (AMPAT), was updated and further developed to help fill this need for information to make informed decisions by providing producers with a suite of options to address air emissions issues. These options will provide the producer with information on how the technology works, management requirements, effectiveness and costs so that they may more wisely evaluate and narrow their options.

Objectives

- A. Compile information on the management, effectiveness, and costs regarding the latest mitigation strategies;
- B. Update the current AMPAT website to provide updated guidance to swine producers in examining a variety of mitigation strategies to address emission of odor, ammonia, hydrogen sulfide and particulate matter based on effectiveness, economics and production system compatibility;
- C. Disseminate educational tools to Extension field personnel and swine producers through a website, workshop, fact sheets and other available forums.

Materials & Methods

Objective A: Emission/Odor was broken down by source. These include: Animal Housing, Manure Storage and Handling, and Land Application. A literature search was conducted to find the recent research on mitigation strategies to tabulate information on effectiveness of various pollutants and costs. The proceedings from: “Mitigating Air Emissions from Animal Feeding Operations” (2008) and published work in American Society of Agricultural and Biological Engineering refereed publications served as a starting point. When multiple studies existed on a specific technology information was pooled to produce a range of effectiveness.

Objective B: A new format was developed for the AMPAT tool which gives producers a better way to compare options so that they might narrow the selection before investigating further. Using the information obtained in the literature search the AMPAT website was developed to include new mitigation techniques and updated information on effectiveness and costs. Where available, new page links and references were added to each mitigation technique for the benefit of those seeking deeper scientific information. Fact sheets which summarize the available mitigation techniques for each pollutant (odor, ammonia, hydrogen sulfide, particulate matter, VOCs) were developed. A short (< 12 minute) powerpoint presentation was recorded for each option. Note pages of slides may be printed.

Objective C: Thus far the Iowa State University Extension and Outreach swine specialists and agricultural engineering specialists have been shown the new AMPAT website and trained in its use. Training also occurred at the national biofilter conference which occurred on August 20, 2014 for the ISU campus. The website itself has training pieces that could be used by educators, both extension and classroom, for various groups. The recorded powerpoint presentations (mp4 files) can be used directly or educators may contact Jay Harmon for copies of the actual powerpoint. A newsrelease is being developed to provide visibility with producers.

Results

The new AMPAT page is located at: <http://www.agronext.iastate.edu/ampat/homepage.html>. It begins with links to mitigation technologies by source (Animal Housing, Manure Storage & Handling, and Land Application). There are also menu options for: Other Links (related to air quality), Literature Database (a database that will be populated through a project led by Jacek Koziel to develop an in-depth scientific literature data base), Photo Gallery (pictures which could be used by educators), Definitions (related to air quality) and links for the National Pork Board and the ISU Animal Agriculture & Air Quality site.

The pages are laid out in a simple format (see Figure 1). The idea came from woodworking magazines where they compare different woodworking tools based on certain criteria. These received a color-coded “score” for each trait. Mitigation technologies are simply another form of tool and the comparison criteria are the targeted pollutants and the cost. The table is laid out as a score card. Each technology within the tool is laid out on the vertical axis on the left. The pollutants are laid out on the horizontal axis at the top. A green color indicates a particular technology has a high impact on that particular pollutant. Likewise, yellow and red indicate medium and low impact respectively. As an example, if a person were concerned about a potential odor problem from animal housing, you would scan down the list under the “odor” column at the top. You would find that “Siting”,

“Scrubbers”, “Urine/Feces Segregation” and “Biofilters” have green bars, meaning they have high impact on odors. You could then investigate them further or check out some of the yellow bars that have a medium impact. Consequently red bars, would have low impact or would not be suitable for addressing that pollutant. Similar tables are available for all the other two sources as well. A relative cost rating is also given in the table using dollar signs (\$).

	Ammonia	H ₂ S	Odor	Dust & Particulates	VOC	GHG	Cost
Barriers	Red	Red	Yellow	Green	Red	Red	\$
Biofilters	Green	Green	Green	Green	Green	Green	\$\$
Chimneys	Red	Red	Yellow	Green	Red	Red	\$
Diet Manipulation	Yellow	Yellow	Yellow	Green	Green	Green	\$
Electrostatic Precipitation	Red	Red	Yellow	Green	Red	Red	\$\$
Landscaping	Yellow	Yellow	Yellow	Green	Green	Green	\$
Oil Sprinkling	Red	Red	Yellow	Green	Green	Green	\$
Pit Ventilation	Red	Red	Yellow	Green	Green	Green	\$\$
Scrubber	Green	Green	Green	Green	Green	Green	\$\$\$
Siting	Red	Red	Yellow	Green	Red	Red	\$
Urine/Feces Segregation	Green	Green	Green	Green	Green	Green	\$\$-\$\$\$
UV Light	Red	Red	Yellow	Green	Green	Green	\$\$

H₂S = Hydrogen Sulfide; VOC = Volatile Organic Compounds; GHG = Greenhouse Gases
 Red - low impact; Yellow - medium impact; Green - high impact; Blank - insufficient data

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Figure 1. Example of the comparison table of mitigation technologies.

For each mitigation technique there is an individual page with a description, pros and cons of the technique, effectiveness estimates and associated cost. In some cases an exact cost is not available so estimates are provided. The same contact is also on a printable pdf format. These fact sheets are also available through the ISU Extension Store so that interested persons can find them through the store rather than through the AMPAT page. It also makes it easier to track the number of downloads to gauge impact of the educational components. The most unique feature is the video. These are voice-over powerpoint slides, recording using Camtasia to create a mp4 file. These are loaded onto the ISU Extension Vimeo website. In total, there are 22 mitigation techniques shown.

Discussion

AMPAT initially was developed in 2004 through a grant from the National Pork Board. This was a good tool that provided information available at that time. The new AMPAT version provides information available since 2004 but also it provides the information in a more user-friendly way to help narrow the choices.

Individual air quality education is particularly important to producers. Educational meetings do not seem effective based on the current regulations. Producers have a low level of interest unless they are directly impacted by regulations or neighbor complaints, in which case they may have a high interest level. Often they are unwilling to openly ask questions and seek more individual counseling. This was found to be true when ISU Extension piloted educational workshops which were very poorly attended. Other states, with different political and regulatory climates may have more interest from producers. A website such as AMPAT seems like the most appropriate approach for initial education. It can be done privately and based on individual needs. Deeper information is available when desired, and users can skip information that is impertinent to their situation. This tool may not answer all the questions, but it will help prepare producers to make better informed decisions when seeking further assistance or talking to vendors. As more information and approaches become available, more information can easily be posted.