DSM

MicroSource® S

Relevance of Ammonia (NH_3) in Swine Houses

a DSM Product

High Ammonia Reduces Pig Performance

For swine it is recommended that the level of ammonia in air be kept below 25 ppm. In research conducted at the University of Illinois (Drummond et. Al, 1980), aerial ammonia levels of 50 ppm and above decreased pig growth. Many producers don't feel that ammonia levels are an issue in their facilities, because when they are in the barns and the fans are running the ammonia doesn't seem too high. What is important however, is the level of ammonia that the pigs are exposed to over their life in the facility. The level of ammonia can rise quickly at floor level when the fans are not running and even though pigs may only be exposed to the high levels of ammonia for a short time, the chronic exposure to these high levels can be detrimental to performance.

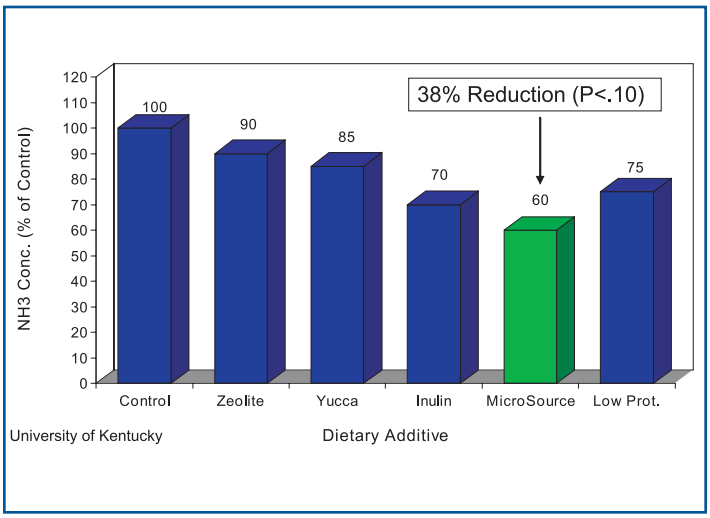
How MicroSource® S Can Help

MicroSource® S is a heat-stable microbial feed additive that contains microorganisms selected for their ability to improve the decomposition of stored swine manure. MicroSource® S is an easy to use feed additive that can be added to all types of swine feed. MicroSource® S is stable in both meal and pelleted feeds. MicroSource® S begins to work by providing a source of live microorganisms in the gastrointestinal tract. These microorganisms are distributed equally in every fraction of manure produced. This allows the decomposition to start as early as possible, and continues as the manure lands on the floor and is collected into the manure handling and storage area. MicroSource® S controls the decomposition process thereby reducing ammonia production. Ammonia is one of the end products of the decomposition process with other microorganisms, but not with MicroSource® S microorganisms. Research trials have shown a 38 - 61% reduction in ammonia when MicroSource® S is included in the feed. Researchers at the University of Kentucky demonstrated that MicroSource® S outperformed several other feed additives by reducing ammonia emissions by almost 40% (Figure 1.) This also helps conserve nitrogen in the manure thereby decreasing the need for commercial fertilizer. This in turn reduces the amount of ammonia that needs to be produced by the Haber-Bosch process which reduces

Unlimited. DSM

the amount of new reactive Nitrogen (Nr) added to the environment. The reduced ammonia levels in the house also provide a better environment for the workers and the pigs. This translates into happier workers and better performance.

Figure 1



Ammonia Recommendation and Regulations

Both the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH) have set regulations for exposure to ammonia. OSHA has set a 50 ppm limit for an 8 hour exposure. NISOH recommends a 25 ppm limit for a 10 hour exposure and 50 ppm limit for a 5 minute exposure. At the Federal level, air quality is regulated by the Clean Air Act, CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) and EPCRA (Emergency Planning and Community Right-to-Know Act). Under CERCLA, all locations producing more than 100 pounds per day of ammonia are required to report it. Current data would indicate that around 3500 grow finish pigs would produce 100 pounds of ammonia per day.

What Is Ammonia (NH_3)

Ammonia is a chemical made by both humans and nature. Ammonia is a colorless gas that is lighter than air and is highly soluble in water. It is a respiratory irritant with a pungent odor that is detectable at levels as low as 5ppm. Ammonia can be found in air, water and soil. In water most of the Ammonia (NH_3) changes to Ammonium (NH_4^+) which is not gaseous and is odorless.

Ammonia is both essential and detrimental

Nitrogen is essential for life, and abundant in the atmosphere, yet only a few nitrogen fixing bacteria can utilize molecular nitrogen (N_2). All other living organisms must rely on sources of reactive nitrogen (Nr) such as ammonia and organic compounds such as amino acids to obtain nitrogen. Synthetic ammonia can be produced from molecular nitrogen using the Haber-Bosch process. About eighty percent of the ammonia produced synthetically is used as fertilizer to grow crops.

Nr did not always accumulate in the environment. The denitrification of Nr to N_2 was essentially in balance with microbial nitrogen fixation prior to industrial revolution. However, that has changed by burning fossil fuels, planting more legumes and using the Haber-Bosch process to produce ammonia. Because of this, more and more Nr is added to the environment every year.

The increased levels of Nr in the environment have many detrimental effects including the acidification, eutrophication and loss of biodiversity in lakes, streams and costal ecosystems. Reactive Nitrogen accumulation also leads to changes in the atmosphere including ozone depletion and an increase in particulate matter which can induce respiratory diseases.

DSM10-0182/0906

MicroSource® S the right thing to do for you, your employees, your pigs and the environment.

MicroSource® S