

CAFO AIR POLLUTION FACTS and RESEARCH

July 2006

- **A USDA study** suggests that aerial transfer of antibiotics and antibiotic resistant bacteria from swine confinements may represent an important and previously overlooked mechanism for transfer of antibiotic resistance to humans and to the environment. (J.A. Zahn, National Swine Research and Information Center, Ames, Iowa, published abstract presented July 2001)
- **An Ohio study concluded that animal confinements should be sited with consideration of the location of human habitation. It also stated that the use of antibiotics should be reviewed to minimize the development of antibiotic resistant bacteria. It discovered antibiotic resistant staphylococcal isolates in the air near swine barns. Air fungi identified included species of Alternaria, Aspergillus, Monilia, Mucor, Penicillium, and Rhizopus. Significant levels of staphylococci and fungi were found in nearby residences. In early summer high numbers of aerosolized staphylococci at one test site constituted 54% of the total bacteria recovered downwind from the swine facility.** (Scarpino, P. V. and Quinn, H., Bioaerosol Distribution Patterns adjacent to two swine growing finishing housed confinement units in the American Midwest. Univ. of Cincinnati.
- **A follow up study Ohio study in 2004 once again found resistant bacterial forms inside and downwind of swine confinement units.** The study concluded that inhalation of microorganisms could be a health concern for workers inside and downwind. The major conclusion was that bacteria found in this study and prior studies could cause a potential human health hazard. The study recommended that it is logical to place confinements in areas that do not have a large population nearby. (Gibbs, Shawn, et al. Airborne Resistant and nonresistant Bacteria Recovered from Two Swine Herd Confined Animal Feeding Operations, Journal of Occupational and Environmental Hygiene, Nov.2004)
- **Additional follow up research published in 2006 found multidrug drug resistant bacteria upwind, and in higher concentrations downwind and within of CAFOs even after subtherapeutic antibiotics were discontinued inside the CAFO. This could pose a potential health effect for those who work within or live in close proximity to these facilities.** (*Environ Health Perspectives* 114:1032-1037 (2006) . doi:10.1289/ehp.8910 available via <http://dx.doi.org/>(Online 27 March 2006)
- **Johns Hopkins University** researchers found airborne multidrug-resistant bacteria and antibiotics inside swine confinement operations. Regardless of bacterial species, 98% of the isolates expressed high-level resistance to at least two antibiotics commonly used in swine production. The study stressed that the high concentrations of pathogens and dust from animal waste could pose unique health concerns to people living near land application sites and raised questions about the spread of drug resistant bacteria beyond the immediate site through ventilation fans.(*Environmental health Perspectives*. Amy Chapin et al. doi10.1289/ehp.7473 November 2004)
- **Concentrated Animal Feeding Operations Near Schools May Pose Asthma Risk** Children who attend school near large-scale livestock farms known as concentrated animal feeding operations (CAFOs) may be at a higher risk for asthma, according to a new study by University of Iowa researchers. The study, led by Joel Kline, M.D., professor of internal medicine in the UI Roy J. and Lucille A. Carver College of Medicine, appears in the June issue of *Chest*, the peer-reviewed journal of the American College of Chest Physicians (www.chestjournal.org).
- **It was found that swine buildings have the potential of generating more odor than manure storage facilities** such as lagoons and tanks and thus could be the major odor sources causing downwind odor nuisance. (TI: A field study on downwind odor transport from swine facilities. AU ZhuJ.;Li X)
- **Public health scientists now recognize that hydrogen sulfide is a potent neurotoxin**, and that chronic exposure to even low ambient levels causes irreversible damage to the brain and central nervous system. Children are among the most susceptible to this poison gas. It is unacceptable for communities to have to continue suffering the ill effects of H₂S when the technology to control H₂S emissions is available and affordable. (*J Environ Sci Health B*, 200003, 35: 2, 245-58)
- In February 2002, The University of Iowa released a joint air quality report from a team of scientists at U of Iowa and Iowa State. The report concluded that **"emissions may constitute a public health hazard and that precautions should be taken to minimize exposures arising from CAFOs."** The report stated that hydrogen sulfide and ammonia measurements near livestock operations have been high enough to be harmful to humans. The report recommended air quality standards be enacted for CAFOs. (Pres Release, ¹ Press Release. The University of Iowa, Feb 8, 2002 Debra Venzke. UI College of Public Health)
- **Research suggests exposure to odor has an effect on secretory immune function and is particularly important in that it documents a physiologic effect among neighbors of industrial hog operations.** (Health Effects Associated with Exposure to Airborne Emissions from Industrial Hog Operations in Eastern North Carolina)
- **New research indicates that short-term exposure in an environmental chamber to malodorous emissions from a swine house at levels expected downwind can induce clinically important symptoms in healthy human volunteers.** (Shiffman et al., *Environmental Health Perspectives* Vol. 1113 #5 May 2005)
- **Increased Asthma Found Among Iowa Children Living On Hog Farms**-New research conducted by investigators in the University of Iowa College of Public Health has found that the prevalence of asthma is elevated among children living on farms where swine are raised. Children living on swine farms where antibiotics are added to feed have a significantly higher prevalence of the respiratory disease, according to the UI study. (University of Iowa News Release, Dec. 9 2004)
- **A report in Utah demonstrate an increase in both diarrheal and respiratory illness cases in Milford Utah during the period from 1992 to 1998 when a 44,000 CAFO became operational.** Keller H. and R.W.Ball. 2000. A Retrospective Study of Diarrheal and Respiratory Illness Incidence Rates in Milford, Utah 1992-1998. Salt Lake City, Utah: Bureau of Epidemiology, Utah Department of Health
- **Dairy Dusts** – Dairy CAFOs produce dusts that may pose a greater risk than other types of dust. The dust from dried manure from dairies is *agricultural organic dust*, which can contain microorganisms, endotoxins, and aero-allergens. Inhalation of these can lead to several disease conditions in humans. Dairies can create dust from increased traffic due to constant deliveries of milk and supplies on rural roads. Dairies are also sources of hay and grain dust. ("Dairy Herds and Rural Communities in Southern New Mexico," Stephen Arnold, PhD. July August 1999, *Environmental Health*)

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- **A National Academy of Sciences (NAS)** study released in July 2002 concluded that airborne pollution from CAFOs is as much of a concern as the animal waste that ends up in our streams. The report, requested by Federal EPA and Department of Agriculture, recommended regulators find better ways of measuring airborne pollutants and the manner that they are dispersed. The study made it clear that these pollutants from factory livestock facilities are a serious environmental and health concern.
- **Air pollution from hog operations is emitted by barns, lagoons, pits, slurries and land application.** Noxious gases have been detected four miles downwind that are as intense as at a lagoon. Heavy accumulations occur most frequently between 6-8 a.m. and 7-9 p.m. Even small levels of odors and gas molecules can produce strong reactions in humans. Roof shingles, siding, fabrics and other material can trap odors and release them when conditions are right. Workers can become desensitized because the molecules tie up their olfactory nerves. (Susan Schiffman, Duke University Swine Odor Task Force)
- **Toxic dusts and gases are found in confinement houses** (Kelley J. Donham, MS, DVM)
- **"A study on human health effects of living near industrial hog operations has found that people living near large hog farms suffer significantly higher levels of upper respiratory and gastrointestinal ailments than people living near other farming areas.** The study was done by the University of North Carolina, School of Public Health." (*Kansas Rural Papers*, May 1999)
- **"The gases and dust that we know are being transferred to the exterior."** Kendall Thu, University of Iowa (now at Northern Illinois University)
- Symptoms of exposure to hog gases include, "more tension, more depression, more anger, less vigor, more fatigue, and more confusion" (Susan Schiffman, Duke University)
- Other symptoms reported from exposure to gases emitted by hog facilities, "may elicit nausea, vomiting and headache, cause shallow breathing and coughing; upset stomach and loss of appetite; irritated eyes, nose and throat; disturb, annoy and depress –Overcash, et al. 1984 (Understanding the Impacts of Large-Scale Swine Production, June 1996)
- **"Please be advised that the Agency has documented livestock waste related odor problems at distances far greater than one-quarter mile.** In fact, we have been involved with situations where offensive odors were reported detected two to three miles from swine production and/or waste handling facilities." (IEPA letter to Little Timber, L.L.C. Illinois 10-10-96)
- **"Many of us still ignore the fact that wind direction and times of spreading are very important to neighbors...Odors can drain downhill a long distance, from three to five miles,"** said Ted Funk, University of Illinois extension agricultural engineer specialist. (*Agrinews*, 9-17-98)
- "People have symptoms, legitimate symptoms. You can't deny them," states Kelley Donham, director of the University of Iowa's Center for Agricultural Safety and Health. **Ammonia and sulfide are tremendous intoxicants.** Ammonia can burn eyes and lungs. Dust can aggravate asthma. "Ammonia from the farm rises into the atmosphere, returning as rain." (*DesMoines Register*, 10-25-98)
- **"A Minnesota Pollution Control Agency study using a computer model found that hydrogen sulfide levels could be expected as far as five miles downwind from confinement sites."** (Des Moines Register, 10-25-98)
- **Evidence suggests that bioaerosols (dander, feed, excreta and bedding) are associated with microbial pathogens of swine.** These "can be carried and spread on dust." "Contrary to odors, many gases are odorless and tasteless, making them benign since they are difficult to detect with the human nose." Odor and gases are different, but both contribute to decreased quality of life of neighbors (Controlling Odor and Gaseous Emission Problems from Industrial Swine Facilities, Yale Environmental Protection Clinic, Spring 1998)
- **Hydrogen Sulfide, found in swine waste gases, "Is considered to be an insidious poison because our sense of smell rapidly fatigues, and therefore, fails to provide a good warning of gas concentration."** Symptoms include eye and upper respiratory irritation headaches, and dizziness. Higher concentrations can cause "severe eye and respiratory tract irritation, acute conjunctivitis, lacrimation, and difficulty breathing, as well as a sudden loss of consciousness: (Safety Net, UC Davis Environmental Health and Safety, 2-1993)
- **Even moderate occupational exposure and insidious environmental exposure to Hydrogen Sulfide can cause permanent impairment.** Because hydrogen sulfide is heavier than air, it should never be vented into the atmosphere where it can descend downwind..."Dr Kaye Kilburn M.D. University of Southern California School of Public Health)
- **Unsolicited complaints from residents living next to a 5 building swine production facility reflected such physical symptoms as breathing difficulties, burning sensations in the nose and throat, nausea and vomiting, headaches, sleep problems and others.** (State of Michigan Department of Health, 1990)
- Hydrogen Sulfide is an extremely toxic gas to humans and animals. (Handbook of Hazardous Materials, 1993)
- During agitation of liquid manure, the concentration of hydrogen sulfide in the breathing zone of workers can climb to lethal levels within seconds. (University of Iowa, 1995)
- **MPCA (Minnesota Pollution Control Agency) data reveal that swine CAFOs can emit hydrogen sulfide onto neighboring property at levels that exceed World Health Organization recommended standards.** (Roth, 1993).
- People exposed to hydrogen sulfide at nuisance levels for prolonged periods - showed chronic neurobehavioral impairment (loss of balance, memory and reaction time) months to years afterwards. Conclusion: **Exposure to hydrogen sulfide must be avoided** (Southern Medical Journal, 1997)
- **Residents living within 2 miles of a 4,000 hog confinement reported significantly more respiratory problems than other residents.** (Institute for Rural and Environmental Health, Univ. of Iowa, 1997)
- When ambient air quality standards for livestock are exceeded, neighbors may experience: eye, nose, and throat irritation, headache, nausea, diarrhea, hoarseness, sore throat, cough, chest tightness, nasal congestion, heart palpitations, shortness of breath, stress, drowsiness, and mood alterations (Minnesota Department of Public Health, 2001)
- **Residents in the vicinity of an approximately 6,000-head hog confinement reported increased occurrences of headaches, runny nose, sore throat, excessive coughing, diarrhea, and burning eyes as compared to residents of the community with no livestock operations.** (School of Public Health, University of North Carolina, 1999)
- **Existing data provide evidence for potential adverse health effects due to hydrogen Sulfide concentrations.** Property line monitoring data indicate that 43 violations in August posed a threat to human health (Minnesota Department of Public Health, 2000)
- **Research from South Sioux City, Nebraska found reports of respiratory problems in children increased 20 to 40 percent when hydrogen sulfide levels in the air exceeded 30ppb** (Agency for Toxic Substances and Disease Registry, 2002)