HUMANE SOCIETY INTERNATIONAL

HSI Fact Sheet

Human health impacts of odors from industrial farm animal production facilities

Reports of adverse human health effects associated with odors from industrial farm animal production (IFAP) facilities have been recorded by numerous studies in the United States.[1,2,3] The most frequently reported problems include eye, nose, and throat irritation, headache, nausea, diarrhea, cough, chest tightness, palpitations, shortness of breath, stress, and drowsiness.[4] People suffering from asthma or allergies complain that the odors exacerbate their existing illness.[5]

A study from the U.S. state of Iowa found that residents living within a two mile radius of an IFAP facility reported higher frequencies of 14 of 18 physical health symptoms, especially respiratory problems, relative to their counterparts who did not live near an IFAP facility.[6] Excessive irritation in the airways resulting from IFAP's airborne pollutants may lead to tissue damage and scarring in the respiratory tract.[7] Stimulation of key sensory nerves by odorous pollutants in the air can also cause a cascade of reactions that result in headaches and migraines.[8]

Another study conducted in the U.S. state of North Carolina reported a significantly higher incidence of mental health symptoms amongst residents living near IFAP, in comparison to a control group.[9] Symptoms included increased levels of tension, depression, anger, fatigue, and confusion.[10] Mental health symptoms frequently have a physiological basis and can be linked to physical problems. For example, reduced breath intake is a reflexive response to unpleasant odors stimulating nerves in the upper airway. This, in turn, triggers activity in the part of the nervous system that leads to higher levels of circulating stress hormones, and subsequently causes increased heart rate and blood pressure. Further, stimulation of this portion of the nervous system has been associated with feelings of fear and anger.[11] Thus there seems to be a clear link between sustained exposure to unpleasant odors, such as those from IFAP, and neurobehavioral functioning.[12] This feeds back into poor physical health, as chronic stress has been associated with heart disease and hypertension.[13]

Humane Society International's investigations in Romania and Mexico suggest that residents living near industrial pig production facilities in these countries experience adverse health impacts associated with IFAP odors, similar to those recorded amongst IFAP impacted communities in the United States. **It is clear that industrial farm animal production compromises community health.**

What is IFAP?

In general, IFAP facilities crowd up to hundreds of thousands[14,15,16] of farmed animals along with their waste on a small land area, frequently in welfare-depriving cages, crates, and pens.[17] Worldwide, a growing number farm animals are housed in environments that severely impair their welfare, as they may be unable to exercise, fully extend their limbs, or engage in many important natural behaviors. For more

information on IFAP's impacts on farm animals, please see HSI's Report on the Welfare of Intensively Confined Animals.

The United States Environmental Protection Agency (EPA) offers a more specific classification of these facilities, defining them as small, medium, or large Confined Animal Feeding Operations (CAFOs). According to the EPA, "Animal Feeding Operations (AFOs) are agricultural operations where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland."[18]

Facilities that confine animals for at least 45 days in a 12-month period, in a confinement area lacking grass or other vegetation during the normal growing season, are designated as AFOs.[19] In addition to meeting the definition of an AFO, CAFOs meet the criteria for a large, medium, or small CAFO. A facility is designated as a large CAFO based on the number of animals confined. A large pig CAFO, for example, confines 2,500 or more pigs weighing over 25 kg (55 pounds), or 10,000 or more pigs weighing less than 25 kg (55 pounds). A large chicken CAFO utilizing a liquid manure handling system confines 30,000 animals or more (the minimum number of chickens required for this designation increases if an alternative manure management system is employed).[20]

Medium and small CAFOs confine fewer animals, but may have been cited by the EPA as a significant contributor of pollutants; medium sized CAFOs may allow the animals or their waste to come in contact with surface water.[21] More detailed definitions of CAFOS, and size classifications for additional species, can be found on the EPA website. [22]

Odor complaints in the United States have increased significantly along with the number of CAFOs.[23]

What types of odorous pollutants emanating from IFAP cause problems?

A total of 411 compounds have been associated with odorous emissions from industrial pig production facilities alone.[24]

1) Volatile Organic Compounds (VOCs): "Hydrocarbon compounds that have low boiling points, usually less than 100ºC, and therefore evaporate readily. Some are gases at room temperature."[25]
    - In IFAP, VOCs are generated by the bacterial degradation of protein, fat, and carbohydrates in organic matter such as manure or other wastes.[26]
2) Reactive inorganic gases such as ammonia and hydrogen sulfide also generate unpleasant odors, and are emitted from animal wastes.[27]
    - Persistent asthma-like symptoms can result from a single, excessively high environmental exposure to hydrogen sulfide from manure.[28]

What is the mechanism through which odorous pollutants impact human health?

Physiological impacts can result from odor (the sensation created by the odorant interacting with receptors in the nasal cavity), or the irritant nature of the odorant itself.[29] There are a multitude of mechanisms through which odorants cause problems:

1) Odorants can be present at levels known to cause irritation and health effects, in addition to odor. The odor merely accompanies, and serves as a marker to, the actual problem.[30] The irritation both inflames the tissue, and activates various sensory signals and responses..[31] Respiratory tract irritation can have varied impacts including (but not limited to) a reduction in the volume of air inhaled, contraction of the the larynx and bronchi, increased the secretion of stress hormones, increased blood pressure, or decreased blood flow to the lungs.[32]

However, many of the VOCs, organic amines, and sulfur compounds are present at very low levels around industrial pig facilities, below the threshold that each individual pollutant is known to cause irritation. In these cases, there are two other mechanisms through which health problems might occur:

2) The combined load of numerous VOCs and other compounds emitted together can exceed the threshold at which people start to experience health problems.[33]
3) The odor is often part of a mixture that contains particulates like dust, pesticides, or bacterial toxins. Airborne particulates (bits of manure, skin cells, molds, feathers, feed dust, bacteria/bacterial toxins) can carry heavy loads of odors on their surface, so odor intensity can actually be greater in the presence of particulates.[34] The particulate is actually the cause of the health effect, but the person's body begins to associate the odor with the symptoms caused by the particulate.[35] In poultry facilities, the combination of ammonia and particulates causes more health problems than just the presence of either pollutant on its own.[36]

   Coarse particles, while causing health problems to workers and those in direct contact with the IFAP facility, are less dangerous to those living downwind than fine particles.[37] Fine particles are generally formed in the atmosphere through the interaction of various gases. The formation of SO_3 and sulfuric acid, and the formation of ammonium nitrate are examples of processes that produce fine particulates from gases emitted into the atmosphere by IFAP facilities. Fine particles can remain suspended in the air for long periods of time, and travel long distances. They can cause serious health effects, including pulmonary inflammation and damage, when inhaled.[38]

There is evidence that continuous exposure to CAFO odors can reduce perceived odor and irritation intensity. This is of concern, as odor and irritancy can often serve as a warning signal that a pollutant is jeopardizing health.[39]

Conclusion:

According to the World Health Association (WHO), "[h]ealth is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."[40] Given the broad range of symptoms induced by IFAP odors, it is clear that industrial farm animal production compromises the health of people working or living near IFAP facilities.

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