

THE ENVIRONMENTAL IMPACT OF THE INDUSTRIAL PIG FARMS FROM THE MAȘLOC COMMUNE

IMPACTUL FERMELOR INDUSTRIALE DE PORCINE DIN COMUNA MAȘLOC, ASUPRA MEDIULUI

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Abstract: *This study present the environmental impact of the industrial pig farms and the high pollution degree of the environmental factors (water, air, soil and people). Reprehensible management and carelessness about the potential dangers of the waste and the failure to install decent pollution control equipment and treat the waste resulted in violations of the permitted limits for phosphorus, faecal coliform and other pollutants. One way that pig farms waste pollutes is through the sprayfield system, which is supposedly meant to fertilize crops. But often too much of the untreated liquid manure is sprayed, resulting in crop damage and contaminated soil, groundwater as well as pose a serious health risk to the small segment of the population subject.*

Rezumat: *Acest studiu prezinta impactul fermelor industriale de porcine asupra mediului si gradul de poluare al factorilor de mediu (apa, aer, sol si populatie). Datorita netratarii si lipsei echipamentului neadecvat de control al poularii s-au incalcat limitele admisibile pentru fosfor, coliformi fecali si alte substante poluante. Unul din modurile in care poluează fermele de porcine este prin sistemul de pulverizare a dejecțiilor, ce ar trebui teoretic să introducă îngrășăminte în soluri. Deseori este împrăștiată o cantitate prea mare de dejecții lichide netratate, ce afectează culturile și contaminează solurile și apele subterane ca de altfel impune probleme serioase in ceea ce priveste sanatatea populatiei.*

Key words: *waste, untreated liquid manure, pollutants, environmental factors, environmental impact*
Cuvinte cheie: *dejecții, dejecții lichide netratate, substante poluante, factori de mediu, impact asupra mediului*

INTRODUCTION

The present document does not attempt to put in balance the economic benefits instead it aims to review what industrial pig farms are, their environmental and health impact.

The current analysis started with the information on one of Smithfield's projects in the western part of the country, in the Mașloc commune.

Mașloc is a commune with 2100 inhabitants, in three villages, approximately 35 km away from Timișoara, where two pig farms have been planned, and their capacity is 8,160 animals each, 1 km from the residential area. The investors are Smithfield an American company and in 2004, Smithfield bought Comtim SA, a pig complex.

There are a few pensions in the area, a school camp at Bogda (10 km from Mașloc), the forest reserve Bazoș (Remetea Mare - 60 ha), gliding, fishing and bird watching and a clinic with natural and homoeopath treatment, with 20-25 persons in daily, where 4 medical symposiums are organised each year, and social programmes are developed with students in the area.

The main environmental impact in the case of pig farms is related to animal waste management. The manure at the farm would be stored in two basins 5000 m³ each and then spread over arable land within the commune, even though Mașloc is a vulnerable area from the point of view of nitrite pollution. The farms would also involve the release in the atmosphere of considerable quantities of ammonia, methane and other bad odour substances. In this

respect, we need to consider the current agro-tourist exploitation, and potential of the area, as well as the disturbance of existing activities including the clinic in the village, pensions, inflow of foreign tourists.

MATERIAL AND METHOD

As potential fertilizing resources, the liquid hog manure resulted in pig farms were tested.

There may well be up to 300 different substances that cause the pungent odour of liquid hog manure. Two of the best-known inorganic compounds present are H_2S and NH_3 . It would be remiss not to mention the others, which include alcohols, aldehydes, amines, esters, sulphides, and mercaptanes.

H_2S is well known to everyone as the rotten egg smell and anyone who has even been in close proximity to a paper mill is familiar with this one. It is colourless, denser than air and tends to collect in low-lying areas and indoors near floor surfaces. Acute exposure to high concentrations even over short periods of time can and has resulted in death. At moderately high concentrations (100-400 ppm) it produces rhinitis, cough, *dyspnoea*, *tracheobronchitis*, and possibly pulmonary oedema.

NH_3 from the urine and faeces can cause severe respiratory damage. NH_3 vaporizing from liquid hog manure sources can be carried with precipitation. It should be noted that one third of the workers in the intensive hog operations will develop chronic respiratory illnesses. Some of these illnesses are due to toxins (endotoxins or glucans) from inhaled microbes.

Hundreds of VOCs are present in liquid hog manure. Their odiferous character can offend even the hardened rural residents. Volatile organic compounds, responsible for noxious odours, also create huge concerns for neighbours, particularly when large volumes of liquid manure are stored for months at a time in open lagoons and when sprayed on fields. The odours can have a devastating effect on health, while permeating people's homes and drastically reducing their quality of life.

Liquid hog manure is 30 times more toxic and has a BOD 160 times that of raw human municipal waste. When this material enters the water supply, it chokes off the normal aquatic life. This is seen in areas of stagnant water where there is a lack of oxygen resulting in fish death; eventually, algae take over. *Pfiesteria piscicida*, a tiny one-celled animal that produces an extremely powerful neurotoxin which paralyses the fish, sloughs their skin and eats their blood cells. *Pfiesteria piscicida* is capable of doing the same thing to humans.

There are up to 50 known pathogens, which have been measured in the waste material of the lagoons from these industrial hog operations. The most familiar, *E. coli*, forms in the intestines of warm-blooded animals.

Hogs in confinement are virtually kept alive by massive doses of sub-therapeutic antibiotics to prevent illness due to crowded conditions and to promote growth. The growth rates are unnaturally sped up with these antibiotics along with hormones and heavy metals added to the feed. Up to 80% of the antibiotics administered to the hogs are excreted, unaltered, into the liquid manure.

Consequently, antibiotics, as well as antibiotic-resistant bacteria, join the nitrogen, phosphorous, heavy metals, and other swine manure constituents that find their way into, and degrade, surface and ground waters.

Phosphorous (P) and Nitrogen (N) are the two major nutrients in manure. When present in excess however, they become serious water pollutants. At high levels phosphorous is acutely toxic to fish. At lower levels both phosphorous and nitrogen stimulate excess vegetative production which alters the ecosystem. This eutrophication process results in severe degradation of a water body when the vegetation decays under conditions that deplete the

oxygen. Nutrient pollution is also implicated as the trigger for the development of the marine micro-organism *Pfiesteria piscicida* mentioned earlier children in the first six months of life are particularly vulnerable to high nitrates because foetal haemoglobin is more reactive than adult haemoglobin; also the flora found in the stomach of infants facilitates conversion of nitrates to nitrite.

RESULTS AND DISCUSSIONS

High levels of nitrogen leaching into drinking water have been linked to increased risk of blue-baby syndrome. High levels of nitrate in well water near feedlots lead to incidents of spontaneous abortions in humans. Nutrient contamination from nitrogen and phosphorous kills fish, causes algae blooms, suffocates a range of aquatic life, and leads to *Pfiesteria* outbreaks. Researchers have suggested that possible causes of *Pfiesteria* proliferation may be increases in nitrogen and phosphorous from fertilizers and animal faeces in runoff from fields and dams that affect the flow and nutrient levels of rivers. Finally, pathogens such as bacteria and viruses can contaminate drinking water causing gastrointestinal illness and occasionally death. Unable to perform their purifying function with so much waste, over-application of hog manure has poisoned drinking water supplies in many communities. And from time to time, spills from manure lagoons devastate nearby lakes and rivers. Seeking to dispose of vast quantities of waste, factory hog farms typically apply far more manure to concentrated areas of cropland - often with large irrigation sprayers releasing liquefied manure and urine - than the soil can absorb. Animal wastes are carriers of parasites, bacteria and viruses including *Salmonella*, *Campylobacter*, *E. coli*, *Cryptosporidium*, *Giardia*, *Cholera*, *Streptococcus* and *Chlamydia*. *Cryptosporidium* and *Giardia* are found to be resistant to conventional chlorination and therefore there is greater probability of drinking water contamination when lagoons containing high concentrations of hog manure leak.

Pollution is not limited to water. Large amounts of methane, a major greenhouse gas, are released from manure lagoons. Hydrogen sulphide is also released from hog manure and has been linked to dizziness, nausea, vomiting, and blackouts in residents near factory farms. At high concentrations, it can cause brain damage. And finally ammonia, toxic chemical released from hog waste, can be carried as far as 500 kilometres through the air before being deposited into water or into the ground where it can contaminate groundwater, cause algae blooms, and kill fish. Hog waste contains a significant amount of nitrogen that evaporates into the air as ammonia and falls back to the land and water bodies when it rains. A small portion of it is lost as nitrous oxide (N₂O) which is the most damaging greenhouse gas that depletes the ozone layer - it is 320 times more damaging than carbon dioxide. Atmospheric nitrogen deposition, though beneficial to the extent that it may be easily absorbed as fertilizer if it falls (with rain) on a crop, can actually cause more harm than good to the environment. It can destroy natural habitats, trigger algal blooms that rob the water of oxygen and changes in population species.

Animal wastes are carriers of diseases, and some of the components of pig waste that have direct adverse effects on human health are pathogens, nitrates, and hydrogen sulphide. Pathogens can contaminate water and cause gastrointestinal diseases.

The nitrate converts to nitrite as it enters the body and affects haemoglobin, the red corpuscles in the blood that carry oxygen throughout the body. With this, haemoglobin transforms into methemoglobin, which does not transport oxygen thus resulting to less oxygen getting to vital tissues, and especially to the brain. Mainly vulnerable are six-month old infants, pregnant women and adults with immunity deficiencies. *Pfiesteria* is a harmful organism, exposure to which may cause skin irritation, short - term memory loss and other cognitive impairments. The vapour emitted by swine farms, which contains noxious gases such as methane, ammonia

and hydrogen sulphide, filter through the skins and houses of people living near the farms. Those people who were living near hog farms suffered from headaches, runny noses, sore throats, excessive coughing, diarrhoea and burning eyes.

While methane and ammonia are large contributors to the greenhouse effect, hydrogen sulphide greatly affects human health. Hydrogen sulphide, usually associated with a "rotten egg" smell, has caused symptoms such as nausea, blackout periods, headaches and vomiting. In addition to odour malfeasance, neighbours appear to be experiencing elevated rates of health symptoms related to the upper respiratory tract as well as immune system damage.

CONCLUSIONS

As the world's leading hog producer, through reprehensible management and carelessness about the potential dangers of its waste, Smithfield has been a leading polluter. The authorities found that Smithfield's failure to install decent pollution control equipment and treat its waste resulted in 5,000 violations of the company's permitted limits for phosphorous, faecal coliform and other pollutants.

One way that pig farm waste pollutes is through the sprayfield system, which is supposedly meant to fertilize crops. The untreated liquid manure is drawn from the lagoon or basin and sprayed over cropland and pastures using large sprinklers. But often too much of the waste is sprayed, resulting in crop damage and contaminated soil and groundwater. Meanwhile, the pork companies attempt to evade responsibility for the pollution their lagoons cause. They often sign contracts with contractors who own the land and run the facility, whereby the company owns the hogs, and the contractor owns the waste product to be sold as fertilizer, thus permitting the producers to point the finger at the contractors if any pollution results from lagoon leakage or over-spraying.

Monitoring the implementation of Smithfield projects in Romania will soon reveal their concrete benefits and impact.

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