

## WAYS OF PREVENTING AND REDUCING NEGATIVE EFFECTS ON THE ENVIRONMENT ON PIG FARMS

BOLOCAN RODICA<sup>1</sup>, PETROMAN I.<sup>1</sup>, PETROMAN CORNELIA<sup>1</sup>,  
OCNEAN MONICA<sup>1</sup>, MARIN DIANA<sup>1</sup>

<sup>1</sup>USAMVBTimișoara, Faculty of Agricultural Management  
email: bolocan\_rodica@yahoo.com

**Abstract:** Intensive raising of pigs generates a significant impact on environmental factors, i.e. on soil, surface waters and underground waters because of untreated waste waters or of waste waters that are not enough treated discharged into natural water courses and of wastes used uncontrollably to fertilise the lands, on the air, because of gas emissions and of aerosols resulted from metabolic processes and from waste management, i.e. the noise and smell that affect farm neighbourhoods. By applying measures that aim at protecting water, air, soil, and underground waters quality, reducing noise and vibrations, negative effects on the environment can be prevented or minimised to make the impact range of activities within admissible limits.

**Keywords:** environmental impact, measures, environmental factors, pigs

### INTRODUCTION

Environmental issues in agriculture have been targeted relatively recently. Until the 1980s, the impact of intensive rearing was not an environmental issue though it was already acknowledged that soil contamination by animal manure and bad smell were already an issue for the increasing population in rural areas [1,3,4,7].

One of the major challenges of modernising pig production is the need for reducing or eliminating the effects of pollution on the environment to harmonise pig rearing requirements and maintain business profitability [2,5,6,8,9].

Agricultural activities in intensive pig rearing can result in several environmental issues:

- acidification (NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub>);
- eutrophication (N, P);
- reducing the ozone layer (CH<sub>3</sub>Br);
- increasing greenhouse effect (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O);
- desiccation (using underground water);
- local discomfort (smell, noise);
- spreading heavy metals and pesticides.[15]

However, the negative effects on the environment can be minimised and ranged within admissible limits.

**During the operation of pig farms**, we recommend the monitoring of environmental factors in the area of the pig farms, as follows:

- **analysing the main indices of waste water quality:** this can be done by making physico-chemical measurements of treated water in the pig farm area;
- **analysing the main indices of air quality** in the pig farm area taking into account mainly the values of such indices as ammonia, methane, sulphured hydrogen, and powders, monitoring their variation depending on time. Measurement points will be established within the pig farm along its main directions (N, E, S, W);
- **analysing the main indices of ground water quality** by making physico-chemical measurements of drilled water (monitoring drills);
- **monitoring soil** by making measurements of quality indices;
- **monitoring noise** at the pig farm boundary;

- **monitoring waste amounts** and their valorising and removal.

## MATERIALS AND METHODS

To carry out this study, we analysed the literature in the field, the Internet sources, the information bulletins, as well as national and international regulations in the field. Data were collected and, after processing, we could draw some final conclusions. In this paper, we present the measures to be taken to reduce pig rearing environmental impact.

## RESULTS AND DISCUSSION

During pig farm operations, emissions from waste decay can be an air pollutant and the impact can be a significant one. In general, the nature of emissions of air pollutants and their amount largely depend on the waste content and amounts.

Pollutant emissions are generated during the storage of animal wastes in pig stalls and by the way they are collected, and gas concentration can be reduced if wastes are removed on a frequent basis.

The risk of accidental discharge of pollutant substances in water bodies is possible when they cannot rely on liquid waste storage, i.e. a buffer storage capacity in case of heavy rains. The consequences and seriousness of pollution in such situations largely depend on the amounts and quality of discharged waste water. In this case, the effects of pollution can be significant contributing to the contamination of water bodies with pathogens and to the occurrence of eutrophication because of nutrient supply.

Thus, to prevent a significant negative impact on the environment during pig farm operations, we need to take measures for each environmental component, as follows:

### ***Measures for the prevention of ground water pollution:***

- waste water storage (technological waste water and liquid wastes) shall be done only in water proof basins;
- periodical checking of the volume of waste water and liquid wastes stored in basins to prevent overflow;
- separation of technological waste water from the cleaning of pig farm buildings from suspension matters and storage in the storage basin, while solid wastes shall be stored on the waste platform. Periodically, they are taken and applied on the soil according to application standards established after soil studies on the lands of the pig farm depending on the crop type in accordance with the Code of Good Practices in Agriculture;
- fertilisers (both liquid and solid) shall be spread with modern systems and observing strictly legislation standards;
- before starting to operate pig farms, measures for the prevention of accidentally polluted waters shall be taken to prevent accidental pollution of the water: thus, home waste waters from the sanitary filter and from the incinerator area shall be collected in dischargeable basins and later treated in water plants;
- technological waste water or home waste water shall not be discharged into natural water bodies;
- the quality of ground waters shall be monitored through observation drills (phreatic wells) to identify possible soil contamination-infiltration of different substances. In the case of water samples from observation drills, the following parameters shall be analysed: pH, suspensions, filterable wastes, sulphates, nitrates, ammonia, extractible substances, phenols;

***Measures for the prevention of air pollution:***

- water proof basins for the storage of wastes are designed to facilitate a mixed, aerobic and anaerobic fermenting and decomposing process and to reduce the amount of smells. Waste stirring shall be done only during basin emptying to homogenise the content.
- to spread liquid and solid wastes on agricultural lands the operators shall use their own equipment or the equipment of licensed companies specialised in the spreading of liquid fertilisers to ensure quick and efficient incorporation of the fertilisers in the arable land;
- equipment operating rates shall be properly regulated;
- the technical state of the engines and equipment shall be maintained within normal limits;
- vegetal protection curtains shall be set at the pig farm borders.

***Measures for the prevention of soil and underground pollution:***

- the management of proper areas for the temporary storage of wastes and matter produced during the pig farm operations;
- periodical checks of the integrity of concrete structures of the water treatment plant and of the water level in these components;
- periodical checks of the functioning at estimated parameters of all components of the water treatment plant;
- all the components of the water treatment plant shall have a volume buffer to overtake rain water and avoid accidental discharge on the soil;
- waste water and sludge analyses shall be done before spreading on agricultural lands, before agricultural land mapping and before the development of fertilisation plans;
- technological waste water and wastes stabilised in storage basins at rates corresponding to soil needs and agricultural crops shall be done depending on the area (vulnerable to nitrate pollution) observing the Code of Good Agricultural Practices;
- sewage system tightness shall be checked (sewage network and dischargeable retention basin);
- wastes shall be properly managed without final or temporary storage on the soil;
- a plan for the prevention and control of accidental pollution (possible oil leakage from the vehicles and agricultural equipment together with measures for the dry collection of possible leakage from concrete platforms of the pig farm units);

***Measures for the prevention of sound pollution:***

- adaptation of a daily schedule of the works to the needs for the protection of neighbouring sensitive receptors;
- use of equipment that work at moderate noise levels: the noise level shall not be above 85 dB(A) per equipment;
- the operator shall use good practice measures to control noise, including proper equipment maintenance;

***Measures for the management of wastes:***

- the operator shall avoid waste production; however, when this cannot be avoided, they will be valorised or eliminated avoiding negative environmental impact;
- animals that died on the pig farm shall be stored temporarily and removed according to sanitary-veterinary standards.

## CONCLUSIONS

Pig rearing has no negative environmental effects as long as operators observe the measures stipulated in the field.

When environmental effects are irreversible, they are considerable and can occur particularly in surface water courses and on agricultural lands, initiating and/or emphasising salinisation and acidification processes and heavy metal pollution of the soil, as well as eutrophication of surface waters and contamination with pathogens in both surface and ground waters and soil.

Reversibility of environmental impact is possible depending on the size of the impact (short- and long-term); it is also determined by the promptness of the intervention and by the category of the measures taken by the operator.

## REFERENCES

1. **BAKER D.**, Training and Technical Assistance Strategies for Behavior Support and Crisis Response, College of Education and Human Development, University of Minnesota, 2005
2. **FRASER A. F.**, Farm Animal Behaviour and Welfare. 3 rd Edition Wallingford: CAB International, 1990
3. **MARIN DIANA, PĂCALĂ N., PETROMAN I., PETROMAN CORNELIA, UNTARU RAMONA, DRAGOȘ LAURA, ȘANDRU O.**, Study regarding the favourable factors that influence swine production, *Lucrări științifice Management agricol*, seria I, vol. XIII(2), Facultatea de Management Agricol, Timișoara, 2011
4. **MARIN DIANA, N. PĂCALĂ, I. PETROMAN, CORNELIA PETROMAN, RAMONA UNTARU, O. ȘANDRU, E. ZAPPE**, The role of endogenous factors upon swine productivity, *Lucrări Științifice Management Agricol*, Facultatea de Management Agricol, seria I, Vol XIII (2), Timișoara, 2011
5. **NEAGU IULIANA, CULEA C., PETROMAN I.**, *Cresterea animalelor*, Editura Eurostampa, Timișoara, 2007
6. **PETROMAN CORNELIA, PETROMAN I., MARIN DIANA, BELA ANGELA, UNTARU RAMONA, MUNTEANU ȘTEFAN**, Prolificacy and lost of piglets for sows exploited on pasture, *Lucrări științifice Management Agricol*, Seria 1, vol. XIV (2), Facultatea de Management Agricol, Timișoara, 2012
7. **PETROMAN, I., CULEA C.**, *Sisteme de creștere și exploatare a animalelor*, Editura Mirton, Timișoara, 1998
8. **PETROMAN I., NICOLAE M., CULEA C., PETROMAN CORNELIA**, (2002), *Creșterea porcinelor*, Editura Mirton, Timișoara, 2002
9. **PETROMAN I., AVRAMESCU DANIELA, PETROMAN CORNELIA, MARIN DIANA, CIOLAC RAMONA, TURC BOGDAN, LOZICI ANA**, (2013), *Habitat as environment in swine*, *Lucrări științifice Management Agricol*, Seria 1, vol. XV (4), Facultatea de Management Agricol, Timișoara, 2013
10. \*\*\* - European Commission, *Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs*, July 2003
11. \*\*\* - Ministerul Agriculturii, Padurilor, Apelor si Mediului, 2003, Ordin nr. 818 din 17 octombrie 2003 pentru aprobarea Procedurii de emitere a autorizatiei integrate de mediu, *Monitorul Oficial al Romaniei*, Bucuresti

12. \*\*\* - Ministerul Mediului si Dezvoltarii Durabile, 2007, Ordin nr. 1798 din 19 noiembrie 2007 privind aprobarea Procedurii de emitere a autorizatiei de mediu, Monitorul Oficial al Romaniei, Bucuresti
13. \*\*\* - Ministerul Mediului si Gospodarii Apelor, 2005, Ordin nr. 1182 din 22 noiembrie 2005 privind aprobarea Codului de bune practici agricole pentru protecția apelor împotriva poluării cu nitrați din surse agricole, Monitorul Oficial al Romaniei, Bucuresti
14. \*\*\* - Ministerul Mediului si Gospodarii Apelor, 2006, Ordin nr. 1234 din 14 noiembrie 2006 privind aprobarea Codului de bune practice in ferma, Monitorul Oficial al Romaniei, Bucuresti
15. \*\*\* - Parlamentul Romaniei, 2013, Legea nr. 278 din 24 octombrie 2013 privind emisiile industriale, Monitorul Oficial al Romaniei, Bucuresti
16. \*\*\*- [www.apmtm.anpm.ro](http://www.apmtm.anpm.ro)