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IMPACT AND VULNERABILITIES OF INTENSIVE ANIMAL HUSBANDRY IN THE NORTH-WEST REGION OF ROMANIA FOR CLIMATE CHANGE

Mintaş Olimpia*, Mintaş Ioan*, Vicaş Gabriela*

*University of Oradea, Faculty of Environmental Protection, 26 G. Magheru st., 410048 Oradea, Romania, e-mail: buzasiu@yahoo.com

Abstract

Global environmental change has the potential to ecologically and socially exacerbate the impact of biodiversity change. In many regions, land conversion is forcing the population to shrink to the edge of covering their species, where they become increasingly vulnerable to collapse if exposed to additional human impact. The most significant effects are probably borne by small farmers who have limited financial and technical capacity to adapt to climate variability and change. This article is proposed to improve the understanding of the impact of climate change, the vulnerabilities of animal husbandry adaptation practices to climate change.

Key words: Climate change, animal husbandry, vulnerability, impact

INTRODUCTION

Global warming currently involves two major problems for humanity: on the one hand, the need to drastically reduce greenhouse gas emissions, in order to stabilize the level of concentration of these gases in the atmosphere, to prevent anthropogenic influence on the climate system and to enable natural ecosystems to adapt naturally, and on the other hand, the need to adapt to the effects of climate change, given that these effects are already visible and inevitable due to the inertia of the climate system, regardless of the outcome of emission reduction actions. (4).

Animal husbandry is the most important source of greenhouse gases in agriculture, more than 50% of which, at EU level, come from livestock farms and manure depots, the main greenhouse gases in this sector being methane. and nitrous oxide. High concentrations of CO2 in the atmosphere come from plant materials that are considered, similar to the situation in the energy sector, a renewable energy source. Carbon dioxide from the breath of domestic animals does not contribute to these amounts, but is again incorporated by plants into the organic matter and thus the cycle continues.

Methane is mostly generated by the fermentation of food in the intestinal tract of domestic animals, especially in the front of the stomach of ruminants, but also during the storage of animal fertilizer. Although methane carbon comes from plant material, it is not environmentally neutral, as is carbon dioxide formed by respiration. The greenhouse effect of methane is 21 times greater than that of carbon dioxide.

Nitrogen oxide is mainly generated by the conversion of nitrogen compounds in agricultural areas and animal manure depots. Agricultural activities also cause indirect emissions, which do not occur on farms, but are the consequence of the volatilization of ammonia and nitrogen oxides (NOX) into the atmosphere. Indirect emissions are also caused by the filtration and run-off of nitrogen compounds in surface and groundwater. Nitrogen oxide emissions depend mainly on the efficiency of nitrogen administration.
Animal husbandry mainly has a negative impact on the climate, but can also have a positive effect in some respects. Herbivorous animals use extensive pastures, the soils of these pastures being usually rich in organic matter that can retain carbon dioxide, thus bringing benefits to the environment. On the other hand, manure increases the amount of organic matter in arable land. (12).

In general, the most important measure to reduce greenhouse gas emissions from the livestock sector is the efficient use of energy and protein, which needs to be improved through the proper management of manure, especially by achieving an efficient nitrogen cycle on farms. It should be noted that methane is also generated by non-productive animals, which need energy in the form of food to maintain vital functions. As productivity increases, the ratio of energy consumed for production to energy required for animal maintenance increases and, as a result, methane emissions per unit of production decrease. As far as nitrous oxide emissions are concerned, it is important to provide the animals with sufficient protein. Excess protein in the animal diet causes excessive nitrogen excretion and increased nitrous oxide emissions from manure storage systems, while protein deficiency results in sub-optimal energy use and increased methane emissions due to enteric fermentation.

In practice, animal husbandry is often separated from the cultivation of plants, often the two activities taking place on different farms or even in different regions, which makes it difficult efficient circulation of nitrogen. While livestock farmers have the problem of excess nitrogen on the farm, growers must use a large number of mineral fertilizers which are an important source of nitrous oxide. Therefore, agriculture must be carried out as much as possible in complex structures that combine animal husbandry and plant cultivation.

MATERIAL AND METHOD

The environmental issues and their consequences on alive organisms have extended, becoming a threat to survival. We are facing a full ecological crisis, crisis which requires an international approach of the environmental

issue. The „biocapacity" of the Earth exceeds today with 25% the capacity to support the needs of human kind, thus this crisis is manifested in three directions (8): - in the multiplication 4 times of the globe's population in the XXth century, from 1,6 billions in 1900 to 6,4 billions in 2000; - in the development of dangerous technologies and their export in the 3rd world countries, poor countries, which lead to the deterioration of their environment due to the lack of instruments for the environmental control; - the replacement of natural products with synthetic, toxic ones, which accumulated in the environment's biosystem. (1,2)

In Central and Eastern Europe, the scenarios show a clear decrease in rainfall, especially in the summer season, so a rainfall deficit that will affect most areas of activity such as animal husbandry, population and ecosystems.

The specific activities of the adaptation process in the zootechnical field refer to the fund of genes, specific measures of elaboration of the diet, the grazing and sheltering of the animals, as well as to the techniques of storage of the fertilizers. Thus, greenhouse gas emissions from the livestock sector can be significantly reduced through genetic improvement, by analyzing the genetic potential of selected animal breeds, by a proper balance between energy and dietary proteins, by building appropriate shelters and suitable fertilizer depots. The introduction of appropriate grazing systems on farms can also help to reduce greenhouse gas emissions.

For the livestock sector, the code of good practice in agriculture recommends:

- large, properly sealed and equipped manure storage platforms;
- storing manure in cool and shady places;
- covering the basins with liquid residues to reduce ammonia emissions into the atmosphere, by using waterproof tarpaulins;
- ensuring the appropriate quantities of manure within the farms specialized in its collection and processing;
- construction of facilities for capturing biogas, resulting in reduced methane emissions, and the energy obtained is used to reduce fossil fuels;
- grazing in the open air compared to growing in shelter systems;
- education, raising awareness among farmers about the consequences of the effects of climate change;
- continuous review of agricultural strategies to ensure their flexibility in relation to the effects of climate change and adaptation measures.

Global warming and the prospect of depletion of conventional energy sources have required a new approach by introducing biofuels in order to reduce pollutant emissions and reduce carbon dioxide from the atmosphere.

Therefore, the widespread use of alternative sources will lead to a gradual shift from fossil fuels to renewable energy sources, in order to reduce greenhouse gas emissions.

RESULTS AND DISCUSSION

For the efficient management of renewable energy sources it is recommended:

- increasing biodiversity on farms by introducing new crops;
- cultivation of annual or perennial herbs with high energy value (cane, grass plants such as pear, sorghum, etc.);
- collection, storage and use of residual organic materials from agriculture, food industry and farms with a high protein content (liquid manure, sewage and sewage, feed residues, crop residues, slaughterhouse waste);
- increasing the share of crops destined for biogas production, such as corn, sugar beet, rapeseed, etc., which can be grown as raw material for biogas plants;
- installation of solar panels for heating water and premises. (4)
- analysis of the genetic potential of selected animal breeds;
- elimination of poorly productive animals from the farm;
- for some species, such as cows, maintaining extremely high yields can lead to low fertility and reduced longevity, which can ultimately lead to a decrease in all the positive effects of the respective yields. This is especially the case with exotic breeds, which are not adapted to local conditions;
- avoid raising animals with low productivity, except for endangered species that need to be kept;
- it is recommended to store the manure in cool and shady places, the heat accelerating the formation of methane;
- it is not recommended to collect and store liquid manure under the wooden floor of the stables, as high temperatures and large areas cause an increase in ammonia nitrogen losses in the atmosphere;
- coating liquid waste tanks with waterproof tarpaulins reduces ammonia emissions into the atmosphere. The natural crust formed on the surface of residues with a high amount of dry matter is much more effective in reducing ammonia emissions;
- ensuring the appropriate quantities of manure in farms specialized in its collection and processing, which prevents the spread of odor and avoids the loss of ammonia nitrogen in the atmosphere;
- the possibility of building facilities for capturing biogas, which reduce methane emissions, the energy obtained being used to reduce fossil fuels. Unfortunately, biogas production is too expensive for small farms.

CONCLUSIONS

The direct and indirect effects of global warming will be manifested, thus, in several general directions: - *modifications of vegetation,* the appearance of weeds which may become fatal for the ecosystem, in time; - *the increase of the level of seas and oceans* with approximately 50 cm in the year 2050, which might put in danger lots of ecosystems, especially by an increase of salinity; - *weather abnormalities* manifested though tropical rains, storms, tornados, waves of heat, etc. With an impact on the entire biosystem and on all alive mechanisms; - *the appearance of diseases transmitted through vectors,* in some regions of the globe this phenomenon may lead to incidence, prevalence and, possibly, mortality; - *the food safety is threatened*, high temperatures will affect crops in some regions of the world, especially due to modifications of the rainfall regime and the soil's humidity; - *emphasis on the desertification,* due to the „green revolution" which lead to a dramatic increase of the agricultural production, especially in the past 40 years after the second world war; - *withdrawal of alpine glaciers* has as main cause the increase of green house gas concentration, phenomenon noticed for the first time in the XIXth century, leading to the withdrawal of river flows (used in irrigations and as drinkable water), which generated a real "water crisis" with consequences in the limitation of population increase in many regions from the globe.

Our society must adopt a practical attitude in solving the *environmental issues*, instead of the one adopted until now, a reactive attitude, taken each time when a crisis appears. An optimism reason might be the fact that the great majority of alive organisms from Terra are robust, powerful, which many times demonstrated the ability to adapt to a large scale of precarious weather conditions. Mankind enters into the largest crisis ever encountered, but the man is full of resources and in the best shape, even in crisis moments.

IPCC, in its report, approached *several options to diminish* these global modifications: non-polluting methods of transportation, reduction of gas emissions of human establishments, preservation of agricultural fields, policies and strategies of management of woods from the Earth, an efficient industry, so on.

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