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Chetroiu, Rodica and Iurchevici, Lidia

The Institute for Agriculture Economy and Rural Development, The
Institute for Agriculture Economy and Rural Development

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SECTION 4: ADER Project 211

"Determination of the technical and economical technologies for crop and animal production applied in order to increase environmental performance (cost, productivity, profitability, gross margin)"

CONTRIBUTIONS OF LIVESTOCK HOLDINGS TO THE ENVIRONMENT OBJECTIVES IMPROVEMENT

CHETROIU RODICA¹, IURCHEVICI LIDIA²

Abstract: *The complexity of the relations between agriculture and environment has created the need to introduce environmental issues into the CAP. The principle of good agricultural practices is essential to understand this relation between agriculture and environment. Environmental measures in agriculture aim at the animal farm activity takes place in accordance with the recommended technologies and livestock waste management in conditions of minimum impact on the environment factors. In this paper, it estimates the annual production of organic fertilizer from farm activity, the quantities of nutrients (nitrogen, phosphorus and potassium) resulting from these, and the areas of agricultural land that can be fertilized with these quantities. The calculations took into account farm modules for the following products: cow's milk, sheep's milk, goat's milk, beef, pork, poultry, and eggs for consumption.*

Keywords: *environment, animal husbandry, fertilizers, organic, agricultural holding*

INTRODUCTION

The European Commission launched at the end of 2012 the 7th Environment Action Program which established the framework for EU environmental policy by the end of the decade. Its title - „A good life, in the limits of our planet” - emphasizes the importance of consolidation in coming years of Europe ecological resistance and transforming EU into a sustainable and inclusive green economy.

The action program sets out three thematic objectives to guide environmental policy by 2020:

- ❖ first is to protect, conserve and enhance the natural capital that underpins our economic prosperity and welfare;
- ❖ second, as provided in the emblematic initiative for a resource-efficient Europe, promoting an orientation toward an economy that uses resources effectively;
- ❖ the third objective is based on the progress already made by the EU in providing important health benefits for its citizens, increasing efforts to combat air pollution, noise pollution and water pollution, improve the management of chemicals and preparing for climate change impacts.

MATERIAL AND METHOD

In this paper, it estimates the annual production of organic fertilizer from farm activity, the quantities of nutrients (nitrogen, phosphorus and potassium) resulting from these, and the areas of agricultural land that can be fertilized with these quantities. The calculations took into account farm modules for the following products:

- Cow's milk;
- Sheep's milk;
- Goat milk;
- Beef;
- Pork;
- Poultry;
- Eggs for consumption.

¹ PhD Candidate Chetroiu Rodica – Scientific researcher, The Institute for Agriculture Economy and Rural Development, e-mail: rodica.chetroiu@iceadr.ro;

² Eng. Iurchevici Lidia – Scientific researcher III, The Institute for Agriculture Economy and Rural Development Rurală, e-mail: lidia.iurchevici@iceadr.ro

RESULTS AND DISCUSSIONS

The production activity of livestock farms may have a minimal impact on the environment through the application of technologies that will meet the EU standards in domain and the best practices. Thus, through ventilation system it can provide an appropriate climate inside animal shelter, reducing moisture, odor and ammonia emission. Also, given the proper management of waste from the housing (solid manure, bedding, liquid manure) through appropriate collection and storage, it contributes to the environmental protection.

The storage of manure shall be located near farmland; storage capacity must be designed according to the number of animals, ensuring its perfect tightness. It will use appropriate construction materials and installations must be reliable and of quality. The farm will have a waste management plan, which will decide when, where and what dose of organic fertilizer to be spread on farm land.

In the livestock farms, the environment objectives are:

- reducing harmful greenhouse emissions and a better management of waste from production activities.

Conducting production activities in animal farms will seek to minimize the impact on the environment. The waste is collected in manure pits and after transforming in natural fertilizer, will be applied to fertilize the area land for producing forages, or other crops and domestic waste is collected in closed containers, on types of waste, will be taken periodically and store on the town landfill or transfer to collection centers of recoverable materials.

- reducing of ammonia and other gases, by compliance with the veterinary standards, hygiene and animal welfare.

The activity of livestock farms will have a minimum impact on the environment, the shelters and the rest of areas must be fully monitored. Natural and artificial ventilation, with elements of automation, should provide a good microclimate, to refresh the air inside shelters and thus significantly reducing moisture, odor and ammonia emissions. The control of manure will be done by appropriate collection and storage in spaces specifically designed for this purpose. Thus, the ammonia emissions are minimized and odor inside shelters and around it is completely removed.

The evaluation of nutrients balance in terms of livestock farms provide a complete view of the factors and processes that influence the accumulation of nutrients, which in some cases exceed the maximum limits and present a potential for pollution of environmental resources. The primary sources of these nutrients within a farm are known, but it is important to establish management strategies through that the excess accumulation of these elements is reduced. The following strategies can be applied to agricultural management through that negative nutrient balance at farm level can be corrected:

- efficient use of nutrients originated from agricultural manure;
- use of alternative animal feeding rations;
- valorisation of nutrients from manure;
- applying manure treatment processes.

Agri-environmental indicators of livestock holdings:

Table 1 - Agri-environmental indicators of a dairy cows farm, capacity 150 heads, average production 6000 l/head

INDICATORS	VALUE		
Annual production of manure, tons	1711,2		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	12150	2250	8100
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	71,5		
Storage capacity of manure for 4,2 months, m ³	819		
Storage capacity of manure for 5,6 months, m ³	1092		
Storage capacity of manure for 6,5 months, m ³	1267,5		

Table 2 - Agri-environmental indicators of a sheep farm, capacity 500 heads, average production 75 l/head

INDICATORS	VALUE		
Annual production of manure, tons	421,5		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	3500	500	2500
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	20,6		
Storage capacity of manure for 4,2 months, m ³	195,3		
Storage capacity of manure for 5,6 months, m ³	260,4		
Storage capacity of manure for 6,5 months, m ³	302,3		

Table 3 - Agri-environmental indicators of a goats farm, capacity 500 heads, average production 500 l/head

INDICATORS	VALUE		
Annual production of manure, tons	421,5		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	3500	500	2500
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	20,6		
Storage capacity of manure for 4,2 months, m ³	195,3		
Storage capacity of manure for 5,6 months, m ³	260,4		
Storage capacity of manure for 6,5 months, m ³	302,3		

Table 4 - Agri-environmental indicators of a young fattening cattle farm, capacity 300 heads, average production 1000 g/head/day

INDICATORS	VALUE		
Annual production of manure, tons	2323,8		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	16500	6000	12900
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	97,1		
Storage capacity of manure for 4,2 months, m ³	1512		
Storage capacity of manure for 5,6 months, m ³	2016		
Storage capacity of manure for 6,5 months, m ³	2340		

Table 5 - Agri-environmental indicators of a fattening pork farm, capacity 2000 heads/series, 7600 heads/year, average production 800 g/head/day

INDICATORS	VALUE		
Annual production of manure, tons	2934		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	22000	8000	14000
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	129,4		
Storage capacity of manure for 4,2 months, m ³	1680		
Storage capacity of manure for 5,6 months, m ³	2240		
Storage capacity of manure for 6,5 months, m ³	2600		

Table 6 - Agri-environmental indicators of a poultry farm, capacity 20000 heads/series, 118000 heads/year, average production 50 g/head/day

INDICATORS	VALUE		
Annual production of manure, tons	240		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	7200	1400	2000
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	42,4		
Storage capacity of manure for 4,2 months, m ³	319,2		
Storage capacity of manure for 5,6 months, m ³	425,6		
Storage capacity of manure for 6,5 months, m ³	494		

Table 7 - Agri-environmental indicators of a laying hens farm, capacity 10000 heads, average production 280 eggs/head

INDICATORS	VALUE		
Annual production of manure, tons	120		
Annual production of nutrients (kg)	<i>N</i>	<i>P₂O₅</i>	<i>K₂O</i>
	3600	700	1000
Area (ha) that can be fertilized with the manure of farm (max. 170 kg N/ha)	21,2		
Storage capacity of manure for 4,2 months, m ³	252		

INDICATORS	VALUE
Storage capacity of manure for 5,6 months, m ³	336
Storage capacity of manure for 6,5 months, m ³	390

CONCLUSIONS

The results of the estimates show that livestock activities are, under appropriate management of manure, a valuable source of organic fertilizer, helping to meet environmental objectives and realizing at the same time saving money to purchase fertilizer. Thus, a farm with 150 dairy cows provides a quantity of manure that can fertilize almost half of the area required for the production of forages (71.5 ha). The sheep or goats farm with capacity of 500 heads provides a quantity of organic fertilizer that can be applied on 20.6 ha and the fattening young cattle farm of 300 heads can fertilize 97.1 ha. As for holding of 2000 fattening swine/ series, it may provide enough for 129.4 ha. In raising broilers, a farm with 20,000 heads / series can fertilize 42.4 ha and 10,000 laying hens farm provides manure for 21.2 ha.

Increasing the environmental performance in livestock activities include the use of technology to control pollution (air pollution control, waste management), the use of services with less energy and natural resources, the adopting of more efficient management practices of natural resources.

The benefits of applying environmental technologies consist mainly of reducing raw material consumption, lowering emissions of pollutants and waste prevention. The application of environmental technologies leads to reduced operating costs and increased productivity. These are applied in almost all sectors, their use generating long-term benefits that far outweigh the initial investment costs and create the potential to reduce environmental externalities generated by economic activities.

The development fund constituted in agricultural holdings modules can modernize technological processes of the farm by acquiring modern equipment; also may invest to increase the environmental performance, consisting of monitoring equipment and automatic control of microclimate factors in shelter, investments to meet the requirements on storage and treatment of manure, etc., thus contributing to the objectives environment.

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