

# STUDIES ON THE RECOVERY OF LIVESTOCK WASTE IN SPECIALIZED PLATFORMS, BASED ON THE LIVESTOCK HERDS IN ANDRIEȘENI COMMUNE, IAȘI COUNTY

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## Abstract

The authors developed, in the current paper, within a simulation, a series of scenarios regarding the soil and water pollution decrease in the rural areas, by collecting the waste resulting from the livestock activities from the rural population owning livestock and processing this waste into manure for the crop production sector. Specifically, the authors propose a series of steps to determine the rural population to deliver the daily obtained livestock waste to a specially built and equipped platform where the waste to be properly managed and processed into manure. The authors have developed two scenarios whose materialization would contribute significantly in the decrease of pollution caused by livestock activities because of the current improper management. Moreover, the authors have compiled a primary data research across several communes of the Iasi County, in terms of livestock, regarding the livestock, taking to study and illustration the Andrieșeni commune, Iași County.

**Key words:** animal waste, pollution, natural fertilizers

## INTRODUCTION

Through this paper, the authors seek to contribute to the reduction of soil and water pollution in the rural areas by developing some solutions and scenarios for converting livestock waste into natural fertilizers. The authors conducted a study across three communes of the Iași County and in five agricultural producers in the livestock, vegetable and mixed fields. Thus, the authors were able to determine the management of waste from livestock activities of the rural population and large farms.

According to the research, the rural population which owns animals does not manage the waste produced daily in any way, instead either throwing them on the ground on the outskirts of the villages or spreading it directly on the agricultural soil without any prior processing. Thus, the establishment of some special platforms for managing the livestock waste would help reduce pollution

and would also represent a significant source of manure.

Two scenarios were developed regarding the amount of organic fertilizer that could be obtained if the rural population would deliver the livestock waste on these platforms.

Analysis of the results of the interview given by the local authorities, as representatives of the rural population, correlated with the scenarios developed by the authors, demonstrated that it might get an annual quantity of natural fertilizer enough to cover an area up to 205 ha if 75% of the livestock activities waste from the commune would be delivered to the specialized platforms.

## MATERIAL AND METHOD

Studies required to develop this paper were carried out during 2014 and 2015. Were used as information sources primary data from interviews addressed to a number of eight representatives of local communities (communes) and large farms and the analysis of their opinions. Also information from secondary sources was used, from the literature existing in Romania and abroad and

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a series of guidelines regarding the prices of construction and equipment on the market, in order to create an estimate on the cost of the waste rural platforms.

## RESULTS AND DISCUSSIONS

In order to prove the efficiency and track the cost of the waste management platform mentioned above, the authors analyzed the actual situation of a commune, the Andrieșeni commune in Iași County. In this regard, the authors extracted the most relevant and recent information available for 2014.

Andrieșeni commune consists of seven villages, has a population of 4350 inhabitants and 1675 households.

The main activity of the inhabitants is agriculture, specifically the two large branches, crops and livestock.

The total area of the commune is 9249,49 ha, of which:

- ✓ Agricultural land 8199,51 ha.
- ✓ Non-agricultural land 1049,98 ha [6].

Regarding the agricultural land, it has the following structure:

- ✓ Arable 5842 ha;
- ✓ Grass land 637 ha;
- ✓ Pastures 1635 ha;
- ✓ Vine yards 75 ha;
- ✓ Orchards 9,93 ha.

Statistics reveal that at the end of 2013 Andrieșeni had the following livestock herds:

- ✓ Cattle – 1407
- ✓ Sheep – 5241;
- ✓ Goat – 1297;
- ✓ Horse – 480;
- ✓ Pigs – 1176;
- ✓ Birds – 8600;
- ✓ Rabbits – 655;
- ✓ Bee hives – 520;

On the other hand, according to the literature [7] correlated to the interviews conducted with representatives of rural communities (mayors) and with the large farms managers, the waste resulting from livestock activities are:



Fig. 1 The livestock waste quantities, consisting of scrap feed and manure, tones/year/head, and for birds tones/year/100 heads

The authors have developed two scenarios for the partial supply of the necessary quantity of natural fertilizer for the area.

The amount of waste resulting from livestock consisting of unconsumed feed by

animals and the manure, per animal (for birds, for 100 birds), the livestock of the Andrieșeni commune, Iași County and the total quantities resulting per quarter, for the whole commune, are shown in the following table:

Table 1 Total quantities of waste from livestock herd in Andrieșeni commune, Iași County

Description	Cattle	Goat & Sheep	Pigs	Birds – 100 head	Horses	TOTAL
Average quantity to/year/head	5,61	0,54	1,09	1,2	6	
Medium quantity to/quarter/head	1,40	0,14	0,27	0,30	1,50	
Livestock herd	1.407	6.538	1.176	86,60	480	
Actual quantity to/quarter	1.973	882	320	25,98	720	3.922,39
Actual quantity to/year	7.893	3.530	1.281	103	2.880	15.689,55

Premises on which the estimates and the two scenarios were drawn:

- a. Using bio substances, a complete cycle of transforming the waste by composting on the platform will occur in about 3 months [1];[3];
- b. Since a conversion cycle is completed in three months, a quarter of a year, the calculations were initially made with regard to the respective quarter;
- c. By the composting procedure about 65% of the original quantity of waste is lost [2];
- d. The construction of such a platform would require the involvement of the Townhall by providing the area of land required, financial and technical resources

owned (a tractor with a front loader and a vegetable waste shredder that could already be owned or bought by the Townhall) [4];[5]. Also, one of the two employees of the platform will have to keep records regarding the quantities of waste delivered by the population.

- a. I<sup>st</sup> scenario – only 50% of the daily livestock waste is delivered to the platform;
- b. II<sup>nd</sup> scenario – only 75% of the daily livestock waste is delivered to the platform;

In both cases, the amount delivered to the platform is fully converted in natural organic fertilizer for the producers in the vegetable crops sector.

Table 2 The actual amount received and converted into compost related scenario I

Description	TOTAL
Actual waste quantity to/quarter resulting in the commune	3.922,39
Actual waste quantity to/year resulting in the commune	15.689,55
50% of the quantity to/quarter is delivered by the population at the paltform	1.961,19
50% of the quantity to/year is delivered by the population at the paltform	7.844,77

From the I<sup>st</sup> scenario presented above it results that every quarter of year the platform may deliver to producers in the vegetable crops sector the amount of 686,41 tonnes of organic fertilizer, accounting for 35% of the original waste quantity of 1961,19 tonnes.

This quantity, if being spread in about 20 tonnes / ha, would provide natural fertilizer for

an area of 34,32 ha. In conclusion, based on I<sup>st</sup> scenario, during a year the platform could provide a quantity of natural fertilizer for an area of 137,28 ha (four quarters of 68 ha each).

II<sup>nd</sup> scenario– 75% of the daily livestock waste is delivered at the platform;

Table 3 The actual amount received and converted into compost related scenario I

Description	TOTAL
Actual waste quantity to/quarter resulting in the commune	3.922,39
Actual waste quantity to/year resulting in the commune	15.689,55
75% of the quantity to/quarter is delivered by the population at the paltform	2.941,79
75% of the quantity to/year is delivered by the population at the paltform	11.842,16

From the II<sup>nd</sup> scenario it results that every quarter of the year the platform may deliver to the producers in the crops sector an amount of 1029,62 tonnes of organic fertilizer, accounting for the 35% of the original livestock waste of 2941,79 tonnes.

This quantity, if being spread in about 20 tonnes / ha, would provide natural fertilizer for an area of 51,48 ha. In conclusion, based on II<sup>st</sup> scenario, during a year the platform could provide a quantity of natural fertilizer for an area of 205,92 ha (four quarters of 51,48 ha each).

The reason for which the authors have not created a third, more optimistic scenario in which 80-85% of the waste from the commune is delivered by the population at the platform is the fact under the current conditions, it is unlikely that the population would deliver in such a percent the livestock waste at the platform, even provided that they would get in exchange the organic natural fertilizer ready for administration.

Related to this, however, it could be made large scale information campaigns and promote these ways of transformation of the

livestock waste into valuable organic natural fertilizer within the commune platforms, having visible and significant results in the future.

## CONCLUSIONS

The establishment of such specialized platforms and in particular the determination thorough promotional campaigns of the rural population owning livestock to deliver the whole quantities of waste would completely eliminate pollution due the improper placement on the outskirts of villages or edges of rivers. Moreover, the organic fertilizers obtained would contribute to the fertilization of large areas of vegetable crops production sector.

The organization of some training courses for the rural population and training them to build their own waste platforms would further contribute to the reduction of water and soil pollution in rural areas.

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