STUDIES ON THE SOURCES OF POLLUTION FROM LIVESTOCK ACTIVITIES IN THE NORTH-EAST REGION

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Abstract

An important consequence in any breeding activity is the production of large quantities of waste. These quantities of waste consist in manure from all species of animals, scrap of crops left from feeding, secondary production of crops unconsumed by animals, solid dung and fluid or semi-fluid manure. If these are managed and treated properly, they may be quality fertilizing material for the vegetable crops. Otherwise, in their initial untreated condition, they are negative polluting matter for soil, having also negative effects on crops, besides the positive ones. According to the studies conducted by specialized institutions, about 80% of livestock farms throughout the country belong to small agricultural holdings, owned by individuals of family farms. Because these kind of units lack the necessary technical and financial resources for its transformation, manure coming from the livestock is not trated, instead being randomly distributed on the edges of arable land, edge of the villages, or waterways, causing pollution to soil, and both groundwater and surface water. The study aims to analyze the current situation in Romania and especially in the North-East Region concerning the causes of pollution from livestock.

Key words: livestock waste, pollution, soil

Globally there is a growing concern regarding to promotion of recovery of the waste through composting method. The literature emphasizes that the organic waste should neither be incinerated, nor randomly scattered, suggesting instead the method of correct composting. A first argument is that treating these wastes to their complete neutralization by traditional methods is a process that involves significant time and financial efforts. So, proper composting of this waste, especially within households, which now, as mentioned, do not have correct information, would represent a contribution to reducing pollution. However, improper composting can contribute to soil pollution with harmful chemicals for plants, and the methane which is released and contributes to global warming, while also presenting a risk of explosion if accumulated indoors.

In Romania there are no generally accepted solutions for an effective management of these wastes, which to be adopted by farmers.

Most farmers or individual rural households, and small farms have no solution for managing these wastes which are produced each day, which is why, in most of the cases, they are thrown or scattered randomly, in their fresh state, on the edge of the villages, on undeveloped areas on the edge of rivers, ravines, ponds etc. There are still some livestock owners who use animal waste, but not scientifically or properly composted beforehand. These distribute it randomly on arable or grassland, in its fresh state, in which case it loses a large amount of minerals and in addition, many viable weed seeds are being scattered. Also, these materials become a harmful factor to the environment, especially for soils, groundwater and surface water.

However, the large livestock farms are the largest producers of such waste. They are obliged by law to possess a working system for collection, treatment, disposal and recycling of this waste. But even in this case there is no precise system of optimal recovery of the waste.

MATERIAL AND METHOD

The studies were conducted during 2014, using as sources of information, on the one hand, primary data obtained by applying a series of in-depth interviews, and on the other hand using as sources of information literature from Romania and foreign sources.

The interview was conducted on a pilot sample of eight subjects, at their headquarters, consisting in livestock producers and local mayors, representatives of rural areas. As a research method, it was chosen the statistical survey based on detailed interview

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because of the advantages presented by this method, advantages that matched the paper's purpose. The interviews provided both multi-choice questions and a request to the respondents to describe how they manage the waste produced in the town or farm livestock.

There were also used for the development of this paper the statistical yearbooks available in Romania and statistical data regarding the livestock and waste quantities they produce, by category and species.

Both data from interviews and data from the literature were statistically processed and interpreted in a way that highlights the most relevant particularities of waste coming from livestock and the management and subsequent use of it as fertilizer, where it is possible.

The eight respondents, of which a total of three local mayors, representatives of municipalities and a number of five representatives of livestock farms, owned by corporate, were as follows:

Interviewed towns:

1. Ungheni town, Iaşi County, with a population of 4.200 inhabitants;
2. Coarnele Caprei town, Iaşi County, with a population of 3.050 inhabitants;
3. Andrieşeni town, Iaşi County, with a population of 4.350 inhabitants;

Interviewed livestock farms:

1. *S.C. AGRAL ŢURCANU S.R.L., Iaşi County;*
2. *LOHAN ILIE-LIVIU ÎNTREPRINDERE INDIVIDUALĂ, Iaşi County;*
3. *S.C. CERBUL CARPATIN FOREST S.R.L., Suceava County;*
4. *Societatea Agricolă ASTRA TRIFEŞTI, Iaşi County;*
5. *S.C. PIG FARM S.R.L., Iaşi County;*

RESULTS AND DISCUSSIONS

For a more accurate interpretation of the data, the respondents and the results were divided into two categories, namely:

- Livestock exploited by population within their small family farm, reported by the three local mayors participating in the study, representatives of their towns;
- Livestock farms operated by large corporate, reported by their owners or representatives;

Regarding the location of the interviewees, as can be seen, the three towns were in Iasi County, and of the five farms studied, four are located in Iasi County, and one is located in Suceava County. In terms of herd size, both villages and farms are close to the national average.

As can be seen in *table 1*, the majority of animal herds owned and exploited in rural households - family farms of the surveyed towns are sheep and goats. For comparison, corporate farms of whose representatives participated in the in-depth interviews are mostly oriented to pigs exploatations with a total of 9.000 heads.

Table 1

Distribution of livestock farms or villages over which the interview was conducted

Category name \ affiliation	Family farms	Farms – corporate	TOTAL
Cattle	2.300	193	2.493
Sheep and goats	8.900	3.600	12.500
Pigs	2.550	9.000	11.550
Poultry	35.000	0	35.000

For a higher degree of accuracy in terms of results for the present study, were considered for the interviews some towns and corporate farms of a size close the the national average, the number of heads of large animals managed by all respondents together exceeding 30.000.

The main topic addressed in the interviews was about the categories of waste from livestock activities, quantities and management methods.

Thus, according to the literature which was approached, and processing the information from the interviews, revealed the two categories of waste, according to *figure 1*:

- Manure, or manure with urine, mixed with plant bedding;
- Scrap deprecated forage or feed unconsumed by animals that farmers subsequently mix with manure.

According to the interviewees, the amount of feed unconsumed is very different from one animal category to another. Thus, cattle are the most selective of the four categories included in the study, consuming only 85-90% of the feed is given when they are in stabulation. In contrast, sheep and goats, along with pigs are consuming almost 100% of the amount of feed given. Consequently, on the category of more selective animals like cattle, to the amount of manure needed to be managed is added an important amount of feed residues important.

Cattle also produce the largest quantity of manure, due to higher body mass compared to the other categories taken for study.

As can be seen, the largest amount of waste results from the exploitation of cattle, due to their higher body mass. Pigs from the surveyed farms also produce a large amount of waste, especially

because most of the heards from Romania and the Northeast Region consists in breeds with high yield of meat production, while also producing higher quantities of waste. However, the management of livestock waste differ between the large corporate farms and family farms, as will be demonstrated.

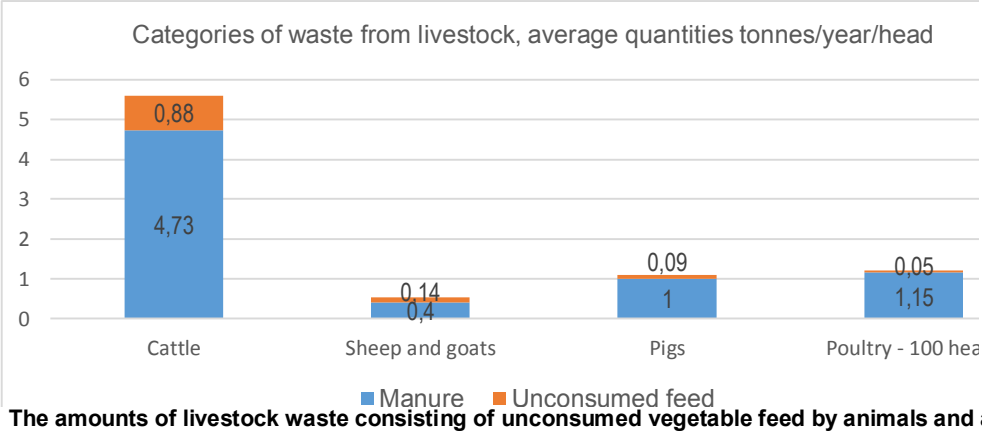

Figure 1 **The amounts of livestock waste consisting of unconsumed vegetable feed by animals and animal manure, expressed in tonnes / year / head and for poultry in tonnes / year / 100 heads**

The management of waste by the large farms owned by corporate

All five subjects which were farms owners or representantives answered that they have also a vegetable farm with arable land on which they are using the waste from livestock as natural fertilizer.

The five respondents decribed the management of the daily waste resulting from livestock by the same pattern: they take the full amount of manure, mixed with unconsumed feed and they store it on platforms located near the livestock farm, or near the vegetable farm which they are exploiting.

Platforms described by some respondents are plots of land dedicated to waste disposal for its fermentation, where the waste is stored directly on the ground. After the homogenization that occures by the taking and handling of manure from the animal shelter and feeding zone, the mixture is transported in its fresh state to the platform, for fermentation. Other respondents of the study stated that manure mixed with plant debris is transported and stored in a dedicated space consisting of a concrete impermeable cell, below ground level.

It was found that regardless of the storage type, farmers use the same process to convert manure into natural fertilizer for the arable land. Those interviewed stated that the waste is left to ferment from 8 up to 36 months without being handled, managed or treated during this period. After this period, it is spread on arable land as a natural fertilizer with the use of the manure spreader machine towed by a tractor.

The impact of this process of storing waste directly on the ground has a negative effect, polluting the soil, groundwater and surface waters, where they are around. The negative impact is given by the fact that waste is stored in its fresh state directly on the ground, containing mostly liquid. Given that in the period of 8 – 36 months the waste weight falls more than 50% through the process of decay and transformation in natural ferilizer, shows that nearly 50% of the initial quantity leaks into the soil polluting it and its groundwater.

The management of waste by the family farms owned by individuals

In contrast to the previously described large farms, livestock farm owners have a much smaller amount of waste that have to manage. On the one hand, the livestock activity that they have is significantly smaller than in the case of integrated farms. On the other hand, the animals are not kept in stalls, instead being grazed on the most part of the year without producing any waste inside the farm. Waste produced by animals during the night as they are in the shelter and during winter, when they are not grazed, are managed by the owners in a particularly inefficient and polluting way.

They are storing the waste in the area of the livestock on dedicated platforms, directly on the surfaces of certain parcels of land, or in a common shared area of the village, along with other inhabitants, owners of livestock. The major negative impact related to this improper management method is the fact that the common areas that locals are often using for storing waste are most of the times near to surface waters which they are significantly polluting, in addition to the inherent pollution caused to groundwater.

Some respondents, representatives of the towns stated that, some manure turned into natural

fertilizer is taken from the shared storing area for spreading on the arable land area, but the largest amount remains stored there, further polluting the soil and water.

CONCLUSIONS

The interpretation of the interview results applied to 8 subjects in the Northeast Region, representatives of small family farms, or small and medium sized farms revealed the following:

- Waste from livestock activities that farmers must manage are composed from manure (manure and plant bedding) and vegetal remains unused and deprecated;
- In many cases in the rural area (towns, villages) the waste is stored in its fresh state, immediately after discharge outside settlements, without any proper management;
- Most of the times, the waste is stored for transforming on platforms on the ground, without a concrete layer or being impermeable, thus allowing liquids from fresh manure to drain into the ground polluting it, along with groundwater;
- For family farms, owned by individuals, the environmental impact is even more severe, as they sometimes choose to deposit the waste on a platform located inside their own property, resulting many such such polluting platforms in each town and village.

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