

## STUDY REGARDING APPLICATION OF MANURE MANAGEMENT SYSTEM IN NEGRAȘI FARM, DÂMBOVIȚA

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### Abstract

The aim of the paper is the conditioning of manure from Negrași farm, Dâmbovița County, the farm specialized in dairy farming. Application of manure management system leads to reduction of environmental pollution by reducing the production of greenhouse gas emissions and emissions. It recommended the establishment of an integrated and environmentally safe and economically efficient management of solid and liquid manure on the Negrași farm. In shelters, manure is collected in underground channels are moved by pressure pumps in a collection basin outside the house. Manure basin will be homogenized using a mixer and pump station will be directed towards manure separation adjacent solid manure storage tank. Calculation of the required capacity of manure storage is based on the amount of feces and urine of livestock products, the amount of bedding used, wasted drinking water of animals and / or humans, and water sanitation. Litter fall is usually administered in paper-based soil when weather conditions are favorable, especially during rain and little wind. During spreading manure, the land must be plowed, so mix and incorporate well garbage. Incorporate the dry areas on light land - sandy is up to 30 cm (deeper), and wetlands on land heavy cold until 18 to 25 cm (shallow). It can manage and spring wetter areas.

**Keywords:** farm, dairy farming, conditioning, livestock manure, manure basin

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## 1. INTRODUCTION

Negrași farm is a private company. The farm is located in the Bucșani-Racovița village, Dâmbovița County. The agricultural area of the farm is 252,77 ha arable land and 7,47 ha occupied by buildings. The farm is composed by eight stables, shelter maternity paddocks for adults, 10 little paddocks for calves 3-6 months (Farm data, 2013).



Figure 1. Stable for calves  
(farm picture)

## 2. MATERIAL AND METHOD

Annual number of cattle is 250 heads on age category. Dairy cows are in the farm stables in loose housing, each having a capacity of 120 heads stall. Watering is done in stainless bucket system and feed trough is mechanized (Stanciu G., 1999).



Figure 2. Holstein cows on Negrași farm  
(farm picture)

Removing manure is made with scraper on concrete pools collection located at the end of the barn (Dinescu S. and al., 2001 ).



Figure 3. Plow scraper on the end of the barn (farm picture)

Final evacuation is made gravitational with water added, through underground concrete channels in the central collector equipped with electric pump and out from here on concrete tank (V = 3000 m) (Georgescu Gh. and al., 2007). From shelters, manure is collected in underground channels and moved by pressure pumps in a collection basin outside the shelter (Rigani T., 1986). In basin, manure will be homogenized using a mixer and pump station and will be directed towards manure separation next to solid manure storage platform (Maciuc V. and al., 2006).



Figure 4. Canal concrete manure collection (farm picture)

Later, after aerobic fermentation into the tank, the manure is loaded and transported for use as organic fertilizer by spreading on agricultural land, according to agrochemical and soil studies and the Code of Good Agricultural

Practice (Codul de bune practici în fermă, 2007).



Figure 5. Concrete tank filling system (farm picture)

Animal waste manure is specific activity and shall be removed after stabilization for soil fertilization (Creța V. and al., 1995). Distribution of agricultural land will be providing introduction fertilized soil mixture doses regulations accepted for the content of P and N, and according to plant crops that will be produced on land fertilized. Neagrași farm manure distribution is done with MEPROZET tank.

### 3. RESULTS OBTAINED

Calculation of the required capacity of manure storage is based on the amount of feces and urine of livestock products, the amount of bedding used, wasted drinking water of animals and / or humans, and water sanitation (Table 1).

Calculation of manure production in Neagrași farm:

- 160 cows x 50 kg. / animal / day = 8000 kg. / day
- 60 heifers x 25 kg. / animal / day = 1500 kg. / day
- 30 steers x 35 kg. / animal / day = 1050 kg. / day

Total manure 250 head / day = 10550 kg. / day

Total manure 250 heads / month = 316500 kg. / month = 316,5 t / month

Total manure 250 heads/year = 3798000 kg./year = 3798 t/year

**Table 1. Manure production in different cattle maintenance systems**

(Source: Manure storage systems. Standards farm)

Anim. categ.	Maintenance systems	Bedding (kg/animal/day)	Type of manure	Manure production including bedding (kg/animal/day)	Storage capac. (m <sup>3</sup> /animal/month)
<b>Loose housing</b>					
<b>Calves</b>	Deep bedding, collective boxes	1 - 2	Solid manure	6 - 10	0,25 - 0,40
	Floor grill, maintenance groups	-	Semi-liquid manure	7 - 12	0,25 - 0,45
<b>Heifer</b>	Deep bedding	3 - 5	Solid manure	20 - 25	0,75 - 0,95
	Deep litter in the area rest, concrete floor in the defecation area	2 - 4	Solid manure	20 - 26	0,70 - 0,90
	Rest individual boxes with bedding, concrete floor in the defecation	2 - 3	Solid manure	18 - 26	0,65 - 0,95
<b>Steers</b>	Deep bedding	3	Solid manure	28 - 38	1,10 - 1,4
	Deep litter in the area rest, concrete floor in the defecation area	2 - 3	Solid manure	28 - 40	1,0 - 1,3
	Floor grill	-	Semi-liquid manure	30 - 40	0,9 - 1,3
	Deep bedding, self-cleaning floor with a slope of 8%	2 - 3	Solid manure	28 - 38	1,05 - 1,4
<b>Dairy cows</b>	Deep litter in the area rest, concrete floor in the defecation area	4 - 5	Solid manure	40 - 50	1,4 - 1,8
	Deep litter in the area rest, self-cleaning floor	4 - 6	Solid manure	45 - 50	1,6 - 1,9

### Convert livestock units (UVM)

By converting the number of animals in UVM is determined storage capacity for manure required. The coefficients used in Romania for converting livestock in livestock units are shown in Table 2.

**Table 2. Coefficients for converting the number of animals in livestock units**

Animal category	Average weight, kg	Coefficients for converting UVM
Dairy cows	500	1,00
	600	1,20
Heifers	450	0,90
Calves of 12-18 months	350	0,70
Calf of 6-12 months	250	0,50
Vițel of 6 months	100	0,20
Young steer of 12 months	375	0,80
Adult steer	900	1,80

Based on motion analysis of livestock since September 2012 could calculated the UVM conversion (Farm data, 2013):

- dairy cows - 160 heads x 1 UVM = 160 UVM
- heifer 12-18 months - 35 heads x 0,7 = 24,5 UVM
- calves 6-12 months - 25 heads x 0,5 = 12,5 UVM
- steer at 12 months - 30 heads x 0,8 = 24 UVM

Total = 221 UVM on the farm

The farm has an area of 250 ha land required for forage base. Existing soil type is 70% podzolic and 30% brown - reddish soil with low humus content (between 1,8 -2,4%) requiring organic fertilizer with manure, of every three years, administering to an amount of 80 to. manure/ ha.

As a result, the area of land to be fertilized every three years is:

252 ha 3 years = 84 ha / every three years

84 ha x 80 to. / ha = 6720 tons manure

Total manure 250 heads / year = 3798000 kg . / year = 3798 t / year

In this situation can fertilize only 47 ha. 3798 to. manure / year : 80 t . / ha = 47 ha

Rules for application and transport of manure

1. The nitrogen dose required to achieve the expected crop, should be provided primarily

from existing organic fertilizers on the farm and in addition to industrial fertilizers.

2. The amounts of organic fertilizer may be applied per hectare per year, depending on the crop, the level of soil degradation, soil texture and other area factors.

3. The specific dose should not exceed 170-210 kg of nitrogen per hectare and year, taking into account the soil reserves (Georgescu Gh. and al, 1990).

The maximum amount will be applied when:

- a slightly fermented manure is used ;
- it is administered on heavy soils ( clay ) or have high denitrification capacity ;
- it is applied to crops with long growing season and which consume high amounts of nitrogen ;
- it applies to areas with high rainfall.

4. Urine can be used as basic fertilization with rates between 10 and 80 to. per hectare and year, depending on the nitrogen content, the maximum for cattle urine 0,2% nitrogen. Urine can be used as additional fertilizer in rates between 3 to 20 tons per hectare, mixed with 2-3 parts water.

5. Must manure is used for basic fertilization in rates between 40 and 80 to. per hectare and year, or as additional fertilizer (10-20 t / ha mixed with 2-3 parts water). It can be used also with very good effect, mixed with superphosphate (300-600 kg / ha), depending on the nitrogen content of manure wort .

6. Periods to be applied manure are set according to certain conditions:

- During growth a crop as early as possible to increase crop nutrient uptake and decreases the risk of pollution.
- Half the amount of manure that get in winter, will spread until 1<sup>st</sup> of July, and the other half to 30<sup>th</sup> of September.
- Do not apply manure in the period between the first and last frost.
- Their application will be avoided during the off season (outside of active growing phase), depending on local

climatic conditions, between October and February, the maximum period is specified for wet and cold areas, the growing season begins later.

7. When manure application is mechanized, the material must be well homogenized during charging, free of impurities and foreign objects (stones, lumps, scrap metal, wire, etc) and litter layer bunker machine managed to be uniform in thickness (Georgescu Gh. and al, 2007).

#### 4. CONCLUSIONS

In general, the storage capacity for manure collection and storage should provide for a period of four months, except for the following situations:

- When there is a risk of pollution during on the scattering field - 5 months
- When farms are located in areas with heavy rainfall - 6 months ( according to the Code of Good Agricultural Practices) .

Additional capacity allows the farmer to optimize time management of manure in the field. In farms with a small storage capacity, the time of administration in the field is often inadequate due to the storage capacity.

The minimum area for storing solid manure for 1 UVM (cow milk 500 kg) is :

- 0,236 m<sup>2</sup> for a week
- 4,25 m<sup>2</sup> for 18 weeks

The minimum solid manure storage area in Neagrași farm is 221 UVM :

- 0,236 m<sup>2</sup> x 221 UVM = 52,15 m<sup>2</sup> / week
- 4,25 m<sup>2</sup> x 221 UVM = 939,25 m<sup>2</sup> / 18 weeks

Tank capacity wort trash placed next platform is established according to platform capacity and discharge rate must of garbage (once or several times per year). In general, it can be approximated needed 4-5 cubic meters per 100 to. of fresh manure.

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