

THE NECESSITY OF PHASE SEPARATION OF MANURE AND ITS EFFECTS ON DECREASING DRY MATERIAL CONTENT

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Abstract

There was an experiment on phase separation of manure. The experiment consisted of measurements of raw manure and liquid phase that has been previously separated. Survey data show that it was a significant decrease in dry material content of manure under the influence of phase separation. The whole dry material content decreased almost by half.

Additional Keywords: manure, phase separation, liquid phase, solid phase

Introduction

In Hungary there are many manure storage reservoirs that do not come up to the environmental requirements, because their beds are not covered. However there are adequate technological processes that come up to the environmental requirements. The dry material content of manure without separation is significant. In our investigation we examined the dry material and nutrient content of manure after phase separation, because the dry material deposits on the bottom of bed and fills it in and it is difficult to remove it.

Materials and Methods

Our investigation was carried out in one of the greatest pig breeding farms in Hungary, where the annual pig production is 35000. In the farm more than 80000 m³ of manure is produced each year. Manure has been separated into two parts, liquid and solid, since 2001. As a result of treating of manure a homogenized liquid phase is produced that is stored for 120 days. During the examination we took samples from the raw manure and the separated liquid phase. Their nutritive and floating matter content was examined in an accredited laboratory, in Velence. Manure was utilized in arable lands of more than 6000 ha.

Up-to-date treating, storing and utilizing of manure

The annual average manure is 40-45 million m³ in Hungary. Its macro and micro nutritive content is characteristic of manure. The ways of storing manure (earlier, currently and in the future): (a) barrages, (b) floating into surface water, (c) caves of abandoned sand-pits, gravel-pits and soil-pits, and (d) according to paragraph 6.1 of Governmental Regulation No 49/2001 (IV.3), the earlier forms of storing areas are to be replaced by storing systems supplied with impermeable isolation – technical protection

Possibilities of intensive reduction of dry material content of manure

- Flowing through a filtering sifter
- Phase separation

The highest efficiency of reduction of dry material content of manure can be carried out by separation and treating with bacteria.

The importance and the effects of the reduction of dry material content of manure

It is a critical point during the production to let the manure flow through the farm, because of drain clogging. Drain clogging can be solved by treating manure with bacteria and by carrying out drain reconstructions. All the producers are under an obligation to store manure. Without separating the manure into solid and liquid parts, it can be stored in concrete storages only – settling down of solid phase. After phase separation it is enough to build a cheaper storage to store the liquid phase – storages covered with plastic foil.

Reduction of dry material content of manure under the influence of phase separation

The separator divides the manure into liquid and solid parts. The efficiency of it depends on the circumstances. The change of the raw material content of the separated liquid phase depends on the dry material content of the raw manure. If the dry material content of the raw manure is higher, the separator works with increasing efficiency. As a result of separation, the original dry material content of raw manure can be reduced into 50-60% of the original quantity (Figure 1).

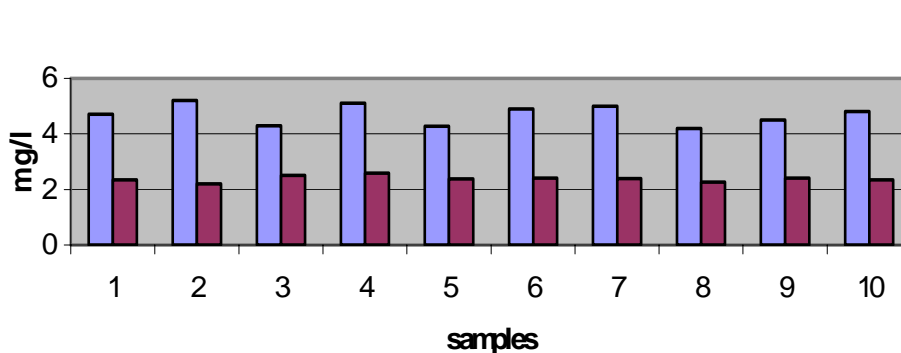


Figure 1. Change in dry material content of manure before and after separation

While the separated liquid phase is stored, a further reduction of nutrition of it is followed. The concentration of nitrogen and other important macro compounds are reduced while stored in reservoirs which are attributable to the further transforming work of bacteria. The reduction of nutritive content of liquid phase under the influence of separation and storage is as follows (Figures 2 and 3).

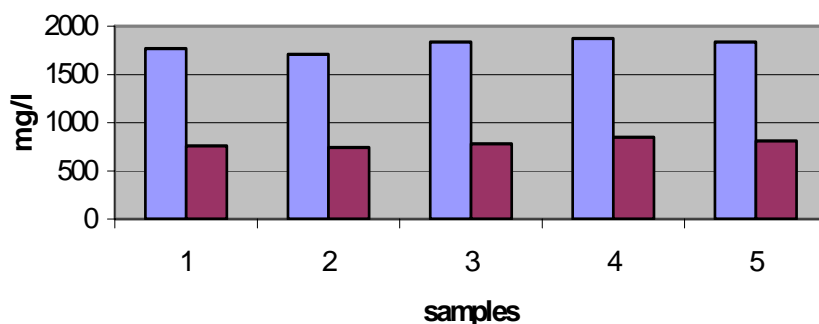


Figure 2. Change in nitrogen content of manure after separation and settling down

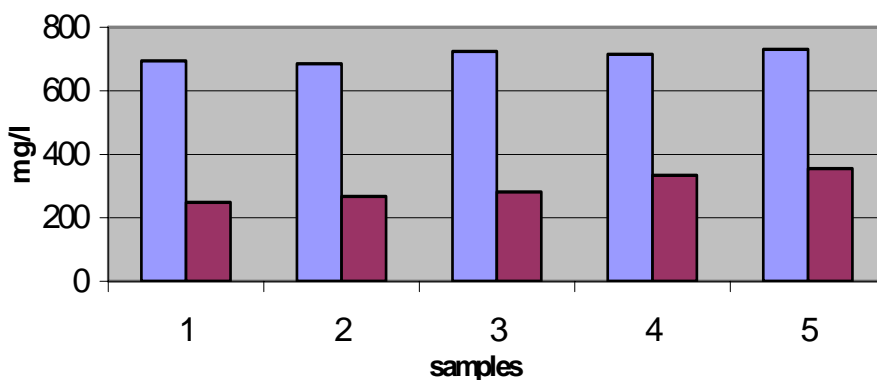


Figure 3. Change in phosphorus content of manure after separation and settling down

Results and Discussion

It can be stated, that under the influence of separation:

- The nutritive content of manure has been significantly reduced;
- The total content of nitrogen and phosphor has been reduced the most significantly;
- The content of potassium has not reduced significantly while being separated and stored;
- The dry material content of manure has been reduced; and
- The original content of nitrogen and phosphorus has been reduced into 50%

Conclusions

The dry material and nutrition content of manure has been reduced after the separation. The dry material content of raw manure is 4% that is followed by a decrease of 2% of it after separation. Due to the almost 50% reduction of

the dry material content of manure, the floating material content of the liquid phase is much less. While cleaning the storage, this residual loose structured material can be stirred easily and watered out to the ground.

The solid phase of manure can be well separated mechanically. Only separation may result the storage of liquid phase in great volume. Governmental Regulation No 49/2001 ordains that manure is to be stored in isolated storage from the end of patient period. The regulation also ordains a manure storing capacity of at least 120 days for the farmers. This is the reason why it is practical to make liquid phase containing reduced dry material flow into the storage to avoid multiplication, which requires manure separation. Phase separation of manure is essential for farmers if they want to apply liquid manure system technology of breeding.