THE POTENTIAL OF RECOVERY OF ORTHOPHOSPHATE FROM DAIRY MANURE

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Introduction

In the Netherlands phosphate is usually the limiting factor in the application of manure. Recovery of the orthophosphate from manure offers possibilities to keep a greater proportion of the nutrients and organic matter available for fertilization. This reduces also the need for artificial fertilizers. The objective of the study was to determine the potential of recovery of orthophosphate from different dairy manures.

Methods

Samples were collected from different separators: centrifuge, screw press (see photo), compressor roller separator and cascading roller press system. The available orthophosphate content was determined in the dairy manure and liquid fraction. In the liquid fraction also the water soluble (dilution 1:30) and acid soluble orthophosphate content was analyzed. In solid fraction the orthophosphate content was determined after dilution the solid fraction to 10% dry matter at the initial pH, pH 6 and pH 5.

Results of dairy manure

The phosphate content of the liquid dairy manure ranged from 1.17 to 2.12 g/kg and the dry matter content was between 6.3 and 10.4%. The orthophosphate content varied from 0.1 to 8.5% of the total phosphate content. In figure 1 the orthophosphate as a function of the phosphate content is shown. No relationship could be established between the orthophosphate and the total phosphate content, due to the variability and low orthophosphate content.

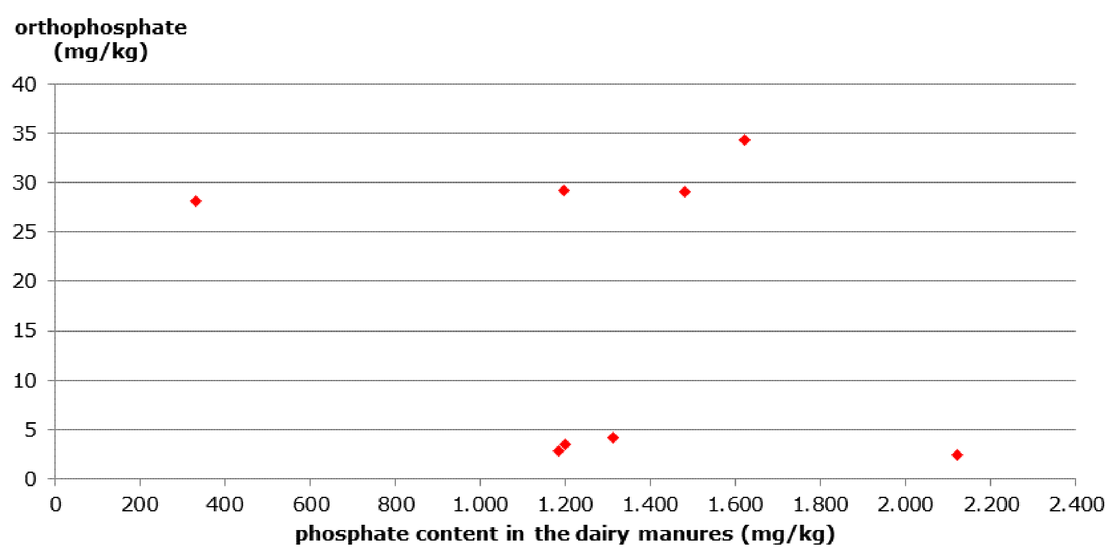

Figure 1. *Orthophosphate in relation to total phosphate content in dairy manures*

Results of solid fraction of dairy manure

The phosphate content of the solid fraction of the dairy manure ranged from 1.21 to 4.29 g/kg and the dry matter content from 14.4% to 37.2%. The orthophosphate content at the initial pH ranged from 1 to 8%, at pH 6 it ranged from 39 to 59% and at pH 5 it varied from 42% to 68%.

Results of liquid fraction of dairy manure

The phosphate content of the liquid fraction of the dairy manure ranged from 0.25 to 1.77 g/kg and the dry matter content from 1.9 to 7.3%. The orthophosphate content was ranging from 0.0 to 4.1% of the total phosphate content. The water soluble orthophosphate content varied from 26 to 48% and the mineral P from 10% to 45%. The acid soluble phosphate content (inorganic phosphate) ranged from 47% to 82%. This is shown in figure 2 for 10 liquid fractions from different separators.

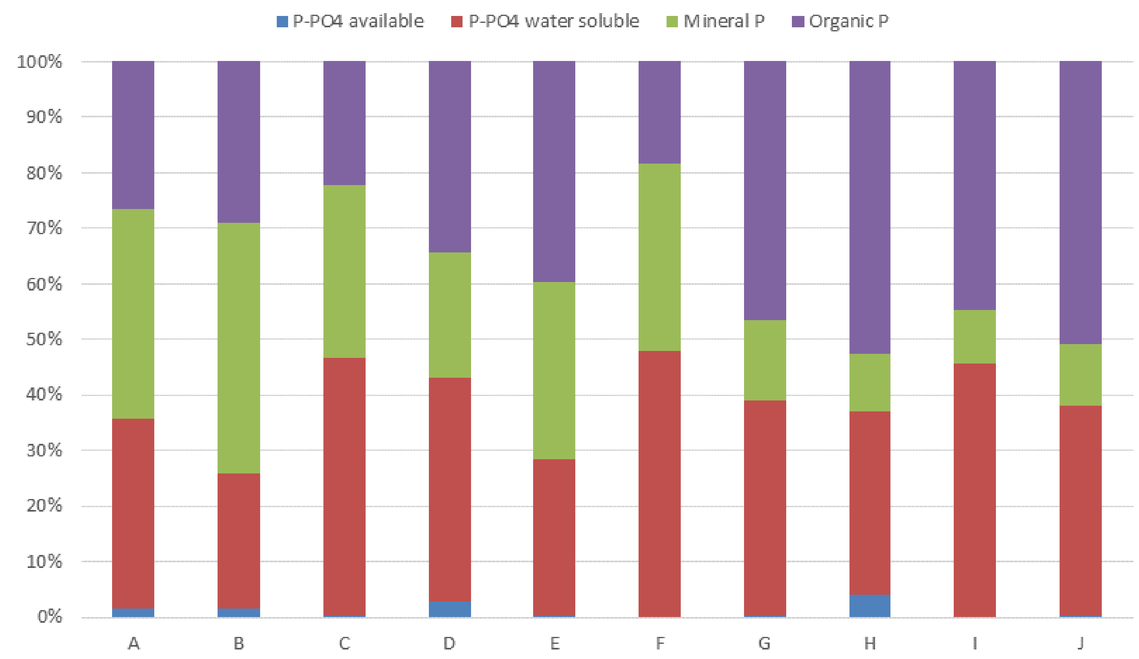

Figure 2. *The available, water soluble and acid soluble orthophosphate and organic bound phosphate as part of the total phosphate content*

Conclusions

The results are showing that the available orthophosphate content of the dairy manure, liquid fraction and solid fraction is only a small percentage (<8%) of the total phosphate content. The potential for recovery of the available orthophosphate is low due to the low concentrations. The amount of available orthophosphate can be raised by dilution with water or by acidification. Acidification gives the highest orthophosphate content.

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