

PHOSPHORUS RECOVERY FROM SWINE SLURRY BY ACIDIFYING ULTRAFILTRATION AND STRUVITE CRYSTALLISATION²

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***Abstract:** Recovering nutrients from waste is an alternative to the continuous phosphorus mining and fertilizers production. Domestic wastewater and waste streams from livestock are among the most promising sources of recycled phosphorus with potential application in the agriculture. The paper reviews a method of phosphorus recovery from swine slurry using stages of acidifying, ultrafiltration and crystallisation with an aim to extract phosphorus, purifying the fluid and sediment struvite crystals. The purpose was to examine the application of swine slurry, to establish pH-optimum for acidifying and crystallisation. Testings of ortho-phosphorus, ammonium and magnesium were carried out on every step of the examination, also they were accompanied with supporting tests which indicated the decreasing of organic matter.*

Based on the results obtained, a procedure for acidic mobilization of the phosphates was developed as an initial step which significantly increased efficiency and recovery rate (up to 65%). Thereby the precipitation of struvite from wastewater and manure could be a step toward the development of hybrid technologies for simultaneously wastewater treatment and resource recovery which will contribute to the transformation of the economy from linear to circular approach.

***Keywords:** phosphorus, swine slurry, manure, ultrafiltration, struvite*

REFERENCES

Petersen, S.O., S.G. Sommer, F. Béline, C. Burton, J. Dach, J.Y. Dourmad, A. Leip, T. Misselbrook, F. Nicholson, H.D. Poulsen, G. Provolo, P. Sørensen, B. Vinnerås, A. Weiske, M.-P. Bernal, R. Böhm, C. Juhász, R. Mihelic. (2007). Recycling of livestock manure in a whole-farm perspective. *Livestock Science* 112, 180–191.

Schoumans, O.F., P.A.I. Ehlert, J.A. Nelemans, W. van Tintelen, W.H. Rulkens, O. Oenema. (2014). *Explorative study of phosphorus recovery from pig slurry. Laboratory experiments*. Alterra Wageningen UR.

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