# Pesticide residues in bio-based fertiliser products – Effect of different processing technologies

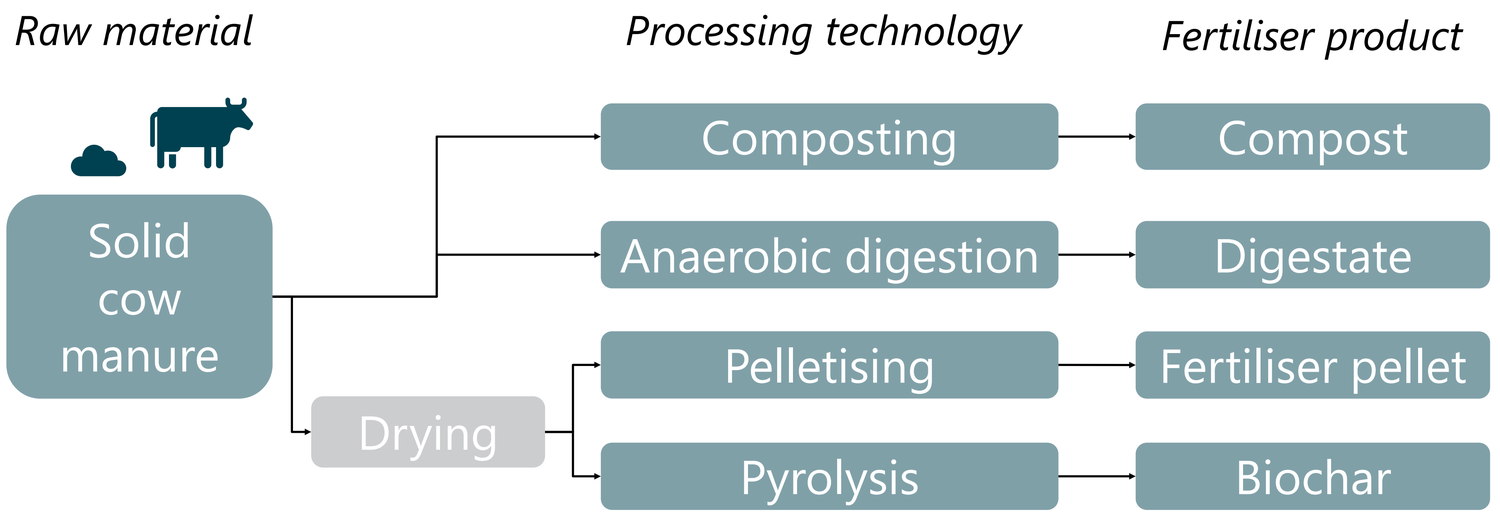
**Elina Tampio, Marleena Hagner, Kati Räsänen, Minna Sarvi, Lucia Blasco, Ari-Matti Seppänen, Niina Honkala, Marika Rastas / Natural Resources Insitute Finland**

## Background

Various bio-based fertiliser raw materials, such as plant materials and livestock manure, may contain pesticide residues that can have a negative impact on crop production.

During fertiliser production, the raw materials undergo various biological, thermal, chemical, or mechanical transformations, which affect the residual concentrations of pesticides in the final fertiliser products.

The aim of this study was to test four fertiliser production technologies and assess their impact on pesticide residues and vice versa.




## Methods

Solid cattle manure was used as the raw material for the processing experiments.

Three pesticides were added to the manure based on the dry matter (DM) content of the manure;

- glyphosate (1 mg/kg DM)
- clopyralid (1 mg/kg DM)
- aminopyralid (0.1 mg/kg DM).

Control runs without pesticides were included, and all experiments were performed in triplicate.

Samples were collected before and after the processing.

## Results

The analysis of the samples (pesticide residue and fertiliser value) is still under investigation.

The addition of pesticides did not affect the pelletisation process or the pyrolysis process.

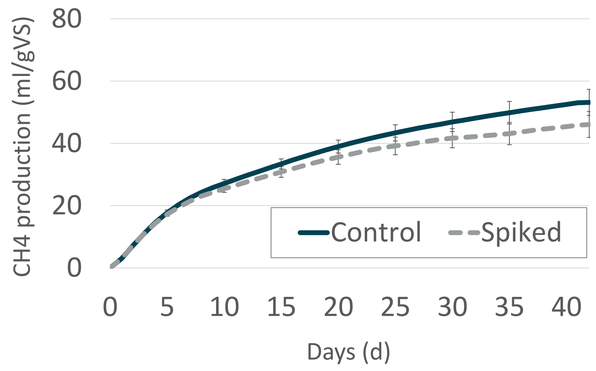
However, the pesticide additions reduced the methane production of the anaerobic digestion potential by 13%.

In conclusion, the use of pesticides needs to be considered more thoroughly in order to avoid negative effects not only on the quality of the fertiliser, but also on the production of renewable energy from bio-based sources.



*Fertiliser pellets (above), and biochar (below) processed from solid cow manure.*

*Composting bin (left) and anaerobic digestion test bottle (right).*




*Cumulative methene production potential of solid cow manure with (spiked) and without (control) pesticide addition.*

The Kiertokas-project is funded by the Ministry of Agriculture and Forestry of Finland from the Development Fund for Agriculture and Forestry (Makera).

The project is coordinated by the Finnish Food Authority (Ruokavirasto) and conducted jointly with the Finnish Environment Institute (Syke) , Finnish Safety and Chemicals Agency (Tukes) and Natural Resources Institute Finland (Luke). Industrial partners are Biolan Oy, Kekkilä Oy, Soilfood Oy, Yara Suomi Oy.

Ministry of Agriculture and Forestry of Finland