

Development of a test method for transformation of veterinary pharmaceuticals and biocides in liquid manure

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Spreading of manure on agricultural soils represents an important path by which veterinary pharmaceuticals and biocides enter the environment. To assess their environmental impact in the context of authorization processes, experimental testing of transformation of these compounds in manure is considered in regulatory guidance documents. However, there is no standardized experimental test method available so far. To fill this gap, a reliable experimental test method was developed to examine transformation of veterinary pharmaceuticals and biocides in liquid cattle and pig manure. The development was a step-by-step procedure.

In the first project, preliminary studies were performed with regard to manure characterization, sampling and storage. Manure parameters to comprehensively describe and characterize the respective manure were identified and their variability due to differences in storage conditions and in manure origin was analyzed. A standardized procedure was established to homogenize manure both in the manure storage tank and in the laboratory prior to performing transformation studies. In addition, the influence of manure storage conditions (duration and temperature) and manure acclimation periods in the laboratory on the microbial activity of manure was tested. Subsequently, two anaerobic intra-laboratory test series with ¹⁴C-labelled compounds were performed to examine the influence of test set-up (flow-through vs. semi-static, flow rate, amount of manure) on mineralization rates and the influence of type and origin of manure on transformation rates (UBA Texte 78/2015, UBA Texte 78/2016).

In a follow-up project the reproducibility of the test method was proven in an international validation ring test (UBA Texte 80/2016). The results and experience gained in both projects, as well as scientific discussions at two technical workshops and several international meetings, were then put together in a draft test guideline on anaerobic transformation in liquid manure. This draft contains a technical description of sampling, manure characterization, test design and chemical analysis, as well as recommendations to identify transformation products and the definition of quality criteria. The draft test protocol is planned to be submitted for evaluation and approval as standard test method by the OECD.