

9th Conference of MIKROBIOKOSMOS

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ABSTRACT BOOK

16 to 18
December
2021

Agricultural
University
of Athens,
Greece

PP_097

FOLLOWING THE ROUTE OF VETERINARY ANTIBIOTICS TIAMULIN AND TILMICOSIN FROM LIVESTOCK FARMS TO AGRICULTURAL SOILS

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Veterinary antibiotics (VAs) upon their administration are not metabolized in the animal body and are mostly excreted in feces. Their use for soil nutrition or energy production may facilitate VA dispersal impacting environmental quality and human health. We studied the persistence of two VAs, tiamulin (TIA) and tilmicosin (TLM) along their route from pigs to feces and receiving environments. We asked the questions: (a) how different administration modes affect their excretion temporal patterns; (b) how efficient are, anaerobic digestion and ambient storage in removing VAs from feces and conversely how VAs affect the anaerobic digestion process; (c) how persistent are VAs in agricultural soils and (d) how VAs affect soil microbial processes. TLM was detected in feces at levels folds higher (4.27-749.6 $\mu\text{g g}^{-1}$) compared to TIA (0.55-5.99 $\mu\text{g g}^{-1}$), with both VAs peaking during the administration period followed by a gradual but incomplete dissipation during the withdrawal period. Administration through water resulted in delayed appearance or lower levels for TIA and TLM respectively, compared with feed administration. TIA and TLM (fortification

levels 0.5, 5 and 50 $\mu\text{g g}^{-1}$) dissipated gradually from during manure stockpiling (DT50 5.85-35.9 and 23.5-49.8 days respectively). Both VAs showed longer persistence during anaerobic digestion (DT90 > 365 days) and negatively affected biomethanation at levels > 5 $\mu\text{g g}^{-1}$. In direct soil application, TLM was more persistent than TIA with soil fumigation extending their persistence, suggesting a major role of soil microbiota in the degradation of these compounds. Soil application of VAs through feces increased their persistence, probably due to increased sorption to the organic fecal matter and hence reduced bioavailability. Potential nitrification rates were suppressed by TIA after the second application and enhanced by TLM in the direct application and at the low pH soil, whereas little/no effect was observed during their application through manure and at the high pH soil. Our results suggest that the administration of TIA and TLM in pig farms and the subsequent use of feces in agricultural soils is expected to lead to dispersal of VA residues in soil with yet unexplored consequences for environmental contamination and human health.

Acknowledgements : This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Programme «Human Resources Development, Education and Lifelong Learning 2014-2020» in the context of the project “Environmental fate and interactions of veterinary antibiotics ceftiofur and tiamulin with the soil microbiota: Resistance, biodegradation or toxicity” (MIS 5048924). It is also funded by the project INVERT (INteractions of Veterinary antibiotics with soil microorganisms: exploiting microbial degradation to avert Environmental contamination and ResisTance dispersal; Hellenic Foundation for Research & Innovation (HFRI) project number 01183).

