



ESPP input to EU consultation on Antimicrobial Resistance

Call for evidence, open to 24th March 2022 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13322-Antimicrobial-resistance-recommendation-for-greater-action_en

ESPP (European Sustainable Phosphorus Platform) supports action to address inappropriate use of antibiotics and underlines that contamination of manure and sewage by pharmaceuticals and by ARG (antibiotic resistance genes) is a potential obstacle to recycling of nutrients and return of organic carbon to soil.

Antibiotics, antibiotic resistant micro-organisms and antibiotic resistance genes (ARG) are significantly present in livestock manures, because of use of antibiotics, and also in municipal sewage.

This is a potential obstacle to the nutrient Circular Economy and to the return to soil of organic carbon in manure and sewage sludge.

Scientific studies show that recycling of manure or sewage sludges to land can increase levels of antimicrobial resistance (AMR aka. antibacterial resistance ABR) in soil and in soil organisms, and if manure is applied to soil during crop growth then also in some plants (e.g. during lettuce growth, Zhang 2019 <https://doi.org/10.1016/j.envint.2019.104912>). However, scientific consensus seems to be that soils can naturally adapt, because soil organisms naturally release antibiotics, so that AMR appearing after sewage sludge application seems to be only temporary (Malmö workshop on pharmaceuticals in sewage sludge, 2016, www.phosphorusplatform.eu/Scope123 and refs below).

Manure application has been shown to increase diversity and abundance of indicators of AMR (ARGs and MGEs mobile genetic elements) in soils, with persistence varying from a few days to months (Lima 2020 <http://dx.doi.org/10.3390/vetsci7030110>). Persistence in soil following manure application varies with type of ARG and environmental conditions, with in some cases recovery only after more than a month or more (Macedo 2020 <https://doi.org/10.1016/j.scitotenv.2020.139563>).

Despite variable persistence of ARGs following use of treated sewage for fertigation, impact on soil ARG abundance has been found to be negligible (Kampouris 2021 <https://doi.org/10.1016/j.watres.2021.116818>).

However, the widespread detection of ARG in manure and sewage sludge, possible with today's analytical methods, leads to negative perceptions of regulators, stakeholders and consumers, which pose obstacles to recycling of the nutrients and organic carbon in these streams irrespective of risk.



The EU's AMR policy should include:

- As first priority: actions to avoid inappropriate use of antibiotics and in particular to minimise use in livestock.
- Threshold limits for antibiotic release from point sources such as hospitals and relevant livestock production (see Uluseker 2021 <https://doi.org/10.3389/fmicb.2021.717809>).
- Develop where possible new types of antibiotics which are degradable in sewage treatment systems and/or in anaerobic digesters (widely used to treat manure).
- Harmonised measurement and reporting, to improve data and develop robust risk assessments on AMR in agricultural recycling of manures and sewage biosolids, including persistence of AMR after application, effects on soil organisms and risk of transfer to crops (see Scope123 above).
- Actions to develop, assess and implement technologies to better degrade and remove pharmaceuticals in sewage and manure treatment systems, including composting, anaerobic digestion or a combination of these.

See joint position on the need for research into organic contaminants in sewage biosolids and manure (EEB European Environment Bureau, Growing Media Europe, Eureau, ECN, EBA, ECOFI, ESPP 2017 https://www.phosphorusplatform.eu/images/download/Joint-position-need-research-organic-contaminants-6_10_17.pdf). Significant EU-funded R&D is underway on AMR (e.g. <https://repares.vscht.cz/>) and this should be continued and extended concerning AMR in manure and sewage sludge and the nutrient Circular Economy.

Our network has indicated the following data references:

- HTC elimination of ARGs: Ducey 2017 <https://doi.org/10.1007/s11783-017-0930-x>
- Long-term application of sewage biosolids to land does not lead to risk of AMR in soil: Rutgersson 2020 <https://doi.org/10.1016/j.envint.2019.105339> and Riber 2014 <https://doi.org/10.1111/1574-6941.12403>
- Assessment of AMR in sewage sludge and manure: Hölzel 2010 <https://doi.org/10.1016/j.envres.2010.02.009>
- Reduction of antibiotics and ARGs in anaerobic digestion, Gros et al, 2019, <https://doi.org/10.1016/j.jhazmat.2019.05.109>, and in AD combined with composting Osorio et al., 2020; <https://betatechcenter.com/wp-content/uploads/2021/10/Guia-tecnica-de-asesoramiento-para-el-sector-ganadero.pdf>