European Sustainable Phosphorus Platform

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To: Cinzia Percivaldi, Angelo Maggiore, EFSA
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Object:
EFSA study and stakeholder call - Food and feed safety vulnerabilities in a circular economy

Dear Dr. Percivaldi, dear Dr. Maggiore,

We unfortunately did not see information about, and so missed, the stakeholder workshop of 29th October 2021. We have seen, on the EFSA website, the (not dated) call for stakeholders on "Food and feed safety vulnerabilities in a circular economy".

The European Sustainable Phosphorus Platform (ESPP) brings together over 40 companies, R&D projects, cities and regions engaged in phosphorus sustainability, and in particular in nutrient recycling. We are 100% funded by our members contributions, the majority of which is from industry.

We wish to underline the **important interactions between the nutrient circular economy and food and feed chain vulnerabilities**. Although there are some potential or operational high-value routes for recycling nutrient elements to industrial applications (e.g. phosphorus from sewage to electronics or batteries), these are quantitatively very small and the main nutrient circular economy routes are direct recycling to food (human food) or to feed (animal feed), or indirectly to food or feed via fertilising products used in agriculture. Nearly 95% of world use of Phosphate Rock, which is on the EU Critical Raw Materials List, is to agriculture (fertilisers nearly 90%, and animal feed) and only around 6% goes to industrial uses (including human food additives).

The potential for phosphorus recycling potential is considerable. There are c. 1 800 ktP/year of phosphorus present in livestock manure in Europe, and a further c. 500 ktP/year in sewage sludge, organic solid wastes and animal by-products. This compares to mineral phosphorus fertiliser consumption of c. 1 500 ktP/year (Van Dijk et al., 2016 https://doi.org/10.1016/j.scitotenv.2015.08.048). It should be noted that most manure is currently returned to soils when livestock are outside in fields and around half of biosolids (stabilised sewage sludge) is used as an organic amendment in agriculture.

The potential for phosphorus recycling and the circular economy for other nutrients (nitrogen, potassium and micro-nutrients) is currently hindered by regulatory obstacles relating to EFSA's competence, see below.

ESPP wishes to underline that we fully support **demanding safety requirements** (pathogens, contaminants) in all nutrient recycling to agriculture and to the food or feed chain, for reasons of social responsibility, but also because consumer confidence is essential for the long-term development of the circular economy.

For these reasons, **we request to be involved in future workshops or consultations** relating to the current EFSA project on circular economy, and we are open to provide any further information or to discuss directly with you how to collect data or input from our wide stakeholder network to optimise information available for your study.

We have identified a number of significant **regulatory obstacles to nutrient recycling**, relevant to EFSA. See ESPP letter to DG SANTE of 20th October 2020 at www.phosphorusplatform.eu/regulatory. These obstacles are outlined below.

We also suggest that it could be useful to **establish an EU "Food chain circular economy info point".** Often developers and producers of circular economy materials are from outside the food and feed sector and have no knowledge of relevant regulations and processes. A contact point would be very helpful to answer initial questions and point to where to find information on relevant regulations, which organisations to contact, how to request and prepare dossiers, what information is needed.

We also have some comments on the slides from the 29th October stakeholders webinar, which we hope will be useful to you.

In particular, it seems that the Preliminary Report centres on direct feeding of secondary materials to animals. We suggest that consideration should be widened to take into account:

- **Use of secondary materials, either as such or after processing, in fertilisers**
- **Processing of secondary materials, before their use in either animal feed, human food or fertilising products**. Such processing rangers from: extraction of specific materials (e.g. extraction of polyphenols from olive oil production wastes), use of wastes to 'feed' production of algae or other biomass, or to 'feed' production of microbial protein, chemical processing (e.g. incineration of the waste, then chemical recovery of phosphorus, nitrogen or potassium chemicals, used in feeds or fertilisers …)

We are at your disposition for any questions or to provide any further information via our members and network.

Yours sincerely

Ludwig Hermann, ESPP President

Comments on the presentations from the 29/10/21 stakeholder webinar and on the Interim Report (Extensive Literature Review)

➔ ***Available studies:***

The Harper Adams slides indicate "14 studies on environmental risks of producing food or feed from waste, FFP or side streams". The Preliminary Report states that 24 articles were considered. To our understanding, these do not include the following which we propose to consider:

"Opportunities for micro algae as ingredient in animal diets", J. Spruijt et al., ACRRES Wageningen UR, October 2016 http://acrres.nl/wp-content/uploads/2016/10/PPO-712-Opportunities-for-micro-algae-as-ingredient-in-animal-diets.pdf

"Lemna minor Cultivation for Treating Swine Manure and Providing Micronutrients for Animal Feed", R. Devlamynck et al., 2021 https://doi.org/10.3390/plants10061124

"Towards a circular economy: A novel microalgal two-step growth approach to treat excess nutrients from digestate and to produce biomass for animal feed", C. Fuentes-Grünewald et al., 2020 https://doi.org/10.1016/j.biortech.2020.124349

"Evaluation of Struvite Recovered from Swine Wastewater as an Alternative Phosphorus Source in Broiler Feed", M. Kim et al., 2019 http://dx.doi.org/10.3390/agriculture9100221

"Recycle food wastes into high quality fish feeds for safe and quality fish production", M-H. Wong et al., 2016 https://doi.org/10.1016/j.envpol.2016.06.035

➔ ***Circular economy routes to food and feed***

On the slide titled: "5 broad circular economy practices were identified", we would suggest to add a 6th practice "- Nutrient recycling".
Currently the "use of organic waste streams" has been identified. However, it is not clear whether the term "use" covers processing via mineral forms, such as recovery of inorganic phosphorus from sewage sludge incineration ash. Furthermore, phosphorus, potassium, or nitrogen salts, or other minerals can be recovered from non-organic streams, such as potassium from municipal solid waste incineration ash, or phosphoric acid from industry processes, and can be purified to animal feed or human food additive quality.

On the slide titled "4 biomass streams were identified from which biobased products are produced:" we suggest that streams important for nutrient recycling are missing:
- manure
- sewage

On the slide "Current & envisaged circular economy practices within the food and feed production chain":
- nutrient recovery "from food waste" is indicated, when this is a relatively small potential for nutrient recovery, whereas manure, ABPs (slaughterhouse waste, meat and bone meal ash …), food industry wastewater are not indicated, when they offer much bigger potential and are already currently operational
- similarly for "biorefinery of …"
- "livestock waste" should be clarified: does it mean manure? Or does it mean food processing wastes and ABPs (as suggested in the slide above)
- the production of algae or other biomass, or of microbial protein, using wastes / secondary materials as inputs, is missing. Such waste-produced biomass and proteins can be used in food, in feed and in fertilising products.

In the Interim Report, table 3 pages 17-18:
Important substrate streams, relevant for nutrient recycling to the food and feed chain, are missing:
- municipal sewage
- fish and seafood processing wastes
- algae and other biomass produced using wastes (inc. sewage) as inputs
- microbial protein, produced using wastes
- insect frass (only one species cited, only food waste)

Regulatory obstacles to the nutrient circular economy relevant to EFSA

- **Recycling of secondary nutrients to agricultural soil.**

This does not imply the direct use of secondary materials in food/feed (assuming agricultural use is appropriately controlled: e.g. no application to grazing land accessible to livestock, etc) but does pose potential risks of indirect exposure via soil, crop uptake, etc, so necessitating specific safety criteria. This is ensured for "European" fertilising products by the EU Fertilising Products Regulation 2019/1009 (FPR), but it is important to note that recycled nutrients can also be sold across Europe under "national" fertilisers regulations, and in this case these products have no obligation to respect EU FPR criteria.

Concerning non-EU ("national") fertilisers, you are probably already aware that a first study was carried out for DG ENVI on risk assessment of digestate and compost as fertilisers (AMEC, Ramboll, Fisk, Wood, 2019 HERE). Following criticism of this study from stakeholders (HERE) a second study was ordered by DG ENVI (tender HERE, underway with Arcadia).

Currently, there are obstacles to the nutrient circular economy, relevant to DG SANTE / EFSA, as follows:

➔ ***ABP End-Points not defined for uses in EU fertilising products:***

- **ABP End-Points are not yet defined for use of animal by-products (and derived products) directly (as such) in EU fertilising products** under CMC10 (see §8.14 in the COM FAQ for the FPR v20/7/21 here https://ec.europa.eu/growth/sectors/chemicals/specific-chemicals_en). For some ABPs and derived products, this is underway, see open EFSA work, Q-2020-00401 https://open.efsa.europa.eu/questions/EFSA-Q-2020-00401 ***This is in our view urgent, in that the materials currently under consideration "already widely used" in Europe in fertilising products*** (quote from DG SANTE in the letter of 30/4/20 for mandate M-2020-0088), that is under "national" fertilisers regulations, and it would be incoherent that they should be excluded from EU-fertilisers when the FPR enters into force in June 2022.
- Also, to date, it is **not possible to use animal by-products, including manure, as inputs for production of EU-label composts or digestates** (CMC 3 or 4), again because ABP End-Points (for such use) are not yet defined. As above, this is underway. ***This is also in our view urgent, in that composting and anaerobic digestion are***

important routes for nutrient recycling from manure, as well as for valorising organic carbon *(methane production, return to soil in a stable form)***.**

- Also, it is **not possible to use animal by-products, including manure, as inputs for production of EU-label precipitated phosphates, pyrolysis and gasification products (inc. biochars) or ash-derived products (FPR STRUBIAS CMCs 12-14)**. It is our understanding that definition of End-Points is underway for ash-derived products (CMC13) but not for precipitated phosphates nor pyrolysis products / biochars (CMC 11, 13). After consultation of operators, ESPP has suggested that it is not useful to pursue (at present) for precipitated phosphates, but that ***an EFSA assessment and definition of an End-Point are necessary for pyrolysis and gasification materials (inc. biochars)***. See ESPP letter to DG SANTE of 16th April 2021 at www.phosphorusplatform.eu/regulatory.
- Similarly, an **ABP End-Point is needed for recycled nitrogen fertilisers, in particular ammonia stripping from manures or manure digestates** (FPR CMC-WW, underway).

➔ ***exclusion of Cat1 ABP ash from (EU) fertilising products***

This is a significant obstacle to the nutrient circular economy (recycling of phosphorus and potassium). Around 1 million tonnes/year of Cat1 MBM are produced annually in the EU, containing 5-6% phosphorus (P), that is 50 - 60 ktP/year and 4 - 10 ktK/y (SCOPE Newsletter n°122). Although this is quantitively small (compared to e.g. manure) Cat1 ash has low levels of contaminants (compared to e.g. sewage sludge incineration ash), high levels of phosphorus and potassium, and can be used directly as a fertiliser, so representing a significant P and K recycling route. It is our understanding that this exclusion is not justified for safety reasons in that the regulatory conditions for incineration of Cat1 ABPs are defined specifically to eliminate all pathogens (including prions) and so fully guarantee safety of the resulting ash.

ESPP suggests that EFSA should assess the safety of use of Cat1 ash in fertilisers and for production of commodity chemicals (e.g. phosphoric acid, phosphates or potassium salts) susceptible to be used directly or after processing in animal feed or human food, and if safety is confirmed, then the ABP Regulation should be amended or legal guidance should be issued clarifying safe use of Cat1 ash.

• Recycling of secondary nutrients into animal feed.

This is an important potential route for the nutrient circular economy where there are currently significant regulatory blockages due to the wording of the Animal Feed Regulation 767/2009, Art. 6.1, which seems to exclude all materials from sewage, manure or industrial wastewater, irrespective how they have been processed.

➔ ***exclusion of recycling of nutrients to commodity chemicals***

If taken as written, Art. 6.1 suggests that any chemical produced by processing manure, sewage or industrial wastewater cannot be placed on the market: in theory, each tanker load should have a label "not to be used in production of animal feed", which is not feasible for industrial or commodity chemicals.

This makes no sense if, for example, sewage sludge is incinerated, and then the ash is dissolved in sulphuric acid, and then further processed to remove contaminants and then finally heat-concentrated to produce industrial-quality phosphoric acid, which is then sold to the phosphate chemical industry, whom might use the acid in production of animal feed phosphates. Pathogen safety is logically not a concern in this case (after incineration, acid attack, …). A similar case can be made for recovery of potassium salts from incineration ashes (see https://www.ragnsells.com/what-we-do/inspired/feed-phosphate/).

Other recovery processes may require an EFSA assessment to define operating conditions which ensure sanitary safety. For example, production of commodity ammonia salts from manure digestate, manure or stable offgas, by processes involving 'stripping' of the ammonia into a gas stream then reaction with an acid, in coherence with the definition of FPR CMCWW (see above).

This is detailed in the ESPP letter to DG SANTE of 7_5_2021 at www.phosphorusplatform.eu/regulatory.

ESPP requests that the Commission issues legal guidance defining when a material can be no longer considered to be "processed" sewage, manure or industrial wastewater.

ESPP requests that an EFSA assessment be engaged to define an ABP End-Point for ammonia recovery from manures and similar.

• Biomass grown using waste inputs

The EU is currently developing its Algae Initiative (DG MARE). Use of secondary nutrients (e.g. from sewage, manure digestate, N recovery from offgas) and other secondary inputs (e.g. CO2, syngas) can enable effective waste treatment and sustainable algae production. **Clarification is needed however concerning the "End-of-Waste" status of such waste-fed biomass** (see ESPP – EABA - Eureau letter to DG ENVI 17_11_21 at www.phosphorusplatform.eu/regulatory).

This is a wide question, including production of algae and other photosynthetic organisms in wastewater, use of wastes as inputs for biomass production, use of the produced biomass directly as animal feed, or use of extracts (proteins, lipids …), but possibly also production of microbial protein (see e.g. EnviDan FUBAF project https://stateofgreen.com/en/partners/envidan/solutions/from-urban-biowaste-to-animal-feed-proteins-from-biogas/) or production of insects.