

SYNFEED: Synthetic proteins for sustainable animal feeding

Description

Half of the protein directed towards animal feeding is wasted due to incomplete protein digestibility, and the distinct amino acid profiles found in both plants and animals. This generates serious pollution problems for our soils, aquifers, and atmosphere (e.g. livestock contribute to 87% of total ammonia emissions in agriculture). Moreover, the EU faces significant challenges in providing adequate protein sources for animal feed (97% of soybean meal is imported; \approx 1.5 billion/year). Hence, it is imperative to identify a sustainable solution for animal protein supply.

SYNFEED will demonstrate that by developing a new interdisciplinary technological approach, it is possible to generate proteins that can produce a radical paradigm change in the way animals are fed, highly reducing both the environmental impact and external dependence on raw materials of the EU. Using the broiler chicken as a model, SYNFEED will

- generate new precision nutrition knowledge (proportion of amino acids to fulfil the requirements and dynamics of protein hydrolysis in the targeted species);
- design several candidate sequences using this nutritional information by protein engineering techniques (combining AI and molecular modelling);
- generate these candidates in cell-free systems adapted to the final host and evaluate them in a new iterative procedure maximizing expression and digestibility potential;
- optimize the sustainable biosynthesis of the selected protein with sustainable hydrogen-oxidizing bacteria strains;
- evaluate the effectiveness of the protein in broilers (productive performance, animal health and welfare and reduction of nitrogen losses), and the sustainability of SYNFEED solution with a life cycle assessment.

This ground-breaking approach will replace conventional animal feeding, positioning the EU as a leader in biosynthetic protein generation, promoting the emergence of biotech companies and reducing livestock environmental impact. animal science, amino acid nutrition, biosynthesis, protein modelling, sustainable microbial protein.

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