



## D3.4: Design, construction, installation and operation of the Pilot plant 3

**WP3, T 3.4**

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This deliverable (D) 3.4. was developed under Work Package 3 (WP3) of the WaINUT Project, led and implemented by 3R

The WP3/Task 3.4 aims to design, construct, operate and validate the Pilot 3 (implemented in Kajaszo Biofarm, Hungary) animal by-product specialized processing line at TRL5, which prototype has been set-up in order to maximise BBFs production, implement WP4/Tak 4.4.3 demonstration and support WP7.

The Pilot 3 input is unexploited food industrial WW (acidic whey) stream, in which secured that no any external contamination is occurring. Food industrial WW (acidic whey) is the largest liquid by-product stream of the dairy food industry with significant EU scale economic importance. Pilot 3 is an integrated liquid and solid animal by-product upcycling line with high added value transformation of unexploited animal byproduct biomass into new products, perceived to be of greater quality and environmental/climate value and safety with second life and new function that finished product becomes more practical and valuable than what it previously was.

### **Key Results**

The design, construction, installation and operation of the Pilot plant 3 has been successfully implemented, completed and validated. The Pilot 3 input is processed food industrial WW (acidic whey) stream, in which secured that no any external contamination occurring. Unexploited WW and biomass by-product streams recycled and upcycled from the food industry and agriculture, which integrated animal by-product management opening new technical, process efficiency upgrade, environmental and economic opportunities through the whole value chain. The 3R successfully developed, designed and tested a specific liquid and solid state fermentation technology with interconnected adsorber where the food industrial WW (acidic whey) was used as liquid medium during the fermentation process. The Pilot Plant 3 outputs are the BIO-NPK formulated safe BBF and the effluent category D agricultural irrigation water of non-food crops. In this context risk management is also considered for identifying and managing risks in a proactive way to ensure that reclaimed food industrial WW (acidic whey) is safely used for category D agricultural irrigation of non-food crops and that there is no risk to the environment or to human or animal health, while ensuring the economic profitability of the upcycling process.

150L capacity liquid fermentor and 500 L capacity solid fermentor used for Pilot 3 TRL5 operations. During food industrial WW (acidic whey) processings ABC Animal Bone Char – BioPhosphate biotech carrier and adsorbent used, made by specific 3R pyrolysis process that is utilizing rendered bovine/cattle bone meal (the ABC process is not in the scope of the WaINUT project). The ABC is highly optimal and efficient to adsorb macromolecular organic contamination in liquid food industrial WW (acidic whey) streams and adjust pH, especially in low pH range.

### **Conclusions and Next Steps**

The TRL5 batch pilot plant 3 has been operated for 12 months and produced BBFs at pilot scale to perform WP4 field trials in Italy and Hungary. Already in the short/medium term <2030, the Pilot 3 based TRL9 full industrialization considered in a scale of economy for contribution to a thriving, sustainable and circular bio economy, while the development of a new business model providing synergic effects with other food industrial and food processing economic sectors, and therefore to the creation of wealth and quality jobs in rural areas. This Task was related with the following WPs:



info from WP1 and WP2/ Task 2.4. related to the food industrial WW (acidic whey) stream and WP2/Task 2.4. technology. WP3 produced BIO-NPK-C compound BBF to be tested in WP4/Task 4.4.3 in Italy and Hungary according to legislation at commercial farms and data to be used in WP5, WP6 and WP7 for market competitive industrialisation and applications with new 3R business models towards TRL9, which will be the first full industrial production and business replication model in EU scale.

