

### **Sustainability Spotlight Statement**

This study develops a low-energy biocatalytic platform (operating below 50°C) through food-grade ethanol permeabilization of lactic acid bacteria cocultures, enabling the conversion of dairy sidestreams—specifically skim milk—into conjugated linoleic acid (CLA)-enriched functional foods with a yield of 44.1%. By eliminating the use of toxic solvents, reducing thermal energy consumption by over 30% compared to conventional methods, and promoting the utilization of underutilized resources, this approach directly supports the objectives of zero-waste biomanufacturing (SDG 12), sustainable nutrition security (SDG 2), and green industrial innovation (SDG 9).