BIOLOGICAL ENGINEERING

Tyler Marlar, Justin Marriot and Michael Hansen

Bioprocessing Lipoprotein Extraction Procedure (LPEP)

Algal biomass that is cultured using nutrients from diverse wastewaters provides a promising source of protein and omega fatty acids for fish and livestock feed. Our research focuses on the development of a new procedure known as the Lipoprotein Extraction Procedure (LPEP). The procedure employs a base hydrolysis of algal biomass to solubilize lipids and proteins, which are separated from the insoluble solids and precipitated with acid. The lipoprotein fraction includes both lipid and protein components. The lipid component has been shown to be high in essential omega-3 and omega-6 fatty acids. The protein component of algae is also a valuable bioproduct.

We have also been working to upscale our process from a bench top scale to an industrial pilot-scale. The upscaled process involves a 100 L bioreactor where the base hydrolysis takes place. Following the hydrolysis reaction, the algal slurry is pumped to a continuous flow centrifuge where the isolation and precipitation of the algal lipoproteins occur.

Preliminary data suggests that the LPEP can save up to 75% of chemical input, save 44% in heating, and yield about 8% more product than the WLEP. Funding for this project was available through USU's Undergraduate Research and Creative Opportunity (URCO) Grant and the State of Utah Water Research Laboratory. Research was presented at the Annual Conference of the Institute of Biological Engineering(IBE) Annual Conference, Spring 2016.