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How to convert industrial dairy effluent into high quality proteins with microalgae

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Utilization of whey or whey permeate is one of major concerns of the dairy industry nowadays, especially the acid whey, which mostly remains untreated prior to disposal. In 2010, 734 million tons of milk, and 160-180 million tons of whey per year were produced worldwide. In 2014, milk production was higher than 800 million tons and is constantly increasing over the years. Despite the different strategies considered by the industrials to valorize whey: lactose crystallization, food applications in bakery products, dry mixes, snack, and milk replacer, alcoholic fermentation, or biogas conversion, only 50% of this whey is processed. In this study we present an industrial fermentation model to valorize these dairy by-products to obtain added-value bio-products at the same time. We demonstrate that the microalgae Galdieria sulphuraria is able to consume 100% lactose, 98% of lactate and 79% of the citrate present in whey permeate. Specific transport experiments show that lactose uptake by Galdieria sulphuraria involves the induction of a specific low affinity transport system (Km=53±2.9). The biomass production is whey permeate specific and range from 30 to more than 110 g/l of dry matter. In addition to direct the bio-remediation of industrial dairy waste, the algae biomass produced show a real nutritional interest due to its high protein content (>50%) and is naturally rich in essential amino acid.

Biography

Marion Champeaud graduated with a Bachelor of Biology five years ago and a Master's degree in Agro-Industry three years ago from Bordeaux University in France and she is currently doing her PhD in partnership between a biotechnology company Fermentalg and Poitiers University in France (UMR CNRS 7267). Her research studies in engineering process and microalgae culture area resulted in 2 patents-pending and 2 publications in progress.

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