

Case Study

Lower-Cost Whey Production at Brewster Dairy



Project Details

Client: Brewster Dairy, Brewster, Ohio

Application: Whey Processing

Product: XL™-1000 Spiral Ultrafiltration Membrane

Overview

Whey, once an environmentally-troublesome waste product of the cheese making process, has become a significant revenue stream for U.S. cheese producers. Whey protein concentrate is dried and sold for use in many products, including nutritional beverages, baked goods, processed foods, and animal feed. The lactose that is removed from the whey can also be dried into powder and sold for use in infant formula and pharmaceutical applications.

At Brewster Dairy, Inc., the country's largest manufacturer of all-natural Swiss cheese, whey products contribute 25 percent to the company's bottom line. Swiss cheese is made from curds, and the whey by-product is processed through a membrane ultrafiltration (UF) system.

Using UF membranes to separate and concentrate whey protein is a process that requires daily cleaning of the membranes with chlorine, which degrades them. Long membrane life is essential to controlling costs and maintaining performance.

The Challenge

To provide a durable, efficient, long-lasting UF membrane system that can withstand harsh chemicals with infrequent membrane replacement.

The Solution

Koch Membrane Systems (KMS) offered Brewster the perfect solution to maximize membrane life—the XL™-1000 ultrafiltration spiral membrane. The XL-1000 modules are composed of a proprietary polyethersulfone (PES) membrane and feature a patented fused-fold protection method that dramatically reduces degradation caused by chlorine exposure, resulting in significantly longer service life.

The Brewster plant achieves a membrane life of 18-24 months with the XL-1000 membrane, twice as long as competitor's products. The durability of the XL-1000 membrane permits the use of aggressive cleaning products, including chlorine, and provides highly stable flux throughout the plant's 16-20 hour operating day.

The high flux and superior protein rejection of the XL-1000 membrane

allows the compact, four-stage UF system to achieve excellent productivity and yield. Because the productivity is so high, the plant is able to concentrate whey protein with fewer membrane elements. Fewer elements and long membrane life have combined to provide Brewster Dairy with a significant savings in membrane replacement costs.

“The system has been continually running for more than two decades practically every day, 365 days a year,” said Ken Shook, Supply Chain Manager at the Brewster plant. “We have hardly needed to change anything—only an occasional motor or valve. We attribute the long service life to the quality of the membrane construction and to the extensive training we have received from KMS on critical pretreatment processes.”

The Membrane System

The KMS UF system at the Brewster plant contains four stages in series, with 14 housings per stage and three membrane elements per housing, for a maximum capacity of 168 elements.

The UF system produces whey protein concentrate by removing sufficient non-protein constituents including lactose so that the finished product contains the protein level desired. The Brewster plant typically produces WPC-34 that contains 34 percent protein on a dry weight basis and is capable of producing WPC-50 with 50 percent protein on a dry weight basis.

“The ultrafiltration system is one of the three key processes in our production of 1.5 million pounds of fluid whey each day,” said Shook. “The KMS system and the XL™-1000 membranes are so durable, dependable and easy to maintain that our operators can focus on the two other key processes, the evaporators and pasteurizers.”

Product Overview

KMS offers a wide selection of sanitary spiral ultrafiltration elements with 5,000 and 10,000 molecular weight cut-off that are ideal for milk and whey concentration, production of whey isolates, and milk standardization. These products are designed to conform to USDA 3A standards and FDA regulations.

The dairy industry benchmark for protein recovery are the standard HFK™-131 and HFK-328 UF element lines, which offer long life and stable productivity. They operate effectively over a wide pH range and can be continuously run at 131° F (55° C).

HFK™-131 and HFK-328 elements are available as the chlorine-tolerant fused-fold protected XL-1000 elements, which provide the added economic benefit of maintaining a very high level of protein rejection for the entire life of the membrane. The superior construction reduces the risk of losing valuable protein product due to leakage. Moreover, longer service life reduces the costs and downtime involving membrane changeover.



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