

Enhancing Dairy Farm By-Products



Solutions Offered in the Dairy Industry

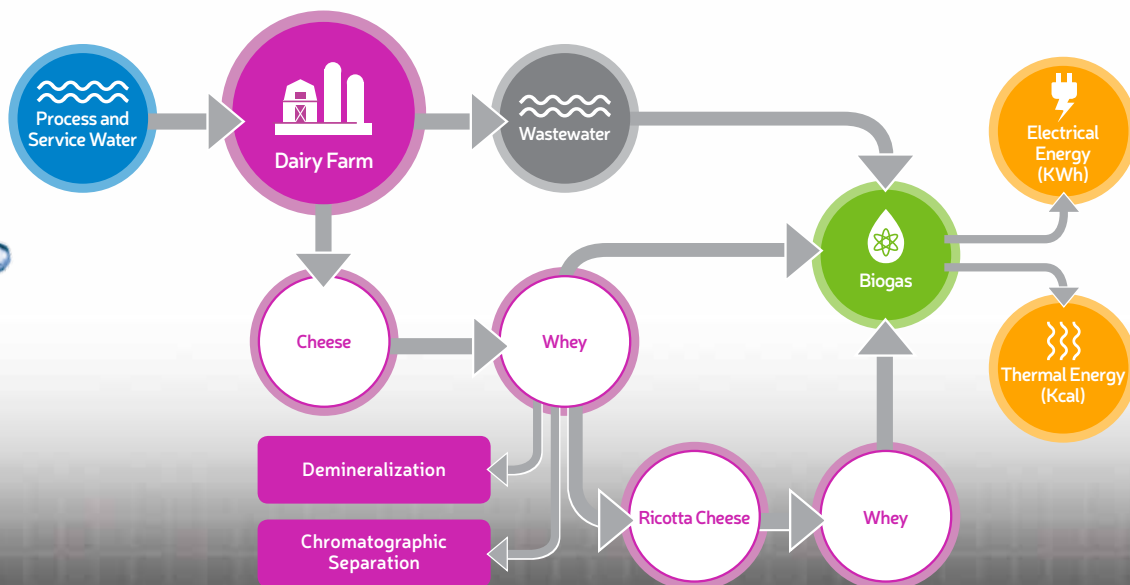
The dairy processing industry is highly diversified, and manufacturing operations create different qualities and quantities of waste that need to be treated. Without treatment, companies encounter disposal issues and miss opportunities to recover valuable biomass and nutrients.

RWL Water offers alternatives to traditional wastewater treatment and provides world class, innovative, economically attractive, and sustainable solutions. Our advanced solutions for wastewater

treatment, processing and product recovery enable clients to reduce water usage, wastewater, sludge disposal, and operating costs.

Solutions offered in the dairy industry include:

- ▶ Whey demineralization
- ▶ 4SMB chromatographic separation of the whey permeate
- ▶ Anaerobic treatment of buttermilk and other dairy by-products



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Whey Demineralization

In addition to proteins, whey contains lactose and mineral salts, which can be recovered and converted into more valuable substances such as baby food ingredients.

The demineralization process involves ionic exchange resins and preserves the lactose and proteins by

reducing the mineral load by 90%.

Demineralized whey, crystalized and dried, is widely used as a raw material for various food products and is also used in the pharmaceutical industry.

4SMB Chromatographic Separation of Whey Permeate

Chromatographic separation is an innovative process of protein separation implemented to minimize the permeate salinity and maximize the lactose recovery and quality.

The technology developed by RWL Water is based on the 4SMB (Four Simulated Moving Bed) chromatographic system, which, in addition to guaranteeing process continuity, considerably reduces

water consumption. The process does not use chemical reagents and reduces the saline content of the raw product by over 90%. Chromatography is a physical treatment, which is in line with Green Chemistry Principles - 12 principles that describe the practice of minimizing the use and generation of hazardous substances and maximizing the amount of material that ends up in the final product.

Anaerobic Treatment of Dairy By-Products

The disposal of dairy by-products is a long-neglected issue that is becoming a growing problem for an increasing number of dairy companies. When by-products produced by dairy farms are not used as pig feed, they are often disposed of. By-product disposal, however, can be very costly and often fails to comply with environmental regulations.

With 30 years of experience in biogas production technologies, RWL Water has performed a series of pilot tests confirming the benefits of anaerobic treatment to generate biogas with a very high yield index.

The dairy by-product first undergoes anaerobic fermentation. Once it has been digested, the digestate is separated into solid and liquid phases. The solid part of the digestate, which has a much lower volume than the influent, is safely reused in agriculture or turned into compost. The liquid part is sent for additional treatment to the existing wastewater plant, which may need upgrading to handle the higher load, or transferred to the local municipal wastewater plant through the sewerage system.



Anaerobic digestion plant of dairy by-products at Brazzale Dairy Farm in Campodoro, Padua, Italy.

The anaerobic digestion process can also be effectively applied to whey, but only as an alternative solution to demineralization or chromatographic separation, which can both lower the company's costs and enhance the company's products. Demineralization and chromatographic separation enable the conversion of whey into demineralized whey and powdered lactose, which can be reutilized in the food processing industry.

What can I get out of whey (and other dairy by-products) treatment?

Reference quantity (ton)	Dry matter (%)	Methane production (Nm ³ /ton)	Methane / biogas (%)	Biogas production (Nm ³ /ton)	Electrical energy (kWh/ton)	Thermal energy (kcal/ton)
1	5.5	19.3	68	28.4	74	75,000

RWL Water has more than 90 years of combined experience building highly successful water, wastewater and waste-to-energy treatment solutions for diverse industries and municipalities around the world.

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