

CASE STUDY

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Whey Protein Concentrate
Germany



Enhanced Whey Processing Efficiency at ArNoCo Nordhackstedt with Toray TR08038HS

ArNoCo Nordhackstedt is a joint venture between two leading dairy cooperatives: Arla Foods Amba (Sweden and Denmark) and Deutsches Milchkontor GmbH (Germany).

The facility specializes in processing whey and permeate into high-value whey protein concentrate (WPC) and lactose powder.

INITIAL EVALUATION - 2019

In 2019, a successful pilot test was conducted using Toray's TR08038HS membrane in the polishing stage of the production process. The results demonstrated significantly higher retention and permeate performance at a dry matter (DM) content of approximately 6%, outperforming a competitor's test membrane under identical conditions.

NEW EVALUATION – 2024: HIGH-CONCENTRATION WHEY PERMEATE (21% DM)

Building on the 2019 success, a new test was carried out in 2024 using Toray's next-generation TR08038HS reverse osmosis (RO) module. This advanced module incorporates a newly developed spacer, designed to withstand higher differential pressures and rigorous daily CIP (Clean-in-Place) routines.

TESTING CONDITIONS

- The TR08038HS was compared with a conventional 8" RO membrane from another manufacturer.
- Both modules were operated under the same conditions at 21% DM.
- The test was conducted in the final loop of the production line, processing 1.3 – 2.2 million liters of whey permeate daily.

CLEANING & SANITIZATION

- Toray modules were hot-water sanitized (80°C) up to three times every two weeks in a dedicated DMK R&D facility.
- Comparison membranes remained in regular production areas.
- Both membranes underwent identical daily CIP intervals. Sanitization cycles were repeated every 7–10 days.

PERFORMANCE RESULTS

- All modules showed improved feed performance immediately after cleaning.
- As expected, feed rates declined over the production day; however, the Toray modules maintained a consistent advantage.
- Toray's feed rate exceeded the comparison membrane by an average of over 30%, indicating superior operational efficiency.



Figure 1: Lactose Powder

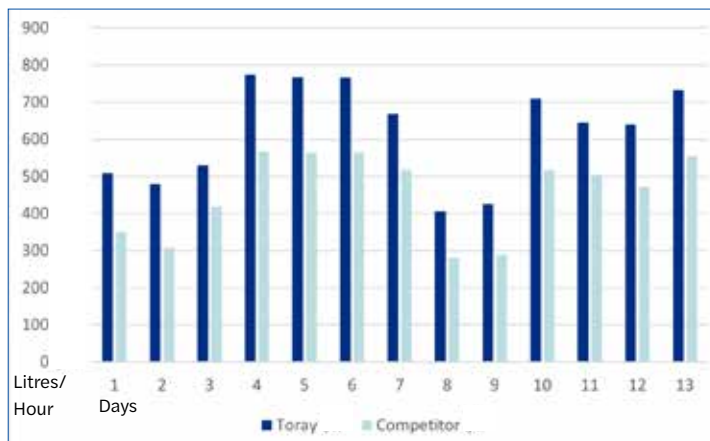


Figure 2: Toray membrane performance, measured in litres per hour, in comparison with a competitor product

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OPERATIONAL IMPACT

The deployment of Toray's TRO8038HS modules at ArNoCo Nordhackstedt has delivered measurable benefits:

- **Energy Efficiency:** Higher performance reduces the overall energy consumption, leading to substantial power savings.
- **Increased Throughput:** With over 30% higher feed capacity, the production volume significantly increases.
- **Higher Product Yield:** Enhanced retention minimizes material loss, improving the output of valuable whey concentrate.
- **Improved Environmental Performance:** Lower COD (Chemical Oxygen Demand) levels in the permeate reflect cleaner discharge and reduced environmental load.

CONCLUSION

The integration of Toray TRO8038HS modules in ArNoCo Nordhackstedt's high-DM whey processing line demonstrates a significant leap in membrane technology performance. With higher efficiency, better cleaning resilience, and environmental advantages, the Toray solution has proven itself as a game-changer for dairy RO applications.



Figure: Whey and permeates to whey protein concentrate

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