

PROTEIN EXTRACTION TECHNOLOGY

Meeting demanding customers goals for purity, activity and yield!

Improving the value chain in the dairy industry

New business opportunities for dairy industry with new products and increased revenue potential by extracting valuable proteins from the side-streams of the milk processing.

Solutions for the finest grade proteins

Highly selective but gentle filtration and chromatography solutions for finest grade functional protein production.

Scalable industrial chromatographic installations

Upgradeable industrial installations for the extraction of high-value functional whey proteins are also suitable for small dairies.

A possibility of spatially separated process steps between extraction of proteins and subsequent elution, concentrating and drying – mobile processing units.

Cost-effective and environmentally friendly process

A highly selective proprietary one-step separation technology with the optimised use of process chemicals, rendering minimised environmental footprint and chemically unchanged whey (except removed proteins) applicable for further processing.

HOW DO WE APPROACH BUSINESS

- ♦ Feasibility study to identify suitable adsorbent for selective capture of desired proteins with a description of extraction performance on laboratory scale tests; suggestions for method development and optimisation, to estimate industrial production costs accurately, capital investment estimates and operating costs projections.
- ♦ A pilot study with on-site trials.
- ♦ Production scale design and installation and integration into existing facilities.

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PROTEIN EXTRACTION TECHNOLOGY

Advanced technology for extraction of high-value proteins from whey



Whey proteins

their importance is growing!

Whey proteins have important nutritional and functional properties with positive health impacts!
The market of animal protein ingredients is a growing market!
Whey protein prices increase with higher levels of purity!

EXCELLENT TECHNOLOGY PROCESS

- ♦ High extraction yields (>99%) with highest protein purity and retained activity!
- ♦ The flexibility of the technology to extract several whey protein fractions depending on business focus and market opportunities!
- ♦ High speed and cost-effective process!
- ♦ Further whey processing options (production of WPC or use as a bioprocessing media) due to unchanged whey characteristics after separation of individual protein!

EXCELLENT, DESIRABLE PROTEIN CHARACTERISTICS

- ♦ More than 98% pure extracts!
- ♦ Highly optimised method for **lactoferrin** extraction with the highest retained iron binding capacity (C value 68 – 76%)!
- ♦ Retained protein structure with specific biological functionalities!
- ♦ High protein solubility!



Business opportunities

for dairies and dairy farms

- ♦ Elimination of whey as waste production flow!
- ♦ Optimisation of value of whey as raw material!
- ♦ Rational use of excess milk (before UTH pasteurisation)!
- ♦ Access to own produced whey proteins!
- ♦ Provision of novel routes to produce new products!

FROM SIDE AND WASTE STREAMS TO NEW PRODUCT LINES

Functional proteins help maximize value

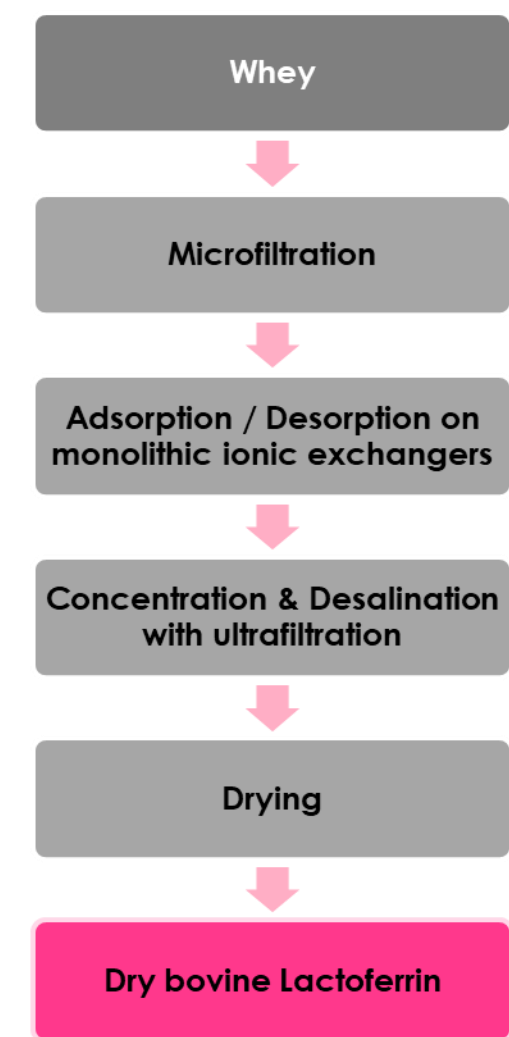
ADVANCED TECHNOLOGY FOR EXTRACTION OF HIGH-VALUE PROTEINS FROM WHEY

Process technical advantages

- ◆ One step extraction process
- ◆ High capacity combined with high flow rate
- ◆ Efficient water use and process liquids recycling
- ◆ Flexible adaptation to changing market conditions by switching between products market demand

Process steps

Lactoferrin production from whey



Typical hardware requirements:

- ◆ Microfiltration to remove fats and cheese fines.
- ◆ CIM® monolithic columns for separations.
- ◆ Ultrafiltration to concentrate products.
- ◆ Drying equipment.
- ◆ Process monitoring and automation equipment.
- ◆ Tanks for whey, process liquids and product handling.



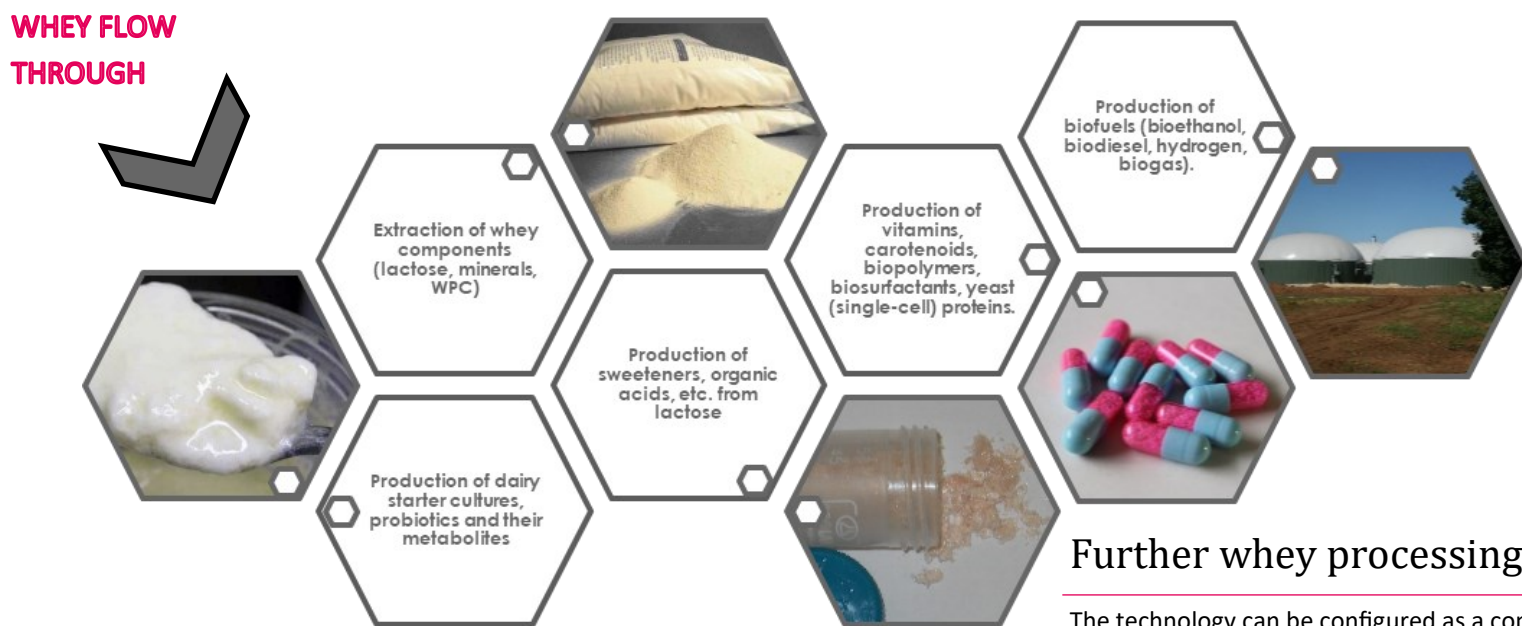
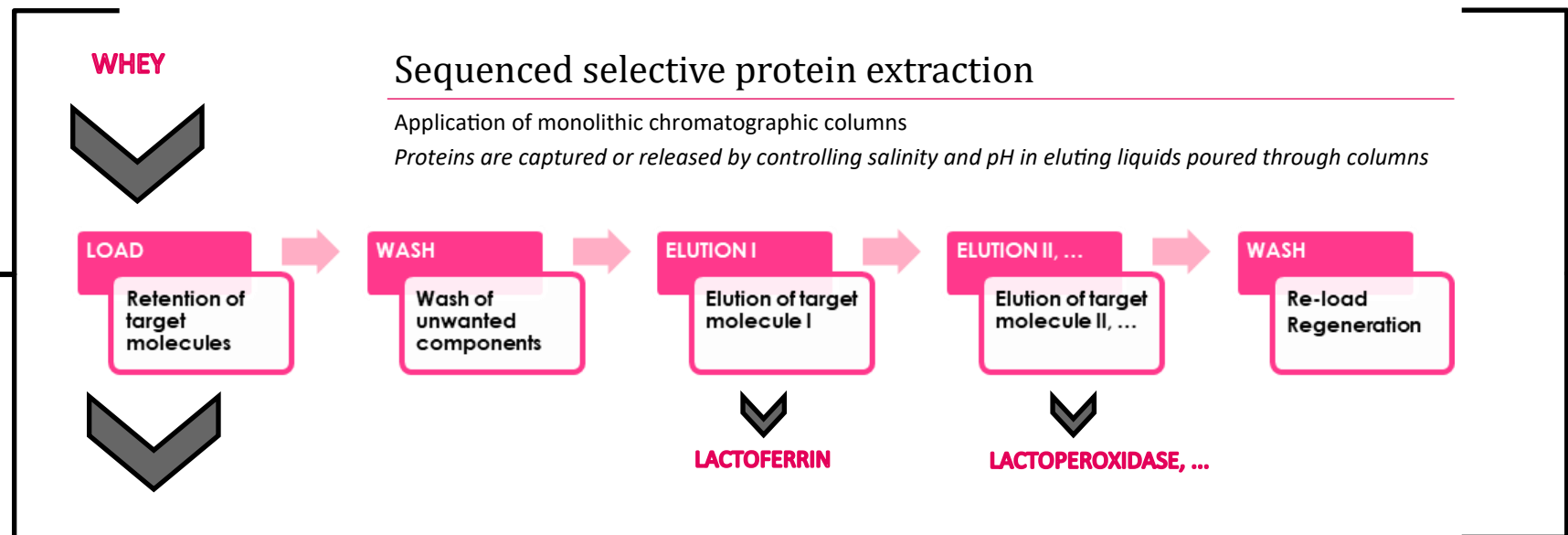
We apply state of the art protein fractionation technology

CIM® (Convective Interaction Media) monolithic chromatographic columns

Sequenced selective protein extraction

Application of monolithic chromatographic columns

Proteins are captured or released by controlling salinity and pH in eluting liquids poured through columns



Further whey processing options

The technology can be configured as a complete Whey Protein Refinery with multiple product outputs and total production flexibility

- ◆ Monolith columns - single piece adsorbent media
- ◆ Homogenous nontoxic methacrylate polymer material with uniform interconnected channels
- ◆ Exceptional mechanical and chemical stability – high resistance and durability
- ◆ Convective mass transfer with extraordinary high flow rates and excellent separation power
- ◆ Fractionation resolution independent of flow rate and size of molecules
- ◆ Highly efficient protein capture profiles efficient with minimal consumption of process liquids
- ◆ A gentle process preserving the functionality of biomolecules
- ◆ Straightforward scalable process