

M Membrane

TECHNOLOGY FORUM®

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Dairy
FOODS



AMERICAN
Dairy Products
INSTITUTE



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Business Development Manager

Tetra Pak Filtration Solutions



- Membrane Filtration started in 1994.
- Began at Filtration Engineering and currently with Tetra Pak.
- Chemical & Electrical Engineering backgrounds.
- Expert in all areas of Membrane Filtration; Engineering, Commissioning, Automation, Development, Pilot Testing, Trouble shooting, and Optimization.





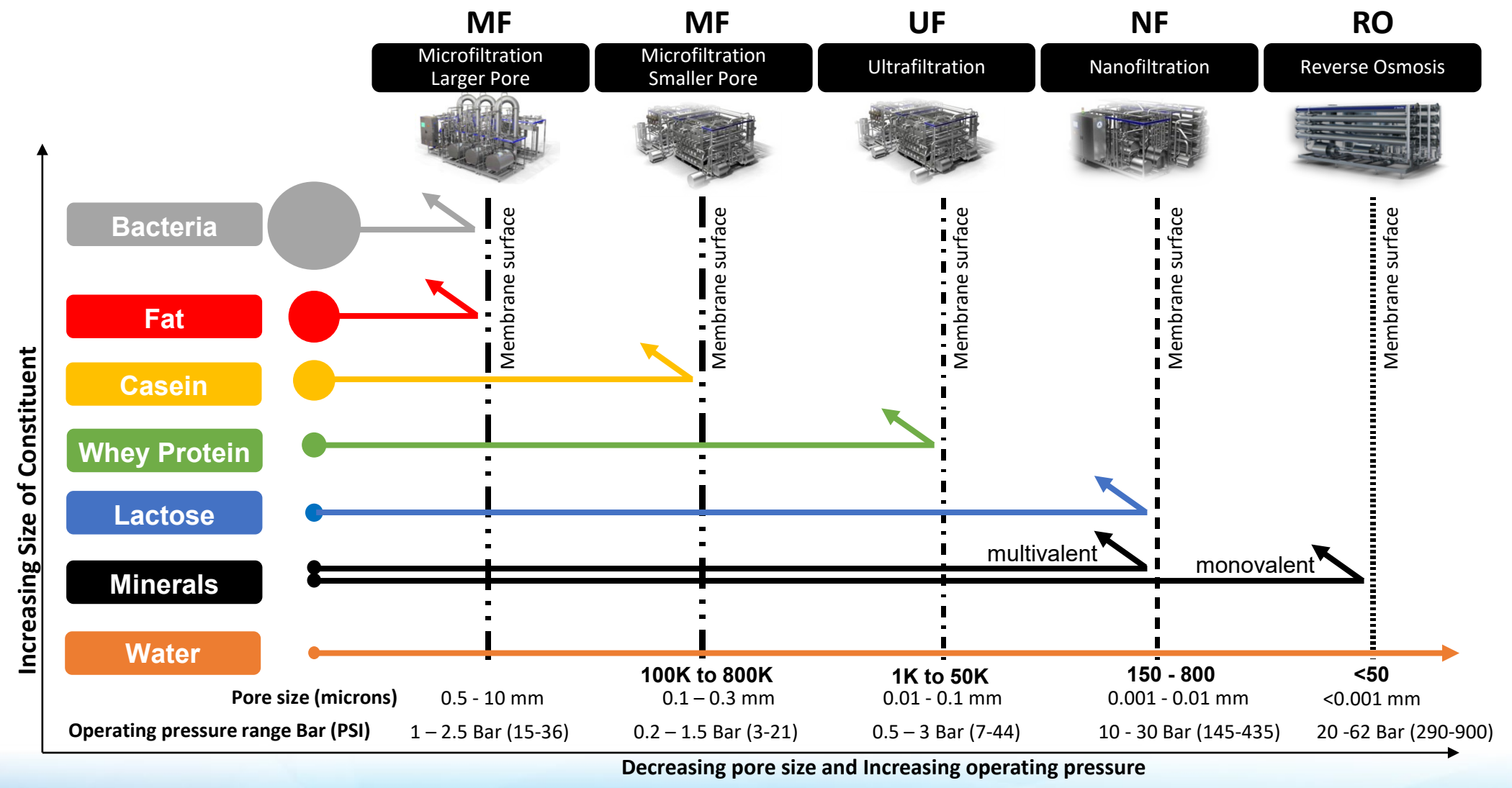
AGENDA

- Membrane Filtration and General Dairy Applications
 - Membrane Filtration Core Technologies
 - Dairy Applications:
 - RO Overview
 - NF Overview
 - UF Overview
 - MF Overview
 - Adding Value with Membrane Filtration
 - Milk Application – MPC/MPI
 - Whey Application – MFR/WPI



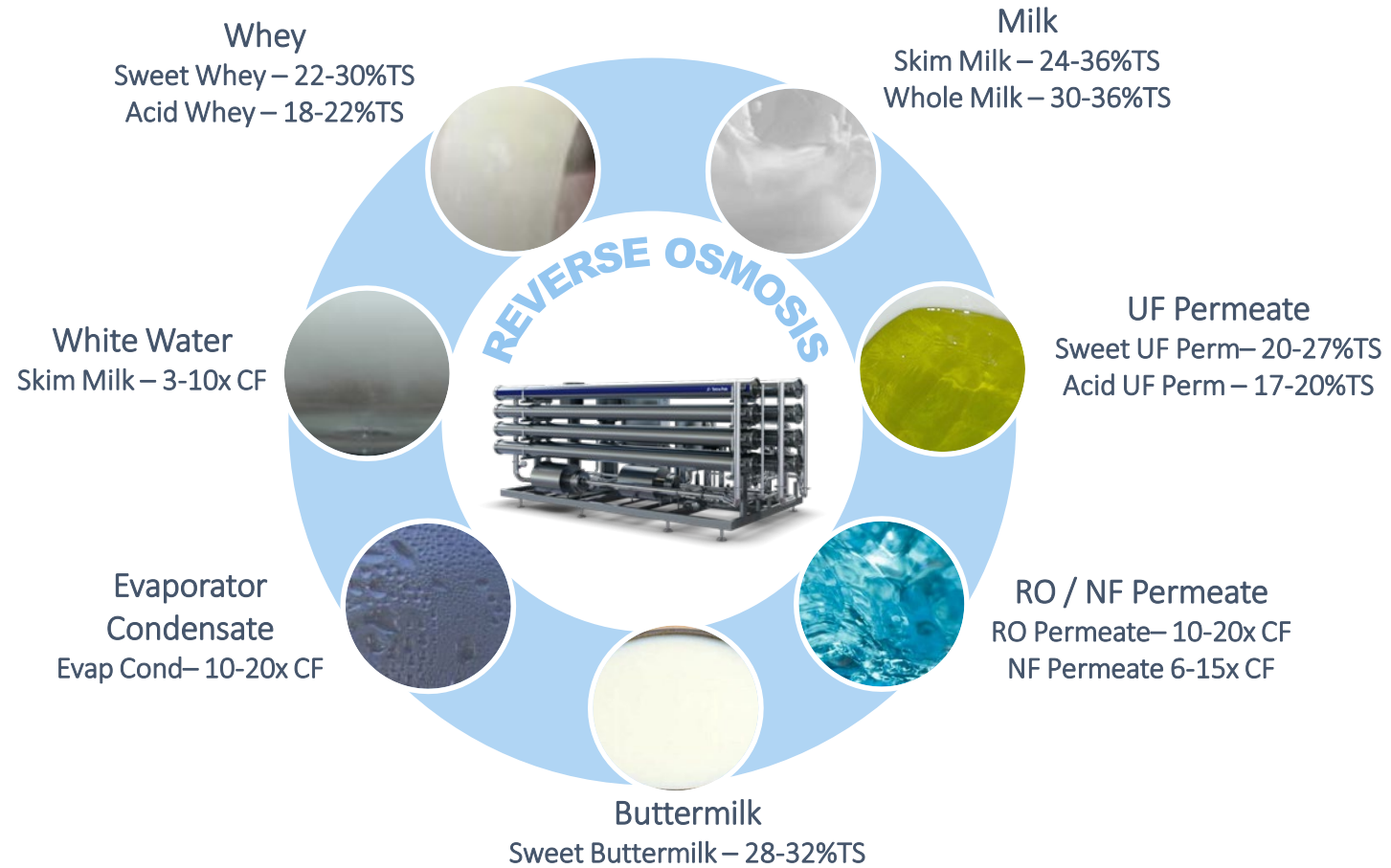


Membrane filtration core technologies with dairy constituents





Dairy Applications Membrane Filtration RO Overview



Lower transportation costs



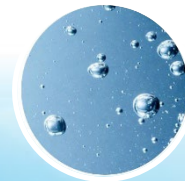
Increased Dryer Capacity



Evaporator Elimination or Decreased Size



Product Recovery



Water Reuse Recovery



Optimized Waste Water



Dairy Applications Membrane Filtration NF Overview

Whey
 Sweet Whey 22-30%TS
 Acid Whey 18-22%TS
 Salt Whey 90% Salt Reduction

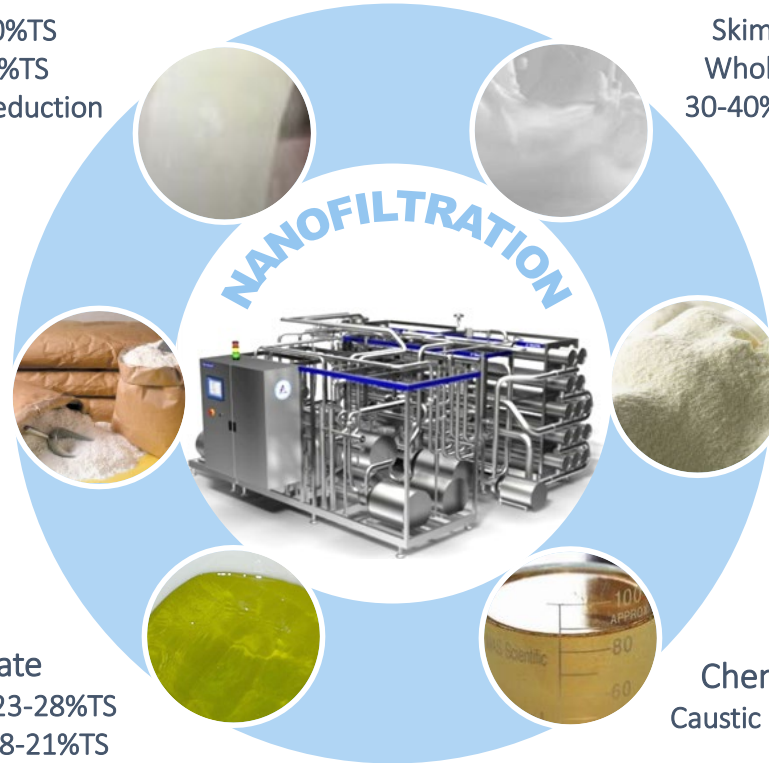
Milk
 Skim Milk 24-36%TS
 Whole Milk 30-36%TS
 30-40% Deimineralization

Whey Derivatives
 WPC35 38-47%TS
 WPC80 36-40%TS
 WPI90 33-36%TS
 MFR 23-26%TS

Milk Derivatives
 MPC70 28-30%TS
 MPC80 24-26%TS
 MPC85 23-24%TS
 MPI90 22-23%TS
 MCC 16-18%TS

UF Permeate
 Sweet UF Perm— 23-28%TS
 Acid UF Perm – 18-21%TS

**Chemical
 Caustic Reclaim**



Lower transportation costs



Increased Dryer Capacity



Evaporator Elimination or Decreased Size



Chemical Recovery



Deminerization



Optimized Waste Water



Dairy Applications Membrane Filtration UF Overview



Higher Product Yields



Increased Dryer Capacity



Evaporator Elimination or Decreased Size



Fractionation of Products



Clarification of Products



High Value Products



Dairy Applications Membrane Filtration MF Overview



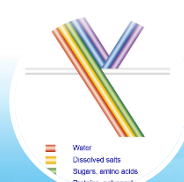
Higher Product Yields



Product Quality



Innovation



Fractionation of Products



Clarification of Products

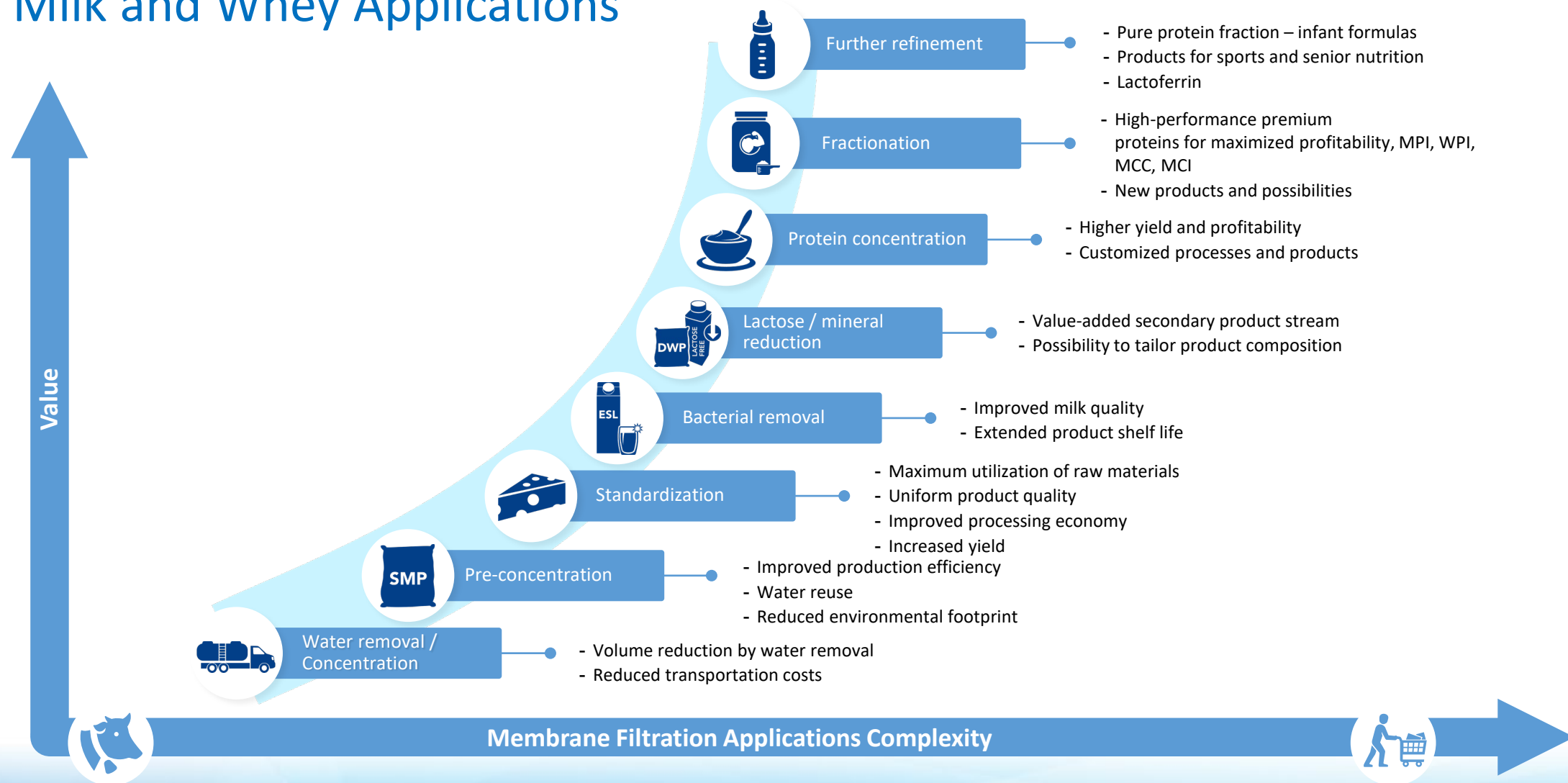


High Value Products



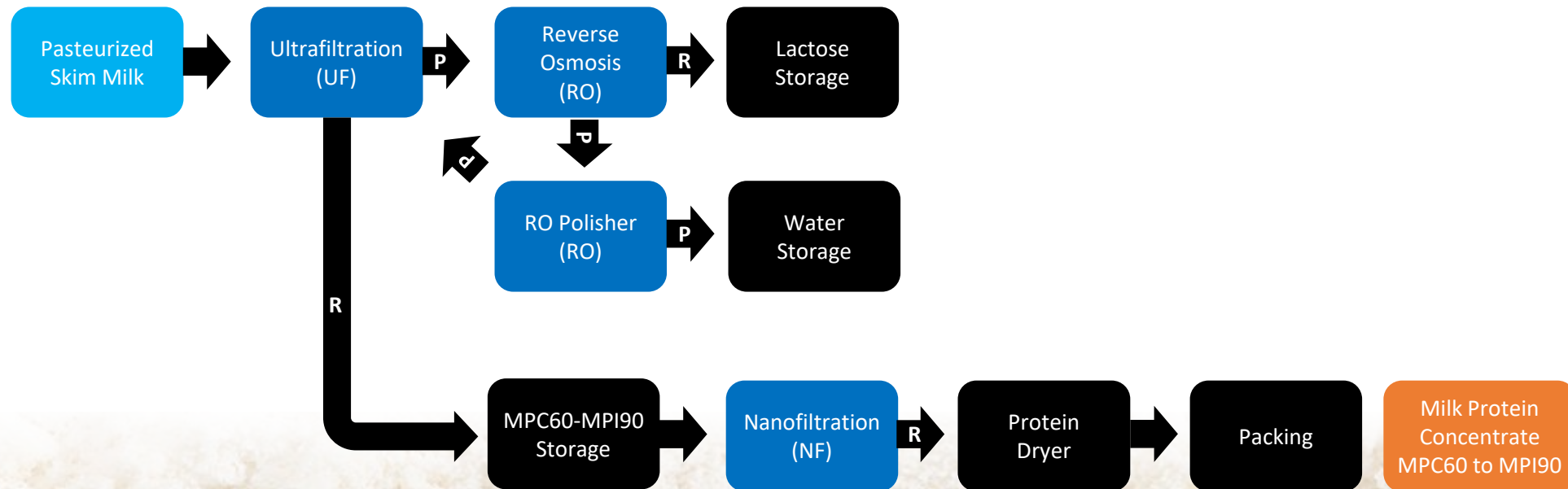
Adding value with membrane filtration

Milk and Whey Applications



Skim Milk - MPC / MPI Production (Basic Process Flow)

- MPC60, MPC70, MPC80, MPC85, and MPI90



MPC60 – Milk Protein Concentrate 60% Protein As Is.

MPC70 – Milk Protein Concentrate 70% Protein As Is.

MPC80 – Milk Protein Concentrate 80% Protein As Is.

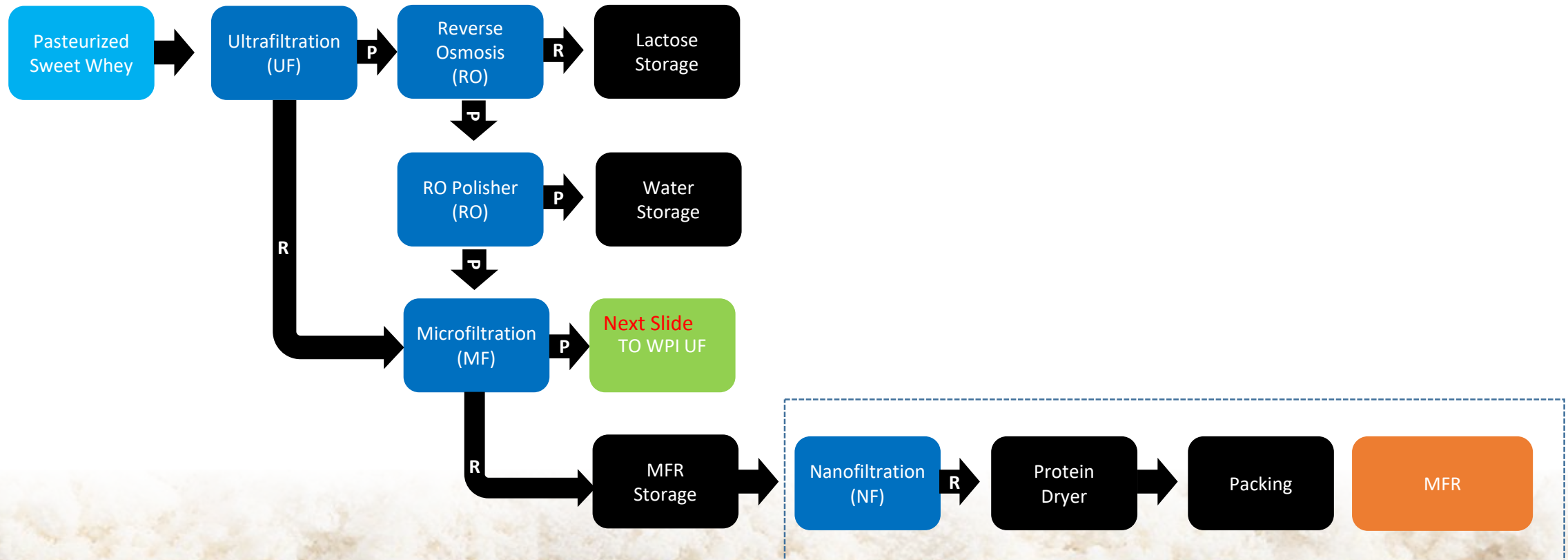
MPC85 – Milk Protein Concentrate 85% Protein Dry Basis.

MPI90 – Milk Protein Isolate 90% Protein Dry Basis, less than 5% lactose dry basis.



Sweet Whey – WPI90 Production (Basic Process Flow)

- MFR and WPI90

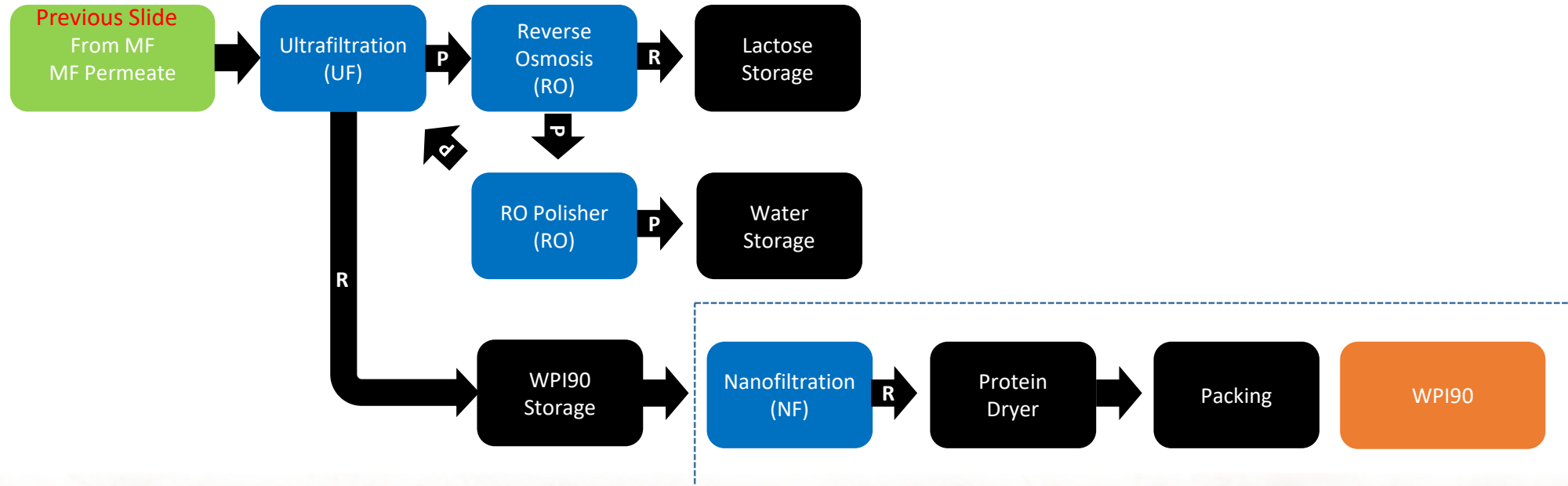


MFR– Microfiltration Retentate High Fat and 50-70% Protein Dry Basis.



Sweet Whey – WPI90 Production (Basic Process Flow) – Continued..

- MFR and WPI90



WPI90– Whey Protein Isolate 90% Protein Dry Basis





Thank you.

