

## Editorial

July 2009

By:  
Bent Oestergaard, Director  
Global Technology Management,  
SPX APV, Silkeborg, Denmark



## The APV GoldStream Process

- A sustainable solution for recovery of milk and water

The dairy industry is very focused on cost effective and sustainable solutions to minimise waste and maximise utilisation of all product streams in the process. For dairy, these include recovery of all milk components and reclaiming and recycling water streams.

The key operational drivers for many businesses are usually based on cost/benefit considerations. Although as climate change becomes more urgent the need to fulfil the company's strategy and commitment to managing their carbon footprint is an ever more critical driver. In other words having a "green profile" will be highly important in years to come.

With a very short ROI (Return on Investment) along with full recovery of milk components and water stream, the APV GoldStream process combines both financial savings with waste elimination.

### White water

The first flush water in an in-line cleaning process (CIP) after production contains diluted milk components, which is called "white water". The white water can be raw milk from road tankers, milk silos or pasteurised white water from pipes, pasteurisers, storage tanks and other processing equipment.

The total volume of white water varies from dairy to dairy depending on production as well as the number and efficiency of flush and production logistics, etc. However, a typical level is in the range of 3 to 4% of the milk intake. A dairy plant with a milk intake of 1 million litres per day will typically produce 30 - 40,000 litres of white water per day consisting of one third milk and two-thirds water. Annually this equates to 4.2 mio litres of milk and 8.4 mio. litres of water.

Traditionally little could be done with the white water due to its high water content. Consequently the water was sent down the drain, which in many cases increased the chemical oxygen demand (COD) significantly. This is not a favourable option when taking into consideration the annual value of 4.2 mio. litres of milk and the cost of water and effluent treatment. Milk has a very high biochemical oxygen demand (BOD<sub>5</sub>) load and converted into its population equivalent 30 m<sup>3</sup> white water is equal to waste water from 15,000 people.

### The GoldStream solution

A new environmentally friendly technology enables effective processing of the collected white water by concentrating the milk back to its original composition or higher depending on the use of the recovered milk. The APV GoldStream is a hygienic dairy process based on proven reverse osmosis (RO) technology enabling use of the recovered milk for cheese, yoghurt, ice cream and flavoured milk, but not for natural milk drink.



APV  
2 City Place, Beehive Ring Road  
Gatwick, West Sussex, RH6 0PA  
UK

TEL | +44 | (0)1293 | 527777  
FAX | +44 | (0)1293 | 552640

[www.apv.com](http://www.apv.com)



The RO permeate or water stream might be used directly for Clean in Place (CIP) purposes or be polished in the flexible Plug & Play GoldStream system to a COD level of approximately 10 ppm. This very high quality demineralised soft water might also be used as:

- Process water for cheese and lactose wash water as well as diafiltration
- Water for cheese cooling before brining and further brine water
- Water to supply boilers or cooling towers
- Water to supply CIP systems including the final rinses
- Seal water on pumps

Depending on the use of the water, a downstream treatment might be needed – e.g. pasteurisation or cold disinfection by Electrolysis for process water and UV light or preservation by Oxonia (H<sub>2</sub>O<sub>2</sub>) for other purposes.

### Highly profitable and a green image

The GoldStream process is a highly profitable solution as the value of the recovered milk is equal to the price for raw milk. Additionally the savings of water and effluent cost add to the profitability. Taking into consideration the capital and operational cost the ROI is in most cases less than one year.

#### Waste solution (1 mio ltrs milk intake/day):

Products	Cost price in €	Days/year	Cost in K€
10.000 ltrs. milk	0.25/ltrs.	360	900
20.000 ltrs. well water	0.65/m <sup>3</sup>	360	5
30.000 ltrs. waste water	2.50/m <sup>3</sup>	360	27
Total cost per annum			932

#### Recovery solution:

Value of milk,water and waste savings	932
Capital and operation cost	220
Gain per annum	712
Return of investment(ROI) in months	7,0

Figure 1.

Figure1. shows the waste solution scenario compared to the recovery scenario using the GoldStream technology based on a daily milk intake of 1 mio. litres.. The figures are based on 360 days of production per year with an interest rate of 5% and three years depreciation.

### Reclaiming milk based water

When processing milk or whey by membrane filtration for protein concentrates, and subsequent evaporation of a substantial amount of milk based water (Cow Water) is obtained as RO or NF (Nano Filtration) permeate or condensate respectively.

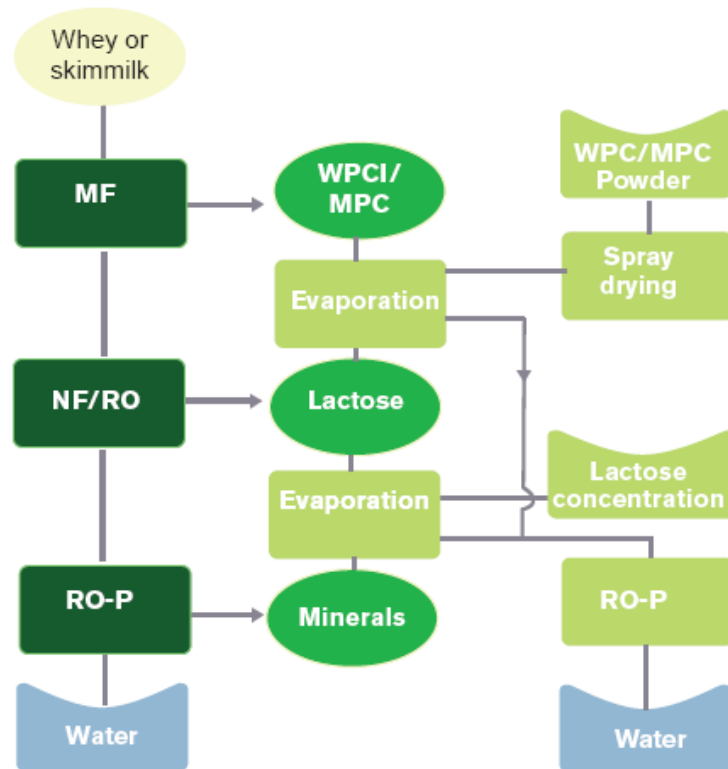


Figure 2. Water reclaim from whey and milk membrane processing

Figure 2 shows the process of generating water from milk and whey.

In this respect the cow water becomes a new milk component of increased value and can be reclaimed by using the above mentioned RO polishing system. This adds a new dimension of value to the milk and cuts significantly the water and waste costs as well as adding value to the green profile too.

### Conclusion

The GoldStream process is a proven, financially attractive and sustainable solution for:

- Recovery and use of all fluid milk components
- Recovery and recycling of water streams
- Reduced load on the effluent plants.

With a pay back time of less than one year as well as helping to contribute to a processors' positive environmental image, GoldStream is a "goldmine" of potential savings.

With the positive results obtained by using the new GoldStream process as well as the interest shown by the industry, we strongly believe that this technology will be a standard solution in all dairies in the future.

For further information on The GoldStream and SPX APV membrane technologies, please visit us at [www.apv.com](http://www.apv.com)



### **About APV**

APV, an SPX brand, is a prominent provider of high quality process technologies and engineering solutions for the food, pharmaceutical, healthcare, power generation, chemical and petrochemical industries. APV's range of manufactured products includes heat exchangers, water desalination units, homogenisers, as well as pumps and valves for hygienic and non-hygienic applications. APV solutions are supplied through its global network of sales and service offices.

### **About SPX**

SPX Corporation is a Fortune 500, global multi-industry manufacturing company. Headquartered in Charlotte, North Carolina, SPX employs more than 17,000 people worldwide and has operations in over 35 countries.

### **Web sites:**

APV: [www.apv.com](http://www.apv.com)

SPX: [www.spx.com](http://www.spx.com)

### **Contact:**

Bent Oestergaard, Director Global Technology Management,  
Tel: +45 70 278 278 Email: [Bent.Oestergaard@apv.com](mailto:Bent.Oestergaard@apv.com)

Anne Mette Lassen, Global Marketing Consultant, APV  
Tel : +45 70 278 278 Email: [Annemette.lassen@apv.com](mailto:Annemette.lassen@apv.com)