

## Optimal Operation in an Integrated Food Processing: A Strategy Development

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Sustainability in industries has become a motivation for companies' business model development. A practical approach to address sustainability in an industry is to perform gate to gate material and energy analysis to minimise the consumption and increase the efficiency of the process.

Food industries have a dynamic nature that it is impossible to separate the operation impacts on sustainability. A good example can be explained by focusing on sustainability pillars, production, and cleaning sequences. Production is mainly driven by economy, which is connected to market's supply and demand and its uncertainties due to material and utility prices. Cleaning and sterilising cycles are essential and expensive which covers the quality of the products. Most of the cleaning and sterilising are currently performed based on general recommendations for a series of products and usually it includes several cycles of acidic, basic and water usage. Its mechanism is complex due to impact of several parameters including previous production cycle. Hence, to achieve certain level of sustainability focusing on both production and cleaning is essential.

More complexity accounts when we look at the whole process line. As an example, for a conventional Ultra-High Thermal (UHT) processing dairy line with four products, there are about 6-8 separate cleaning sequences. This leads to more than 100 alternative operational selections which can be reduced by technical constraints. Besides that, there are other operational choices that can be added by automation, for example type of utility control in case of the Fouling in heat exchanger network to keep the product temperature constant. Other decisions factors can be added by plant manager to perform intermediate or full cleaning, and production, cleaning, and sterilising time to a certain level. Another practical challenge is how to utilise a massive information available from instrumentation in the form of plant data. As the process lines are usually tailored based on customer requirements, identify the necessary information/instrumentation is required.

In this paper which address a strategy development to recognize key information needed to develop a tool that can help to study a process line to improve decision making focusing on a dairy UHT line.