RECP Best Practice Catalogue

Reduce Pasteurization temperature

Developed within the framework of MED TEST II

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

switchmed

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Best Practice - Reduce Pasteurization temperature

SECTOR:	**Food & Beverage**
SUBSECTOR:	Manufacture of dairy products
PRODUCTS	UHT Milk products
CATEGORY	Process control or modification
APPLICABILITY	Process

COMPANY NAME	---
COMPANY SIZE	Large

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Description of the problem (Base scenario):

The company receives fresh milk, which is pasteurized at the reception stage at 85 degrees, then sent to processing (removal of fat, addition of flavors, mixing with powder milk…).
Following the processing, the product is pasteurized again according to the international standards of UHT (139-140 degrees).
In the existing pasteurizer, there is a regenerative section, which preheats the incoming milk with the cooling of the pasteurized milk, reducing the need for heat addition and heat removal. According to the temperature profile, the heat recovery ratio (HRR) is 75%, the heat addition by steam is only from 65 to 80, while the heat removed by cooling is 28 degrees (Pasteurization temp. – (HRR*(past – Temp IN).

Temp IN	Regenerative	Past	Temp Out
20	65	80	7

Description of the solution

As the fresh milk is re-pasteurized, reduce the pasteurization temperature for the fresh milk from 85 degrees to 75 degrees will be sufficient.
This shall yield a decrease in Regenerative tempt. to 61.3 degrees while keeping the same HRR.

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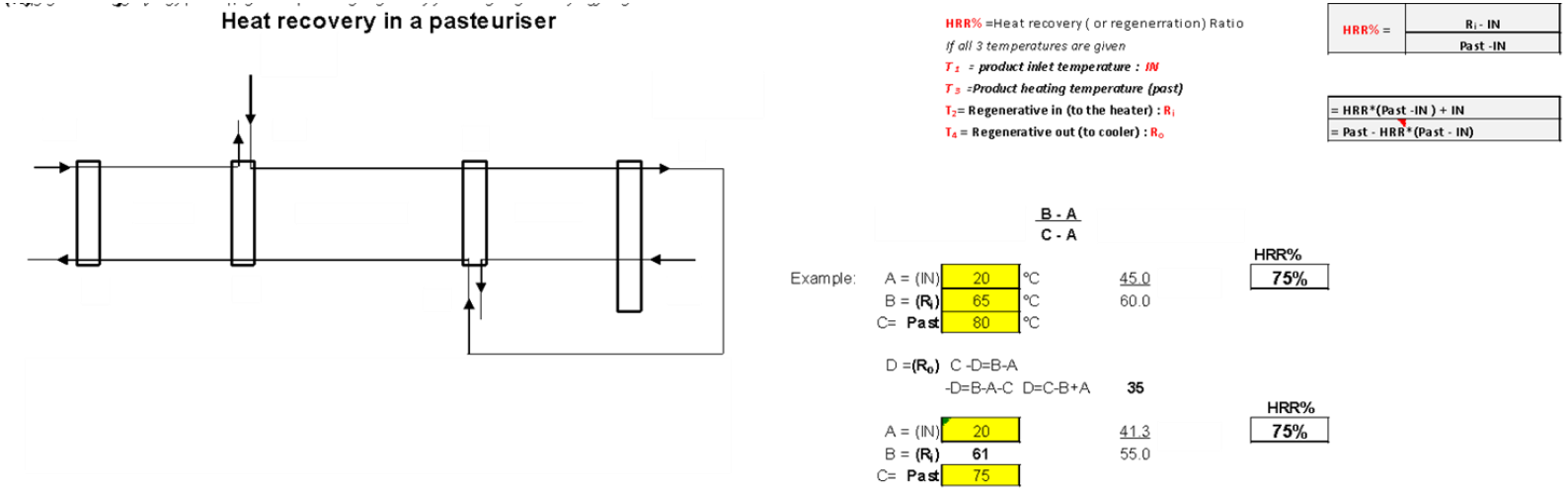
Schematic for the solution



Credit: Chris Arvantakis – International Dairy Expert

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Economic Benefits	Baseline scenario, the temperature addition is 15 degrees, and temp. removal is 28 degrees. Following the modification, the temp. addition is 13.75 degrees, and temp. removal is 27 degrees. Energy consumption for heating is calculated as: $Q_{heating}$= mass flow rate x specific heat capacity x temperature addition by steam / boiler efficiency And the cooling is calculated as: $Q_{cooling}$= mass flow rate x specific heat capacity x temperature reduction by chilled water/ chiller efficiency Energy savings was calculated to be 946,209 kWh/year, equivalent to 23,402 Euro/year
Environmental Benefits	Reduction in energy consumption by 3.32 kWh/ton With an annual production of 284,832 ton/year = 946,210 kWh/year (5.8.% of the baseline). CO_2 reduction associated with the energy savings is equivalent to 318 ton/year
Health and safety impact	Not applicable

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Capital investments & financial indicators	Changing the temperature is a no cost measure. Payback is immediate
Suppliers	None. In house operators can adjust the temperature, with assistance from technology supplier
Other aspects	None
Implementation	The company implemented this measure

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Replicability sectors	The same concept can be replicated in • Dairy industry
Aspects to investigate for replicability	Temperature profile of pasteurization Holding time Heat Recovery Ratio Pasteurization temperature against international best practice Treated volume Efficiency of boiler and cooling system (chiller)
Useful resources	EU BREF document for Food, Drink and Milk Industries, August 2006, Table 2.2 Examples of heat treatment combinations used in the FDM sector http://eippcb.jrc.ec.europa.eu/reference/BREF/fdm_bref_0806.pdf