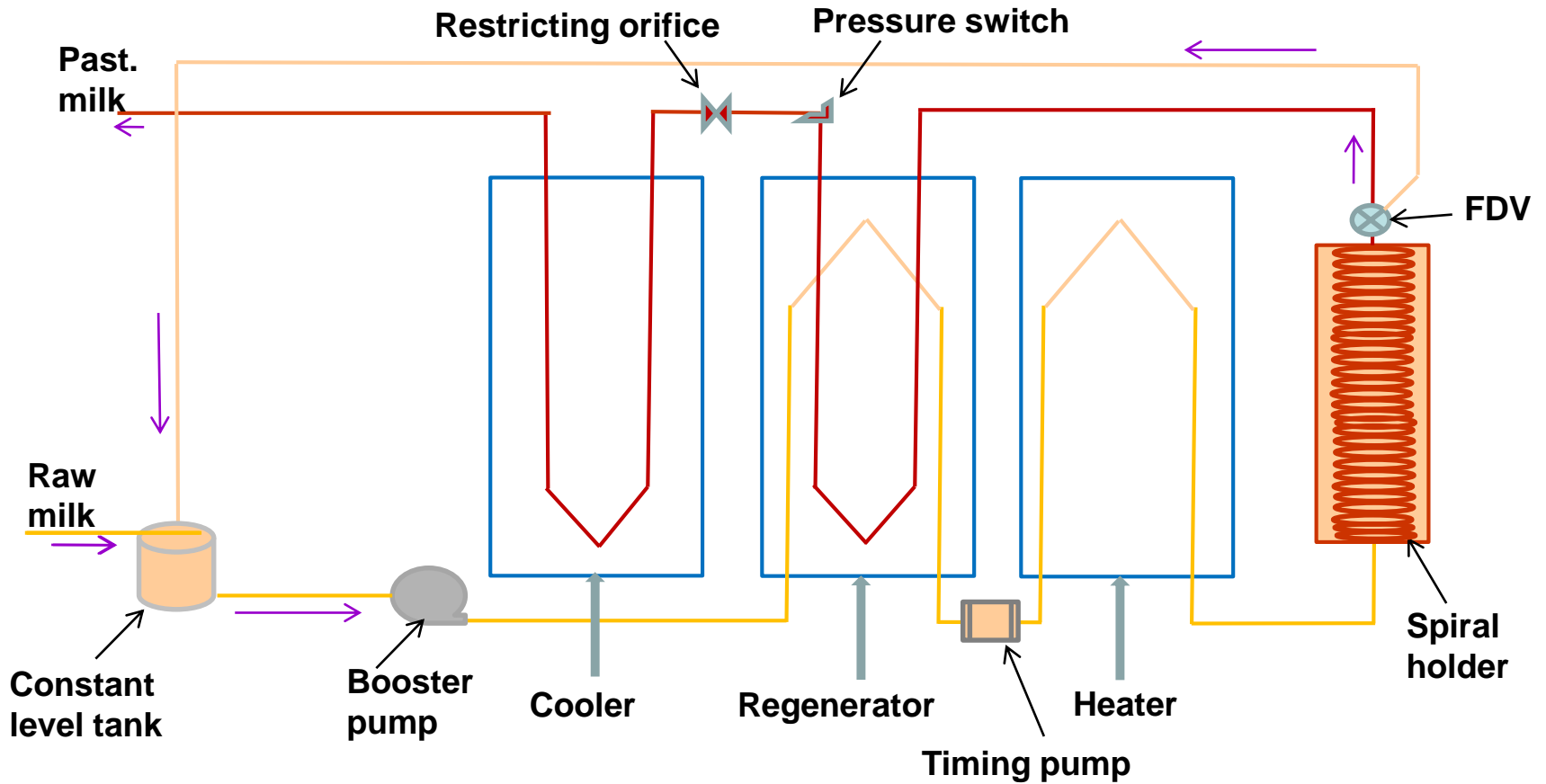


PASTEURIZATION CONTROLS

HTST pasteurization- Controls



- *Flow rate*
- *Temperature*
- *Pressure*

HTST pasteurization

Control for Flow rate

- Regulated by a metering or timing pump
- A positive displacement pump of rotary or piston type is used.
- Often variable speed drives are used to change the rate of flow when desired.
- Pump must be sized and perfectly driven such that flow rate does not exceed the actual that is holding time not below legal minimum.

HTST pasteurization

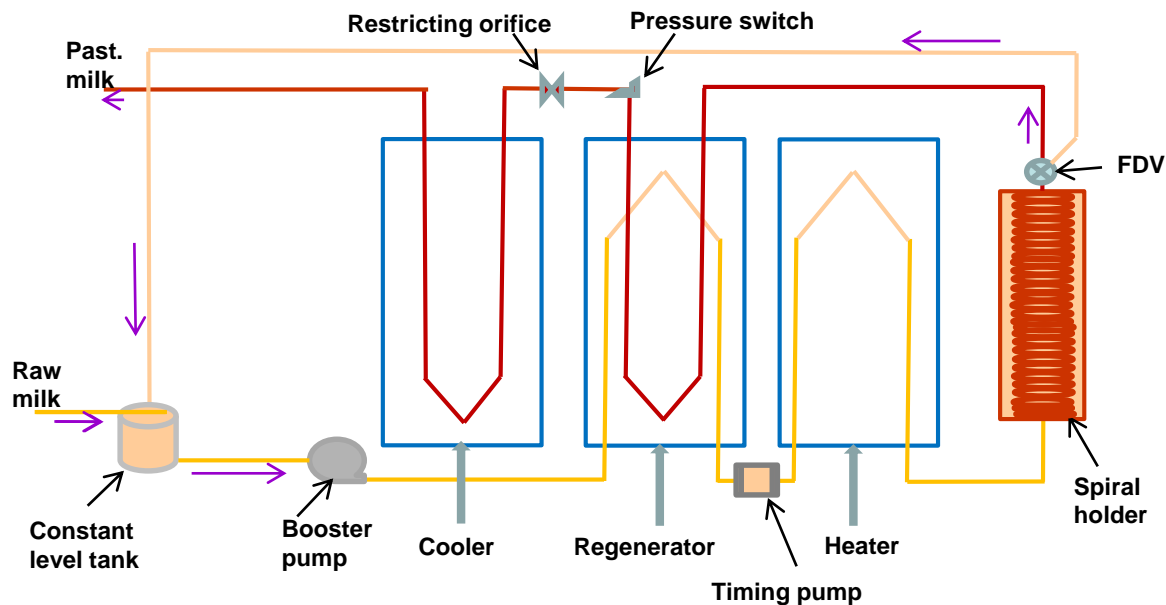
Control for Temperature

- Control of temperature includes means for maintaining a uniform product temperature at or above the legal minimum at a safe value.
- It should divert the flow back to the system if the temperature at the end of holder is below legal minimum.
- Usually a safety thermal limit recording controller is used. (It makes a continuous record of the temperature and marks the time when the flow diversion valve operates.)

HTST pasteurization

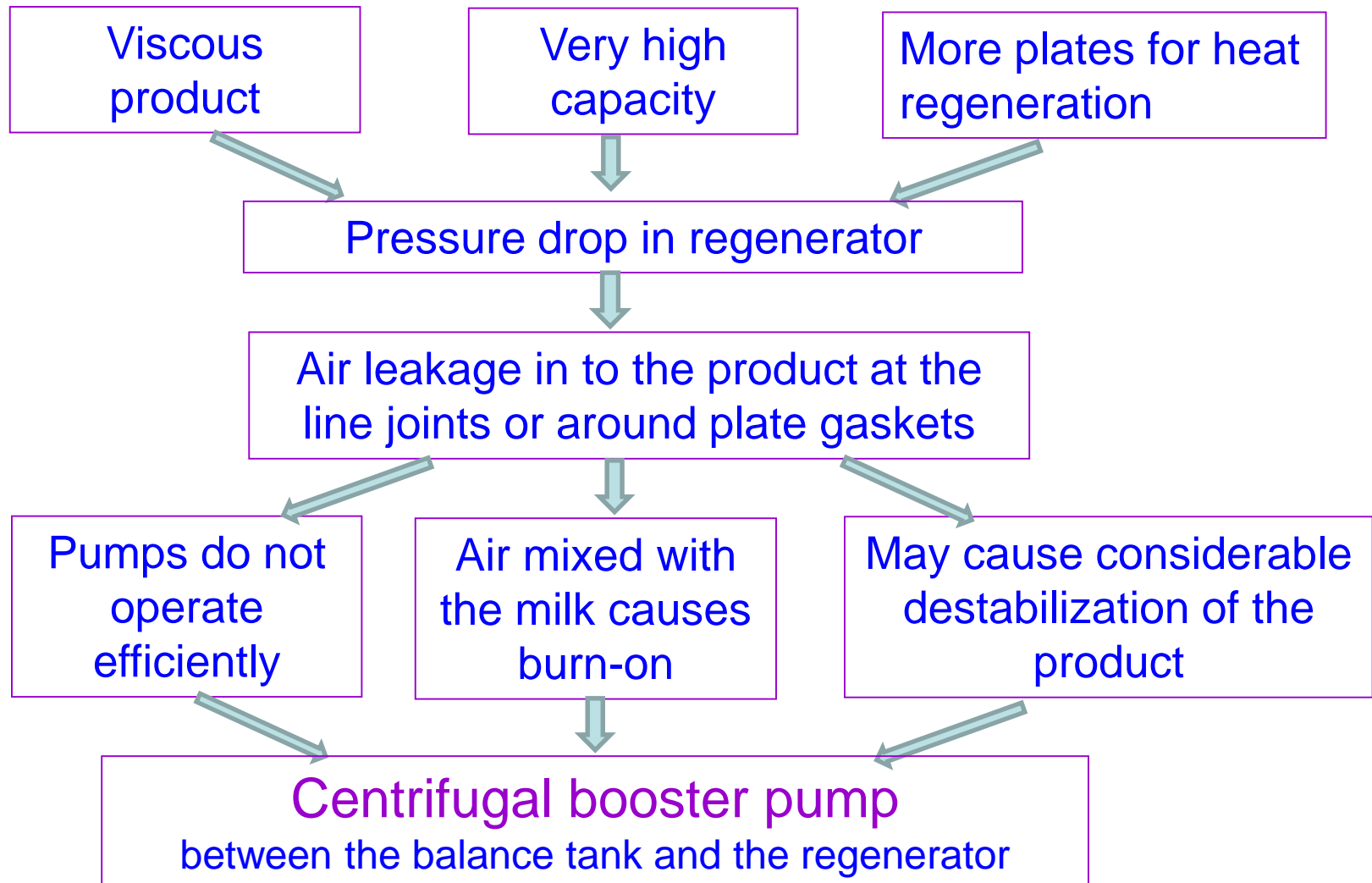
Pressure control

- In the REGENERATORS
- In the FLOW DIVERSION VALVE
- In the DIVERTED MILK LINES
(for Homogenisation, etc.)



HTST pasteurization

Pressure related problem in the regenerator



HTST pasteurization

Pressure management in the regenerator

- **Timing pump** : Assures that the pasteurized product is always under higher pressure than the raw.
- **Pressure switch** : The pump runs only when the pressure differential is at least 1 psi.
- **Restrictor** : Additional device to satisfy the minimum 1 psi difference if the cooler section does not produce enough back pr. on the pasteurized side.

HTST pasteurization

Pressure management in the flow diversion valve

- The thermal limit recorder not only makes a record of the temperature of the milk but also indicates, records and controls the action of the flow diversion valve.

HTST pasteurization

Pressure management in diverted milk line

- The other pressure management is needed on the diverted milk line, since it may affect the holding time during diversion.
- If the holding time during diverted flow is shorter than that in forward flow, a restricting orifice should be placed in the divert line.

HTST pasteurization

Main parts

Constant level tank, Regenerator, Booster pump, Timing pump, Heater, Holder, Flow diversion valve, Pressure switch, Restricting orifice, Cooler

HTST pasteurization



Important accessories

- Leak detector valves at all inlet and outlet pipes.
- Air space heaters

Air space heating is done by introducing steam above the level of the product.

HTST pasteurization

Advantages

- Uniform treatment.
- Temperature is regulated at close limits and overheating is prevented.
- Economical than batch systems (due to regenerative heating).

Disadvantages

- Complicated
- Not portable
- Installation cost is more

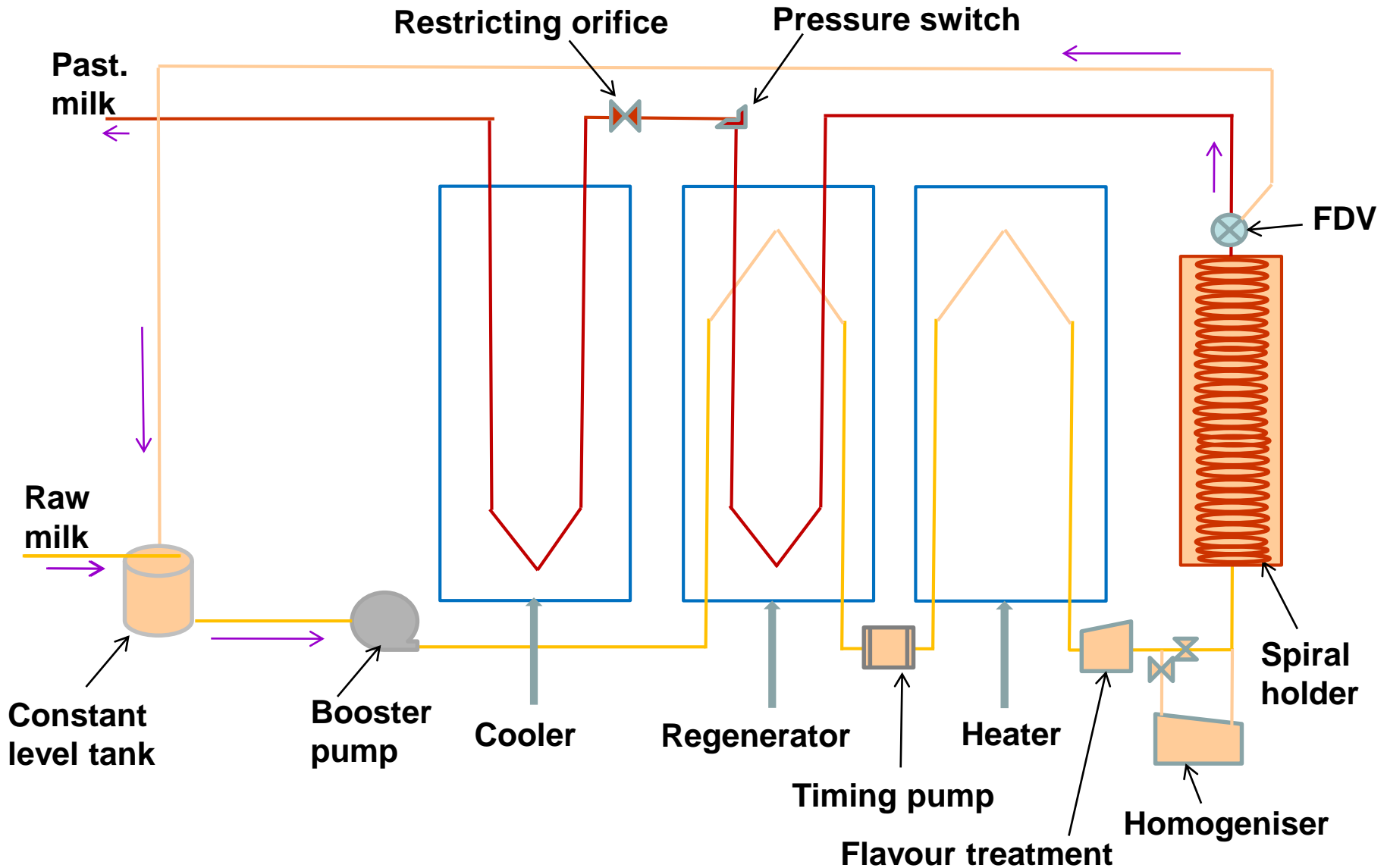
UHT pasteurization

- The equipment is much the same as the HTST units.
- The controls are similar but the operating temperature is higher.
- The **holder is much smaller** for smaller pasteurizing time.
- When UHT treatment is needed for greater bacterial destruction or its beneficial effect on the body and texture of ice cream, then the treatment may be given following regular pasteurization.

Advantages :

- Better texture
- Greater bacterial destruction

Homogenizer incorporated in HTST pasteurization system



Pasteurization and Homogenization

Clarifiers, separators and homogenizers may be integrated into the lines of HTST and UHT systems.

Since nearly all fluid milk and ice cream mix etc. are homogenized, homogenizers are integrated to the continuous pasteurisation process.

Since homogenization temperature must be at least 60°C, the homogenizer must be located either between the regenerator and heater or after the heater.

These equipment, when installed, should not reduce the holding time below the legal minimum either when they are operating or when they are at rest.

Pasteurization and Homogenization

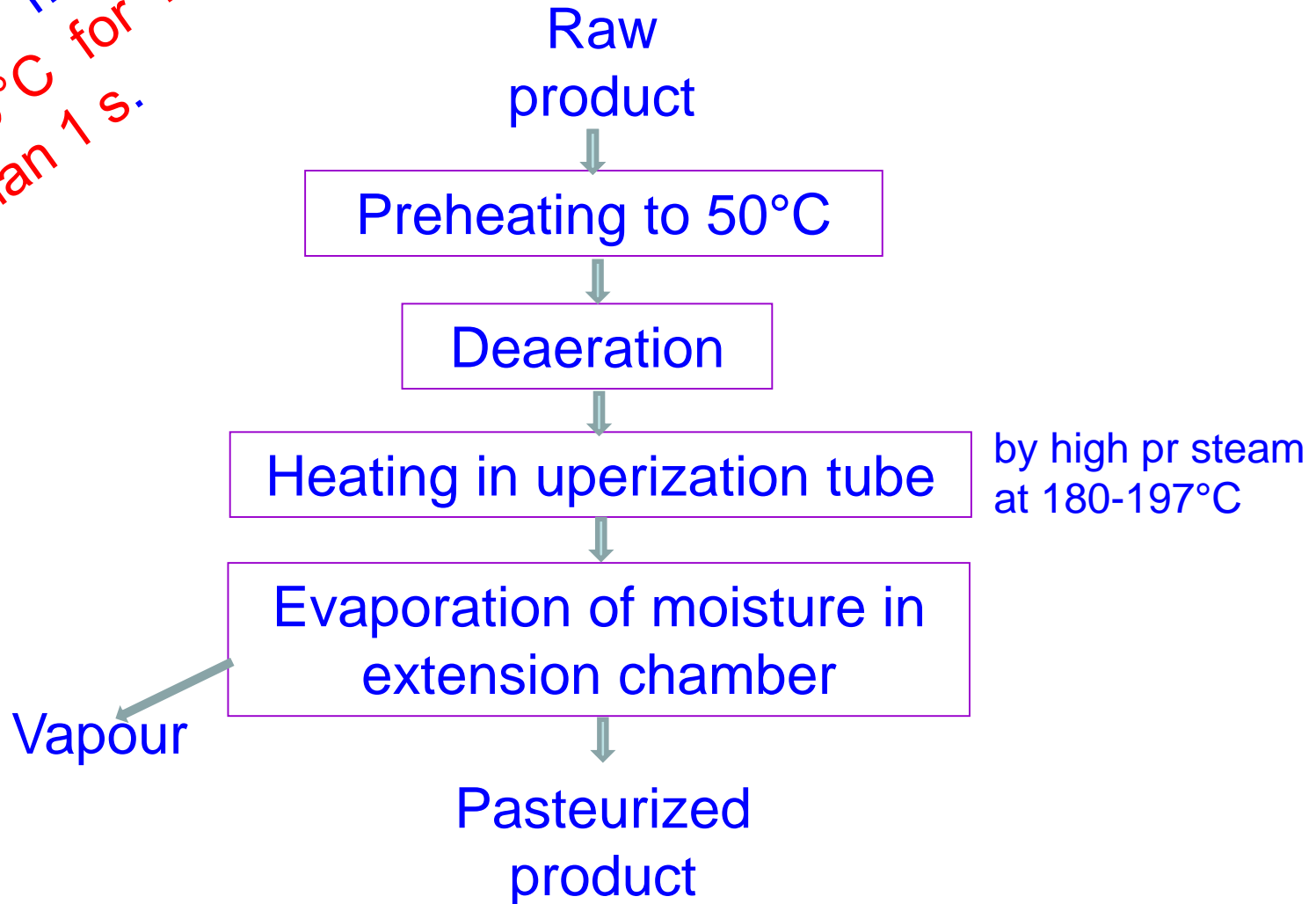
The capacity of the homogenizer can seldom be synchronized exactly with the timing pump unless a vented cover or other relief valve is employed, and then the pump operates at slightly greater capacity than the homogenizer.

- Recent installations use a homogenizer having 3-8% greater capacity than the maximum flow rate of the system and they are equipped with a recirculation, by-pass loop from the discharge line to the suction feed line.
- Here the timing pump regulates the flow rate of the system at all the times.

Uperization

(Ultra-pasteurization)

Uses steam to heat milk to 150°C for less than 1 s.



Vacreation

- The process of heat treatment under different vacuum in stainless steel chamber is known as vacreation.
- Vacreation is normally done for cream used in manufacture of butter.

The purpose of vacreation is to

- (1) Kill bacteria,
- (2) Inactivate enzyme,
- (3) Remove undesirable odors and flavors,
- (4) Deaeration to expel dissolved air and finely dispersed bubbles.

The system consists of a product feed pump, steam pressure controller, a temperature-recorder controller, vacuum controller, milk inlet controller, concentration ratio controller.

The equipment is called Vacreator (trade name adopted from Protech engineering, NZ).

Thank You