



MILK PASTEURIZATION

1. PURPOSE

- 1.1. This Standard Operating Procedure (SOP) instructs farm staff and students on how to use the pasteurizer in the calf barn at the UBC Dairy Education and Research Centre.

2. SCOPE

- 2.1. This SOP will describe the equipment, equipment location and procedures used for pasteurizing milk for the calves at the UBC Dairy. This document will provide step by step instruction on how to use the equipment properly.

3. RESPONSIBILITY

- 3.1. The Operations Manager is responsible for reviewing and updating this procedure as required.
- 3.2. The Operations Manager is responsible for ensuring all staff are trained in this procedure and training is documented.
- 3.1. Personnel who work with newborn calves are responsible for reading and adhering to the procedures outlined in this SOP.

4. DEFINITIONS

- 4.1. **Pasteurization** – process by which milk is heated up for a specified period of time to kill pathogens which may be present in the milk.

5. TRAINING

- 5.1. Training will include SOP overview, animal handling, equipment instruction, and cleanliness administration.

6. SAFETY PRECAUTIONS

- 6.1. Farm workers and/or summer students handling equipment will follow routine health and safety procedures to protect against human and animal injury.
- 6.2. All personnel entering the calf barn will need to rinse boots off with hot water. Dedicated facility footwear and coveralls are to be worn when working with calves. When working with newborn calves, gloves are recommended.



MILK PASTEURIZATION

7. MATERIALS AND EQUIPMENT USED

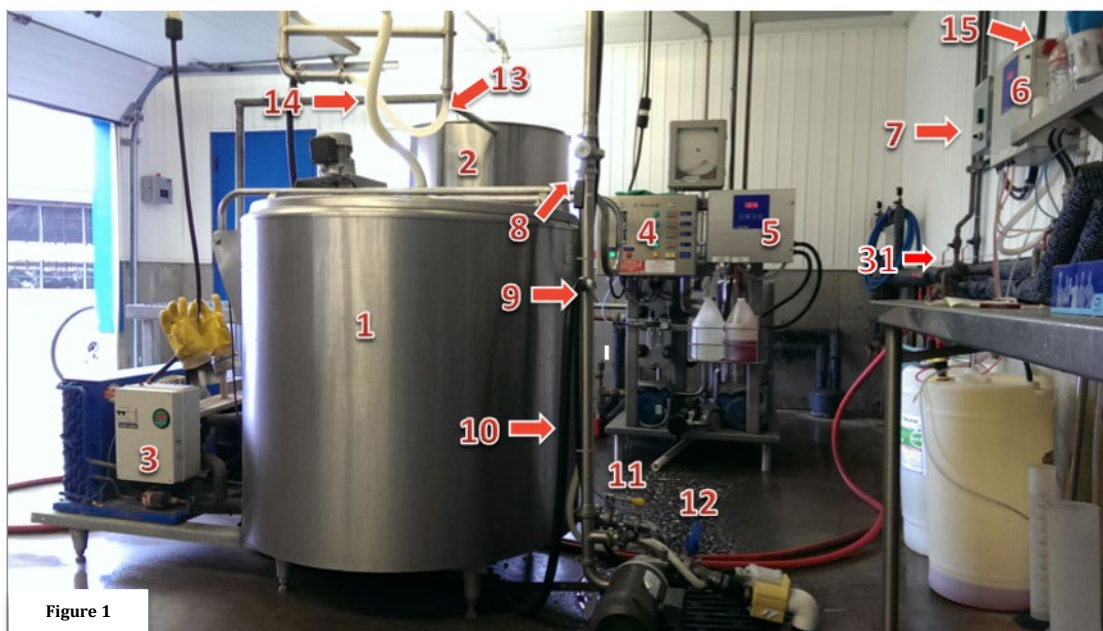


Figure 1

Figure 1: the different parts of the pasteurizer (photo taken from the sink).

- | | | | |
|-----|--------------------|-----|----------------------------|
| 1. | Cooling tank | 12. | Blue valve |
| 2. | Holding tank | 13. | Pasteurized milk exit pipe |
| 3. | Cooler | 14. | Purge line |
| 4. | Pasteurizer panel | 15. | Red purge button |
| 5. | C125 panel 1 | 16. | Drain filter |
| 6. | C125 panel 2 | 17. | Plastic cap |
| 7. | Transfer pump dial | 18. | Record sheet |
| 8. | Black valve | 31. | Small water valves |
| 9. | Milk valve | | |
| 10. | Milk hose | | |
| 11. | Yellow valve | | |



Figure 2: the accompanying items



MILK PASTEURIZATION

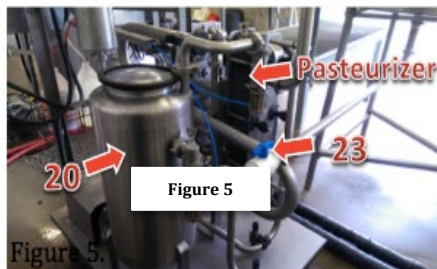
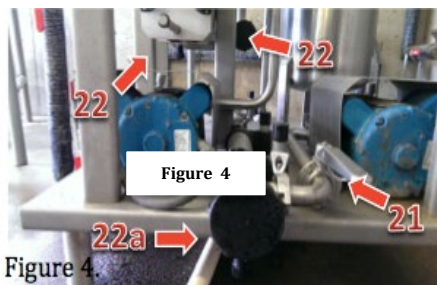
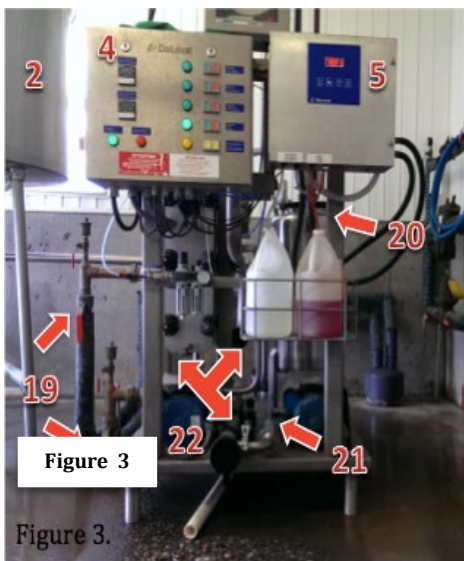


Figure 3: the parts under the pasteurizer panel and C125 panel 1; **Figure 4:** a closer view of the silver valves and 3 valves; **Figure 5:** shows the parts behind the pasteurizer panel and C125 panel 1

19. Large water valves (2)
20. Small milk vat

21. Silver Valve
22. Valves (3)

22a. Valve with filter
23. Boiler Valve



Figure 6: inside the cooling tank; **Figure 7:** the long hose; **Figure 8:** the float

24. Return pipe
25. Cooler pipe

26. Ruler
27. Rubber stopper outside, insertion site for float

28. Water outlet switch



MILK PASTEURIZATION



Figure 9



Figure 10

Figure 9: milk pipelines, calf feeder drop lines; **Figure 10:** a calf feeder

29. Milk pipeline

30. Calf feeder drop lines

When a valve handle lines up with the pipeline, it is open. When a valve handle is perpendicular to the pipeline, it is closed.



Open




Close

Procedure steps:

A. ON A NON-WASH DAY

1. Measure and mark down the number of pails of milk remaining in the cooling tank:
 - a) Clean ruler with paper towel, hose, or wipe off with fingers
 - b) Dip ruler into cooling tank near where exit pipe comes out of bottom of the tank
 - c) Divide reading on ruler by two to get number of pails

 University of British Columbia Centre for Dairy Education and Research	Document Number	SOP-GENERAL -005
	Revision Number	000
	Effective Date	June 24, 2020
MILK PASTEURIZATION		

- d) Mark down the number of pails remaining on the record sheet
2. Calculate and report the number (#) of pails of milk needed for the day:
- a) Find # of pails drank yesterday
- # of pails drank yesterday = (# of pails remaining in cooling tank yesterday + # of pails taken from parlor yesterday) – (# of pails remaining in cooling tank today)
- b) Find # of pails needed for the day and report the number of pails to the milker.
- # of pails needed for the day = (# of pails drank yesterday) – (# of pails remaining in cooling tank today)
3. Heat up the pasteurizer:
- a) Open large water valves
- b) Turn on pasteurizer and water pump on the pasteurizer panel (1st and 3rd green buttons)
4. Transport milk from the milking parlor to the calf barn (**Fig.11**).
5. Prepare for milk transfer from holding tank to cooling tank:
- a) Unhook pasteurized milk exit pipe (**Fig.13**)
- b) Drain water in pipe, and put into the cooling tank
- c) Fill holding tank with milk
6. When water temperature gets to 170°C, open boiler valve to pasteurizer and press 2nd green button (milk pump button) on the pasteurizer panel.
7. When milk is empty from both the holding tank and small milk vat, rinse them with hose. Close lid on holding tank after rinsing.
8. When no milk is coming out of the pasteurized milk exit pipe, turn off pasteurizer (1st red button).
9. Prepare for holding tank and pasteurizer wash:
- a) Open silver valve
- b) Drain the three valves (**22 in Figure 3**) of the pasteurizer



Figure 11

Fig. 11 Parking position of gator



MILK PASTEURIZATION

- c) Take filter out of the bottom valve (22a in Figure 4).
- d) Rinse the small milk vat, three valves and filter
- e) Put filter back in, with open end of filter in pipe first, and close all valves
- f) Rinse the end of the pasteurized milk exit pipe and connect in the wash position (**Fig.12**)



Figure 12



Figure 13

10. Carry out the wash:

- a) Open small water valves (31 in Figure 1).
- b) Turn on wash on the pasteurizer panel (4th green button) and press WASH on C125 panel 1
- c) When the wash cycle gets to 6, press WASH on the C125 panel 1 to hold the wash
- d) Drain the three valves and remove the filter out of the bottom valve. Rinse the three valves and the filter
- e) Change filter
- f) Put filter back and close all valves
- g) Push water outlet switch upward to drain water out of the hose. Then pull down on the switch to close it
- h) Press WASH to resume wash
- i) Repeat *c*, *d*, *f*, *g* and *h* when the wash cycle gets to 15 and then again when it gets to 22
- j) When the wash cycle gets to 24, close large and small water valves, boiler valve and silver valve, and turn off wash on pasteurizer panel (4rd red button)




Figure 14

Fig.12. Wash position; **Fig.13.** Unhooked position;
Fig.14. Three valves drained & filter out

11. Wash pails with a warm water rinse, brush, and hot water chlorine rinse and return them to the parlor during the wash. Refer to SOP-General-006 Calf Barn and Equipment Cleaning.

12. Write down the number of pails of milk taken from the parlor on the record sheet.

 University of British Columbia Centre for Dairy Education and Research	Document Number	SOP-GENERAL -005
	Revision Number	000
	Effective Date	June 24, 2020
MILK PASTEURIZATION		

B. ON A COOLING TANK AND MILK PIPELINE WASH DAY

*****Once a week, during the cooler and milk pipeline wash, do a circuit clean on the calf feeders*****

1. Measure the number of pails of milk remaining in the cooling tank (for details, refer to Section A, Step 2).
2. Calculate and report the number of pails of milk needed for the day (for details, refer to Section A, Step 2).
3. Turn off cooler with black switch on it.
4. Purge milk from the milk pipeline:
 - a) Press OFF on the C125 panel 2 (on the wall) to stop the pump
 - b) Close yellow valve on cooling tank
 - c) Press red purge button on the side of the C125 panel 2 and hold until the purge line is blown out (approximately 70 seconds)
5. Transfer milk from the cooling tank to the holding tank:
 - a) Remove milk hose and attach long hose (**Fig. 15**).
 - b) Put opposite end of long hose in the holding tank (**Fig. 15**).
 - c) Close black valve on milk line
 - d) Open yellow valve on cooling tank and the milk valve fully
 - e) Press MILK on C125 panel 2 and milk will flow through the long hose into the holding tank
 - f) When cooling tank is empty, close milk valve and press OFF on C125 panel 2
6. Drain milk out of all the calf feeder drop lines (do while milk is flowing from cooling tank to holding tank):
 - a) Close valve on the feeder drop line
 - b) Disconnect feeder drop line
 - c) Open valve into the drain and leave in
7. Start the wash cycle for cooling tank and milk pipeline cleaning:
 - a) Take long hose out of the holding tank
 - b) Set long hose on the ground and open milk valve to get the remaining milk out of the long hose
 - c) Open blue valve on cooling tank and black valve on milk line
 - d) Rinse cooling tank with water hose



Figure 15

Fig.15. Long hose attached, with opposite end in holding tank



MILK PASTEURIZATION

- e) Remove return pipe from inside of the cooling tank and install plastic cap (**Fig.16**)
- f) Remove rubber stopper and put float into the cooling tank (**Fig.16**)
- g) Put one end of the long hose into the cooling tank (**Fig. 16**)
- h) Turn milk valve halfway
- i) Set transfer pump to 10 on dial
- j) Press WASH on the C125 panel 2

8. Transport milk from the milking parlor to the calf barn during the wash.

9. Prepare for milk pasteurization:

- a) When wash cycle gets to 19, open large water valves
- b) Turn on pasteurizer and water pump on the pasteurizer panel (1st and 3rd green buttons)
- c) Fill holding tank with milk
- d) When wash cycle gets to 24, close milk valve
- e) Remove long black hose and attach short milk hose
- f) Close blue valve on cooling tank
- g) Take float out and put rubber stopper on
- h) Remove plastic cap and put return pipe in with kink away from cooler blade (**Fig. 17**)
- i) Unhook pasteurized milk exit pipe. Drain water in pipe and put it into the cooling tank (**Fig. 13**)



Figure 16

Fig.16. One end of long hose in cooling tank. Plastic cap and float installed.



MILK PASTEURIZATION

10. When water temperature gets to 170°C, open boiler valve to pasteurizer and press 2nd green button (milk pump) on the pasteurizer panel.
11. When enough milk to cover the cooling blade completely has been transferred to the cooling tank, turn on the cooler with switch.
12. Pump milk from cooling tank to calf feeders:
 - a) Reconnect feeder drop lines. Valves on drop lines that are not connected to a feeder should be closed.
 - b) When milk in the cooling tank covers the kinked part of the return pipe, press OFF then MILK on the C125 panel 2
 - c) When there is milk coming down the return pipe, turn transfer pump dial from 10 to 6.
 - d) Fix feeder machines to get them back to automatic mode (solid green light).

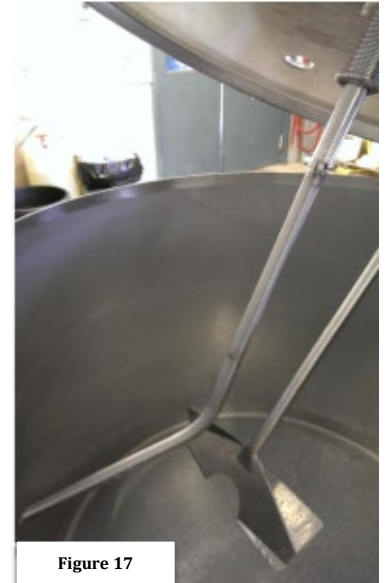
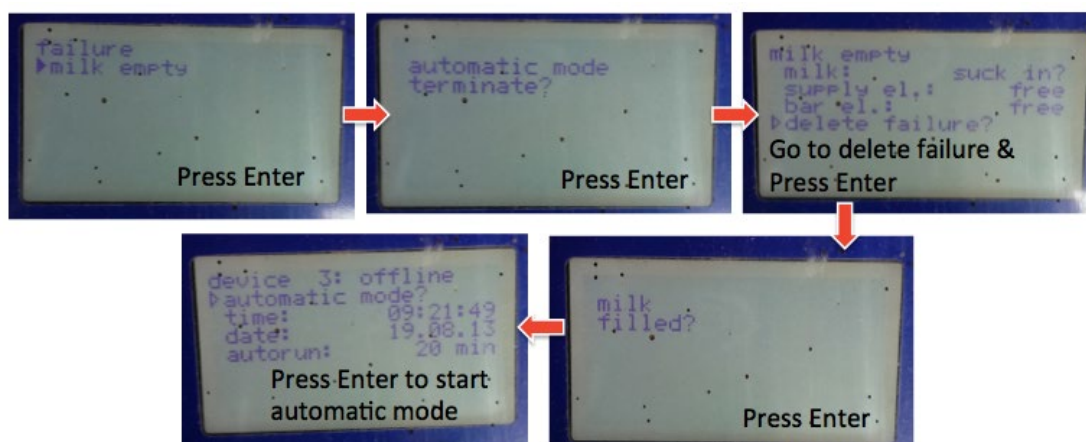


Figure 17

Fig. 17. Return pipe installed. Ensure kinked part of return pipe is away from cooler pipe

Restarting the automatic milk feeder via the hand-held device:



13. Follow Steps 7-11 in section A to complete pasteurization, and holding tank and pasteurization wash.



**University of British Columbia
Centre for Dairy Education
and Research**

Document Number	SOP-GENERAL -005
Revision Number	000
Effective Date	June 24, 2020

MILK PASTEURIZATION

8. REFERENCE SOPS

8.1. SOP-CALF-006 Calf Barn and Equipment Cleaning