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ASPECTS REGARDING THE LOSSES RECORDED IN THE FIRST PROCESSING OF THE MILK

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Abstract: *This paper presents an analysis of the mass losses which can appear in the raw milk's first processing. At first, there are specified the main operations of the technological flow from the milk's first processing, the technical equipment used in each situation and then the causes of the milk mass losses in each operation are analysed. At the end, an estimation regarding the total losses during the first processing is made and some solutions in order to diminish them are proposed. 50% of the total losses can be eliminated through the modernization of technical equipment used starting with the milking, transportation, until the first processing.*
Keywords*: raw milk, first processing, mass losses*

1. INTRODUCTION

The reason why it is of high importance to maintain the initial quality of the milk is its chemical composition - the bacteria inside the milk can destroy the germs only in the first two hours after the milking, the temperature being the main factor that determines the rapid growth of microorganisms in the milk.
Usually, the technological process of obtaining drinking milk, ready for consumption, begins immediately after the milking in the moment when it undergoes some specific normalizing processes followed by the actual processing. [2]
The raw milk delivered to the processing plant must meet the following requirements:
1. to come from farms declared free of tuberculosis and brucellosis;
2. to come from females that do not show symptoms of diseases which can be transmitted to humans through the consumption of raw milk;
3. to have a high degree of freshness with a maximum of 20° T when it comes to acidity, so it can resist to the heat treatment;
4. to have normal organoleptic characteristics (colour, taste, smell);
5. to come from females that do not suffer of any visible disease, infection of the genital or digestive system (enteritis with diarrhoea or fever) or udder inflammation;
6. to come from females that do not show any wounds on the udder that could affect the milk;
7. to come from females that give less than 2 litres of milk per day.
8. to come from females that have not been under treatments with substances, excepting the milk collected after the waiting period, established by the present veterinary health legislation. [5]
The technological process of obtaining drinking milk includes the following main operations:

- Transport and collection
- Cooling
- Cleansing of the milk from impurities
- Milk normalization
- Homogenization
- Pasteurization
- Packing
- Storing.

2. MATERIAL AND METHOD

1. Qualitative and quantitative reception of milk

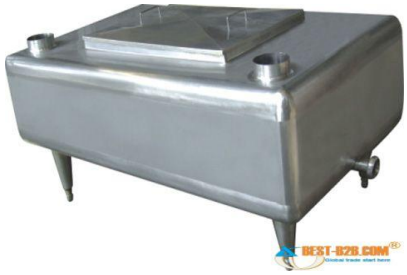


Fig.1 milk reception tank

Fig. 2 milk measurement device

Table 1 Technical characteristics of the milk reception tanks

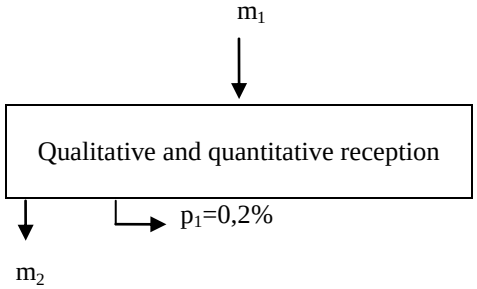
Actual volume	(A) Length of the body of the container	(B) Width of the body of the container	(C) Height of the body of the container	(H) Total Height
(L)	(mm)	(mm)	(mm)	(mm)
300	1100	800	450	745
350	1100	800	550	850
500	1100	800	630	1050
600	1300	900	570	850
1000	1300	900	1000	1250
3500	1800	1500	1700	1550

Fig. 3 installation for reception

Table 2 Dimensions of the installation for reception

Length of the container	Width of the container	Total height
2000	1000	1800

- **Mass losses recorded during the reception**



m_1= flow rate of the raw material which enters reception l /h
m_2= flow rate of the raw material after the reception, l /h
p_1= losses, l /h

$m_2 = m_1 - p_1$
m2=2000-(2000x0,2%)=2000-4=1996 l/h
m2=1996 l/h

2. Filtration

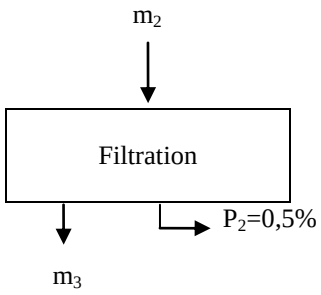
Fig. 4 Centrifugal cleaner

Centrifugal cleaners are devices similar to the separators, in which the elimination of the impurities is done according to the principles of the centrifugal forces, in the drum assembly of the cleaner. The modern cleaners assure the periodic automatic elimination of the impurities while functioning.

Table 3 Technical characteristics of the centrifugal cleaners

Model	NRSDH5	NRSDH10	NRSDH20	NRSDH30
Production	500L/h	1000L/h	2000L/h	3000L/h
Speed pin tumbler	8000rpm	7320rpm	7320rpm	6500rpm
Power of the engine	2.2KW	4KW	5.5KW	7.5KW
Slagging module	Automatic-control	Automatic- control	Automatic- control	Automatic-control
Output pressure	100-350KPa	100-350KPa	100-350KPa	100-350KPa
Working state	Semi-closed	Semi-closed	Semi-closed	Semi-closed
Separating temperature	40-45ºC	40-45ºC	40-45ºC	40-45ºC
Fat content	<0.04%	<0.04%	<0.04%	<0.04%
Dimensions	700*550*800mm	800*600*1250mm	1000*620*1400mm	1100*650*1250mm

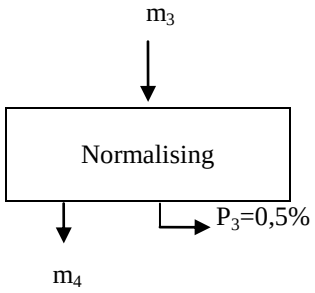
- **Mass losses during the filtration process**



m_2= flow rate of the milk which enters filtration, l/h
m_3= flow rate of the milk after filtration, l/h
p_2= losses, l/h
$m_3 = m_2 - p_1$
m3= 1996- (1996x0,5%)= 1996-9,98= 1986,02 l/h

3. Normalising milk

- **Mass losses during normalising process**



m_3= flow rate of the milk which enters normalising process, l/h
m_4= flow rate of the milk after normalising process, l/h
p_3= losses, l/h
$m_4 = m_3 - p_3$
m4= 1996- (1996x0,5%)= 1996-9,98= 1986,02 l/h

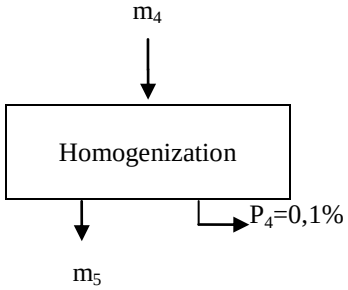
4. Homogenization

Fig. 5 Homogenizer

Table 4 Technical characteristics of the homogenizer

Type		JJ-1/25
Maximum pressure (Mpa)		25
Nominal pressure (Mpa)		20
Nominal flow rate quantity (L/h)		2000
Viscosity of the material (Pa.S)		≤0.2
Temperature of the material (°C)		≤80
Feed pipe diameter		OD:33
Outlet pipe diameter		OD:21
Admission of the cooling water		G1/4″
Coling water evacuation		G1″
Electric motor	Power (KW)	7.5
Global dimension (mm)		1500×950×990
Weight (kg)		400

- **Mass losses during homogenization process**



m_4= flow rate of the milk which enters homogenization, l/h
m_5= flow rate of the milk after homogenization, l/h

p_4= losses, l/h
$m_5 = m_4 - p_3$
m5= 1986,02- (1986,02x0,1%)= 1986,02-1,98= 1984,04 l/h

5. Pasteurization

Fig. 6 Plate pasteurizer

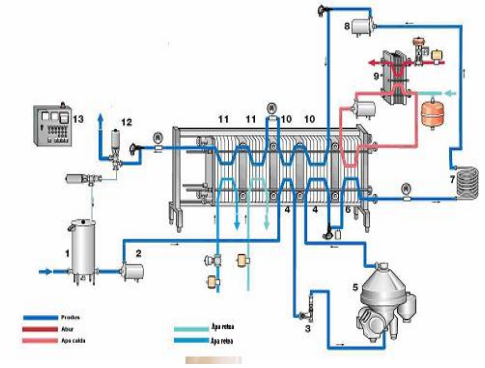
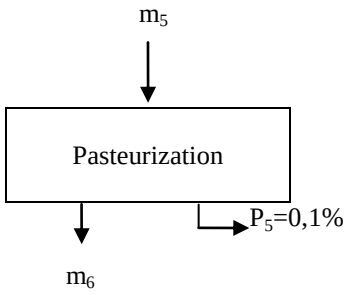


Fig.7 Pasteurization installation scheme

- **Mass losses during the pasteurization process**



m_5= flow rate of the milk which enters pasteurization, l/h
m_6= flow rate of the milk after pasteurization, l/h
p_5= losses, l/h
$m_6 = m_5 - p_5$; m6= 1984,04- (1984,04 x0,1%)= 1984,04-1,98= 1982,06 l/h

CONCLUSIONS

1.The technological process of the milk's first processing consists of many operations which take place in different locations, with the help of the appropriate technical equipment.
2. With each operation from the technical processes of the milk's first processing can also appear some losses determined by the technical states of the equipment of by the workers' lack of qualification.
3. By diminishing these losses the efficiency of the technological process of the milk's first processing improves and the infestation of the environment with milk that causes infections can be avoided.

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[8] Regulation (EC) NO 853/2004 of the European Parliament and of the Council of 29 April 2004 on the establishment of specific hygiene rules for food of animal origin