
Psychrotrophic microflora as one of the criteria microbiological quality of milk

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Psychrotrophic bacteria (PBC) in raw milk are regarded as a frequent cause of the current unexplained problems in milk processing. It is becoming increasingly dangerous to the dairy industry due to their production of extracellular heat-resistant lipases and proteases (Shah, 1994).

Cempírková (2002) confirmed the effect of housing and milking technology on microbial milk quality. The differences between TBC (total count) and PBC between herds using different housing and milking technologies were significant ($P < 0,05$). The correlation coefficient for bulk milk samples was $r = 0,69$ ($P < 0,01$).

Nearly 90% of contamination is caused by insufficient sanitation of milking and cooling equipments (Vyletelová et al, 1998). Some Gram-negative representatives of psychrotrophic microorganisms have a higher resistance to any types of detergent (Ruzicková, Majeríková, 1999).

The objective of this study was to establish how certain factors, act in basic production of milk, influenced changes of TBC and PBC and to test the efficiency of alkaline and acid detergents to psychrotrophic microorganisms, isolated from raw cow's milk, in model experiments.

Milk sample were collected during 1 year period on 2 farms with different milking systems (1- milking parlour, $n=40$; 2- pipeline milking machines; $n=31$). Samples were taken after morning milking and after evening milking (morning and evening milk mixed in cooling tank).

Bulk tanker samples ($n=10$) were taken off the vehicle, to which milk of 5 suppliers was collected. Pool samples ($n=50$) were taken on each farm of these 5 suppliers.

TBC was determined according to STN ISO 4833 (1997) and PBC according to STN ISO 6730 (2000) in laboratory of the Department of Evaluation and Processing of Animal Products of SAU.

Introduction

Material and methods

The effectiveness of alkaline and acid detergents was tested in pattern experiments. 13 psychrotrophic microorganisms originally isolated from raw cow's milk, in suspension of growing medium, were used for testing. The effectiveness of detergents was tested by standard suspension method in 3 repetitions. Detergents were tested as 0,75% solutions at the temperature 60°C resp. 40°C and action of 10 minutes in condition with increasing concentration of organic impurities. Bouillon was used as an organic impurity.

Results and discussion

It was found out that the effect of milk obtaining (housing and milking) has high significant influence ($P < 0,01$) on TBC and significant influence on ($P < 0,05$) PBC. These results correspond with findings of Cempirkova (2002).

Statistically significant correlation between TBC and PBC in bulk milk samples ($r = 0,702$; $P < 0,001$) was observed. The correlation was calculated from the regression line ($y = 0,923x - 0,203$).

Transport of milk from the farm to dairies was contributed to growth of TBC as well as PBC. TBC increased 2,59-times and PBC 1,38-times. Reduction of number of the dairies contributes to changes of milk collection frequency from the farms. Pre-processing prolongation of milk storage in dairies negatively reflects in microbiological milk quality.

The high correlation between TBC and PBC was observed in milk samples stored in cooling tanks ($r = 0,800$; $P < 0,001$). The regression line was defined by the equations $y = 0,571x + 0,937$ (x -TBC, y -PBC). It is possible to use the equation for assessment of probable PBC in milk, whose determination is time-consuming.

The results of correlation corroborate with findings of Cempirkova (2002) ($r = 0,69$) and they are higher than published by Vyletelova et al. (1999) ($r = 0,61$).

There was not found out the growth of psychrotrophic microorganisms after application of alkaline and acid detergents in conditions prescribed by their producers (temperature 60°C) in water environment or in environment with organic impurities. These results correspond to findings of Ruzicková, Majerikova (1999). Microbicidal effect was achieved by high temperature of solution.

In pattern experiments lowering temperature of alkaline solution to 40°C inhibited the growth of microorganisms only in environment without impurities or with their concentration up to $0,6 \text{ g} \cdot 100\text{ml}^{-1}$. Proportion of surviving psychrotrophic bacteria was increased by gradually increasing concentration of organic impurities in solution. The effect of fall in temperature to surviving of microorganisms was even more marked at application of acid detergent. Microorganisms survived in water

environment (without organic impurities). Lower disinfection effect on psychrotrophic bacteria corroborates our earlier findings (Canigova et al, 2001).

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