Summary

The aim of this study was to evaluate the suitability of skimmed milk, subjected to microfiltration with the use of a membrane with 1.4 μm pore size, for acid tvorog production.

In a small-scale production trial, acid tvorog was made from pasteurised milk (temp. 75^{o}C/30 s) and microfiltered milk (temp. 50^{o}C, membrane with pore size of 1.4 μm), by the traditional method.

The results of the study indicate that pasteurisation and microfiltration were equally effective in reducing total microbial counts and the counts of psychrotrophic bacteria and *Enterobacteriaceae* in skimmed milk. In addition, microfiltration led to a nearly complete removal of somatic cells, and it did not inactivate alkaline phosphatase. Pasteurisation increased active acidity, whereas microfiltration increased active acidity and decreased the content of dry matter, total protein, lactose, and ash, and reduced potential acidity in skimmed milk. The changes in the chemical composition and acidity of skimmed milk, noted after microfiltration, did not affect its suitability for acid tvorog production. Acidification of pasteurised and microfiltered milk followed a similar pattern.

Acid tvorogs made from microfiltered and pasteurised milk did not differ in total microbial counts or the counts of *Escherichia coli*, coagulase-positive staphylococci, yeasts and moulds, whose values confirmed that the production process and sanitary conditions were adequate. In comparison with acid tvorog made from pasteurised milk, acid tvorog made from microfiltered milk was characterised by a slightly lower yield, a lower content of dry matter, total protein, lactose and ash, lower active and potential acidity, and similar fat content. The yield, chemical composition and acidity of acid tvorog made from microfiltered milk were typical of this type of cheese. In comparison with acid tvorog made from pasteurised milk, the protein fractions of acid tvorog made from microfiltered milk were characterised by higher proportions of total whey proteins, serum albumin, immunoglobulins, proteoses and peptone, lower proportions of total caseins and β-lactoglobulin, and an identical proportion of α-lactalbumin. A comparison of protein in acid tvorogs made from microfiltered and pasteurised milk revealed that the former contained more tryptophan and methionine, less glycine, valine, leucine, isoleucine, serine, arginine and aspartic acid, whereas no differences were found in the content of alanine, proline, phenylalanine, tyrosine, threonine, cysteine, histidine, lysine or glutamic acid. Regardless of milk preparation for production, the protein of the obtained acid tvorogs contained all essential amino acids in the amounts consistent with those found in the complete protein (FAO/WHO/UNC 2007). In comparison with acid tvorog

made from pasteurised milk, acid tvorog made from microfiltered milk had a higher content of zinc and copper, and a lower content of calcium, phosphorus, magnesium, sodium, potassium, iron and manganese. The analysed acid tvorogs had an amorphous microstructure. The protein matrix of acid tvorog made from microfiltered milk was composed of larger casein aggregates, and was less porous than the protein matrix of acid tvorog made from pasteurised milk. Regardless of milk preparation for production, the obtained acid tvorogs were characterised by the absence of expelled whey, they were homogeneous, their structure was compact and moderately granular, their colour was white, very intense and uniform, their taste was moderately sour, with no off-flavours, and their aroma was moderately sour, with no off-odours. The sensory properties of the acid tvorogs produced in the experiment were typical of acid tvorog.

In comparison with acid whey generated during the production of acid tvorog from pasteurised milk, acid whey generated during the production of acid tvorog from microfiltered milk was characterised by a lower content of dry matter, lactose and ash, lower active and potential acidity, and a similar content of total protein and fat. The chemical composition and acidity of acid whey generated during the production of acid tvorog from microfiltered milk were typical of this by-product.

The results of the study indicate that skimmed milk, subjected to microfiltration with the use of a membrane with 1.4 μm pore size, is suitable for acid tvorog production by the traditional method.

Key words: skimmed milk, pasteurisation, microfiltration, acid tvorog, acid whey, milk acidification, microbiological quality, chemical composition, physicochemical properties, nutritional value of protein