The effect of polyphosphates on streptococci isolated from mastitis cases

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Abstract

The effect of 0.01, 0.02, 0.03, 0.05, 0.6, 0.8 and 0.9% of polyphosphate mixture on 5 strains of Streptococcus agalactiae, 2 strains of Streptococcus dysgalactiae and 3 strains of Streptococcus uberis in blood agar in vitro and in milk was examined.

It was found that the growth of all strains of the above mentioned bacteria was completely inhibited by 0.03% phosphate mixture in blood agar. In milk, however, the amount of polyphosphate mixture necessary for total inhibition was, from 0.6 to 0.9%, depending on the strain.

Key words: Streptococcus agalactiae, Streptococcus dysgalactiae, Streptococcus uberis, phosphate

Introduction

Mastitis incidence in cows is one of the key factors affecting losses in milk production (Kossaibati et al. 1998, Rajala and Gröhn 1998, Peeler et al. 2000, Bradley et al. 2001). According to Hurley (2006), it is the most expensive disease of dairy cows, due to which the American dairy industry loses annually 2 billion USD annually. In many reports, it has been estimated that 30-50% of cows demonstrate subclinical forms of mastitis and in ca. 10-15% of cows clinical form of mastitis is present. Production losses are mainly caused by the subclinical forms of mastitis (Hortet and Seegegers 1998, Oszvari et al. 2001). Etiological factors of mastitis include about 150 species of bacteria and fungi. The following streptococci: Streptococcus agalactiae, S. dysgalactiae, S. uberis; and staphylococci: Staphylococcus aureus, S. epidermidis and S. chromogenes, are most often isolated bacterial forms (Jakubczak et al. 2004, Malinowski 2004).

The efficiency of mastitis treatment depends on ethiological factors, clinical course, susceptibility of bacteria to antibiotics, and the efficiency of the immune system. Antibiotic therapy still remains the basic element in the treatment of cows (Wawron and Sczubiał 2002). According to data published by some authors (Williams and Heymann 1998, Witte 1998), actions should be taken to reduce the application of antibiotics, especially in such animals as dairy cows, which continuously provide raw materials for the production of basic foodstuffs. Hence, alternative methods of cows treatment are being sought. The number of chemical compounds applied in medical treatment is limited due to their negative effects on the human organism as well as problems with their solubility and hindered possibility of their direct application. The application of a polyphosphate solution for the inactivation of mastitis-inducing bacteria therefore seems reasonable.

Polyphosphates serve a major function in the food industry and the application of a wide range of polyphosphate preparations has become indispensable for the production of foodstuffs. In food production processes, polyphosphates are used in different concentrations. In the Member States of the European Union, their addition is regulated by the Directive