The effect of Biolex-MB40 on the phagocytic activity and oxidative metabolism of peripheral blood granulocytes and monocytes in lambs

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Abstract

The objective of this study was to determine the effect of Biolex-MB40 on the phagocytic activity and oxidative metabolism of peripheral blood granulocytes and monocytes in lambs. The experimental material comprised 32 lambs aged 30 ± 3 days, divided into two equal groups: control and experimental. Experimental group animals were fed a diet supplemented with the Biolex-MB40 (Saccharomyces cerevisiae) in the amount of 3 g/kg of the concentrate. At the beginning of the experiment (day 0) and on experimental days 15, 30 and 60, blood was sampled from the jugular vein to determine and compare the phagocytic activity (PHAGOTEST) and oxidative metabolism (BURSTTEST) of peripheral blood granulocytes and monocytes by flow cytometry. Based on the results of an analysis of granulocyte and monocyte phagocytic activity, statistically higher levels of phagocytic activity were observed in the group of lambs administered Biolex-MB40 than in the control animals, expressed in terms of the percentage of phagocytic cells as well as mean fluorescence intensity. Biolex-MB40 also had a positive effect on the oxidative metabolism of both granulocytes and monocytes after stimulation with Escherichia coli bacteria and with PMA (4-phorbol-12-β-myristate-13-acetate), expressed in terms of the percentage of oxidative metabolism as well as mean fluorescence intensity.

Key words: Biolex-MB40, flow cytometry, granulocytes, monocytes, lambs

Introduction

Biolex-MB40 is a commercial prebiotic which contains 10-15% mannooligosaccharide (MOS) and 25-30% 1,3/1,6-β-D-glucan. Oligosaccharides, β-glucans and MOS isolated from the cell wall of Saccharomyces cerevisiae yeast exert immunostimulatory effects by binding to specific receptors on the surface of effector cells, β-glucans stimulate a wide range of immune responses, such as cytokine release (Abel and Czop 1992, Pelizon et al. 2005), generation of ROS (Gallin et al. 1992), generation of NO (Ohno et al. 1996) and release of arachidonic acid metabolites (Czop and Austen 1985). Ozinsky et al. (2000) and Akreimen et al. (2007) demonstrated that TLR-2 and, probably, TLR-4 receptors on macrophages, dendritic cells and lymphocytes are able to bind β-glucans. They activate a cascade of reactions on the surface of those cells to activate nuclear factor κB (NF-κB – nuclear factor kappa-light-chain-enhancer

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