Serum paraoxonase-1 activity of dairy Holstein-Fresian cows in different lactation stages – preliminary study

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Abstract

The objective of this study was to investigate paraoxonase-1 (PON-1) activity in different lactation stages. The study was conducted on Holstein – Friesian dairy cows in 2nd and 3rd lactation. A significant decrease in paraoxonase activity was found in the postpartum period and during peak of lactation. Serum triglyceride and cholesterol concentration were also markedly reduced during postpartum period. The concentrations of uric acid in serum was 23% higher during lactation peak in comparison with dry and postpartum period. The results indicate that lower serum paraoxonase activity and higher concentration of uric acid are associated with oxidative character of transition period and lipid functional antioxidative protection during intensive milk production.

Key words: paraoxonase-1, lactation stages, HF cows

Introduction

Paraoxonase-1 (PON-1) or arylerase (EC 3.1.8.1.) is the calcium-dependent esterase that catalyzes the hydrolysis of organophosphates and several aromatic carboxylic acid esters. PON1 is synthesized in the liver and most of it is released into the bloodstream, where the enzyme binds with high density lipoproteins (HDL). In human serum PON1 is closely associated with apolipoprotein A-I of HDL (La Du and Novais 1989). PON1 activity can be measured in either serum or heparinized plasma using two synthetic substrates: paraoxon and phenyl acetate (Mackness 1998).

Paraoxonase is considered as a negative acute phase protein (-APP) which serum level and hepatic synthesis are reduced during infection (James and Deakin 2004). Administration of lipopolysaccharide (LPS) strongly decrease PON1 concentration (Feingold et al. 1998).

PON1 plays an important role in lipid metabolism and protection against oxidative stress. In particular, HDL-bound PON1 hydrolyzes lipid peroxidation products and protects other lipoprotein fractions as