Seasonal-dependent variations in metabolic status of spermatozoa and antioxidant enzyme activity in the reproductive tract fluids of wild boar/domestic pig hybrids

A. Dziekońska¹, L. Fraser¹, M. Koziorowska-Gilun¹, J. Strzeżek¹, M. Koziorowski², W. Kordan¹

¹ Department of Animal Biochemistry and Biotechnology, University of Warmia and Mazury, Oczapowskiego 5, 10-718 Olsztyn-Kortowo, Poland
² Branch Campus of the Faculty of Biotechnology, University of Rzeszow, Werynia 502, 36-100 Kolbuszowa, Poland

Abstract

This study investigated seasonal changes in the metabolic performance of spermatozoa and activity of the antioxidant enzymes in the seminal plasma of three wild boar/domestic pigs (aged 1.5 to 2.5 years) and the activity of the antioxidant enzymes in fluids of the cauda epididymidis and vesicular glands from 16 wild boar/domestic pig hybrids (aged 1 to 3 years). Parameters of the sperm metabolic activity, such as total motility, mitochondrial functions, and measurements of oxygen uptake, ATP content and L-lactate production, were analyzed during the spring-summer and autumn-winter periods. Besides these sperm metabolic parameters, the sperm membrane integrity was also assessed. Total protein content and activity of the antioxidant enzymes, such as superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx), were measured in the reproductive tract fluids. There were no marked significant differences (P > 0.05) between the seasonal periods in terms of sperm motility, mitochondrial function and oxygen uptake; however, spermatozoa collected during the autumn-winter period exhibited higher (P < 0.05) ATP content and L-lactate production than those harvested during the spring-summer period. It was found that the vesicular gland fluid exhibited a higher level of SOD activity during the spring-summer period compared with the autumn-winter period. Furthermore, CAT activity in the seminal plasma and vesicular gland fluid was greater during the autumn-winter. Total protein content was significantly higher in the vesicular gland fluid, whereas the cauda epididymidal fluid exhibited greater SOD and GPx activities, irrespective of the seasonal period. The findings of this study confirmed seasonal-related differences in the metabolic performance of spermatozoa and activity of antioxidant enzymes of the reproductive tract of the boar/domestic pig hybrids.

Key words: spermatozoa, wild boar/domestic pig hybrids, metabolic activity, antioxidant enzymes