

Nutrition and stress prevention programs in livestock/animal production: From vitamins to vitagenes

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Commercial livestock/animal production is associated with four major types of stresses, including environmental, technological, nutritional and internal stresses, affecting productive and reproductive performance of animals and their health status. It has been suggested that at the molecular level most stresses are associated with overproduction of free radicals and oxidative stress. Therefore, the development of the effective antioxidant solutions to decrease negative consequences of commercially-relevant stresses is an important task for animal/poultry scientists. One of such approaches is based on possibilities of modulation of vitagenes, a family of genes responsible for animal adaptation to stress. In fact, the vitagene network includes heat shock proteins (HSPs), thioredoxin system, sirtuins and superoxide dismutases (SODs) and plays a regulatory role in most important cellular processes in stress conditions. Indeed, HSPs, including heme oxygenase-1 and HSP70, are responsible for protein homeostasis in stress conditions, while the thioredoxin system is the major player in maintaining redox status of the cell involved in protein and DNA synthesis and repair as well as in regulation of expression of many important genes.

Furthermore, sirtuins regulate the biological functions of various molecules post-translationally by removing acetyl groups from protein substrates ranging from histones to transcription factors and orchestrate cellular stress response by maintenance of genome integrity and protein stability. Finally, SODs belong to the first level of antioxidant defence preventing lipid and protein oxidation at the very early stages. All the vitagenes operate in concert building a reliable system of stress detection and adequate response and are key elements in stress adaptation. Our studies clearly showed that supplying vitagene-regulating nutrients (carnitine, betaine, vitamin E, etc.) via drinking water could significantly improve adaptive ability of poultry/farm animals to commercially-relevant stresses and prevent decrease in their productive and reproductive performance.

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Biography

Peter F Surai has his expertise in Animal and Human Nutrition and published a number of papers as well as two books ("Natural Antioxidants in Avian Nutrition and Reproduction", 2002; and "Selenium in Nutrition and Health", 2006) which became textbooks for animal nutritionists. His recent research is devoted to the development of effective strategies to fight commercially relevant stresses in livestock/animal production. He successfully transferred vitagene concept from Medical Sciences to Animal and Poultry Science and developed stress-prevention programs based on supplying vitagene-regulating nutrients to farm animals via drinking water. He held Honorary Professorships in Nutritional Biochemistry at various universities in the UK, Hungary, Bulgaria and Ukraine, and became a Foreign Member of Russian Academy of Sciences. For the last 15 years he has been lecturing all over the world visiting more than 70 countries.

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