Effect of feed antioxidants on behavior and stress resistance of fattening pigs

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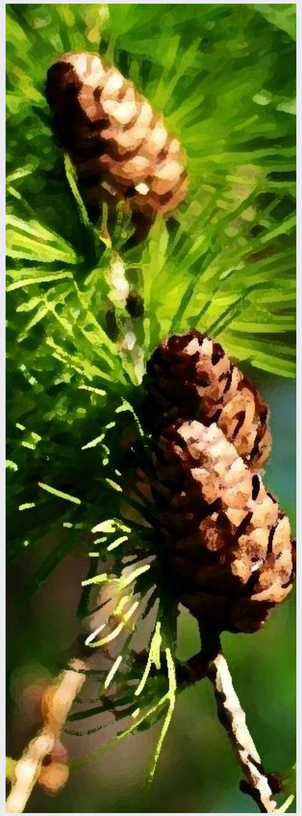
ASAS-CSAS-WSASAS Virtual Annual Meeting & Trade Show
July 19-23, 2020

Introduction

Antioxidants application (selenium, vitamin E and flavonoids) in pig diets provides solving the problem of oxidative stress effects. It is known that the use of antioxidants in animal diets contributes to the stabilization of free radicals (Tolkushkina, 2001; Cadenas & Packer, 2002). Many plants, including vegetables and spices, contain natural antioxidants and are widely studied by researchers (Sebranek et al., 2005; Mariassyova, 2006; Carpenter et al., 2007; Habanova & Haban, 2008). Some plant extracts contain flavonoids and phenolic ingredients that have antioxidant effects. Dihydroquercetin (Taxifolin, $C_{15}H_{12}O_7$) is the main component of the Diquertin bioflavonoid complex. Taxifolin is a bioflavonoid with a wide range of biological effects: it regulates metabolic processes, has a positive effect on the functional state of the internal organs, creates mechanisms for protecting healthy cells from pathologies caused by chemical toxicity, electromagnetic emission and radiation, by eliminating radical activity, viral and bacterial processes. The research aims to study the efficiency of supplement Taxifolin feeding to reduce the stress effects.

Material & Methods

Experiments were performed using crossbred ((BWxL)xD) pigs (BW1=34.5-34.9 kg, N=36, n=9) during the fattening period. Animals were allocated to 4 groups: 1 – control (standard forage – SF, without stress – STR-), 2 – control (SF, STR+), 3 – experimental (SF+0.2 mg kg Se, STR+), 4 – experimental group (SF+32 mg kg TAX, STR+). The animals were kept for 3 heads in a stall and to simulate technological stress in the 2nd, 3rd, and 4th groups. To model technological stress in pigs, animals were additionally regrouped every 14 days. Experiments on animals were carried out within the scientific-economic research, which included balance (metabolic) tests, in the physiological yard and laboratories of the L.K. Ernst Federal Science Center for Animal Husbandry and Gorbatov Research Center for Food Systems.



Results

The results of our work indicate that regrouping animals upon their placement for fattening and moving pigs during the experiment was the technological stress factor that caused the disorder of functional homeostasis of animals and development of the stress reaction.

The incidence of animal anxiety was directly dependent on the recorded acts of aggression (17%; 29%; 29%; 25% & 8%; 27%; 35%; 30% of the total incidence, according to the experimental groups). In general, for the whole fattening period, the average daily gain increase by 1,6% was recorded in the fourth experimental group compared to the first control group (1012.1±43.5 vs. 996.4±32.8 g, $p>0.5$). The Taxifolin effect was manifested as an “adaptive factor” to external stimuli under simulated stress, and contributed to a decrease in cortisol level in the animals’ blood at the end of the experiment (215±53 vs. 309±107, 294±111, 305±61 nmol/l, $p>0.5$). At the end of the experiment pigs fed with Taxifolin had the higher lysis rate by 19.2% (42.0±4.8 vs. 22.8±2.5, $p<0.5$), the lysozyme content in the blood serum – by 0.35 µg/ml (0.79±0.10 vs. 0.44±0.04 µg/ml, $p<0,5$) compared to the control.

Conclusion

Modern highly productive lines and breeds of pigs place new requirements on keeping conditions and the nutritional value of diets. The high concentration of energy and nutrients in feedstuff is necessary, which leads, in particular, to feeding stress and, consequently, to oxidative stress. To eliminate defects linked with myopathic changes in the muscle tissue structure, it is necessary to take into consideration a role of used adaptogens in different age periods of raising young pigs in addition to maximum efforts aimed at assurance of optimal conditions of feeding and keeping.

Consequently, stressors prevention by using natural antioxidants (bioflavonoids) is justified.

Taxifolin, preventing negative effects of stress, improves animal productivity.

The work was supported by the grant No. 19-16-00068 of the Russian Science Foundation & GZ AAAA-A18-118021590136-7 by Ministry of Science and Higher Education of the Russian Federation