Fglb_ug
@gmKcb Pcqc_paf GlrcpI_rgmI_j
Tmjskc0.0/*?prgajcGB 33110/.*//n_ecq
frrnq8--bmg,mpe-/.,//33-0.0/-33110/.

Hindawi

Research Article

# Influences of Selenium-Enriched Yeast on Growth Performance, Immune Function, and Antioxidant Capacity in Weaned Pigs Exposure to Oxidative Stress

Lei Liu,[1,2] Daiwen Chen,[1,2] Bing Yu,[1,2] Yuheng Luo,[1,2] Zhiqing Huang,[1,2] Ping Zheng,[1,2] Xiangbing Mao,[1,2] Jie Yu,[1,2] Junqiu Luo,[1,2] Hui Yan,[1,2] and Jun He[1,2]

[1]Institute of Animal Nutrition, Sichuan Agricultural University, Sichuan Province, Chengdu 611130, China
[2]Key Laboratory of Animal Disease-Resistant Nutrition, Sichuan Province, Chengdu 611130, China

Correspondence should be addressed to Jun He; hejun8067@163.com

Pcacgtcb02H_ls_pw0.0/9Pctgqcb04Dc`ps_pw0.0/9?aacnrcb/6K_paf0.0/9Ns`jgqfcb06K_paf0.0/

Academic Editor: Heide Schatten



This study elucidated the function role of dietary selenium-enriched yeast (SeY) supplementation on growth performance, immune function, and antioxidant capacity in weaned pigs exposure to oxidative stress. Thirty-two similarity weight pigs were randomly divided into four treatments: (1) nonchallenged control, (2) control+SeY, (3) control+diquat, and (4) control+SeY+diquat. The period of experiment was 21 days; on day 16, pigs were injected with diquat or sterile saline. Results revealed that oxidative stress was notably detrimental to the growth performance of piglets, but SeY supplementation ameliorated this phenomenon, which might be regarding the increasing of body antioxidant capacity and immune functions. In details, SeY supplementation improved the digestibility of crude protein (CP), ash, and gross energy (GE). Moreover, the serum concentrations of proinflammatory cytokines (TNF-α, IL-1β, and IL-6), glutamic-pyruvic transaminase(GPT), and glutamic-oxaloacetic transaminase (GOT) were reduced via SeY supplemented, and serum concentrations of immunoglobulins A (IgA), IgG, and activities of antioxidant enzymes such as the superoxide dismutase (SOD), catalase (CAT) ,and glutathione peroxidase (GSH-Px) were improved in the diquat-challenged pigs ($P < 0.05$). In addition, SeY supplementation acutely enhanced the activities of these antioxidant enzymes in the liver and thymus upon diquat challenge, which involved with the upregulation of the critical genes related antioxidant signaling such as the nuclear factor erythroid-derived 2-related factor 2 (Nrf-2) and heme oxygenase-1 (HO-1) ($P < 0.05$). Importantly, we also found that SeY supplementation apparently reduced the malondialdehyde (MDA) concentrations in the liver, thymus, and serum ($P < 0.05$). Specifically, the expression levels of TNF-α, IL-6, IL-1β, Toll-like receptor 4 (TLR-4), and nuclear factor-κB (NF-κB) in the liver and thymus were downregulated by SeY upon diquat challenge. These results suggested that SeY can attenuate oxidative stress-induced growth retardation, which was associated with elevating body antioxidant capacity, immune functions, and suppressed inflammatory response.

## 1. Introduction

Recent studies have shown that neonatal animals such as the weaning pigs (approximately 3-5 weeks of age) are more prone to gastrointestinal diseases, infections, and diarrhea because of incomplete development of immune and digestive systems [1]. In addition, weaning can cause a variety of oxidative stress-induced injuries, including growth retardation, disease, and even death, resulting in considerable economic losses [2]. Under normal circumstances, ROS produced in the body participates a variety of biological events including signal transduction, gene expression, and activation of receptors [3]. Excessive production of oxidative radicals is generally neutralized or eliminated by the antioxidant system including nonenzymatic components, such as glutathione, selenium, vitamin E, and vitamin C, and a series of antioxidant enzymes, such as SOD, CAT, and GSH-Px [4, 5]. Previous study indicated that overproduction of ROS can bring the damage to DNA, proteins, and lipids and further provoke the production of reactive species such as MDA