

COLLECTION OF SCIENTIFIC PAPERS

SCIENTIA

22

SEPTEMBER, 2023

SINGAPORE, REPUBLIC OF SINGAPORE

**MODERNIZATION OF TODAY'S
SCIENCE: EXPERIENCE AND TRENDS**

IV INTERNATIONAL SCIENTIFIC AND THEORETICAL CONFERENCE



**EUROPEAN
SCIENTIFIC
PLATFORM**



SECTION 9.

AGRICULTURAL SCIENCES AND FOODSTUFFS

Demchenko Alexander

candidate of Agricultural Sciences

D.K. Zabolotny Institute of Microbiology and Virology of the NASU, Ukraine

Bityutskyy Vladimir

doctor of agricultural sciences, Professor

Bila Tserkva National Agrarian University, Ukraine

Tsekhmistrenko Svitlana

doctor of agricultural sciences, Professor

Bila Tserkva National Agrarian University, Ukraine

Melnichenko Yuliia

candidate of Agricultural Sciences, Associate Professor

Bila Tserkva National Agrarian University, Ukraine

Kharchyshyn Victor

candidate of Agricultural Sciences, Associate Professor

Bila Tserkva National Agrarian University, Ukraine

EFFECT OF SELENIUM NANOPARTICLES OBTAINED BY THE METHOD OF GREEN SYNTHESIS WITH THE PARTICIPATION OF PROBIOTICS AND FLAVONOIDS ON METABOLIC AND ZOOTECHNICAL PARAMETERS OF BROILER CHICKENS

For many years, there has been a growing interest in finding alternative methods to improve the health and performance of broiler chickens. One of these areas is the use of nanoparticles, in particular selenium nanoparticles, which have been shown to have numerous benefits for animals [9]. Selenium is an essential trace element that plays an important role in the body's antioxidant defence system. It is involved in various metabolic pathways and has immunomodulatory, anti-inflammatory and anti-cancer properties. However, traditional methods of selenium supplementation, such as inorganic selenium salts, have limitations in terms of bioavailability and potential toxicity. This has prompted researchers to explore alternative methods of selenium delivery, particularly in the form of nanoparticles. Green synthesis is the process of synthesising nanoparticles using natural sources such as plant extracts, microorganisms, etc. [10]. This method has a number of advantages, including cost-effectiveness, environmental friendliness, and the ability to produce nanoparticles with unique properties [2]. In the case of selenium nanoparticles, green synthesis has been shown to increase their stability, bioavailability, and biological activity [3]. Probiotics are living microorganisms that provide health benefits when consumed in sufficient quantities. They are widely used in animal feed to improve gut health, nutrient absorption and overall performance. Quercetin, on the other hand, is a flavonoid compound found in a variety of fruits and vegetables and is known for its antioxidant and anti-

inflammatory properties. Both probiotics and quercetin have been widely studied for their potential to improve animal health and performance. Recent studies have shown that selenium nanoparticles synthesised with probiotics and onion peel flavonoids have a positive effect on the metabolic parameters of broiler chickens [8].

In our research, we studied the effect of selenium nanoparticles obtained by green synthesis with the participation of probiotics and onion peel flavonoids on the biochemical and zootechnical parameters of broiler chickens. The study included the introduction of different doses of selenium nanoparticles obtained by the green synthesis method using probiotics and onion peel flavonoids into broiler feed.

Biogenic selenium nanoparticles obtained by green synthesis using microorganisms and plant extracts are biocompatible and less toxic than inorganic selenium compounds. This study was aimed at investigating the effect of different forms of selenium in combination with ProbioBac on metabolic processes in broiler chickens to provide an experimental basis for the effective use of selenium-containing feed additives. A total of 300 day-old Cobb-500 broiler chicks were divided into three groups using the analogue method: Control group (CG); nanobioconjugate of selenium with onion peel flavonoids (0.3 mg Se/kg feed + ProbioBac (group 2); biogenic nanoselenium (0.15 mg Se/kg feed + nanobioconjugate of selenium with onion peel flavonoids (0.15 mg Se/kg feed + ProbioBac on (group 3). Various metabolic and zootechnical parameters were monitored, including feed intake, body weight gain, serum biochemical parameters and antioxidant enzyme activity.

The results of the study showed that the introduction of selenium nanoparticles obtained by green synthesis with the participation of probiotics and quercetin had a positive effect on the zootechnical parameters of broiler chickens. Chickens in the experimental group showed improved feed intake and body weight gain compared to the control group. In addition, studies of biochemical parameters of their blood serum showed a decrease in cholesterol levels, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) activity, creatinine levels, uric acid, triglycerides and glucose concentrations were within normal limits. In addition, the activity of antioxidant enzymes such as superoxide dismutase (SOD) and catalase (CAT), which are important for combating oxidative stress, increased in the chickens of the experimental groups. This suggests that the combined use of selenium nanoparticles, probiotics and quercetin can enhance the antioxidant defence system of broiler chickens, protecting them from oxidative damage. The best performance in terms of productivity, preservation and metabolic characteristics was observed in broilers of the 3rd experimental group, which indicates the synergistic effect of functionalised selenium nanoparticles with bacterial exometabolites and onion peel flavonoids on the poultry body.

Over the past decade, nutraceuticals containing selenium nanoparticles have improved growth performance, feed requirements, reproductive performance, egg production, immune response and antioxidant status, as well as meat and egg quality and microflora [1]. It has been proven that nanoSe increases the relative weight of organs associated with the immune system (thymus) and improves immunity [4].

It has been proven [5] that the addition of nanoselenium at a dose of 0.15 mg/kg of diet and nano-curcumin at a dose of 100 mg/kg of diet to broiler chickens' feed improves productivity and has a hypolipidemic effect.

Our results and those of other researchers highlight the potential of green synthesised selenium nanoparticles as a new approach to improve the metabolic parameters of broiler chickens [6]. By improving feed intake, body weight gain, and antioxidant defence, this combined therapy can contribute to improved overall health and productivity in broiler production [7]. Thus, the green synthesis of selenium nanoparticles with the participation of probiotics and quercetin is promising as an effective method for improving the metabolic parameters of broiler chickens. Further research is needed to optimize the dosage, duration and routes of administration to

maximise the benefits of this combined treatment. Nevertheless, this study provides valuable insights into the potential of nanoparticle-based interventions in agriculture, paving the way for future advances in broiler meat production and animal health.

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