

## Review

official reviewer **SAMOKHINA Yevgenia Anatoliivna**, candidate of agricultural sciences, associate professor for a dissertation Qiao Yingying (Цзао Іньїнь) «Development of technological methods of growing and use the plant extracts to improve the meat quality of broiler chicken»,

(«Удосконалення технологічних прийомів вирощування та використання рослинних екстрактів для покращення м'ясних якостей курчат-бройлерів»), applied for the degree of Doctor of Philosophy, from the field of knowledge 20 - "Agrarian sciences and food" in the specialty 204 - "Technology of production and processing of animal husbandry products"

### **1.Relevance of the dissertation topic.**

Poultry products are an indispensable food source in people's daily life and ensuring their green, environmental protection and safety is an important part of food safety. However, in recent years, as the poultry breeding industry has become increasingly intensive, farmers use antibiotics extensively to improve economic benefits, which has brought great harm to human health and environmental safety. In the context of comprehensive "anti-antibiotics", exploring new, efficient, safe and green antibiotic alternatives has gradually become a research hotspot in the feed industry. In recent years, many studies have found that plant extracts have strong immunomodulatory activity, can enhance the body's immune function, have the advantages of being green, environmentally friendly, safe, and non-toxic, and can act on immune cells in the body, thereby regulating the body's immune state, play an important role in resisting the infestation of various pathogenic bacteria. At present, most research on Astragalus extract and Glycyrrhiza extract has focused on the effects on animal performance, and there are relatively few studies on intestinal health and respiratory health, as well as combined use. Therefore, it is of great significance to study the effects and mechanism of Astragalus extract and Glycyrrhiza extract according to their safety, and green and environmental characteristics. This chapter mainly reviews the physiological functions of Astragalus and Glycyrrhiza and their application in poultry production, intestinal barrier, and respiratory barrier of poultry.

This dissertation is devoted to study which elaborates on the application of Astragalus and Glycyrrhiza extracts in broiler chicken farming and their effects on broiler production performance, immune function, antioxidant capacity, intestinal health, and respiratory health, as well as the impact of high-temperature steaming and boiling processes on meat quality. The given results of the studies testify to the effectiveness of the use of these extracts.

### **2. Connection with scientific programs, topics, plans.**

The dissertation work was carried out according to the thematic plans of scientific research works of the Department of Biochemistry and Biotechnology of the Sumy National Agrarian University in the period from 2019-2022: SRW

0118U006179 "Improvement of breeding and technological programs in the breeding of agricultural animals in conditions of intensive production".

### **3. Scientific novelty of the obtained results.**

For the first time established, the effectiveness of the use of Astragalus extract, Glycyrrhiza extract as a feed additive to compound feed when growing broiler chickens. Experimentally established, the optimal rates of extract feeding were , which had a positive effect on both growth indicators and the quality of raw meat. For the first time, the study of the influence of steaming and boiling technology on the quality of raw meat of broilers fed with Astragalus and Glycyrrhiza extracts, which in turn improved the color of the meat and had a positive effect on the chemical composition of the meat and its content unsaturated fatty acids. The results of the study provide a theoretical basis for replacing antibiotics with Astragalus extract and Glycyrrhiza extract, and their use in broiler farming, as well as an effective way to produce safe feed for broilers. The main scientific propositions, results and conclusions of Qiao Yingying dissertation have significant novelty, a sufficient degree of validity, the authenticity of which has been proven by the author.

### **4. Theoretical significance of the dissertation.**

The theoretical significance of the dissertation lies in the following:

-the comprehensively investigated effect of Astragalus extract, Glycyrrhiza extract and their combined use on poultry productivity, meat quality, antioxidant function, immune function and intestinal barrier function of broilers;

-for the first time, the mechanism of influence of Astragalus extract and Glycyrrhiza extract on broilers through the regulation of intestinal microflora was investigated by analyzing the intestinal microbial diversity.

### **5. Practical significance of the results of the dissertation.**

The significance of the research results in this work is to replace the use of antibiotics in broiler breeding with the use of Astragalus extract and Glycyrrhiza extract, which will allow obtaining high-quality meat raw materials. It also provides better production efficiency and will increase the income of each chicken by \$0.078, \$0.120, \$0.044, and \$0.113, respectively. Adding Glycyrrhiza extract alone has the best economic benefits. High-temperature boiled technology can improve meat quality of broilers fed with Astragalus extract and Glycyrrhiza extract.

An analysis of the plagiarism check report for the presence of textual borrowings (Strike plagiarism) was carried out. The reviewers came to the conclusion that Qiao Yingying (Цзао Инъинь) «Development of technological methods of growing and use the plant extracts to improve the meat quality of broiler chicken», («Удосконалення технологічних прийомів вирощування та використання рослинних екстрактів для покращення м'ясних якостей курчат-бройлерів») is the result of independent research of the acquirer and does not contain elements of plagiarism and borrowing in accordance with the resolution of the CMU dated 12.01.2022 No. 44, paragraph 9. The used ideas, results and texts of other authors have a link to the corresponding source.

### **6. Number of scientific publications.**

The main results of the dissertation have been published a total of 10 articles based on the research results of the dissertation, including 6 articles in scientific

professional publications of Ukraine, 4 articles published in journals indexed in Scopus and Web of Science Core Collection, and 9 conference proceedings.

### **7. Remarks and wishes regarding the content.**

The dissertation introduces the application of *Astragalus* and *Glycyrrhiza* extracts in broiler production and the influence of cooking techniques on meat quality, as well as their effects on broiler production performance, antioxidant function, immune function, intestinal health, and respiratory system health. The author provides detailed descriptions in the sections of research design, experimental methods, data analysis, and conclusions, with clear structure and strong logic, indicating a relatively high overall level. However, attention should be paid to the following issues:

1. While the dissertation mentions the effects of *Astragalus* and *Glycyrrhiza* extracts on regulating animal immune function, antioxidant properties, and the respiratory system, is there any discussion on their effects on the animal digestive system? For example, do they influence the intestinal microbial community?

2. In the experimental methods, gas chromatography was mentioned for determining muscle fatty acid content. What impact do these fatty acids have on meat quality?

3. The study points out the effects of *Astragalus* and *Glycyrrhiza* extracts on broiler production performance, antioxidant function, and immune function.

However, has the safety and potential side effects of these extracts been considered? Particularly, potential issues with long-term use?

4. The study recommends a cooking time of 30 minutes for the optimal treatment of meat using cooking techniques. Is this conclusion supported by sufficient experimental data? Have the characteristics of meat from different parts been considered?

5. The discussion section mentions that *Astragalus* and *Glycyrrhiza* extracts may affect broilers by regulating intestinal microbial diversity. What is the specific regulatory mechanism? Have any relevant analyses or experimental validations been conducted?

6. The study mentions the application of *Astragalus* and *Glycyrrhiza* extracts as alternatives to antibiotics in broiler production. However, has research considered potential issues with antibiotic resistance?

### **8. General conclusion**

Dissertation work of Qiao Yingyin on the topic "Development of technological methods of growing and use the plant extracts to improve the meat quality of broiler chicken" («Удосконалення технологічних прийомів вирощування та використання рослинних екстрактів для покращення м'ясних якостей курчат-бройлерів»), which was submitted for defense to the specialized academic council for obtaining the degree of Doctor of Philosophy in the field of knowledge 20 - "Agrarian sciences and food" in the specialty 204 - "Technology of production and processing of animal husbandry products" according to their relevance, scientific and theoretical level, main results of validity the main provisions and results published in professional publications, the novelty of the production and the practical significance meet the requirements of the order of the Ministry of

Education and Science of Ukraine No.40 from 12, January 2017 year "On approval of requirements for the preparation of a dissertation" and Resolution of the Cabinet of Ministers of Ukraine from 12 January, 2022 No. 44 "On approving the Procedure for awarding the degree of Doctor of Philosophy and canceling the decision of the one-time specialized academic council of the institution of higher education, of a scientific institution on awarding the degree of Doctor of Philosophy" with changes introduced in accordance with Resolution of the KM №341 from 21.03.2022.

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**Євгенія САМОХІНА**

