

Research on the Microecology of Poultry Intestines and Nutritional Regulation Techniques

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Liu Xuelan, Senior Research Fellow, serves as a Science and Technology Commissioner of Shandong Province and a Council Member of the National Technology Innovation Alliance for Feedable Chinese Herbal Medicine Industry. Her primary research focuses on the development and evaluation of new feeds and feed additives, precise nutrient requirements for livestock and poultry, and healthful breeding techniques. She has led or participated in more than 20 provincial and ministerial-level scientific research projects, published over 120 papers, authored 6 books, and obtained 10 authorized invention patents. Additionally, she has received 4 provincial-level Science and Technology Progress Awards, 5 municipal-level Science and Technology Progress Awards and other provincial honors, and contributed to the formulation of 5 technical standards.

Introduction

At present, poultry farms suffer huge economic losses every year due to intestinal health problems, and intestinal health is the key to realizing high-efficiency farming by enabling poultry to reach their maximum growth potential. Therefore, it is imperative to study nutritional techniques that meet the needs of green and efficient livestock farming to regulate poultry intestinal health.

In recent years, amino acids and intestinal immune function have become a hot research topic both at home and abroad, which has led people to recognize that amino acids are not just used as substrates for protein synthesis. As an essential nutrient for animals, amino acids affect the immune function of the intestine. Amino acids are the main energy substrates for intestinal mucosal cells, and the intestinal mucosa limits the composition of intestinal barrier proteins, so amino acids can regulate intestinal immune responses and oxidative stress. These types of amino acids mainly include glutamine, arginine, threonine, tryptophan, glycine, sulfur-containing amino acids, and branched-chain amino acids.

With the continuous in-depth study of the nutritional value of functional fibers, our understanding of their role has become more comprehensive. Current research suggests that functional fibers have the functions of promoting gastrointestinal motility, adsorbing harmful substances in the intestine, improving intestinal flora, and providing energy and nutrients for the proliferation of probiotics. More and more studies show that a moderate amount of fiber in the intestine plays an important role in maintaining animal intestinal health, such as promoting intestinal development, stimulating the growth of small intestinal villi, improving intestinal morphology, promoting the growth of beneficial bacteria in the intestine, and ensuring the integrity of the intestinal mucosa.

Given that current research on the regulation of chicken gut health by functional amino acids and functional fibers is not systematic, this project carried out research on the regulatory effects of functional amino acids and their derivatives (arginine, threonine, glutamine, tryptophan) and functional fibers on intestinal morphology and gut microbiota, and integrated and established a comprehensive technology for regulating chicken gut nutrition, providing a scientific basis for its application in production.

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Study on the Regulatory Effect of Tryptophan on the Intestinal Health of Broiler Chickens

Tryptophan is a limiting amino acid in poultry diets and belongs to functional amino acids. In the body, in addition to participating in the synthesis of body proteins, tryptophan is also a precursor of various biologically active molecules, such as 5-hydroxytryptamine and melatonin. It also plays an important role in regulating animal feed intake, growth, stress, and immunity. Studies have shown that adding 0.202% tryptophan to the diet can significantly increase the average daily feed intake (ADFI) of Beijing ducks aged 1 to 21 days. Tryptophan deficiency or excess can lead to a reduction in poultry feed intake and body weight gain. In addition to its effects on growth performance, tryptophan also has significant regulatory effects on poultry nutrient metabolism, immunity, and intestinal development. Studies have shown that adding tryptophan to the diet significantly increases the content of immunoglobulin G (IgG) and IgA in the serum of broiler chickens, as well as the thymus, spleen, and bursa of Fabricius indices in ducks. Studies have found that tryptophan increases the activity of lactate dehydrogenase, alanine aminotransferase, and alkaline phosphatase in the liver and reduces the content of triglycerides in the blood of broiler chickens. Recent studies have shown that a tryptophan level of 0.21% to 0.25% in the diet can meet the growth needs of broiler chickens. However, since tryptophan not only has the function of synthesizing body proteins but also has other biological functions, does the appropriate addition of tryptophan under normal production conditions further enhance the growth, metabolism, and intestinal health of broiler chickens? This experiment aims to study the effects of adding tryptophan to corn-soybean meal diets on the growth performance, serum biochemical indicators, immune organ indices, and intestinal development and health of broiler chickens, in order to further understand the nutritional regulation and intestinal health protection effects of tryptophan as a functional amino acid and provide a scientific basis for its wider use in broiler chicken diets.

1.1 Materials and Methods

1.1.1. Experimental Design

The experiment used a single-factor experimental design. A total of 720 AA male broiler chicks with similar body weights at 1 day old were selected and randomly divided into 6 groups, with 6

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《粤港澳大湾区发展规划纲要》明确了澳门“一个中心、一个平台、一个基地”的三个定位，即：建设世界旅游休闲中心、中国与葡语国家商贸合作服务平台，**打造以中华文化为主流、多元文化共存的交流合作基地。**

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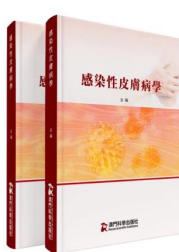


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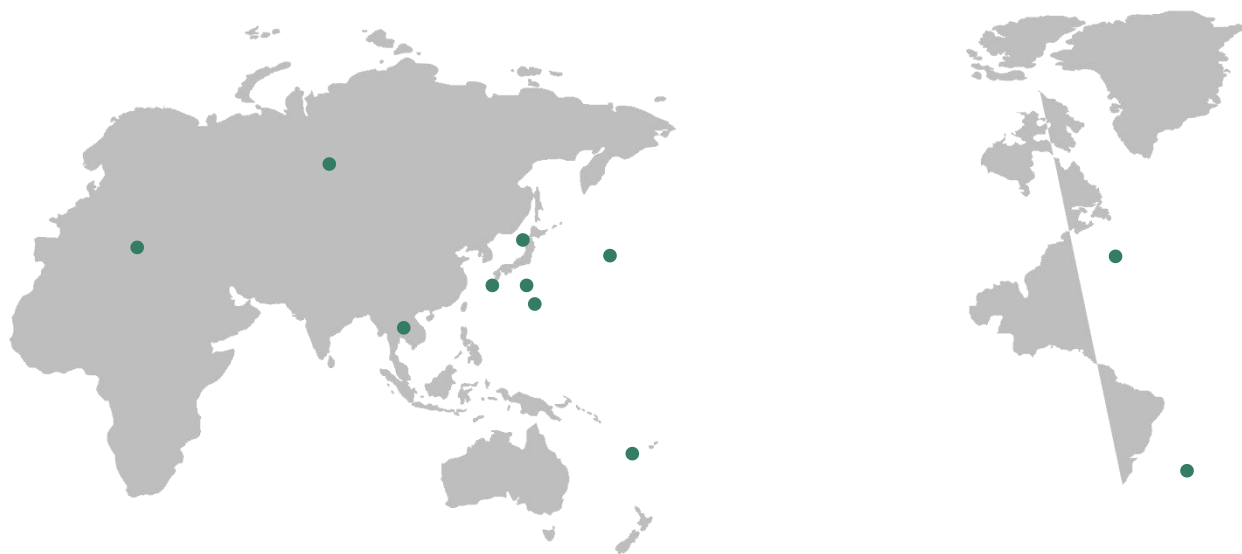
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