

PROBIOTICS IN POULTRY FEED

Через проблеми використання антибіотиків у годівлі всіх свійських тварин, в тому числі птиці, виникла можливість додавання у корми пробіотиків, які будуть підтримувати здоров'я птиці та покращувати її продукцію. Зазначено основні переваги цього відкриття.

Ключові слова: пробіотики, сільське господарство, домашня птиця, годування.

Due to the problems of using antibiotics in the feeding of all domestic animals, including poultry, it has become possible to add probiotics to the feed, which will support the health of the bird and improve its production. The main advantages of this discovery are indicated.

Key words: probiotics, agriculture, poultry, feeding.

Pathogens face numerous obstacles in the process of colonizing the intestinal tract and causing infection. In addition to physical limitations such as low pH in the stomach and rapid transit through the small intestine, pathogens must overcome the inhibitory effects of the gut microbiota, the physical barrier of the epithelium, and the response of the host's immune tissues. There is a well-established concept of cross-talk between these systems and between pathogens and the epithelium. Recent studies indicate that at least some species of nonpathogenic gut microbiota also interact with the epithelium and the immune system, modulating tissue physiology and their ability to respond to infection. However, the popularity of the use of antibiotics in agriculture has not decreased.

The use of antibiotics in animal husbandry to support animal welfare and increase productivity has been going on for over 50 years. However, over time it became clear that this practice had serious negative consequences, as it led to the emergence of antibiotic-resistant bacteria, especially streptomycin and tetracycline. These findings served as the basis for the introduction of stricter regulations on the use of antibiotics in poultry feed, which agricultural authorities introduced [1].

Instead, manufacturers changed their strategy and started using probiotics. Probiotics are live microorganisms that are added to animal diets as feed or food additives. They are known for their usefulness to the owner, mainly due to the positive effect on the gastrointestinal tract of the animal. Incorporating probiotics into the diet can improve animal health and performance by supporting gut health and efficient nutrient utilization [2].

Probiotics significantly affect the composition and functions of the intestinal microbiota. Considered mechanisms of their use to accomplish this include competing with other microorganisms for nutrients, interacting with binding sites and receptors on the intestinal mucosa, and inhibiting the growth of other microbes through the production of antimicrobial substances (Abdel-Moneim & Sobic, 2019; Abdel-Moneim & Sobic, 2019; Abdel-Moneim et al., 2020;) [3, 4].

Other potential mechanisms of antagonistic action of probiotics against pathogenic bacteria include immunomodulation, production of organic acids, lowering of intestinal pH, and stimulation of the body's defense systems (Abdel-Moneim et al., 2020) [4]. In addition, probiotics can reduce the translocation of pathogens across the intestinal mucosa, increasing the integrity of the intestinal barrier and maintaining immune tolerance.

To study the effects of probiotics on the function, diversity and composition of the gut microbiota, scientists use different methods and tools, such as culture-based methods, metagenomic sequencing and in vivo experiments. However, administration of probiotics in vivo is the most effective method for obtaining accurate results.

Numerous studies confirm the effect of probiotic supplements on the histomorphometry of the intestines of birds. These reports indicate that dietary administration of probiotics affects villus

height (VH) and crypt depth (CD) in portions of the small intestine (Abdel-Moneim et al., 2020; Abdel-Moneim et al., 2019;) [3, 4].

Additionally, studies have shown that probiotic supplements benefit farm animals in the form of immunomodulation, structural modulation, and increased production of cytokines that positively affect the intestinal mucosa in the fight against pathogens. For example, *Bacillus subtilis* is a popular bacterium used in industry, and studies have shown that it improves the height of intestinal villi. Increasing villus height and crypt structure in the gastrointestinal tract improves digestion and absorption of nutrients (Amerah et al., 2013) [5].

In summary, probiotics can help reduce the risk of disease by competing with pathogenic microorganisms in the animal's gut and help boost its immunity. In addition, they can positively influence aspects of product quality such as taste, texture and appearance of animal products. In this regard, the use of probiotics is becoming increasingly popular in agriculture as an alternative to antibiotics.

References:

1. Abd El-Hack ME, El-Saadony MT, Shafi ME, Qattan SYA, Batiha GE, Khafaga AF, Abdel-Moneim AE, Alagawany M. Probiotics in poultry feed: A comprehensive review. *J Anim Physiol Anim Nutr (Berl)*. 2020 Nov;104(6):1835-1850. doi: 10.1111/jpn.13454. Epub 2020 Sep 29. PMID: 32996177.
2. Krysiak K, Konkol D, Korczyński M. Overview of the Use of Probiotics in Poultry Production. *Animals (Basel)*. 2021 May 31;11(6):1620. doi: 10.3390/ani11061620. PMID: 34072694; PMCID: PMC8230106.
3. Abdel-Moneim, A. E., Elbaz, A. M., Khidr, R. E., & Badri, F. B. (2019). Effect of in ovo inoculation of *Bifidobacterium* spp. on growth performance, thyroid activity, ileum histomorphometry and microbial enumeration of broilers. *Probiotics and Antimicrobial Proteins*. 12(3), 873–882. <https://doi.org/10.1007/s12602-019-09613-x>
4. Abdel-Moneim, A.-M.-E., Selim, D. A., Basuony, H. A., Sabic, E. M., Saleh, A. A., & Ebeid, T. A. (2020). Effect of dietary supplementation of *Bacillus subtilis* spores on growth performance, oxidative status and digestive enzyme activities in Japanese quail birds. *Tropical Animal Health and Production*, 52(2), 671–680. <https://doi.org/10.1007/s11250-019-02055-1>
5. Amerah, A. M., Quiles, A., Medel, P., Sánchez, J., Lehtinen, M. J., & Gracia, M. I. (2013). Effect of pelleting temperature and probiotic supplementation on growth performance and immune function of broilers fed maize/soy-based diets. *Animal Feed Science and Technology*, 180, 55–63. <https://doi.org/10.1016/j.anifeedsci.2013.01.002>