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Innovation In Poultry Nutrition Through Sustainable Alternatives To Antibiotic Growth Promoters

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Abstract:

The poultry industry has made tremendous advances commercially since the past few decades by increasing production efficiency, smooth organisation of poultry farming in the vertical strata and discoveries in poultry nutritional requirements and genetical modifications. In this journey of achieving economical benefits, antibiotic growth promoters were introduced to refine the nutritional requirements, to reduce the chances of disease outbreaks and to improve the gastrointestinal microflora of poultry birds. But with due course of time, these antibiotic growth promoters raised serious public health concerns and thus alternatives to these promoters were innovated.

Introduction: A Brief Overview of Evolution In Poultry Nutrition:

In 1925, the Beacon Milling Company created the first comprehensive broiler feed, and by 1929, they also introduced a coccidiosis control mash diet. In 1976, Sibbald introduced the concept of true metabolizable energy (TME).

The poultry industry didn't begin discussing protein requirements until the Third World Poultry Congress in 1927. The National Academy of Sciences' National Research Council (NRC) released the first Nutrient Requirements of Poultry in 1954, which detailed the existing knowledge of crude protein needs and essential amino acid requirements for starting chicks, poults, and laying hens.

The poultry business has conducted a great deal of study on mineral requirements in addition to protein and energy needs, particularly for fast-growing broilers including calcium, sodium chloride, phosphorus, zinc and carbonate are linked to the development of the skeleton, metabolic pathways, osmotic equilibrium, pH balance, cofactors or structural elements of hormones and enzymes, mineral supplement and creation of the eggshell. But keeping in mind the quick growth of modern broilers,

formative malformations have increased because chicken developed for active flight, with tiny amounts of bone marrow and pneumatic bones being a classic adaptive characteristic. In fact, Williams et al. (2000) found that fast-growing genetic lines showed less mineralisation and greater porosity in cortical bones than slow growers in an examination between a fast-growing genetic line and a heritage line.

The acknowledgment of the "vitamin hypothesis" in nutrition in 1881 advanced the understanding of disease having nutritional origins, shifting away from the germ theory of diseases. Vitamins were first proposed by Casimir Funk in 1912, with the term used to describe the amine structure of thiamin. Vitamin A was the first vitamin described in 1913, and by the 1940s, the remaining vitamins were identified, with cobalamin (B12) being discovered in 1948.

Ascent of Poultry Feed Additives in Commercial Sector:

“Antibiotic Growth Promoters - Pros & Cons”

When AGPs were added at subclinical levels into the supply chain on a prophylactic basis, the industry observed a reduction in bird pathogen prevalence and enhancement in growth performance. The primary theories behind this improved growth encompassed the stimulation of intestinal vitamin synthesis and the reduction of microbial competition for nutrients and inhibiting pathogens.

In 2017, all growth-promotion clearances for medically important antibiotics were removed by the US Food and Drug Administration (FDA), and antibiotics administered in feed for disease control were reclassified as veterinary feed directive drugs. Concerns about antibiotic-resistant foodborne pathogens like Salmonella, Listeria, and Campylobacter, which are linked to food animal production and processing, pose significant public health challenges. The global worry over the presence of antibiotic residues in food, animal meat, and egg products is attributed to factors such as improper antibiotic usage, non-compliance with the appropriate withdrawal period, and a potential increase in antibiotic usage in low-income countries transitioning to intensive animal production systems. These waste materials ultimately find their way into groundwater, surface water, and land where animal wastes like poultry litter are applied.

Sustainable Alternatives to AGPs:

“Biological and Chemical Innovations in The Poultry Industry”

The National Agricultural Library (NAL) in Beltsville, MD, devised an extensive search plan to explore alternative antibiotics and their various categories, primarily concentrating on poultry sciences during the year 2009-2022 by collecting various scientometric analysis data from Scopus, Web of Science/Incites, and Dimensions.

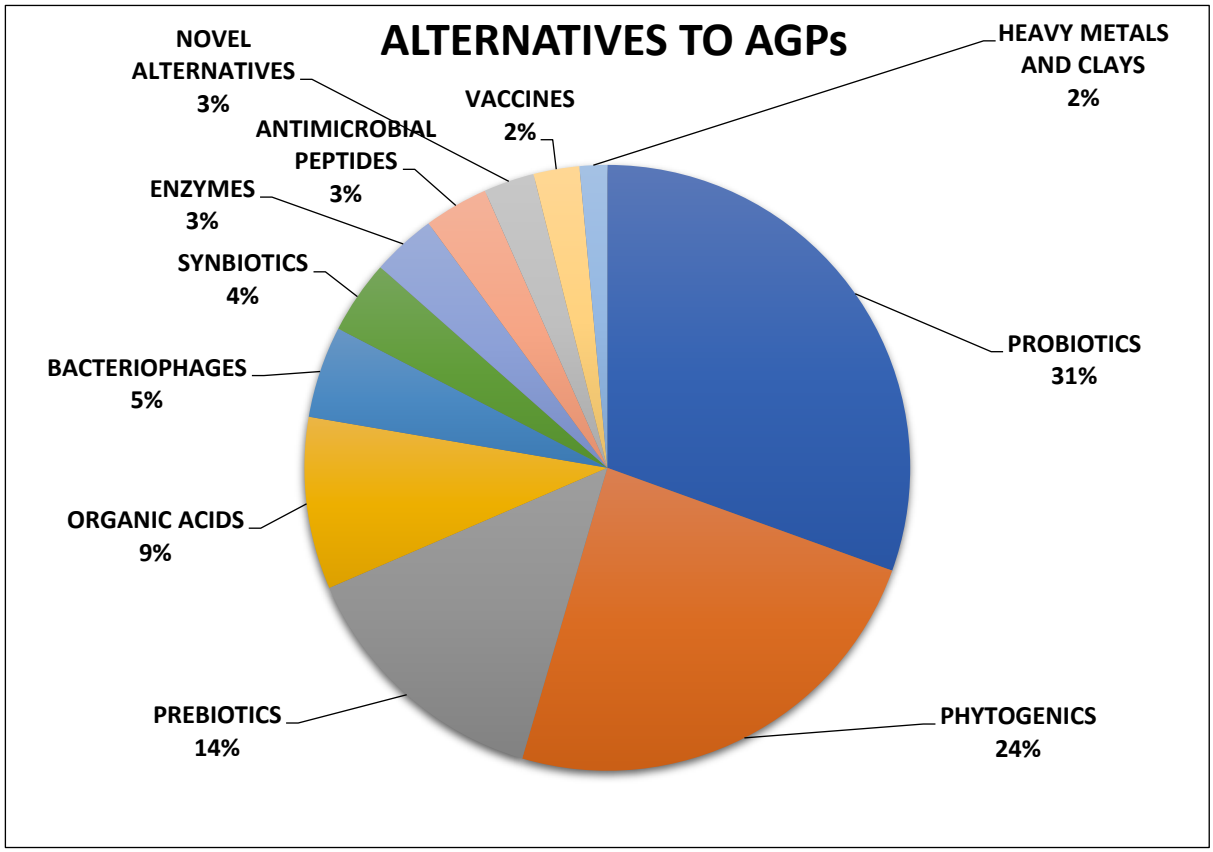

Fig. - Approximate percentage of alternatives according to publications from Scopus, Web of Science and Dimensions during the search period from 2009 to 2022

Prebiotics support the growth of existing microorganisms, decrease the presence of harmful bacteria, improve digestibility, enhance the absorption of vitamins and minerals, help maintain optimum intestinal pH and enhance nutrient usage.

Probiotics, also referred to as direct-fed microbial (DFMs), are defined by FAO/WHO (2001) as "live microorganisms that, when administered in sufficient quantities, provide a health benefit to the host." Probiotics relevant to broilers encompass the groups Aspergillus, Candida, Lactobacillus, Bacillus, Streptococcus, Enterococcus, Saccharomyces and Bifidobacterium. The positive impacts of probiotics encompass enhanced biological functioning, modulation of the gastrointestinal microbiota, inhibition of pathogens and enhancement of the sensory and microbiological characteristics of broiler meat.

In poultry research, ***phytogenic feed additives (PFAs)*** are plant-derived compounds such as herbs and herbal extracts essential oils and spices, which are added to feed with the aim of providing health benefits and possess properties such as antibacterial, coccidiostats, anthelmintic, and antioxidants, while also enhancing feed intake and immune response.. Examples of these additives include derivatives of rosemary, sage, pepper, cinnamon, thyme, citrus, turmeric, oregano and anise.

The most common types of ***organic acids*** include lactic acid, formic acid, propionic acid, acetic acid, oxalic acid, uric acid, sorbic acid, citric acid and butyric acid. Organic acids, when combined with proper nutrition, management, and biosecurity measures, can support poultry in maintaining intestinal

health. This, in turn, can lead to improvements in habitability, feed conversion ratios, fattening and immunological responses.

Adding specific ***enzymes*** decrease the amount of manure produced and the amount of nitrogen and phosphorus expelled, which improves feed efficiency, lowers feed costs, and improves the environment. Protozyme, an enzyme product derived from the fungus Aspergillus oryzae, was the first documented application of this product in poultry diets.

Latest Perspectives Towards Sustainable Feed Additives in My Respective Region: Assam and Other Northeastern States

According to a newspaper editorial section authored down by Farhana Ahmed, the most commonly used antibiotic used in Assam poultry industry is Cephalexin Monohydrate, which is antibacterial in nature working against E. coli, Gangrenous Dermatitis, Fowl cholera, Coryza and Salmonella and helps prevent early mortality of chicks. But unfortunately, over the decades, this antibiotic is causing a lot of gastrointestinal and hypersensitivity issues including diarrhea, nausea and vomiting. As depicted by one of the commercial poultry farmers of Mangaldai district of Assam, Rakib Ahmed that to compensate the losses during transport of the chicks from Andhra Pradesh to Assam, they had to sell the remaining chicks at a higher rate to the buyers and who in turn use antibiotics to save the remaining chicks causing a health hazard.

Another potentially dangerous ingredient used along with antibiotics is the EM solution all-over north-eastern regions. Though it improves health condition, prevents exo-parasitic infestation and helps in gain of body weight, when mixed with antibiotics can cause detrimental effects.

But according to various sources obtained from Dr. Prabin Saikia, a leading veterinarian of Assam, the chicks deported from the other states cite early deposits of antibiotics like Enrofloxacin and levofloxacin in their farms. A combined solution of enrofloxacin , ciprofloxacin and colistin is fed to the chicks for 6 days to prevent respiratory disorders.

A survey issued by the poultry department of Assam on “Management of poultry farms in Assam” with special reference to Kamrup district, it has been clearly mentioned about the usage of antibiotic growth promoters like colidex, alongwith other probiotics and herbal supplements.

A Recent Case Study of Antibiotic–Free Poultry Farming Startup in Assam:

This case prevails in the village of Jijiga, Cachar district of Asam, where Bapan Das, a lawyer turned entrepreneur and Archana Das, poultry farmer brought into transformations in the scenario of small-scale poultry farming. They usually feed recycled food waste, sustainable ingredients from water hyacinth, snail shells from local fisheries and plant or animal sourced minerals to the chicken which gains them a profit of Rs. 40,000/month without the involvement of middlemen. Bapan Das has streamed these antibiotic free supplements in both online and offline platforms at marginally low costs

for easy access to the farmers.

Conclusion: Future Endeavour Towards a Sustainable Future

The uprising of artificial means of feed supplementation is causing a havoc in public health society all over the globe. But with each passing decade, health specialists have realized the significance of antibiotic free ration in eliminating the previous health hazards. Biomagnification leads to irreversible health issues especially in the last strata of ecological pyramid i.e., humans. So, we as a concerned and the only intellectual society must abolish hazardous substances sold to us in the form of consumable food without proper authorization by the government.

References:

Ahmed Farhana (2020), 'Use of antibiotics among broiler chickens in Assam and North Eastern states', in the Editorial column of "*The Eastern Today".*

Callaway r. Todd, ricke steven c. (2023) 'Direct-fed microbials and prebiotics for animals, science and mechanisms of action', second edition https://doi.org/10.1007/978-3-031-40512-9

El-Hack Mohamed E. Abd, El-Saadony Mohamed T., Salem Heba M., El-Tahan Amira M., Soliman Mohamed M., Youssef Gehan B.A., Taha Ayman E., Soliman Soliman M., Ahmed Ahmed E., El-kott Attalla F., Al Syaad Khalid M., and Swelum Ayman A. (2022), 'Alternatives to antibiotics for organic poultry production: types, modes of action and impacts on bird's health and production', *Poultry Science Elsivier*, Volume 101(4) https://doi.org/10.1016%2Fj.psj.2022.101696

https://animalhusbandry.assam.gov.in/sites/default/files/swf_utility_folder/departments/ahvetdept_webcomindia_org_oid_3/portlet/level_1/files/management%20fo%20poultry%20farms.pdf

Wickramasuriya Samiru S, Ault Jessica, Ritchie Stephanie, G. Gay Cyril, Lillehoj Hyun S. (September 2024), 'Alternatives to antibiotic growth promoters for poultry: a bibliometric analysis of the journals', *Poultry Science Elsivier*, Volume 103 (Issue 9) https://doi.org/10.1016/j.psj.2024.103987

Żbikowska Katarzyna , Michalczuk Monika, and Dolka Beata (2020), 'The Use of Bacteriophages in the Poultry Industry', *Animals (Basel)*, Volume 10(5) https://doi.org/10.3390%2Fani10050872