Seaweeds of Poultry Feeds

Subjects: Others
Contributor: Khalid Mahrose

Poultry are birds which render economic services to humans as a primary supplier of meat, egg and raw materials for different industries (feather, waste products, etc.), source of income and employment to people when compared to other domestic animals. Currently, there is an interest in the application of seaweeds in poultry nutrition. Seaweeds (called also macroalgae), which include green (Chlorophyceae), brown (Phaeophyceae) and red algae (Rhodophyceae), are a naturally occurring source of the biomass that develops in variable environments (results also from eutrophication) and is easily cultivated. Seaweeds as a rich source of bioactive compounds when included into feed can improve poultry health and performance as well as increase the quality of poultry products (eggs, meat).

Keywords: Seaweeds, Poultry

1. Introduction

Poultry production is an important agricultural subsector in many countries. Poultry are birds which render economic services to humans as a primary supplier of meat, egg and raw materials for different industries (feather, waste products, etc.), source of income and employment to people when compared to other domestic animals [1]. According to USDA (2020), the world chicken meat production in 2020 increased than previous years. In July 2020, the total production of meat reached 100,026 metric tons, whereas in July 2019 it was 99,027 metric tons–an increase of nearly 1%. The demand for poultry meat will increase because in the face of the economic crisis customers are looking for cheaper animal protein. The total world consumption of chicken meat reached 97,908 metric tons in July 2020, whereas in July 2019–97,127 metric tons [2]. Poultry is efficient in converting feed into high-value products within a comparably short period [3][4][5]. Eggs and poultry meat are beginning to make a substantial contribution to relieving the protein insufficiency in many countries [6][7]. In today's poultry industry, practices regarding management and feeding (composition, systems) are among the most important factors [8][9][10][11][12][13][14].

Currently, there is an interest in the application of seaweeds in poultry nutrition. Seaweeds (called also macroalgae), which include green (Chlorophyceae), brown (Phaeophyceae) and red algae (Rhodophyceae), are a naturally occurring source of the biomass that develops in variable environments (results also from eutrophication) and is easily cultivated [15]. Seaweeds as a rich source of bioactive compounds when included into feed can improve poultry health and performance as well as increase the quality of poultry products (eggs, meat) [16][17]. According to the Commission Regulation (EU) No 575/2011 of 16 June 2011, algae in different forms are listed in the catalog of feed materials, which contains: "algae-live or processed, regardless of their presentation, including fresh, chilled or frozen algae", "dried algae-product obtained by drying algae" that "may have been washed to reduce the iodine content", "algae meal—product of algae oil manufacture, obtained by extraction of algae", "algal oil—product of the oil manufacture from algae obtained by extraction", "algae extract—watery or alcoholic extract of algae that principally contains carbohydrates", "seaweed meal—product obtained by drying and crushing macroalgae, in particular brown seaweed" that "may have been washed to reduce the iodine content". What is important, the name of the feed material should be supplemented by the species.

2. History and Development

The literature data show that seaweeds in poultry nutrition are used in both forms: as a feed material and a feed additive. According to the Commission Regulation (EU) No 767/2009 of 13 July 2009 on the placing on the market and use of feed, "feed materials—means products of vegetable or animal origin, whose principal purpose is to meet animals' nutritional needs, in their natural state, fresh or preserved and products derived from the industrial processing thereof and organic or inorganic substances, whether or not containing feed additives, which are intended for use in oral animal-feeding either directly as such or after processing or in the preparation of compound feed or as carrier of premixtures". "Feed additives" according to Regulation (EC) No 1831/2003 of 22 September 2003 on additives for use in animal nutrition are defined as "substances, microorganisms or preparations, other than feed material and premixtures, which are intentionally added to feed or water in order to perform, in particular, one or more of the functions": they "(1) favorably affect the characteristics of feed, (2) favorably affect the characteristics of animal products, (3) favorably affect the color of ornamental fish and birds, (4) satisfy the nutritional needs of animals, (5) favorably affect the environmental consequences of animal production, (6) favorably affect animal production, performance or welfare, particularly by affecting the gastrointestinal flora or digestibility of foodstuffs or (7) have a coccidiostatic or histomonostatic effect". In the European Union feed legislation, intact seaweeds or macroalgae are considered "feed material" not requiring registration, while "extracts" of seaweeds are recognized as "feed additives" requiring an EC authorization act before legal use in animal feeding within the EU.

3. Prospects

Macroalgae can be not only a part of the strategy to look for new, natural, ecological and healthy feed materials and/or feed additives, but also for the production of designer poultry products (eggs, meat) enriched with biologically active compounds (e.g., polyunsaturated fatty acids, polyphenols, polysaccharides, pigments, vitamins, amino acids, etc.,) with functional attributes, such as antimicrobial, antioxidant, anti-inflammatory, etc. [16][17][18]. Consumption of such food can be beneficial to human health. Seaweeds can also be considered as a promising alternative to conventional terrestrial resources used for the production of feed materials/feed additives [19]. Locally available materials, such as seaweeds, can reduce feed cost [20].

In the literature, there are several review articles or book chapters on the use of seaweeds in animal feeding [15][21][22][23][24][25], and a few of them are dedicated to particular species of animals, for example: ruminants (sheep, lambs, goats, cows, calves) [22]; pigs [19][22][23]; rabbits [22]; poultry (broilers, laying hens) [22][26][27]; horses [24]. Literature data confirm that seaweeds can play an important role in the animal feeding, but there is no detailed analysis of the effects of algae in poultry nutrition. This article arrays the current state of knowledge in this field. Appropriately selected seaweeds applied at low inclusion levels can improve not only poultry growth performance and the quality of products, but also their health status (e.g., immune function) due to alteration of gut microbiome and antioxidant properties and can be considered an alternative to antibiotic growth promoters (AGP) used in poultry production [21][28][29][30][31][32][33][34][35][36]. Most often, seaweeds are used as feed additives for hens and broilers, but there are also a few reports on their application in duck [30][37][38], Japanese quail [39][40] and cockerel [41] feeding.

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