



The impact of key-factors on birds physiology, welfare and healthcare in Poultry

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Abstract: *The factors impacting on the homeostasis of birds, their welfare and health are interconnected, both internally (through nitrogen metabolism) and externally (through the released ammonia emissions) around the key element, nitrogen (N). From this biochemical element, a whole cycle is formed between the organism and the environment, exposing the natural link between living systems. We need to further investigate why it is important that the sanitary and veterinary conditions for application of proper prophylactic and biosecurity measures could make a difference to increase zootechnical performance, to generate clear data on probiotic methodology in poultry in order to support the modernization of this industry.*

• Introduction

The study focuses on identifying, describing and analysing factors influencing bird homeostasis. Interpretation of the results is the veterinarian's recommendation for improving poultry production.

• The main considered factors

Investigation and observation of data and identification of factors influencing nitrogen levels and the threshold for pathophysiological transition in poultry were carried out in accordance with the ethics of veterinary practice, in compliance with the Romanian legislation on animal and bird welfare, animal and human health, food safety and production efficiency.

The proper functioning of an organism in a clean production should be investigated, as prophylaxis is the best method, while treatment should be introduced only when necessary. The protection of the health of birds grown for meat and eggs consists of regulating the concepts of biosecurity and prophylaxis in farms, slaughterhouses and storage and commercial units. The welfare of poultry is primarily influenced by the **human factor**, as it is the predator of this species and this influences the way veterinary health activities are conducted. Basically, the whole breeding system is based on the broiler and maintaining its homeostasis in the best physiological conditions. **The measures to prevent and protect the welfare of the birds consist of ensuring sanitary-veterinary conditions through engineering and technological application.**

Approximately 2/3 of the N consumed by poultry is excreted as uric acid and as undigested feed protein in faeces (Ritz et al., 2004)^[5]. Long-term exposure to high levels of NH₃ can cause adverse effects in humans and animals: decreased performance, mucosal inflammation and respiratory disease (Zhou et al., 2021). Physiological changes can also occur around approx. 15 ppm (% NH₃), and scientific studies have concluded that the occurrence of changes could in fact be influenced by values as low as 10 ppm. From this point of view, the analysed stress factors are: time of exposure to ammonia, animal density and growth rate.^[3] It is therefore necessary to understand the physiological effects in order to control the factors. According to studies in the literature, the main methods to effectively reduce ammonia emissions are: optimisation of feed formulations and additives to reduce uric acid excretion, respecting physiological requirements and thus bird welfare, drying and proper collection of excreta in time to avoid uric acid decomposition.

In general, chemical analysis methods, using medical equipment and specific bioelement determination techniques, show us what the effects of nitrogen are in the body, thus influencing the physiological impact. It is an indicator of the welfare of poultry as it is that 'pencil mark' in the picture of factors that have a major impact on the quality of poultry meat consumption and the environment.

Maintaining moderate pH in the intestine of laying hens is beneficial for maintaining healthy intestinal flora and normal physiological function and production performance of the host^[33]

Environmental management: Chickens are normally sensitive and prone to fear, as it can be seen during the first 10 days after hatching. This stressor affects immune function in particular, increasing susceptibility to disease. Therefore, proper environmental management in raising systems is beneficial for alleviating fear and stress in hens^[12].

Immune system. Organ samples are collected: thymus, spleen, liver, bursa of Fabricius. According to Li X. et al., an appropriate diet can achieve the necessary level of immunity during the vaccination period. This facilitates the health and welfare of broilers.

Antioxidant capacity can be boosted through a probiotic diet with *L. plantarum* enriched with selenium and zinc, poultry nutritional health, oxidative stress, prebiotics, phytobiotics, trace elements and vitamins, amino acids and protein levels^[26]. Scientific, nutritional and genetic progress from several chemical, physical and functional perspectives, given the characteristics, according to Ricke et al. (2022), is based on bird physiology.

• Results and discussions

Digestive disorders are a current problem in this industry. Birds are vaccinated for *Mycoplasmosis*, *Newcastle disease* (*Avian Paramyxovirus-1*), *Avian Infectious Bronchitis*, which are coupled with prophylactic treatments given for *Colibacillosis* and *Coccidiosis* (*Eimeria* infection), but the intestinal flora imbalance and poor immunity of birds are still present.

Veterinary health principles must be done well, respected and correctly applied in poultry farming. In view of the prophylactic measures, it can be recommended that only specialists in the field of rearing poultry for meat and the release of products and by-products for the public consumption should be admitted. This closed circle of: residues released into the environment (ammonia emissions), represents the N circle in nature, between some natural components: water, air, proteins, broiler bodies, soil, human alimentation and toxic-infections and of course, pollution.

The addition of poultry manure to the soil increases its fertility through the decomposition of organic matter and the production of carbon dioxide, ultimately leading to increased grain root growth.^[25] Thus, agricultural application of poultry manure along with copper and zinc supplementation can improve the yield of green bean (*Phaseolus vulgaris* L.) seeds. Also, for tomatoes (*Solanum lycopersicum* L.) very good results have been recorded^[2] and the use of chicken manure in this form has positive effects on productivity in organic farming.

A good centralisation of decomposition/processing of poultry manure in the initial phase leads to a good use of chicken manure/animal waste as fertiliser for agricultural plantations. Poultry farms should consider measures to integrate the rearing environment into nature to protect the welfare of birds, consumers and Mother Nature.

Continuous exposure to NH₃ emissions, impairs the immune system, causes behavioural disorders (as cannibalism is not normal), disrupts the production characteristics and increases mortality. These conditions manifest themselves as stress-inducing factors in birds and cause serious consequences through out the production chain.

• Conclusions

*It's not **hard** to breed birds, but **to breed quality**.*

It is not hard to raise chickens for food, but to raise their quality, as it is a challenge for applied animal sciences in poultry.

Consideration should be given to adapting **biosecurity** on farms to the current environmental conditions.

The Vet Recommendations could be: **a good administration and management of a system: use of natural chicken manure in agriculture, optimal supervision and control in the sector of farming, slaughtering and storage of meat carcasses and eggs, by respecting the shelf life and maintaining the integrity of the product, taking into account the prophylaxis and veterinary control along this productive-poultry system.** Investigating the factors affecting the survival of infectious pathogens in the litter of poultry grown for meat can help to mitigate the presence of increased risks of contamination and food poisoning in humans.

