



Effect of Management in controlling necrotic enteritis in poultry

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ABSTRACT

The prohibition of antibiotic growth promoters has an unavoidable impact on the intestinal environment of chicken. The biggest challenge to the chicken business has been the resurgence of necrotic enteritis, which inhibits growth and feed conversions in preclinical forms and produces high mortality in its clinical form. In terms of performance, welfare, and mortality, it has been one of most prevalent and economical damaging bacteria's infections in contemporary broiler flocks. A multi-factorial disease process known as necrotizing enteritis occurs when a considerable number of co-factors are often needed to start a disease outbreak. *Clostridium perfringens* is now identified as disease's etiological agent, it is unclear whether predisposing conditions cause excessive *C. perfringens* growth and as subsequent development of the disease. Any condition that stresses broiler chicks could impair the intestinal ecosystem's balance and weaken the immune system, increasing the chance of an epidemic of NE. The management of poultry may have a big impact on NE pathogenesis. In instance, feed limitation and vaccination against coccidiosis can guard against NE, but high stocking densities, excessive house temperatures, and feed mycotoxins can predispose to NE. Understanding the disease's pathophysiology and the linkages between dietary, the nutritional, viral factors and emergence of the necrotic enteritis become extremely crucial. In order to imply managerial methods at the farm level to minimize occurrence and the severity of the disease in post-antibiotic era, this is essential and crucial.

INTRODUCTION

One of the most common diseases affecting broilers is necrotic enteritis (NE), which places a heavy financial burden on the global poultry sector. According to Wade and Keyburn (2015), it causes an annual economic loss of over \$6 billion worldwide and is expected to cause healthy birds to lose 12 percent of their body weight and have an 11 percent higher feed conversion ratio (Skinner et al., 2010). Despite the fact that *C. perfringens* has been identified as the disease's etiological agent and that our current knowledge of the disease includes this information, the predisposing variables necessary for the disease's outbreak remain poorly understood. These elements may have an impact on the ecology and upsetting the intestinal balance causes the disease to spread (Williams, 2005; McDevitt et al., 2006).

All of these techniques are used in poultry management on farms to help birds show their genetic potential as effectively and efficiently as possible. It takes account matters of economics, law, welfare, and health, but its impact on gut health is not yet fully understood. This study focuses on management techniques that might be used to control NE in chicken without using antibiotics, including as nutrition, health, and husbandry.

NUTRITION MANAGEMENT

The etiology of NE in broiler chicks is substantially influenced by raw components and the physical state of the poultry feeds. Particularly well-known NE risk factors include foods heavy in animal protein, fat, and non-starch polysaccharides (NSP), such as grains (Williams, 2005; McDevitt et al., 2006). They have ability to change physicochemical characteristics of the intestinal digesta, to impact microbiota, to provide the substrates, and to foster the environment which encourages *C. perfringens* growths in the intestinal tract (Timbermont et al., 2011; Caly et al., 2015). A well-known method for the NE control is the feed management. In the poultry, feed restriction is used to limit growth and guard against metabolic problems (Zhan et al., 2007). In a NE experimental model, Tsiouris et al. (2014) demonstrated that the feed limitation of the broiler chick is reduced in the population of *C. perfringens* in the caecum and lowered the severities of NE lesions. The endocrine and the defense mechanisms influences, along with the lack of nutrients in the digestive tract, were thought to be responsible for the feed restriction's protective effect against NE. Additionally, feed limitation enhances blood flow to the gastrointestinal system and may prevent necrosis (Tsiouris et al. 2014).

Feed management techniques like feeding whole grains to chickens are widely utilised to cut feed expenditures. These mechanical stimulations of the gizzard, along with the resulting lowering of the intestine's pH, creates an adverse environment for the growth of *C. perfringens* and may be utilised to treat chicken enteric illnesses (Williams, 2005; Biggs and Parsons, 2009). There are only a few or no scientific studies on the impact of whole-grain eating on the NE, though.



MANAGEMENT OF HEALTH

The most well-known type of NE risk factor is mucosal injury brought on by coccidia infection (Williams, 2005; Timbermont et al., 2011). On the other hand, subclinical test NE in broiler chicks was significantly prevented by the attenuated anticoccidials immunization, which results in the mild intestinal ulcers (Tsiouris et al., 2013). The ability of anticoccidial vaccines to protect against NE was thought to be due to the localised inflammation's promotion of both nonspecific and specific immune mechanisms. Additionally, the mucus secretions and nutrients available for the *C. perfringens* proliferations into the intestinal tract are limited with the reduction of the acute coccidia lesions in the mucosa. The prevention of coccidiosis also deters *C. perfringens* from adhering to the intestinal epithelium (Timbermont et al., 2011). Controlling NE depends critically on both specific and general immunity to *C. perfringens*. The vaccine campaign needs to focus on immunisation against chicken immunosuppressive diseases such as Gumboro disease, and the Chicken Infectious Anemia, Mareks, etc (Timbermont et al., 2011). Additionally, immunisation against the *C. perfringens* appears like a sensible prophylactic measure for NE defence. The *C. perfringens* type A and alpha toxoid vaccines (NetvaxTM), which is administered to breeder flocks, has been registered. Excellently summarised by Mot et al., recent advancements and issues with NE immunisation have been highlighted (2014).

Mycotoxins are abundant and frequently present in feed for chicken. They endanger the public's health and are linked to poultry growth retardation. Additionally, broiler chickens feed is a diet polluted with the 5 mg of deoxynivalenol/kg diet was prone to the NE in an experimental NE models (Antonissen et al., 2014). Due to mycotoxins' detrimental effects on small intestine epithelial cell integrity and morphology as well as their connection to immunosuppression, coccidiosis and NE lesions may become more severe (Murugesan et al. 2015).

LIVESTOCK MANAGEMENT

Since it could have detrimental impact on the performances, welfare of poultry, and health of the poultry birds, stocking density is indeed a managerial component with a lot of important consequences for poultry business (Estevez, 2007). In an experimental NE model, the high stocking densities dramatically enhanced frequency and the severity of the NE and the liver lesions, and the pH and *C. perfringens* numbers in the caecum (Tsiouris et al., 2015a). Stress in chickens raised in high stocking densities can have a poor impact on humoral immune system, quality of the litter that can lead to increases in *C. perfringens*, litter and have an impact on intestinal flora (Burkholder et al., 2008; Guardia et al., 2011). One major physical environmental stressor is temperature and can have a considerable impact on the performances, healthiness, and the wellbeing of poultry farmer's bottom line (Tsiouris et al., 2015b). The experimental work by Tsiouris et al. (2015b) found that the immunosuppression caused by cold stress makes birds more likely to acquire NE lesions. Similarly, heat stress exacerbated the severities of the NE lesion in the experimentally infected chicken and was linked to the emergence of NE in birds that had not been challenged (Tsiouris et al., 2009). These effect could be ascribed, that how the immune system and the intestinal microbiota are impacted by high ambient temperatures. It's also crucial to consider the function of heat shock proteins, which were upregulated in response to heat stress among other stressors (Mashaly et al., 2004; Burkholder et al., 2008). Further study is required because there may be other husbandry elements at play, such as the microenvironment of the poultry house (such as humidity of air and the litter conditions), which is influenced by the temperature. Additionally, the lighting schedule is a crucial aspect of bird husbandry that has a big impact on the birds' performance, health, and immunity (Campo et al., 2007). There is no research on its impact on the NE, though. Diagnosis of diseases can be done through AI means (Patil et al., 2022)

CONCLUSION

A classical illustration of the multi-factorial disease state in chicken is NE. Since the existence of *C. perfringens* alone does not cause disease, it results from an imbalance in the gut ecology. To cause clinical symptoms and lesion of NE, additional variables that alter their intestinal environment and permit the spread of *C. perfringens* are needed. Therefore, it is believed that the NE outbreak is a problem with gut health and is dependent on the interaction between host, viral, dietary, and management factor (Williams, 2005; McDevitt et al., 2006).

The development of the novel tactics for its control is a result of the restriction on antimicrobial and economic effects of NE in the contemporary poultry sector. Strategies of great significance include the detection of *C. perfringens* pathogenicity and management of the predisposing variables. Optimization of chicken farm management procedures, such as husbandry, stringent biosecurity and sanitation guidelines, diet-related tactics, and nutritional supplements (probiotics, probiotic bacteria, herb, organic acid, and enzyme), have all gained importance. Active immunisation is effective, but only as part of a comprehensive strategy to reduce NE (Caly et al., 2015; Mot et al., 2014)

The study of the pathogenesis and aetiology of NE in gut of poultry has advanced significantly during the last ten years. By improving or avoiding management procedures, limiting pathogenic *C. perfringen* into the intestines, by boosting immune system as well as the intestinal microbiotas of chicken, new researches should be concentrated on lowering the risk of the diseases.

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