Effect of Prebiotics in Intestinal bacteria of Broilers

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Abstract: Prebiotics are widely used nowadays commercially in poultry industry, they are not digested inside bird gut but are metabolized by specific members of normally inhabitant microflora resulting in many beneficial effects for host body including induce unfevrable condition for pathogenic bacteria and improve overall productivity. Fermentable oligosaccharides considered one of the best widely used prebiotics in poultry production, work through many mechanisms including their neutrient value for host cell, preventing pathogenic bacteria adherence to intestinal cell, stimulation host non-specific immune response and finally improve intestinal histological structure such as crypts length – depth for better digestibility. Recently it was proved that prebiotic's become an antibiotic alternative in order to produce what's is called green food through enhancing normal inhabitant microflora activities resulting in control of many pathological pathogens either by interference on active side or production of many metabolites producing unfevrable media for those pathogenic bacteria. Our review will give a sight on role of prebiotics on broiler productivity and their way of working inside bird body in order to improve chicken gut health. Also their effect on normal inhabitant microorganism, their effect on bird immunity, together with effect of prebiotics on histological appearance of intestinal tract which will support nutrient digestibility which will reflected on poultry performance and better carcass quality.
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1. Introduction

In modern poultry intensive production antibiotics and or anticoccidials medications are widely used in sub therapeutic doses in order to control pathogenic bacteria or intestinal parasites growth control, improve feed conversion rate and meat production unfortunately they have many drawback on birds and human **Gaskins et al. (2002)** Prebiotics has selective positive impact on intestinal beneficial bacteria and non-specific immune response of broiler chickens **Bozkurt et al., 2014)**. Mannan oligosaccharide (MOS), a commercially used yeast extract by products, found to prevent gram-negative pathogenic infection by competitive exclusion in chicken gastrointestinal (GI) tracts active site resulting in decrease both bacterial load and infectivity, inclusion of MOS in poultry also may enhance immune function, improve the growth of the intestinal mucosal layer and intestinal mi-crobiota diversity together with exerting antimycotoxine effect **Pourabedin et al. (2014).** On the other hand Beta-glucans, is another commercial prebiotic active ingredient, found to have positive impacts on broilers performance by improving innate immunity and final weight gain. Beneficial effect of synergestic effect of combined uses of MOS and β-glucans on growth performance not all proved in poultry but also have been reported for aquatic animals **Van Hai and Fotedar, (2009).**

1. Review

Prebiotics are fermentable non-digested feed additives used extensively nowadays for better intestinal health together with replacement of antibiotics for control of foodborne pathogens. Term prebiotics was stated by **Gibson and Roberfroid. (1995)** who stated that prebiotics beneficially affects the host through influence the growth of beneficial bacteria including Bacteroides and Bifid bacterium **Johnson et al. (2015)**.

Many pathogenic bacteria show multidrug resistance against many antibiotics **World Health Organization. Antimicrobial Resistance (2014)**, including enteric pathogenic bacteria such as Salmonella species which controlled well by using prebiotics safely resulting in reduction in the number of foodborne Salmonella and the repression of virulence factors with no fear of drug resistance or food residues that hazard human health **Micciche et al. (2018)**.

Mechanism of action of Prebiotics

Many theories discuses mechanism of action of prebiotics, the most accepted are that prebiotics work through selective alteration of gut microorganisms through create a good media for growth and metabolites production of beneficial bacteria resulting

in reducing colonization of pathogenic bacteria **Hajati and Rezaei (2010),** thus improving the integrity of gut mucosa, improves intestinal crypt-depth for better nutrient digestibility. Other theories stated that Prebiotics are non-digestible bird gut and so become good nutrient source for beneficial bacteria normally inhabitant in poultry gut such as Lactobacillus (LAB) and Bifid bacteria in the lower GIT, resulting in what is called competitive exclusion with pathogenic bacteria, preventing the attachment of such pathogenic bacteria including Salmonella and promotes microbiota in the gut **Thomas et al. (2004)**

The theory of competitive exclusion when 1-d-old chicks fed with probiotic containing ration found to have positive impact on both intestinal microbiota resulting in better intestinal function and disease resistance **Stern et al. (2001).**

Prebiotics in chickens

Prebiotics found to improve broiler weight gain which considered the main factor of growth performance parameters in broiler chickens **Ajuwon (2015)**. Also it was found that prebiotic replace antibiotics as growth promoter growth promoter (AGP) overcoming the well-known side effects of used antibiotics **Chattopadhyay (2014)**, moreover it was found that prebiotics modulate intestinal epithelium function and integrity together with antigen presenting cells and macrophages by both direct and indirect mechanisms of action **Wu et al. (2017)** resulting in stimulation of host adaptive immune system **Baurhoo et al. (2012)**. many researchers proved that prebiotics manipulate gut microbial composition **Gagg`ıa et al. (2010)**, also it was found that chickens fed prebiotic containing ration has better lactobacilli and bifid probiotics activities normally inhabitant in poultry gut. Furthermore, broiler fed prebiotic containing ration found to have probiotic active occupying intestinal tract by competitive exclusion of pathogens together with production of antimicrobial factors **Munoz et al. (2012)**;together with improving gut histomorphological structure of intestinal mucosa for better performance **Pourabedin et al. (2014)**

Early application of prebiotic in broiler ration found to have positive impact on overall performance together with development of health intestinal tract, and also enhance post hatch utilization of yolk in poultry gut (**Potturi et al., 2005)**

Summary

For active infection Pathogens pass many infection stages for intestinal colonization and active disease condition, likely during this stages many immune defence mechanisms could control their colonization includes low gastric acidity, rapid passing of digested materials through small intestine which prevent colonization, microflora which prevent colonization by competitive exclusion together with induce unfavourable condition through production of bacterial metabolites, health intact epithelium lining of intestinal tract and immune response of poultry chicken, moreover normal inhabitant microflora found to improve intestinal histological together with stimulating non-specific against pathogenic intestinal bacteria. It could be concluded that Probiotics and prebiotics has a beneficial effects in condition of changing intestinal microbile load by favouring good media for beneficial bacteria together with improve immune response, resulting in reduce colonization of pathogens. These prebiotic products also proved to be safe alternatives for antibiotics that are widely used in our poultry field in Egypt with better safety profile.

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