

CPRC Update – Development of an enzyme/yeast-based prebiotic supplement for poultry

The Approach

Currently more than 90% of broiler chicken feeds contain enzyme supplements, which have a direct positive effect on animal performance. However, new generation enzyme supplements have been developed for specific use in the feed industry. Yeast products are rich sources of mannan polysaccharides, β 1,3- and β 1,6-glucans, and nucleotides, which can function as prebiotics and have been shown to stimulate the immune system and gastrointestinal tract development. This provides favorable conditions for beneficial intestinal bacteria and results in decreased attachment of pathogens such as *Salmonella*.

Dr. Bogdan Slominski from the Department of Animal Sciences at the University of Manitoba aimed to develop a product that would contain a combination of a multi-carbohydrase preparation fortified with a yeast cell wall lytic activity with the yeast-derived product(s) as an effective and inexpensive alternative to antibiotic growth promoters.

The Experiments

A series of experiments were conducted to first optimize the depolymerisation of yeast cell wall polysaccharides using varying enzyme activities to explore the potential for the release of bioactive components from various yeast products. Dr. Slominski and his research team demonstrated that the use of a specific yeast cell lytic enzyme could significantly depolymerize yeast cell wall polysaccharides so they become water-soluble and thus more bioactive. Additionally, yeast cell lysis resulted in the release of a variety of nutrients, including nucleotides, known to play a role in immune system development. In addition to investigating the effects of enzyme/yeast-based prebiotic supplements on growth performance of broiler chickens and turkeys under commercial field conditions the research team produced different enzyme-pretreated yeast products as dietary enzyme/yeast-based prebiotic supplements and performed feeding trials with *Salmonella* and *Clostridium perfringens* challenged poultry,.

The Findings

The developed enzyme/yeast-based prebiotic supplements significantly decreased the incidence of *Salmonella* shedding and reduced *Salmonella* cecal counts in broiler chickens and laying hens. In the laying hen the enzyme/yeast-based prebiotic supplements also reduced *Salmonella* colonization/numbers in different internal organs. The *Clostridium perfringens* challenge study with broiler chickens demonstrated that enzyme/yeast-based prebiotic supplements were as effective as antibiotics in birds post challenge recovery. Other findings of the feeding trials show that enzyme/yeast-based prebiotic supplements fed to broiler chickens suggests a shift in microbial population of the lower gut towards beneficial microbes and a more diversified microbial community; consequently less susceptible to pathogenic invasion.

In the broiler chicken study performed under field conditions, improvements were observed in body weight gain and feed conversion ratio for diets containing the enzyme/yeast-based prebiotic supplements. In addition, a significant effect of the enzyme/yeast-based prebiotic supplements on body weight gain and feed conversion ratio was observed in turkeys. Dr. Slominski and his research team have clearly demonstrated the benefits of enzyme/yeast-based prebiotics supplements, which may serve as alternatives to antibiotic growth promoters.

The Next Steps

The researchers plan to develop yeast products with further enhanced biological activity. Additionally, the researchers aim to investigate the 'configuration' of yeast products required for the bioactive components to exert their activity in protecting the gut from pathogens.

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CPRC, its Board of Directors and member organizations are committed to supporting and enhancing Canada's poultry sector through research and related activities. For more details on these or any other CPRC activities, please contact The Canadian Poultry Research Council, 350 Sparks Street, Suite 1007, Ottawa, Ontario, K1R 7S8, phone: (613) 566-5916, fax: (613) 241-5999, email: info@cp-rc.ca, or visit us at www.cp-rc.ca.

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