EVALUATION OF A PROBIOTIC PRODUCT ON CECAI COLONIZATION AND ORGAN INVASION OF SALMONELLA ENTERITIDIS IN BROILERS

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Summary

The use of Antibiotics in animal production has been declining worldwide throughout the years. Consumer pressures continue to be the cause of this decline in both EU and Non-EU countries. Recent studies suggest that some natural alternatives offer good efficacy towards the reduction of foodborne pathogenic bacteria. One such alternative is the use of probiotics which speed the development of a protective intestinal microfloral which is ultimately essential for protecting against food poisoning salmonellas and other disease causing organisms. With the rise of food/health crisis the use of competitive exclusion strategy is becoming more accepted among farm producers. This review describes evidence in which a particular probiotic product decreased colonization of Salmonella enteritidis in broilers. The data obtained from this experiment also emphasizes that such a strategy may be a possible alternative not only to reduce avian diseases but also to limit the use of antibiotics in animal husbandry.

I. INTRODUCTION

Antibiotics (Abs) are very powerful and effective tools in preventing pathogenic bacteria from causing infection. For many years it was accepted that animals could be given Abs to optimize growth. However due to political and consumer concerns this act is undergoing extreme scrutiny. For example, recent legislation within the European Union has banned certain antibiotics (EC Council Regulation, 1999). Now many researchers and companies alike are searching for alternatives to antibiotics as methods of disease prevention and growth promoters. Cost effective control of avian disease and food borne pathogens remains a high priority for all sectors of the poultry industry with cleansing and disinfection, vaccination and competitive exclusion (CE) approaches used widely (Ragione et al., 2003). Although practicing good management on the farm has shown to reduce pathogens such as Salmonella there are other methods to control pathogenic bacteria. Probiotic supplementation has shown great promise in protecting broilers against pathogens by colonization in the gastrointestinal tract (GI) (Nisbet et al., 1993).

One of the most common enteric infections worldwide is caused from salmonella species. In the last few years, massive foodborne illness outbreaks have made us aware of the risks involved in our world food supply. Most infections are traced back to the consumption of contaminated foods of animal origin, like beef, poultry and other meat products including eggs.

The intestinal microflora of animals is the first barrier in protecting the host from diseases caused by colonization of pathogens in the gastrointestinal tract (Huang et al., 2003). In modern commercial conditions the chick is hatched in relatively clean conditions thus only having indirect contact with the mother hen. Most of the chicks gut flora starts to develop from the incubator environment and their food. Exploitation of the CE effect is now an accepted part of the overall strategy by which poultry-associated salmonellas are being controlled in some countries (Mead, 2000). From a commercial standpoint it is important that the method used is practical and that it provides that all birds receive a proper treatment.

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A proper method of CE administration is through spray application, which was first developed by Goren et al. (1984, 1988), where chicks were treated in the delivery boxes, prior to leaving the hatchery. Later Blankenship and co-workers (1993) combined spraying in the hatchers and providing treatment also in the drinking water upon arrival of the farm. Based on these facts Biomin developed a product combining not only the essential components that are needed to combat with pathogenic bacteria, but also employed this application strategy. Both of which have been studied for many years. Biomin® C-EX and Biomin® IMBO is a probiotic and prebiotic product that can be administered to young chicks in order to competitively inhibit pathogenic salmonella bacteria in the intestinal tract of livestock thus improving food safety. The composition of Biomin® C-EX and IMBO product line is comprised of specific natural agents such as probiotics, prebiotics, and immunostimulating substances.

With the concerns of salmonellosis on the rise an experiment was conducted to confirm the effectiveness of C-EX and IMBO in reducing Salmonella cecal colonization and organ invasion in 49-day-old broilers as well as body weight and weight gain were recorded. Also measured was the concentration of volatile fatty acids (VFA) and lactic acid as well as the pH in the GI-tract were recorded. In this trial, which was conducted at the Universidad Nacional Autónoma de México the results proved to be significant.

Four hundred and fifty day-old chicks were weighed, divided into 6 groups, randomly allocated and reared in cages at isolation units until the age of 49 days. Food and water were given ad libitum. Twenty-four hours after oral application of tested products the chicks were challenged with Salmonella enteritidis, orally inoculated with 0.25 ml of S. enteritidis, which contained 4x10^7 CFU/ml. The groups and treatments consisted of the following:

Group 1: Control, inoculated with S. enteritidis
Group 2: Positive Control (Avi-xy), inoculated with S. enteritidis
Group 3: Biomin® C-EX, inoculated with S. enteritidis
Group 4: Biomin® IMBO, inoculated with S. enteritidis
Group 5: Biomin® C-EX and IMBO, inoculated with S. enteritidis
Group 6: Negative Control, not inoculated

Although there were no significant differences (P>0.05) on body weights in experimental groups the applications of all three Biomin products, especially the combination of C-EX and IMBO resulted in higher live weights at the end of fattening period compared to controls. pH of cecal contents decreased significantly in groups given Biomin® C-EX, Biomin® IMBO and the combination of both compared with control groups at day 7, 14 and 21. There were no significant differences on the Avi-xy group. The number of chicks with S. enteritidis positive organ cultures was significantly reduced compared to control-chicks throughout the whole evaluation period. The combined application of Biomin® C-EX and IMBO resulted in a total reduction of S. enteritidis positive organ cultures already at day 21. In general it can be noticed that levels of organ invasion by S. enteritidis were much lower compared to Avi-xy when given Biomin® C-EX and IMBO combination. Furthermore the effect of tested products on organ invasion of S. enteritidis in broiler chicken; values show number of positive liver and spleen per total of chicken were significantly different from positive control. The data clearly showed that the combination of C-EX and IMBO had reduced the number of S. enteritidis samples in liver and spleen at days 7, 21, and day 35. The trial groups that received C-EX and IMBO had a better result when compared to the other 4 experimental groups. All three Biomin products could reduce the concentration of S. enteritidis distinctively until day 21. With this data it can be stated that the potential of such a strategy has a great benefit in animal production and could ultimately help safeguard the health of consumers.
REFERENCES


