APPLICATION OF IMMUNOGENOMIC TECHNOLOGIES TO POULTRY:

BUILDING A BETTER CHICKEN

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SUMMARY

As is the case for all young animals, newly hatched chicks are highly susceptible to infection. A major problem faced by poultry industries worldwide is reduced productivity due to disease. The two main mechanisms used to control disease over the past several decades have been antibiotics and vaccines. Antibiotics have been widely used in intensive livestock systems - in addition to controlling bacterial disease, they also have growth promoting activity. Unfortunately, the extensive use of antibiotics and chemicals over a long period of time has resulted in the emergence of pathogens that have become resistant to such treatments. Public and government concerns over these issues have led to restrictions in the use of antibiotics in food production animals and this has driven the search for alternative health products. Vaccination strategies provide the second arm of protection from disease. In the past decade, several hyper-virulent strains of poultry pathogens have emerged and these have been difficult to control using conventional vaccines. There is now a need for alternative vaccines for several key diseases of commercial importance to the poultry industry. We have taken a new approach to address these key issues. By combining functional genomics, immunology and gene silencing technologies (immunogenomics), we hope to develop new strategies and products that will enhance the productivity and health of not only poultry, but livestock in general.

Keywords: Poultry, immunogenomics, antibiotic replacements, vaccines, adjuvants, RNAi

INTRODUCTION

The annual consumption of chicken meat has continued to grow, with the 40 billion broiler (meat) birds hatched annually, accounting for nearly 40% of all meat consumed world-wide. In Australia, around 400 million broiler birds are raised each year and the annual per capita consumption is 30 Kg. Poultry products have an annual national retail value in excess of $2.5B.

A global problem faced by poultry industries is reduced productivity due to disease. This is compounded by the fact that newly hatched chicks are highly susceptible to infection during the first two weeks of life. Over the past several decades the two main mechanisms used to control disease have been the use of vaccines and antibiotics. Vaccines are intended to offer long-term immunity and protection against a particular pathogen following immunisation. In contrast, antimicrobials, such as in-feed antibiotics and chemicals, provide broad-spectrum protection and their use is intended to prevent bacterial disease. In addition to controlling disease, antibiotics also have growth-promoting activity, making them a highly attractive product. Unfortunately, the extensive use of antibiotics and