

ABSTRACTS
2003 Poultry Science Association
Annual Meeting
July 6–9, 2003

* Author Presenting Paper

Ancillary Scientists Symposium

1 Proteomics in the chicken: tools for understanding immune responses to avian diseases. S. C. Burgess*, *Mississippi State University, Mississippi State, MS 39762-6100.*

The entire chicken genome sequence will be available by the time this review is in press. Chickens will be the first production animal species to enter the “post-genomic era”. This fundamental structural genomics achievement allows, for the first time, complete functional genomics approaches for understanding the molecular basis of chicken normo- and patho- physiology. The functional genomics paradigm, which contrasts with classical functional genetic investigations of one (or few) genes in isolation, is the systematic holistic genetic analyses of biological systems in defined contexts. Context-dependent gene interactions are the fundamental mechanics of all life. Functional genomics uses high throughput large-scale experimental methods combined with statistical and computational analyses. Chicken expressed-sequence-tag projects have already allowed the creation of cDNA microarrays for large-scale context-dependant mRNA analysis (“transcriptomics”). However, proteins are

the functional units of almost all biological processes and protein expression very often bears no correlation to mRNA expression. Proteomics, a discipline within functional genomics, is the context-defined analysis of complete complements of proteins. Proteomics bridges the “sequence to phenotype gap”; it complements structural and other functional genomics approaches. Proteomics requires high capital investment but has ubiquitous biological applications. Although currently the fastest growing human biomedical discipline, new paradigms may need to be established for production animal proteomics research. The prospective promise, and potential pitfalls, of using proteomics approaches to improve poultry pathogen control will be specifically highlighted. The first stage of our recently-established proteomics program is global protein profiling to identify differentially expressed proteins in the context of the commercially important pathogens. Our trials and tribulations in establishing our proteomics program, as well some of our initial data to understand chicken immune system function, will be discussed.

Key Words: Functional genomics, Proteomics, Immune response, Genome

Immune System Functions and Mechanisms

2 Our current understanding of humoral immunity of poultry. T. R. Scott*, *Clemson University.*

With the inception of the modern era of avian immunology in the mid-1950s following the discovery of the role and importance of the bursa of Fabricius (BF), steady and persistent research has been conducted by scientists to this day. Findings that have advanced our knowledge of humoral immunity in all species have included such things as the distinct role of the B cell in antibody production, the explanation of antibody diversity by gene conversion, the identification of a bursa secretory dendritic cell (BSDC) and DC of the spleen, characterization of cytokine factors produced by immune and stromal cells, and mapping of MHC class II genes. Numerous experiments have been conducted over the years to evaluate the humoral immune responses of poultry through antibody titer determinations and quantitation of immunoglobulin (Ig) concentrations in the body humors. These antibody studies have also included the genetics of humoral immunity regarding both quantity and persistence of responses as influenced by multiple genes and MHC haplotypes. In

the past decade or more, the emergence of many monoclonal antibody reagents employed to identify cell surface markers on B cells and accessory cells has allowed for the discrimination of humoral immune functions of cells by immunohistochemistry, flow cytometry and other techniques. Continued work with avian immunity has led to more advances in the identification, characterization and gene sequencing of cytokines important in this area. Additional work is required to identify and sequence the genes for many more cytokines that have direct effects on B cells for growth, differentiation and Ig class switching. A brief history of the research published on humoral immunity of poultry will be presented followed by an examination of some of the important research findings reported in recent years.

Key Words: Humoral immunity, B cells, Antibodies, Genetic influences, Cytokines