

CHALLENGES IN CONTROLLING VIRAL DISEASES OF POULTRY

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ABSTRACT

As in many countries including Malaysia, poultry industry has become a major contributor to the country's economy primarily due to the rapid revolutionary of the industry and advances made in poultry management, nutrition, genetics and better diagnosis and control of diseases. As the poultry industry is expanding, much is needed to be done to improve the efficiency of production, which directly depends on the control and prevention of diseases. Infectious diseases are one of the major causes of economic losses in poultry industries. In many instances, no specific signs are associated with a particular disease. Besides clinical signs and findings from post mortem examinations, diagnostic tools based on serological and molecular detection are used to confirm the causative agents. However, the identification of causative agents and the detection of specific antibody responses in relation to a clinical problem are complicated due to the concurrent infections and improper use of vaccines. Currently, the poultry industry is threatened by more virulent viruses of endemic diseases or by exotic and emerging diseases that can cause major economic losses to this sector. The emergence and re-emergence of avian influenza virus (AIV), particularly the highly pathogenic avian influenza (HPAI) H5N1, the presence of endemic low pathogenic avian influenza (LPAI) H9N2 in poultry flock and recently the detection of novel H7H9 posed significant threat to the poultry industry and public health sector. Catastrophic diseases such as HPAI H5N1 is not easy to overlook, the real challenge is to confront H7N9, H9N2 and other LPAI which act in concert with other factors such as management, environment, nutrition and concurrent infections which form continuous threat to the entire poultry production system. The repeated outbreaks of diseases caused by variant strains of infectious bronchitis virus (IBV), velogenic Newcastle disease viruses (NDV) and more virulent viruses of infectious bursal disease virus (IBDV), infectious laryngotracheitis virus (ILT) and Marek's disease virus (MDV) in well managed poultry flocks have prompted the need to evaluate the underlying factors contributing to the failure of vaccination to provide complete protection against clinical infections and transmission of disease. Vaccination failure can be classified as primary vaccination failure where the chickens do not develop adequate antibody titer and succumbed to a field disease outbreak. However, in secondary vaccination failure, the chickens develop adequate immune response but then immunity wanes over time. In the field, vaccination failure is complex involving various factors associated with the vaccine strains and vaccination program, the virulence of field pathogens and the host immune competence. In many situations, immunosuppressive agents primarily MDV, IBDV, and chicken anemia virus play an important role in increasing the susceptibility of chickens to opportunistic infections and/or suppressing effective vaccine induced responses. There is no doubt diagnostic tools, vaccines and vaccination equipment

have improved over the years. However, despite these advancements, conventional laboratory diagnosis using serological tests and conventional live and killed vaccines are used extensively in health and disease management of poultry. As the poultry industry become more intensive, accurate, economical and practical laboratory diagnostic tools are important for effective control of disease outbreaks. The advancements in the use of molecular detection method using real-time PCR approach, highly automated instruments for antibody detection and development of rapid on site antigen capture assays for virus antigen detection may have significant impact in the field of disease prevention and control. In the area of vaccinology, most of the advances in the development of the so called recombinant vaccines against poultry disease are based on the development of recombinant protein or synthetic peptide vaccines, recombinant vector vaccines using selected virus or bacteria as carriers and DNA plasmids as genetic vaccines. However, very few recombinant vaccines are available commercially. The majority of these newer vaccines are live recombinant viral vectors based on fowlpox virus and herpesvirus designed to deliver specific gene(s) to stimulate the host' immune system. Recently, a few new live recombinant viral vector vaccines based on avian adenovirus and reverse genetic NDV and AIV are making their way in several countries. However, the use of vaccines against field viruses also contribute to the emergence of variant or more virulent viruses that are able to escape existing vaccine induced immunity as what have been reported for several RNA viruses namely AIV, IBV and IBDV. Similar phenomenon was also reported for DNA viruses such as MDV and ILT, where the use of different live attenuated ILT vaccine strains contribute to the emergence of new pathogenic ILT strain affecting poultry. It is clear that progress has been made in the control and prevention of viral diseases of poultry. However, a comprehensive approach is needed for disease control requiring consideration of the interactions between management, nutrition, poultry genetics and immune functions against infectious disease. It is envisioned that the progress in functional characterization of the chicken genome, avian transgenic technology and further improvement of poultry vaccines and therapeutics will further increase the global competitiveness of poultry industry.