



Research summary

Impact of infectious bronchitis virus and how to cope with it

About the study

Infectious bronchitis virus (IBV) is a highly contagious, acute infection that results in decreased egg production and egg quality. Egg farmers rely on vaccines to protect flocks from IBV infections and prevent egg production losses. However, with its ability to mutate and create strains at a rapid state, IBV poses control challenges that require further understanding of the virus and alternate management strategies.

Dr. Faizal Careem and his team at University of Calgary, Faculty of Veterinary Medicine, studied the impacts of major IBV strains originating in poultry flocks in Canada and explored their effect on bird health to develop strategies for minimizing IBV impacts on egg production and egg quality.



Methods

Major IBV strains originating from poultry flocks in Canada were isolated using 95 IBV positive samples received from Animal Health Lab in Guelph, Ontario and Poultry Health Services in Airdrie, Alberta.

Two separate trials were conducted to determine the impact of different IBV strains on egg production at peak production times and long-term effects on birds when an infection occurs early in life. The first trial consisted of infecting 24-26-week-old White Leghorn hens with one of four IBV strains commonly found in Canada. In the second trial, a group of day-old chicks were infected with DMV1639 strain, the most recent strain emerged at the time of the study. Birds were monitored for signs of infection such as ruffled feathers, dropped wings and diarrhea. Egg production and quality was monitored.

Based on the outcomes of these trials, the researchers assessed the efficacy of commercially available IBV vaccines against DMV1639 strain. The tested vaccination program comprised of multiple (3-4 doses) applications of live and inactivated IBV vaccines between 2-9 weeks and 14-16 weeks of ages, respectively and followed by exposing vaccinated and unvaccinated hens to the DMV1639 strain.



The economic impact of IBV on egg farms was examined using data available from Agriculture and Agri-Food Canada, scientific papers, websites and industry sources. The analysis estimated the cost of infection when birds were vaccinated or not and the impact on farm revenues.

Findings

Researchers identified four major IBV strains (DMV1639, 4/91, Massachusetts and CA1737/04) originating from poultry flocks in Canada. Two of these strains (DMV1639 and 4/91) were found to have combined with IBV vaccine strains to generate new strains, highlighting the importance of biosecurity to minimize IBV infections in vaccinated flocks.

Of the studied strains, only 4/91 IBV strain was not associated with egg production issues in hens infected at the peak of lay. All other IBV strains (DMV1639, CA1737/04 and Massachusetts) contributed to a 35-40% decline of the egg production in infected hens during peak production. Additionally, in pullets that were infected with DMV1639 strain at one day of age, approximately 46% had cysts in oviducts that would lead to false layer syndrome, where hens ovulate normally but are unable to produce eggs.

When the researchers analysed the economic impact, they found a high benefit-cost ratio from adopting IBV vaccination practices, suggesting that vaccines as a preventive strategy would be a cost effective approach. The impact of vaccination was substantial in all scenarios, underscoring its role as a preventive or response strategy to IBV. This was further demonstrated when the vaccinated and non-vaccinated

hens were exposed to DMV1639, as vaccinated hens were protected from egg production issues at a much high rate than non-vaccinated hens.

Conclusions

Robust vaccination and biosecurity programs are critical to manage IBV outbreaks and minimize the economic, production and animal welfare impacts. Given the outcomes of this study, researchers recommend a combination of live and inactivated IBV vaccines to be applied pre-lay to induce protection against different IBV strains.

About the researchers

Dr. Faizal Careem (BVSc, MVM, PhD) is a professor (virology) attached to the University of Calgary Faculty of Veterinary Medicine, Alberta. He is a board certified poultry veterinarian and veterinary microbiologist. He has been focussing on IBV research for more than a decade.

Dr. Mohamed Hassan (DVM, MSc, PhD), instrumental in conducting major component of this research relevant to DMV1639 IBV strain, is a postdoctoral associate attached to the University of Calgary Faculty of Veterinary Medicine, Alberta.

Shahnas Najimudeen (BSc, MSc) is attached to the University of Calgary Faculty of Veterinary Medicine, Alberta as a Research Assistant and focussed on research relevant to 4/91 strain of IBV.



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