

Simulation of Foot-and-Mouth Disease Spread on Farms Under the Regular Vaccination Strategy

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This study presents a simulation model on foot-and-mouth (FMD) transmission among the farms with cloven-hoofed animals. Considering current regular species-specific vaccination program implemented in Korea, model was developed at two stages: within-farm transmission after spreading in a farm. Between-farm transmission was determined by the frequency of contacts of farms through vehicles and farm environment factors. With the between-farm transmission model, 14 out of 16 outbreak farms during the epidemic in February 2017 were correctly predicted. This study proved that the simulation model would be useful to quickly respond to FMD outbreak under regular vaccination policy. This would help to develop detailed action plans of FMD control programs.

Big Data Based Risk Assessment Model on Highly Pathogenic Avian Influenza on Poultry Farms in Korea

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This study presents a big data based highly pathogenic avian influenza (HPAI) risk assessment model using machine learning method for poultry farms in Korea. Livestock related vehicles visiting HPAI outbreak farms were traced to address risk of poultry farms in Korea. The sensitivity of this model was 90.2% and the positive predictive value was 51.4%. Risk assessment results for each poultry farm were communicated to local governments to be used to implement pre-emptive control measures during the epidemics of HPAI at winter seasons of 2016/2017 and 2017/2018.

Mathematical Model on Within Herd Transmission of Foot-and-Mouth Disease

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A mathematical model presenting within-herd transmission of foot-and-mouth disease was developed, considering current regular species-specific vaccination program of Korea. This stochastic model was based on SLIR (Susceptible, Latently infected, Infectious, and Resistant-generating antibody) scheme. But in fact, its status was expanded into eight compartments depending on the manifestation of clinical signs, seroconversion, and partial culling. Number of clinically infected animals per day, predicted by model with 1,000 iterations was comparable to the real outbreak data of a farm with 16,000 pigs. Number of daily infected animals in a farm of 50% herd immunity was twice higher compared to herd immunity 90%. These models showed potential to be used to predict FMD transmission pattern under regular vaccination policy, and this would help to develop detailed action plans of FMD control programs.

The Application of Animal Welfare Certification System for Farm Animals in South Korea

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There is a growing public concern over the standards of farm animal welfare, with higher standards of food safety. In this study, we introduce animal welfare systems covering the rearing, transport and slaughter of farm animals in South Korea. The concepts of animal welfare farm certification are based on ensuring the five freedoms of animal. The animal welfare is also achieved by observing the condition of environment including shelter and resting area, feeding and water and the care for animal health. The certification of farm animal welfare is handled by the Animal Protection & Welfare Division of Animal and Plant Quarantine Agency (APQA). Following the full amendment of Animal Protection Law in 2011, animal welfare farm certification program has been implemented since 2012. Livestock farmers who want to be certified must apply for certification at the APQA. Upon receipt of the application, the APQA notifies the applicant of the detailed schedule of the on-site examination after reviewing the document and conducts the on-site inspection according to the evaluation criteria of the welfare standard. If the on-site audit results meet the certification criteria, APQA issues a certificate. The production process of certified farms is inspected at least once a year for follow-up management. In addition, animal welfare transportation vehicles and slaughterhouses have been designated since 2013. The whole process including rearing-transportation-slaughtering completes the farm animal welfare system. In accordance with 5-year animal welfare plan (2014-2019), we will promote farm animal welfare policy in order to truly advance the Korean livestock industry.