

CPRC Update – Assessment of biosecurity breaches and sanitation mitigation procedures

The Approach

Biosecurity measures are designed to protect populations from transmissible infectious agents and to reduce the consequences of an infection. Research has regularly highlighted the importance of barn entrances and overall barn sanitation in relation to pathogen spread, reaffirming the importance of both as key elements of biosecurity measures. To be effective, biosecurity measures must be applied consistently by all; however, application of biosecurity protocols are often sporadic and variable. Previous studies have proposed that lack of knowledge or understanding of biosecurity principles helps explain low or variable compliance with biosecurity standards. However, the scientific literature is limited in applied studies using pathogens to demonstrate their relative impact. Dr. Jean-Pierre Vaillancourt from the University of Montreal, and Dr. Michele Guerin from the University of Guelph, and their research teams decided to evaluate the value of recommended biosecurity measures and sanitation procedures in the poultry industry.

The Studies

A typical poultry barn entrance was created in a laboratory facility in Québec to include clean and dirty areas. The dirty area contained sterilized material retrieved from the entrance of an actual farm contaminated with a genetically modified bacterial strain or viral surrogate that allowed their presence to be monitored by measuring bioluminescence. The degree of floor contamination occurring from three most frequent biosecurity breaches was determined. The security breaches included (i) not changing boots between contaminated and clean areas, (ii) donning farm boots while in the clean area, and (iii) donning farm boots while in the contaminated area. The dilution effect on pathogen load when walking with contaminated boots was assessed.

The second study was conducted under field conditions in Ontario. Thirty-six commercial broiler barns were cleaned following flock removal using one of three sanitation procedures. The procedures included dry cleaning (blow down), wet cleaning (with detergent after dry cleaning), and disinfecting with disinfectant after wet cleaning. Bacterial loads on cement and wood floors were evaluated at three time points: before dry cleaning (baseline); 2 days after sanitation; and 6 days after sanitation.

Findings and Recommendations

Results of the biosecurity breaches at barn entrances demonstrate that it is possible to prevent cross-contamination of areas by effectively changing boots. Stepping back into the contaminated area does significantly contaminate both boots and the floor in the clean zone. Not changing boots at all between areas significantly increases the floor contamination level of the clean area. Additionally, no dilution effect of the contamination was observed on either boots or the floor

after walking 10 steps. Outcomes of this study demonstrate that barn entrance designs should focus on creating conditions to facilitate changing boots between areas to ensure optimal biosecurity compliance.

Results of the sanitation procedures study show that current sanitation procedures performed on commercial farms reduce floor contamination. The impact of the three different sanitation procedures differs between the studied pathogens. Based on these findings it is recommended that producers use the cleaning procedure best suited for the pathogen outbreak they are having in their barn (Disinfection for *E. coli*, and Dry cleaning for *Salmonella* spp. and *Clostridium perfringens*). Allowing sufficient time post-sanitation is of great benefit to pathogen reduction, and concrete rather than wooden floors are recommended for new barns.

Next Steps

Key elements that will be useful for biosecurity training purposes and for decision making regarding on-farm sanitation procedures have been identified in this research to allow for improved practices. Such activities are the current focus of the research team.

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