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Full Length Research Paper

Interactive methods to educate and engage poultry producers on the importance of practicing on-farm biosecurity

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Biosecurity is the key within the poultry industry in preventing the spread of diseases and infections. A "biosecurity culture" is needed to increase the adoption of farm biosecurity practices because financial incentives are not always apparent. The objective of this project was to provide innovative and participatory education and extension to industry leaders that would enable them to act as "biosecurity champions" and promote recommended practices sparking a "biosecurity culture". By using Glogerm™, a luminescent product (under UV light) in this project was able to visually and immediately demonstrate the effectiveness and importance of inexpensive, but yet effective biosecurity practices.

Key words: Poultry, biosecurity, cost benefit, education and extension, hand washing, boot washing, personal protective equipment.

INTRODUCTION

When discussing the importance of biosecurity with producers, industry and governments often focus on catastrophic clinical disease outbreaks such as Avian Influenza (Shenandoah Valley, Virginia, 2002; Fraser Valley, British Colombia in 2004) which can be devastating. However, the costs of "everyday" subclinical infections such as Infectious Bursal Disease, Coccidiosis and Infectious Bronchitis can become just as significant over time and are much more prevalent than catastrophic events. Both types of diseases outbreak cost producers and the industry millions of dollars in lost revenue (Vaillancourt, 2002; Cox, 2005; Carey, 2005; Siekkinen, 2008); however the costs of subclinical disease are much harder to assess. Death losses, deductions on injured or sick birds and costs for treatment are obvious and easy to calculate. The hidden costs associated with subclinical disease which are often overlooked include reduced performance and lower carcass quality. Currently, there are not any defined business benefits for the producer to increase the implementation of biosecurity practices on farm. Although there are multitude of government and expert recommendations surrounding best practices, there is little information regarding return on investment. With this in mind the premise of this project is to provide a visual example of the risks of disease transmission that are present daily on farm.

Biosecurity programs have been developed for poultry farms to control the transfer and spread of disease-causing pathogens. Studies have shown that in theory, if these practices are adhered to by all personnel entering the facility, and are teamed with infectious disease monitoring plus disinfection and sanitation procedures, pathogens can be reduced to non-infective levels (Vaillancourt, 2002; Carey, 2005).

The bottom line (the net increase of revenue over expenditures) is the key in determining whether a new program is implemented and adopted on a poultry farm (Adamson, 2006). However, it is difficult to quantify the bottom line for everyday practices which do not in themselves result in increased performance. Therefore a secondary outcome could be changing poultry producer and supportive industry expectations. A "biosecurity culture" could be developed when the poultry industry (service industry, farmers, rural neighbours etc) expects a level of commitment to adoption. Examples of this in recent history include wearing seatbelts in vehicles,

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prohibiting drinking and driving and most recently, the ban on smoking in public places. In order for biosecurity to become commonplace on all farms, industry leaders must promote a "biosecurity culture".

Based on the above factors there are two objectives for this project. Firstly the project will identify simple yet effective low cost biosecurity technologies that can be implemented on farm. The second objective is to gather a wide range of industry representatives to participate in a workshop that will provide insight into the effectiveness of low cost biosecurity actions. This objective will enable the development of a biosecurity culture by enhancing opinion leaders' awareness surrounding the effectiveness of specific biosecurity practices.

A review of the literature was conducted to determine current recommendations for biosecurity programs on poultry farms. There is a lack of primary research on the effectiveness and cost benefit of biosecurity recommendations on poultry farms. However, the review found that there are six commonly recommended low cost biosecurity mechanical interventions that can reduce the incidence and transmission of disease on poultry farms. These interventions include hand washing, boot washing, changing into barn-specific clothing, vehicle sanitation, mortality management and quarantining sick or new birds. Practicing these recommendations will help to minimize the occurrence of disease and the costs associated with loss of birds and production from disease outbreaks (Otake et al., 2004; Cox, 2005; Animal Health Australia: Farm Biosecurity, 2009).

These simple procedures can be hugely beneficial; leading to the decrease in incidence and transmission of disease in poultry facilities (Funk et al., 2003; Carey, 2005; Stone et al., 2007). From the six key mechanical interventions, hand washing, boot washing and barn-specific clothing were selected to become part of the extension and promotion of this project because they were identified as activities a group could simultaneously participate in. These measures were also selected from the six because they can be put into place immediately.

EXPERIMENTAL PROCEDURE

A total of 15 local farmers, service industry representatives and government personnel participated in a workshop to test their skills in disease prevention through application of biosecurity practices. Glogerm™ gel and powder products (Marlatek Inc., Brockville Ontario) were used to emulate bacteria and viruses and to test workshop participant disease prevention skills. This inert product shows up bright orange under UV light and is used in the medical field to train doctors in hand washing (Mittal et al., 2011). The amount of product left on the size of the residue that there is a risk of transmission and surfaces was not measured directly. The goal of this project was to prove to participants that regardless of the there is a carrying capacity.

Hand washing

(i) Each participant received 5 ml of Glogerm™ and was instructed to thoroughly cover their hands including in between fingers, palms and backs of hands. Each participant then viewed their hands under UV light to visually assess coverage.
(ii) Participants were instructed to wash their hands with soap and water as they normally would. A workshop organizer diverted participants' attention with casual conversation to ensure customary hand washing habits were followed.
(iii) Participants reviewed their hands under a UV light to visually assess their hand washing effectiveness.

Boot washing

(i) For this exercise, all of the participants received new (unused) rubber boots and half of the group received plastic boot covers to go over the rubber boots. Each participant stepped into a bucket that was filled with moist litter (shavings), Glogerm™ and dirt. 5 ml of Glogerm™ was applied to the top surface of each boot (or boot cover) to simulate walking through deep litter.
(iii) Each participant viewed their "dirty" boots under a UV light. They were then asked to wash their boots (or boot covers) by stepping into a low sided bucket of warm soapy water and scrubbing all surfaces of their boots with a nylon bristle scrub brush that was provided (the same bucket was used for all participants to wash their boots in to emulate worst case scenario field conditions). Participants reviewed their boots (or boot covers) under a UV light to assess fluorescence levels and therefore their boot washing effectiveness.

Personal protective equipment (PPE) Donning and Doffing

(i) All participants were asked to dress in disposable coveralls (boots or boot covers) and hairnets over their street clothes. Once outfitted in biosecurity apparel, each participant was dusted with Glogerm™ powder (chest area) to simulate particulate matter landing on clothes when working in a barn. The participants were then asked to remove their biosecurity equipment without "contaminating" their street clothes.
(ii) After all of the biosecurity equipment was doffed and disposed of, a UV light was used to view residual fluorescence that would indicate "contamination" of street clothing.

RESULTS AND DISCUSSION

Previous training and experiences that some of the participants had with regards to each biosecurity practice/methods had a definitive impact on the results of this exercise. The wide range of participants and prior experience led to a wide range in results and cleaning effectiveness. However, none of the participants were able to complete any of the exercises without at least minimal "contamination". This also suggests that training and awareness programs such as this one are successful in training participants to become more effective in their biosecurity practices.

Hand washing

Key areas that participants missed while washing their hands were wrists (especially if the participant was wearing a watch), fingernails, between fingers and the backs of hands. Participants with dry skin, cuts or scars

Figure 1. Glogerm™ Contamination levels before and after washing.

on their hands had difficulty cleaning these areas as the Glogerm™ tended to absorb more into these areas. It was observed that those who had participated in similar exercises were more likely to focus on areas that those with less experience often missed suggesting that the results of this exercise should be used to create awareness and education programs for people in agriculture.

Boot washing

This exercise provided awareness around the usefulness of boot washing stations as well as actually cleaning boots. Participants recognized that the boot washing station should be changed regularly or its usefulness declines. The results of this exercise showed that plastic boot covers can reduce contamination in addition to wearing barn specific rubber boots because contaminants are less likely to stick to the smooth, slippery surface. Additionally, boot covers are a good alternative to foot baths as they can be readily disposed of after use. Rubber boots often have grooves and ridges where organic material collects and these areas are difficult to clean.

Personal protective equipment

Each of the participant's street clothes became contaminated with the Glogerm™ in different areas ranging from the bottom of pants, to the pant pocket area and to the front and back of participants shirts; different to the areas of original contamination (chest area on coveralls). If baseball caps are worn instead of hairnets, the hat should be kept in the barn. One participant did have Glogerm™ on his hat by the end of this exercise which could have been contaminated directly though physical contact or through air-borne dust particle contamination.

These exercises provided excellent visual representations of how diseases can be transferred from barn to barn or property to property. Figure 1 shows representative examples of the results of the workshop. The prewashing photos show how "contaminated" each of the objects were under a UV light once Glogerm™ had been applied while the post washing photos show the areas that were missed during cleaning and in the case of the PPE equipment show contamination of street clothes while taking off PPE equipment.

All of the participants provided very positive feedback regarding the effectiveness of this exercise as an extension tool to create awareness around the importance of practicing high level biosecurity on poultry farms. It was suggested that this type of demonstration should be used at producer meetings and workshops to continue to develop awareness and a "biosecurity culture". Table 1 contains some of the participant feedback regarding this exercise. The exercise was effective because it encouraged participation, it provided instant visual results and it presented participants with take home messages that could be applied directly to their farms, or to their jobs. Key extension material surrounding this project was created and will be disseminated through the poultry industry at events and through mailings.

Conclusions

Practising effective biosecurity to prevent the spread of

Table 1. Workshop Participant questionnaire comments.

What did you think of Glogerm as a tool to demonstrate on–farm contamination?	How has this exercise impacted the way you think about practicing biosecurity?
"Great! Glogerm is an excellent way to demonstrate - great visual"	"We need to rethink our cleaning strategies"
"Very informative, boots were surprising"	"It is very easy to not see the potential virus, bacteria etc that could remain on your street clothes or PPE if not cleaned properly"
"Informative, interesting, useful"	"It shows the importance of being vigilant on the farm as to who is coming in and out of your facility"
"Demonstrated how easily things can spread and how hard it is to clean thoroughly"	"I will take more time when washing especially knowing that bacteria can travel so far "
"I think everyone would go away taking something they learned today"	"Boot trays are useless, you will always have transfer, use a Danish entry system"
"Good exercise and demonstration to assess the difficulties with cleanliness and accepted interventions"	"I will be more thorough in cleaning and avoiding the spread"
"These activities show the importance of PPE on a practical basis and prove that each facility should have site specific PPE"	"I will think about how I go about daily activities, makes you want to avoid doing anything unnecessary to avoid contamination"
"Gave an awesome visible effect of germ transmission"	"Better attention to proper footwear, less creases the better"
"Even when trying not to transfer bacteria, it still can happen"	"Much more awareness! Transmission is imminent"

diseases on farms has been well documented in scientific and industry literature however, acceptance and implementation within the farming community still needs to be encouraged. This project provided immediate visual examples of the importance of three low cost activities which are the key for initiating and implementing on farm biosecurity programs. Workshop participants were very responsive to the results. Going forward, the results of this study should be paired with diagrams that provide instruction for hand or boot washing and donning and doffing personal protective equipment to enhance the impact of the recommended instructions. The long term impact of this study is that workshop participants can now act as leaders in the development of a “biosecurity culture” and educate their family, staff, farm visitors and neighbours.

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