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Jill L. Stevenson

Washington State University, jstevenson@vetmed.wsu.edu

Dale A. Moore

Washington State University, damoore@vetmed.wsu.edu

Jerry Newman

Washington State University, newmanj@mail.wsu.edu

Janet L. Schmidt

Washington State University, schmidtj@wsu.edu

Sarah M. Smith

Washington State University, smithsm@wsu.edu

See next page for additional authors



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Authors

Jill L. Stevenson, Dale A. Moore, Jerry Newman, Janet L. Schmidt, Sarah M. Smith, Jean Smith, Susan Kerr, Michael Wallace, and Pat Boyes



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Jill L. Stevenson

Extension Coordinator, Veterinary Medicine Extension
Pullman, Washington
jstevenson@vetmed.wsu.edu

Dale A. Moore

Professor, Veterinary Clinical Sciences
Director, Veterinary Medicine Extension
Pullman, Washington
damoore@vetmed.wsu.edu

Jerry Newman

4-H Youth Specialist
Pullman, Washington
newmanj@mail.wsu.edu

Janet L. Schmidt

County Director, Whitman County
Colfax, Washington
schmidtj@wsu.edu

Sarah M. Smith

Extension Educator, Grant County
Ephrata, Washington
smithsm@wsu.edu

Jean Smith

Extension Educator, Benton County
Kennewick, Washington
smithjea@wsu.edu

Susan Kerr

County Director, Klickitat County
Goldendale, Washington
kerrs@wsu.edu

Michael Wallace
4-H Coordinator, Whatcom County
Bellingham, Washington
mlwallace@wsu.edu

Pat BoyEs
Director, 4-H Youth Development
Puyallup, Washington
boyesp@wsu.edu

Washington State University

Abstract: 4-H livestock projects present disease transmission risks that can be reduced by the use of bio-security practices. The responsibility of teaching bio-security to youth belongs primarily to volunteer leaders, who may not be aware of the importance of these practices. A needs assessment for an online educational module about bio-security revealed that existing materials are inconsistent, are not directed at this audience, and are not being used by leaders. Although barriers to online education exist, there are many benefits of online education that can be passed from leaders to youth to help reduce the spread of disease in 4-H livestock.

Introduction

Simulation modeling to estimate the potential spread of foot-and-mouth (FMD) disease at the California State Fair revealed that with a single infected animal unit (animal unit = animals from a single premises) entering the fair (with a total of 195 animal units represented), 13 infected animal units would return to their home premises (Carpenter, Christiansen, Dickey, Thunes, & Hullinger, 2007). Due to the time required for disease incubation, it would be unlikely that the disease would be detected before the completion of the 5-day fair. If quarantine was not practiced at all premises where animals were returned, the disease would rapidly spread.

4-H livestock projects present disease transmission risks because they involve comingling of livestock from different locations and exposure to the public and other traffic. The impact that a disease outbreak could have on animal agriculture is great. To prevent disease and disease transmission in 4-H livestock, bio-security practices must be implemented in all 4-H livestock activities. Teaching these bio-security practices and the principals behind them to volunteer leaders is one way to reach youth audiences because volunteer leaders are relied on to provide crucial instruction about animal care and husbandry.

The definition of bio-security as it pertains to livestock can be summarized as the preventive measures taken to minimize risk of introducing an infectious disease into an animal population and to protect human consumers from disease-causing agents. Bio-security practices such as limiting contact between animals, limiting contact between animals and the public, boot disinfection, hand washing, disinfection of shared equipment, quarantine and isolation, and vaccination should be used to facilitate disease prevention. Perceptions about livestock bio-security range from feelings of intimidation and fear, because of the perceived association of bio-security with bio-terrorism (Barletta, 2002), to an understanding of bio-security as a necessary means of disease prevention.

Information on bio-security in 4-H livestock projects is available from various sources, including Extension publications, websites, industry publications, books, etc., but none of these resources are directed at volunteer leaders who oversee livestock projects. Moore, Merryman, Hartman, and Klingborg in 2008 compared published recommendations regarding bio-security practices for various livestock species, including 65

publications from Extension and 46 publications from state departments of agriculture, and found that they contained wide variations in recommended bio-security practices. This disparity and the fact that these resources are directed at commercial livestock producers and not 4-H volunteer leaders could lead to confusion over how best to implement bio-security to prevent disease in 4-H livestock projects.

There are over 1,500 volunteers in the state of Washington enrolled in 4-H as livestock project leaders who oversaw 7,978 youth livestock projects in 2007-2008 (unpublished data from the Washington State 4-H office). Volunteer leader training is commonly conducted in face-to-face settings, but, because of faculty, staff, and new volunteer leaders' time and budget constraints, this type of training is becoming more difficult (Kaslon, Lodl, & Greve, 2005). It was the purpose of the project reported here to implement a three-part needs assessment concerning bio-security training and to use the results to best meet the needs of volunteer leaders charged with overseeing 4-H livestock projects.

Methods

A three-part needs assessment began with a thorough inventory of currently available materials on the subject of bio-security for this audience using Internet search engines and through communications with higher education faculty familiar with livestock bio-security.

The second part included interviews with Washington State University Extension faculty and staff. An Extension faculty or staff member who had the most interaction with volunteer livestock leaders in each county was identified by county Extension directors, and an interview was conducted either in-person or over the phone. During the interview, information was gathered about perceptions of volunteer leaders' current levels of knowledge of bio-security and what knowledge volunteer leaders should have about bio-security.

Each interview included 25 questions related to bio-security: five on demographic information, 15 on bio-security practices in 4-H livestock, and five on the need for an online training module (copies of the interview questions are available upon request). These questions were reviewed prior to the interviews by a nine-member committee formed specifically for the development of this module (authors of this article). Interview questions focused on volunteer leaders' awareness of bio-security practices, access to information on bio-security, and whether they were teaching bio-security practices to youth in their county. The interviewees were also asked if they felt that online training about bio-security would be beneficial for 4-H volunteer livestock leaders and what barriers they felt were associated with this method of delivery. The interview responses were entered into a Microsoft® Excel® spreadsheet and analyzed using pivot tables.

The third part of the needs assessment was an online survey of volunteer livestock leaders. The survey consisted of 26 questions related to bio-security: three questions about demographics, 20 on bio-security, and three on the need for online training modules (copies of the survey questions available upon request.), which were also reviewed by the project committee. The Washington State University Institutional Review Board determined that the needs assessment satisfied the criteria for exempt research (IRB # 10453).

Email addresses for 924 leaders, the total number of e-mail addresses on file, were obtained from the Washington State 4-H office. In order to be consistent with epidemiological sampling methods, the sample size needed in the study was calculated, for a desired confidence level of 95% and a power of 80%, at 310 surveys (EpiCalc 2000). An additional 20% was added to account for non-responders for a total of 372 (Dillman, 2000). Email addresses were then sorted randomly and 372 were selected from the list. An email announcement describing the survey was sent to these addresses, followed by a link to the survey 2 days later, which was conducted in Microsoft® Sharepoint®. Reminder emails were sent 1 and 2 weeks after the initial announcement. Following each email announcement, non-working email addresses were removed and an equal number of new randomly selected email addresses were sent the survey. This was repeated until 372

working email addresses were sent survey information.

Washington State University County Extension faculty and staff made additional efforts to increase the response rate by personally encouraging volunteer leaders to participate and by mentioning their support of the project in county 4-H publications. The survey responses were exported into a Microsoft® Excel® spreadsheet and analyzed using pivot tables.

Results

Current Materials Inventory

The majority of materials collected through the Internet search were brief Extension publications from across the United States directed at youth livestock exhibitors. The materials defined bio-security and its role in 4-H livestock disease prevention and ranged from 1-4 pages in length. More in-depth publications were found such as one from The Ohio State University Extension and Maryland Cooperative Extension called *Prevention*, which provides a complete overview of bio-security that can be used across species, along with suggested group activities (Mallinson, Workman, & Epperson, 2006). Additionally, the American Association of Swine Practitioners and the National Pork Board produced a pamphlet entitled *A Champion's Guide to Youth Swine Exhibition: Bio-security and Your Pig Project* (American Association of Swine Veterinarians & National Pork Board, 2007), which provides swine-specific information on bio-security for youth.

Although these publications and others provided in-depth information, they are still either directed at a youth audience and not volunteer leaders or are species specific, requiring adaptation to be used by volunteer leaders of multiple species livestock projects. All of the resources uncovered through the needs assessment are available as Internet links in the final production of the bio-security module for volunteer leaders created as a result of the needs assessment reported here (Stevenson et al., in press).

Faculty and Staff Interviews

A total of 26 faculty and staff interviews were completed, representing 25 counties in the state. Interviewees were located in all four regions of the state and represented a self-reported total of approximately 1,346 volunteer leaders statewide (Table 1). Interviewees responded to all questions in the interview.

Table 1.
Distribution of Interviewees Across the Four Regions of Washington

Region	Number of Faculty/Staff Interviewed	Volunteer Leaders Represented (Self-Reported)
Northeast	5	140
Northwest	6	135
Southeast	9	871
Southwest	4	200
Statewide	2	NA

Total	26	1,346
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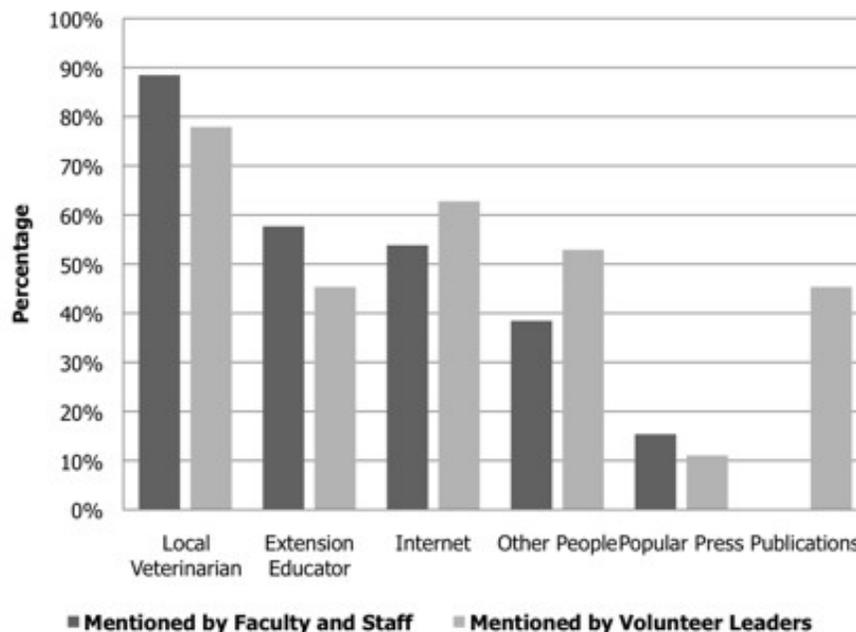
Faculty and staff had a wide range of opinions about volunteer leaders' understanding that bio-security is important when working with livestock. County faculty reported that between 2% to 100% of volunteer leaders in their county understand that bio-security is important (mean and median of 54% and 55%, respectively). Seventy-three percent of interviewees reported that there had not been workshops or trainings about bio-security in their county in the last five years.

Faculty and staff were asked about materials of which they were aware that volunteer leaders could use to learn about bio-security. The greatest proportion of interviewees was aware of Extension publications on this topic (42%), producer association materials (38%), and online resources (30%). Also mentioned were state and national agriculture department materials (19%) and books (3%), but three interviewees were unaware of any materials available for volunteer leaders (11%).

Faculty and staff were asked who they felt volunteer leaders relied on most for animal disease information. This question was also asked to volunteer leaders in the online survey. Although these two pieces of the needs assessment were not designed to be compared directly, the combined results are shown here (Figure 1) to emphasize similarities and differences between the two audiences. Respondents could choose multiple responses. The local veterinarian was mentioned most frequently by both faculty/staff and volunteer leaders (88% and 78%, respectively).

Figure 1.

Summarized Responses of Faculty/Staff (n=26) and Volunteer Leaders (n=174) When Asked "Who do Volunteer Leaders Rely on the Most for Animal Disease Information?"



Barriers to use of an online program for volunteers reported by faculty and staff included no or slow Internet connection (69%) and little time to devote to online training (42%). Other barriers reported were that volunteer leaders would not be willing to use the module due to unfamiliarity with computers (30%), because it might not be interactive enough (15%), that it would be too difficult (11%), or that volunteer leaders would

not be able to use this technology due to illiteracy (7%). Despite potential barriers to its use, all 26 interviewees thought an online educational program about bio-security would be beneficial for volunteer leaders.

Interviewees were also asked what they thought might motivate volunteer leaders to use on-line educational courses. Seventy-six percent of faculty and staff said that making it mandatory would motivate leaders to participate. Other motivators mentioned included monetary or other reward (30%), materials that volunteer leaders could use with youth in their clubs (23%), suggested by county faculty or staff (19%), or a certificate or other type of recognition (15%).

Volunteer Leader Surveys

A total of 174 surveys were completed during a 1-month time period out of the 372 surveys sent out, a 47% response rate. This resulted in 56% of the desired sample size of 310 surveys. All age categories (18 to 25, 26-35, 36-45, 46-55, and 56 and over) were represented by respondents. Just over 65% of participants were between the ages of 36 and 55. A high school diploma (44%), a bachelor's degree (38%), a master's degree (10%), and a professional degree (6%) were the highest academic degrees reported by volunteer leaders completing the survey and 86% of the participants reported that they had livestock of their own.

Seventy-six percent of the volunteer leaders reported they attended no workshops or trainings about bio-security in the last 5 years. The most common response by leaders when asked to indicate resources they used to learn about bio-security was "I have not sought information about livestock bio-security" (46%). Other responses (of which volunteer leaders could select more than one answer) included that they sought out online resources (37%), Extension publications (16%), and books (16%) about livestock bio-security.

Leaders were also asked in an open-ended question if there were any barriers that would prevent them from using an online training module to learn about bio-security. Sixty percent of survey participants left this question blank. Out of the 70 responses to this question, the most frequent was the lack of computer access (32%), followed by the lack of time (29%). Another barrier mentioned was the potential difficulty of use (16%). Despite these reported barriers, just over 90% of all the leaders surveyed thought an online educational module about bio-security would be beneficial for them.

The survey also asked an open-ended question about what things would motivate them to use an online training module about bio-security. Forty-nine percent of responders left the question blank. Of the 89 responses to this question, motivators mentioned included ease of use (20%), module would help the kids (17%), mandatory (6%), or a certificate or other type of recognition (5%). Seventeen percent of volunteer leaders said specifically that they would not need anything to motivate them to use online training modules.

Discussion and Conclusion

This needs assessment identifies a lack of available resources for volunteer leaders specifically to learn about bio-security. Faculty and staff were aware of Extension publications, producer association materials, and online resources on this topic, and three of the interviewees were unaware of any materials on the topic. But even though these published materials exist, 46% of volunteer leaders had not sought out information about bio-security and 37% relied on the Internet for this information. This presents a problem of reaching this audience with information using traditional Extension interactions and publications and calls for a more innovative and modern approach. Even 10 years ago it was realized that in order for 4-H to program to be a force in the future, it needs to be progressive and adaptive to new trends and ideas (Van Horn, Flanagan, & Thomson, 1999).

Faculty and staff interviewed for this needs assessment felt that volunteer leaders relied on local veterinarians followed by Extension educators for animal disease information. Although leaders also reported relying on local veterinarians, they rely more often on the Internet and other people for this information than on county Extension educators. Educational materials available on the Internet can enable learning to occur at flexible times and locations based on individual need and preference, and can break down spatial and temporal barriers to instruction (Tennessen, PonTell, Romine, & Motheral, 1997), which is important for audiences who report time constraints. The source of Internet materials, however, must be considered critically. Integrity of information on bio-security can be ensured for leaders if it is produced with them in mind and by a team of Extension educators dedicated to livestock disease prevention. Development of an online curriculum for this purpose was the next step accomplished through the project, which demonstrates how different sectors of Extension, in this case 4-H and Veterinary Medicine Extension, are able to collaborate to develop programs that address specific educational needs of volunteers (Stevenson et al., in press).

Perceived barriers associated with online education in Extension programs include connectivity (lack of computer or internet access), lack of competencies, unfamiliarity with technologies, reluctance to accept distance education methods, and the costs associated with high quality programs (Dromgoole & Boleman, 2006). Our findings are consistent with these perceptions but also include time as a significant barrier perceived by Extension faculty and staff. Leaders, however, noted few barriers. Due to the reported frequency of volunteer leaders using the Internet as a resource for information, it is possible that technology-related barriers are not as prevalent as Extension faculty and staff perceive. A bias must be pointed out, however, in that responders to the volunteer leader survey by design of the survey method had email addresses and therefore were more likely to have connectivity and confidence using technology. Encouragement by faculty and staff for leaders to use Extension offices for Internet access where there is one-on-one assistance may be a way for some leaders to overcome technological barriers.

A recent examination of delivery modes for volunteer training revealed volunteers' preference for a wide range of delivery modes, including technology delivery modes such as emailed information, computer-based CDs, and Web-based training (Fox, Hebert, Martin, & Bairnsfather, 2009). An online training module could fulfill these delivery modes if made available through email communication, copies on CD, and access from a 4-H website.

The majority of volunteer leaders responding to the survey did not report any motivators needed or mentioned that they were already motivated to learn about bio-security. Faculty and staff who have the most interaction with this audience overwhelmingly felt that making it mandatory was the best motivator for leaders. Another motivator mentioned by both faculty/staff and volunteer leaders was if the module provided materials that leaders could use with youth. The authors of this article responded to this by including activities for youth in the online educational module produced based on this needs assessment (Stevenson et al., in press).

The needs assessment reported here demonstrates an effective method of gathering information from different audiences (faculty and staff and volunteer leaders) in different ways (personal interviews and online surveys) to determine the need for educational materials. To our knowledge, this is the first time a needs assessment of this magnitude has been completed with 4-H volunteer leaders. In response to the three-part needs assessment, an online module was developed about bio-security for this audience (Stevenson et al., in press). A broader implication of the project reported here is the potential for adaption of the needs assessment structure described here to be used by Extension professionals across the country. An efficient method for assessing the need for online education for a given audience is timely as many Extension programs are facing a reduction in their number of employees and their budget.

Because volunteer leaders working with 4-H livestock projects are on the forefront of implementing disease

prevention, facilitating their efforts to teach bio-security practices to youth is of utmost importance. The needs assessment reported here determined that volunteer leaders are not seeking out information on bio-security on their own, resources developed specifically for volunteer leaders about bio-security are lacking, and published recommendations are inconsistent. A disease prevention curriculum created with volunteer leaders in mind is needed to increase awareness and understanding of the importance of bio-security to animal and human health and to help reduce the risk of disease transmission in 4-H livestock projects.

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