Bilingual, Digital, Audio-Visual Training Modules Improve Technical Knowledge of Feedlot and Dairy Workers

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Abstract

Two studies were conducted to determine the effectiveness of digital multimedia modules as training tools for animal care workers. Employees at a commercial feedlot (n = 17) and a commercial dairy (n = 10) were asked to independently complete a 10-question quiz prior to and following viewing of training modules. Module topics in the feedlot were proper handling of non-ambulatory animals and humane methods of euthanasia; modules were administered to the workers, as a group, in either English (n = 7) or Spanish (N = 10), depending on previously indicated worker preference. Modules addressing dairy cattle health practices and dairy cattle handling were presented to the dairy care workers who had a preference for learning in either English (n = 7) or Spanish (n = 3). For feedlot workers, post-test scores were improved by 28% after viewing the modules compared to pre-test scores (74% vs. 58%; $P < 0.01$), across language and topic. There were no interactions ($P > 0.30$) between language, topic, and between-test variation, indicating that the modules were equally effective at information

delivery to both audiences in both languages. For the dairy workers, test scores improved by 27% from pre-viewing to post-viewing (73% vs. 92%; $P < 0.01$); there was an interaction between the effect of module and language preference ($P < 0.01$) indicating that although scores increased for both of the topic areas for the English-speaking workers, only the score for the animal health topic increased for the Spanish-speaking workers. Regardless of nationality, level of formal education, topic, or preferred language, digital media are effective at improving knowledge transfer to animal care professionals.

Introduction

The animal agriculture industries are currently experiencing tremendous change in the demographic makeup of the workforce. Immigrants make up 41% of hired labor on dairies across the U.S.,[1] and 71% of hired labor on large (>1,200 cows) Wisconsin dairies are Latin American immigrants,[2] of the immigrants currently working throughout agriculture, 90% have less than a secondary education.[3] Although the presence of immigrant, non-English-speaking workers is not new to animal agriculture, the need for rapid, effective, adoption of modern vaccines, pharmaceuticals, and humane animal practices is perhaps more critical than ever before.[4, 5]

Although the concept of incorporating digital media as the primary method of introductory information delivery in commercial animal agriculture is novel, digital multimedia technologies are and will continue to be a significant method of information delivery in the public educational arena. As of 2005 57% of students surveyed were using the internet regularly for school or training purposes.[6]

The objectives of this study were to evaluate the effectiveness of digital, multi-media modules, in both English and Spanish, on improving knowledge in various topic areas, in commercial feedlots and dairies.

Materials and Methods

Modules were developed describing proper handling of non-ambulatory animals, proper methods of euthanasia, dairy cattle health practices, and dairy cattle handling. The modules contained still photographs, video, illustrations, audio narration, and text and were translated from English to Spanish by native Spanish-speakers from Mexico and Peru.

Workers were asked to complete a written demographic survey. Questions from the survey included:

1.   Age

2.   Gender

3.   Country / state of origin

4.   Native language

5.   Years of schooling / Education level (elementary school, secondary, college, degree/s earned)

6.   Years (or weeks) of experience with the current operation

7.   Years of experience in the beef/dairy industry (combined before and since arrival in the U.S.)

In addition to being written, questions were read aloud in the language preferred by the workers.

Feedlot Study

At a commercial feedlot in central Kansas, feedlot doctors (n = 7) and processors (n = 10) were asked to complete a demographic survey. The doctors were all born in the U.S., spoke English as their primary language, and six out seven had completed high school or some college. The processors were all born in Mexico, spoke Spanish as their primary language and English as a second language, and only one of ten had completed high school. Immediately prior to viewing each of the two training modules, all workers were then asked to complete a written, 10-question, multiple-choice examination pertinent to the module topics (proper handling of non-ambulatory animals and proper methods of euthanasia), in the language preferred by the workers (English for the doctors and Spanish for the processors). In addition to the questions being written on the exam, the questions were read aloud by the trainer (fluent in English and Spanish), in the language preferred by the workers. The examinations were completed independently. After completion of each exam, workers, as a group, were shown the module of the topic corresponding to the exam, translated into their respective preferred language (English for the doctors and Spanish for the processors). Immediately following viewing of each module, workers were asked to independently complete the identical exam that they had completed prior to viewing the modules. Once again, questions were both written and read aloud by the bilingual trainer.

Training was conducted as a group consisting of the entire job description group, with all seven doctors being trained together as a group and all 10 processors being trained as a group; examinations were completed independently. Training and examination were conducted in the common area where the respective groups spend break time.

Dairy Study

Similar to the feedlot study, 10 workers (n = 7 native English-speakers; n = 3 native Spanish-speakers) on a commercial dairy in Northeast Kansas were asked to evaluate the effectiveness of modular training technologies. All workers had completed high school and at least some post-secondary training; however, the non-English speakers had less than two years of experience in the dairy industry and the English speakers had greater than 10 years experience.

Topics presented to the dairy workers were dairy cattle health practices and dairy cattle handling. Workers completed written, 10-question, examinations prior to viewing each of the training modules, and then completed the same respective exams.

Training was conducted by preferred language of the group, by a trainer fluent in both English and Spanish. There were seven workers in the English-speaking group and three workers in the Spanish-speaking group. Workers were trained in their common break area.

Statistics

The general linear models procedure of SAS (v. 9.1; SAS Institute, Cary, NC) was used to evaluate pre-training vs. post-training test scores. Data from the feedlot and dairy training groups were analyzed separately. Pre-training exam scores were compared to post-training exam scores with data being analyzed as a repeated measures experiment with individual worker as the experimental unit and training, language, and module topic as treatments. Effects were considered significant when the P-value fell below the F-test of $P < 0.05$.

Results and Discussion

At the feedlot, there was a 28% increase in test scores following viewing of the training modules ($P < 0.01$), and there were no interactions ($P > 0.37$) between the effects of training, language and module topic area (Table 1). Processors had lower ($P < 0.01$) pre-viewing and post-viewing scores for both module topic areas compared to Doctors. This likely is a reflection of reduced experience in the feedlot workplace, as indicated by the demographic survey.

Table 1. Effects of viewing multi-media training modules on topic area exam scores for workers at a commercial feedlot.

	Pre-viewing	Post-viewing	SEM	P-value
All	55.3	71.5	3.34	< 0.01
Language				0.79
English	70.7	87.9	6.95	< 0.01
Spanish	44.5	60.0	6.61	< 0.01
Module Topic area				0.42
Humane euthanasia	53.3	72.1	6.00	< 0.01
Handling of non-ambulatory animals	57.6	73.9	6.31	< 0.01
Module Language				0.73
	English	Spanish		
Pre-viewing	70.7	44.5	4.01	< 0.01
Post-viewing	87.9	60.0	5.09	< 0.01

The main effect of module viewing at the commercial dairy indicated that test scores were increased by 27% after viewing the training modules (Table 2). There was no effect of language on pre-viewing or post-viewing test scores ($P = 0.52$). However, there was a significant 3-way interaction between test score, language, and module ($P < 0.01$) and a non-significant interaction between test score and module ($P = 0.08$).

Table 2. Effects of viewing multi-media training modules on topic area exam scores for workers at a commercial dairy.

	Pre-viewing	Post-viewing	SEM	P-value
All	72.5	92.0	2.86	< 0.01
Language				0.53
Module topic area				0.08
Language × Module topic area interaction				< 0.01
English				
Animal Health	75.7	91.4	4.44	0.03
Handling	71.4	92.9	6.20	0.03
Spanish				
Animal Health	67.9	92.4	4.71	< 0.01
Handling	73.3	83.3	5.27	0.25

These results indicate substantial improvements (28% and 27% for feedlot and dairy workers, respectively) from initial exam scores following viewing of multi-media training modules. This is noteworthy due to the fact that language preference in the feedlot study was confounded with nationality and job description and in the dairy study language preference was confounded with nationality and years of experience within the dairy industry.

Success of the training despite these confounding factors may be interpreted to indicate that the modules, which contain the elements of audio, still photography, video, illustrations, and text, can engage multiple learning styles.[7] Griggs and Dunn[8] suggest that training for Hispanic/Latino learners is optimized if the environment is structured and peer-oriented. In these studies, this was indeed the case. However, those authors also suggested that more kinesthetic teaching resources be utilized, which is not the case with digital modules. While multimedia technologies are clearly effective at training those students who prefer learning from facts and data, visual images such as video, photographs, and illustrations, or from verbal and written communication,

there are still other students who will have limited benefit from these forms of learning and still require a more hands-on, interactive approach to learning.[9]   Also, digital media cannot completely replace a more experiential approach to learning in the physical, tactile environment of commercial animal agriculture. Beef and dairy cattle are large, fast, and often unpredictable; heavy equipment commonly utilized on the farm can be dangerous if operated improperly.

Nevertheless, these data demonstrate that the multimedia approach can be used to rapidly and inexpensively expose new and inexperienced workers to a large quantity of customary industry practices, procedures, and technologies as a means of accelerating the learning process. Also, these modules can be utilized with experienced workers to reinforce previously learned techniques in order to maintain the integrity of best management practices. By reducing travel costs, this technology may offer a cost-effective means of delivering state-of-the-art training to remote, rural locales. The rural veterinary practitioner may choose to utilize this technology to accelerate and reinforce ongoing training programs, reserving the actual time spent in person on the farm especially for addressing individual farm-specific issues raised within the digital training.

End Notes: Reinhardt, C.D., D.U. Thomson, D.D. Retzlaff, B. Butler, and J.A. Valles. "Bilingual, Digital, Audio-Visual Training Modules Improve Technical Knowledge of Feedlot and Dairy Workers." *Online Journal of Rural Research & Policy* (5.7, 2010).

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Dr. Reinhardt received a B.S. in Meat and Animal Science from the University of Wisconsin, an M.S. in Nutrition from Texas A&M University, and a Ph.D. in Nutrition from Kansas State University. With a focus on beef cattle nutrition and management, Dr. Reinhardt has published 21 scientific papers, 2 book chapters, and 78 abstracts, proceedings, and reports. In his spare time Dr. Reinhardt enjoys spending time with his family.

D.U. Thomson (back to top)

Dr. Dan U. Thomson is a third generation bovine veterinarian and was raised in Clearfield, IA. Dr. Thomson completed a BS in Animal Science from Iowa State University, MS in Ruminant Nutrition from South Dakota State University, PhD in Ruminant Nutrition from Texas Tech University, and DVM from Iowa State University. Formerly an associate veterinarian with Veterinary Research and Consulting Services in Greeley, CO and Director of Animal Health and Well-being for Cactus Feeders in Amarillo, TX, Dr. Thomson is presently The Jones Professor of Production Medicine and Epidemiology and Director of the Beef Cattle Institute at Kansas State University.   Dr. Thomson teaches production medicine and nutrition, serves as the OIE Chair of Beef Cattle Production and Welfare, has published 40 peer-reviewed papers, 3 book chapters, 180 abstracts or proceedings and delivered over 300 invited talks internationally. Dr. Thomson is married with 4 daughters.

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Deanna Retzlaff earned her B.S. degree in Animal Sciences from the University of Tennessee, and Ph.D. in Food Science/Food Safety at Kansas State University. Deanna coordinates distance education in the fields of food and animal science. Deanna is a member of the University Continuing Education Association, the American Society for Microbiology, the International Association for Food Protection, and the Institute of Food Technologists. In 2005 she received the Support Specialist Award for the Great Plains Region of the University Continuing Education Association. Deanna, her husband, and their two daughters reside near Manhattan, KS with their horses and dogs.

B. Butler (back to top)

Brooks Butler is currently in year two of his DVM program at Kansas State University. Brooks conducted feedlot research as part of the Veterinary Research Scholars program during the summer of 2010, and served as the Business Unit Manager for the Beef Cattle Institute at Kansas State University in 2009 where he developed and marketed quality assurance and verification software programs for the Beef, Dairy, and Equine industries.
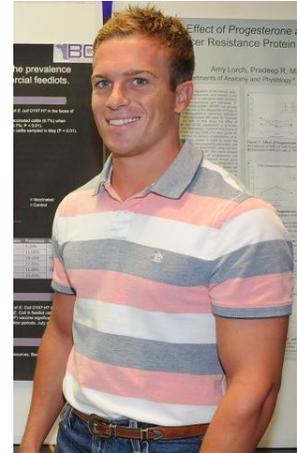
J.A. Valles (back to top)

Jose Valles is an Animal Science student at Kansas State University. Jose has worked as a Spanish translator in the Beef Cattle Institute at Kansas State University since 2007, and is a graduate of the Developing Scholars and Bridges to the Future programs.