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## Health and Safety Training for Immigrant Dairy Workers in the Upper Midwest

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### ABSTRACT

This project implemented *Seguridad en las Lecherías*, an award-winning, bilingual (Spanish and English), 5-module curriculum approved by the Occupational Safety and Health Administration. The intervention aimed to increase safety knowledge among immigrant dairy workers, encourage a safety culture, and identify challenges faced by the dairy farming community in Minnesota and South Dakota. A total of 360 Hispanic immigrant workers from 19 participating dairies were trained. Pre- and post-assessments revealed a statistically significant increase in knowledge after each training. Producers and managers provided positive feedback noting improved awareness of safety and positive behavior changes to reduce farm incidents. A flexible approach to implementation was essential to the intervention's success, including synchronizing training with workers' shifts. Overall, this application of the *Seguridad en las Lecherías* curriculum suggests that comprehensive, culturally responsive safety training delivered in the language spoken by workers can have a positive impact on workers' safety knowledge, practices, and behavior on dairy farms. Continued efforts to prioritize and reinforce worker safety are vital to the sustainability and well-being of the dairy farming community in the region and beyond.

Keywords: Occupational safety, Dairy farming, Immigrant workers, Safety training

### INTRODUCTION

Dairy farming is among the most dangerous occupations, with high injury and illness rates (Doughrath et al., 2013; Liebman et al., 2018; Ramos et al., 2021; US Department of Labor, 2022). In addition, immigrant labor accounts for 51 percent of all dairy labor, and dairies that employ immigrant labor produce 79 percent of

the US milk supply (Schenker and Gunderson, 2013; Adcock et al., 2015). Most immigrant workers in dairies are Spanish speaking (Durst et al., 2018) with limited formal education and primarily originate from Mexico with fewer numbers from Central America (Arcury et al., 2010; Durst et al., 2018; McDonald et al., 2020). The magnitude of the injury and illness problem is likely underestimated as immigrant workers are less likely to report injuries due to fears related to their immigration status (Lopez-Cevallos et al., 2014; Flynn et al., 2015; Liebman et al., 2016). Limited educational opportunities, lower literacy rates, and language barriers in the workforce increase the possibility of injury or death in high-risk occupations in these workers (Hagevoort et al., 2013; Juárez-Carrillo et al., 2017).

The Upper Midwest Agricultural Safety and Health (UMASH) Center, a regional agricultural safety and health center, in collaboration with Migrant Clinician Network, and the National Farm Medicine Center developed *Seguridad en las Lecherías* (Safety on Dairy Farms) curriculum to support culturally appropriate health and safety education to Spanish-speaking immigrant dairy workers. The *Seguridad* curriculum is a 5-module, bilingual (Spanish and English) curriculum approved by the Occupational Safety and Health Administration (OSHA). Modules provide comprehensive education about working safely on dairies, including safe animal handling, use of equipment, machinery, and chemicals, confined spaces and silos, and worker rights and responsibilities. The curriculum includes background sections on each topic, evaluation tools, comic books, handouts, and a step-by-step facilitator guide with visuals, such as PowerPoint presentations and flip charts. Materials include colorful images and minimal wording designed to spark discussion, encourage workers to ask questions, think about potential injury risks, and develop solutions to prevent them.

Presently, limited research addresses the receptivity and impact of this training on health and safety for dairy producers. This paper focuses on producers and their perceptions of the training implemented on dairies among

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dairies in Minnesota and South Dakota. The objectives of the intervention included 1) supporting health and safety education on dairy operations, 2) documenting the health and safety practices on participating dairies, and 3) assessing the impact of the training through producer and manager testimonials and worker pre- and post-training assessments.

## METHODS

### *Farm Recruitment*

Farms were recruited by promotion through lay articles and interviews in dairy newspapers, presentations, webinars, brochures, phone calls, and the UMASH website and Facebook page. This included working with University of Minnesota Extension Educators, the Minnesota Milk Producers Association, dairy cooperatives, dairy veterinarians, and those facilitating regional dairy conferences and workshops. Participation was free to producers and no compensation was provided. Producers or dairy managers signed a consent form that provided an overview of the project and expectations.

All workers verbally consented before the intervention began and before any interviews. When each worker attended their first training session, they were asked basic demographic information on age, sex, preferred language, country and state of origin, years working in dairies, years living in the United States, incidence of dairy-related injuries, previous health and safety training, and education level. This information was collected verbally and anonymously. Survey results were recorded manually and entered into REDCap® for analysis.

This research was reviewed and approved by The University of Minnesota Institutional Review Board (study number 00001580).

### *Training*

Five 1-h training modules were provided in Spanish to workers at no cost to dairy workers or producers. The training modules included 1) working safely in dairy, 2) working safely with cattle, 3) staying safe with equipment and machinery, 4) workers' rights and responsibilities, and 5) working safely around chemicals, confined spaces, and silos. A bilingual (Spanish and English) trainer provided on-site education with permission from dairy management. Participating dairies chose the dates and times of the lessons, which were organized according to the workers' shifts. Lessons occurred before and after milking shifts to accommodate work schedules and occurred twice a day in large dairies to accommodate each shift. The time between lessons ranged from one month to several months, depending on the dairies' schedules.

With the COVID-19 pandemic, there was more than a year lag between lessons on some farms. However, training staff maintained ongoing communication focusing on health and safety concerns regarding COVID-19 testing and vaccination for workers.

To evaluate the impact of the training, 1) workers' knowledge was assessed before and after lessons 2 through 5, and 2) farm management (i.e., producers, managers, or supervisors) who attended the training session were interviewed with structured surveys. The training assessments pertained to each lesson and included 5 short, multiple-choice questions. The trainers read each question aloud, and workers responded by marking a circle, an X, or an arrow for their answer. Responses were anonymous, so worker pre- and post-knowledge scores were not paired. For example, for lesson 2, one question was: What is the safest container to throw the needles used? There were graphics of 3 containers with one correct answer for workers to choose.

The structured interviews with farm management were conducted to ascertain key farm characteristics, including the number of milking cows, worker housing, worker characteristics, injury records, and health and safety procedures. For dairy operations completing all 5 lessons, post-training interviews were conducted with management. Producers and managers described the impact of the training and whether they observed changes in worker behaviors.

### *Data Analysis*

Worker responses to the pre- and post-knowledge checks were put into REDCap. Two-sample *t*-tests were employed to test for any changes in knowledge between pre- and post-lesson tests for lessons 2 through 5. Cohen's *d* effect size was calculated to measure the learning effect by comparing pre- and post-test results (e.g., small effect = 0.2, medium effect = 0.5, large effect = 0.8). Statistical analyses were conducted with R version 4.2.2.

The farm manager's responses were recorded in REDCap. Two authors independently reviewed the qualitative responses from producers using a grounded theory process (Miles and Huberman, 1994). Emerging codes and themes were identified to ultimately come to a consensus about how to describe the impact of the intervention on the dairies from the perspective of producers. These common themes were summarized.

## RESULTS

### *Worker Training and Assessment*

Three hundred and 60 workers were trained across 19 dairies as part of this intervention. Each worker partici-

pated in at least one lesson of the 5-part training. Of the 19 dairies, 11 completed all 5 lessons, 2 completed 4 lessons, 2 completed 3 lessons, and 4 completed one lesson. Lesson 1 had 254 workers attending at all 19 dairies; lesson 2 had 240 workers attending at 16 dairies, lesson 3 had 193 workers attending at 15 dairies, lesson 4 had 179 workers attending at 12 dairies, and Lesson 5 had 170 workers attending at 12 dairies. Throughout the training, dairies experienced worker turnover, and as workers left, others joined, accounting for the total number of 360 workers trained over the 5 lessons. Each lesson covered separate topics that did not require knowledge of the previous lessons, and workers were evaluated on what they learned during each training session.

Workers performed a variety of tasks as part of daily dairy operations, which included milking cows, moving cows, operating skid loaders to transport cow feed, scraping cow pens, handling calves, helping with bunker silos, and other dairy-related work. Some workers repaired tools and did maintenance work. A few immigrant employees were fluent in English or bilingual and had work experience took on managerial or supervisory roles like herdsmen, farm managers, or human resources staff.

Sixty-eight percent of trained workers were between the ages of 18 and 34 years, 23% were between 35 and 44, and 6.7% were 45 years or older. Ninety percent of workers were male, 94% Spanish-speaking, and 74% from Mexico. The educational backgrounds of participating workers varied, with 14% having 0 to 5th grade education, 27% having 6th to 8th grade, 32% having 9th to 11th grade, 19% having a high school degree, and 9% having post-secondary education. Sixty-two percent of the workers had arrived in the United States within

the past 5 years, while 25% had arrived within the last year. Seventy-one percent of trained workers had been employed in dairy operations for less than 5 years, and 32% began in the past year. Forty-two percent of workers previously experienced work injuries while working on dairy operations. Over half (52%) had previously received occupational safety and health training.

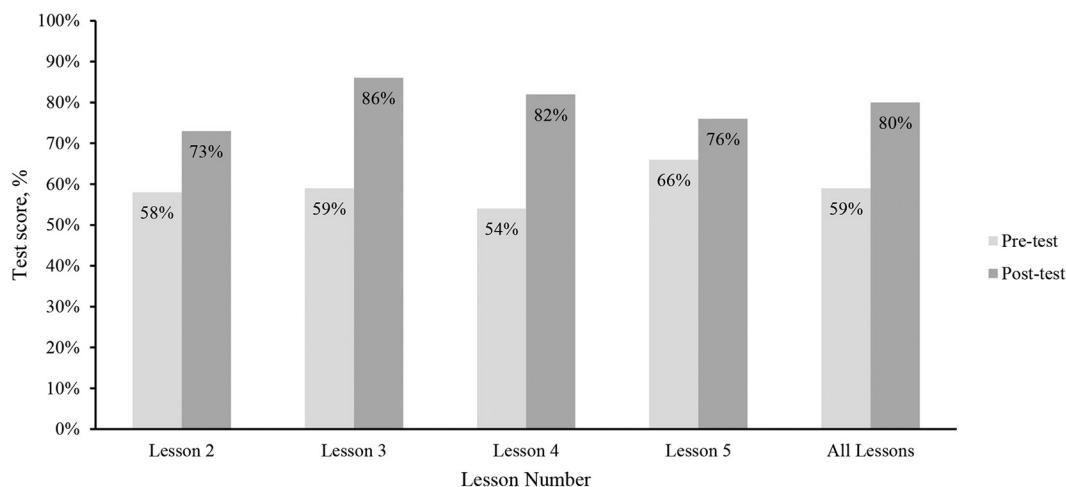
There was evidence of a significant increase in knowledge between all pre- and post-assessments of individual lessons at an  $\alpha$  of 0.05 ( $P < 0.001$ ) (Figure 1). The calculated Cohen's D was 0.52 for Lesson 2, 0.86 for Lesson 3, 1.14 for Lesson 4, and 0.33 for Lesson 5.

### Farm Manager/Producer Survey

Eighteen of 19 producers, managers, and supervisors were interviewed before the training to provide farm demographic information. Exit interviews were completed from 11 dairies that completed the 5 training courses.

### Worker and Farm Demographics

Eighteen dairies had a median of 21 total workers (range: 10–43) on each operation, including family and non-family members. Operations had a median of 15 Hispanic workers (range: 7–40) and (94.4%) had at least 500 milking cows. More than half (55.6%) had over 1,000 milking cows (range: 470 to 2500). Some dairies ( $n = 8$ , 44.4%) had workers who lived on-site.



**Figure 1.** Pre- and post-lesson test scores for immigrant dairy workers given health and safety training. The differences between pre- and post-lesson tests were all statistically significant at a level of  $p < 0.01$  for each lesson. Lesson topics included working safely in dairy (lesson 1), working safely with cattle (lesson 2), staying safe with equipment and machinery (lesson 3), workers' rights and responsibilities: safety and health on the farm (lesson 4), working safely around chemicals, confined spaces and silos (lesson 5).

### Operation Characteristics

All operations had workers' compensation insurance; half used the OSHA 300 log to record work-related injuries. Fourteen of 18 (78%) farm owners, managers, or supervisors reported that at least one employee missed a 1/2 d of work due to work related injuries or illnesses on the farm over the past year (range 1 to 6 employees). Five of 18 (28%) farm owners, managers, or supervisors reported that, on average, greater than 3 d were lost annually for general health and safety reasons. Two operations (11.1%) reported over 10 d on average that employees were out per year due to farm illness or injury. Fifteen of 18 (83.3%) operations included some safety measures in their management plan. However, safety protocols were under different stages of development on 50% of the farms at the time of the training sessions. There was a range of individuals responsible for addressing health and safety issues on the farms, including the producer (44%), manager (33%), human resources personnel (17%), producer's wife (11%), or others (28%). When asked where workers go for healthcare, 38.9% of producers identified a local clinic for primary care, and 66.7% identified a hospital or clinic for emergency services. Most producers (61%) did not know where their workers go for primary or emergency care.

### Existing Health and Safety Policies

Of the 18 dairies owners/managers/supervisors interviewed, 16 (89%) had written farm policies and procedures with 14 (78%) translated into Spanish, 15 (83%) included safety in their policies, and half (50%) had safety protocols in Spanish. Policies were also reported to be reinforced throughout employment (50%), explained at hiring (39%), or written down and provided to employees (21%). Emergency procedures included providing workers with the farm address and contact information (58%), emergency phone numbers (47%), and a designated person responsible (26%). Participating farms reported that they provided personal protective equipment (PPE) to employees, including gloves (95%), eye protection (74%), masks (63%), aprons (42%), and hearing protection (74%). Other PPE utilized varied but included high visibility vests, milking sleeves, boots, and winter jackets.

### Training Assessment Feedback

The results of structured interviews with farm management are outlined in Table 1. Producers and managers reported that safety attitudes improved after the training, including improved knowledge, awareness, attitudes, and communication among workers. Most importantly, safety

behaviors improved, such as using personal protective equipment (PPE) and safe animal handling. Anecdotally, producers reported fewer incidents on the farm.

## DISCUSSION

The *Seguridad en las Lecherías* training increased safety knowledge and promoted safety on participating dairy farms in the Upper Midwest. There was a statistically significant change in immediate knowledge about staying safe on farms, with the largest increase in lesson 4 on worker rights and responsibilities. These findings suggest that comprehensive, evidence-based, flexible, and culturally responsive knowledge-based health and safety training delivered in the language spoken by the workers has the potential to be accepted by and valuable to workers. This study population's characteristics—a quarter are newcomers, and many don't speak English, lack training in dairy production, have limited education, or are without knowledge of labor laws—highlight the benefits of training this workforce in their language and with a culturally appropriate curriculum.

Reviewing the dairy operation's health and safety policies identified areas for improvement. Most dairies had written farm policies and procedures, yet only half had safety protocols in Spanish which likely accounts for a significant portion of the workforce. With limited education, additional methods are needed to train workers such as a combination of in-person onboarding, peer training with experienced workers, close supervision, and frequent reinforcement of safety practices. In addition, half of operations used OSHA 300 logs to record work related injuries. It is likely that many injuries are underreported and that novel methods are needed to help farm operators be aware of work-related injuries and provide prevention strategies. In addition, few farms had documented or written emergency procedures in place. This provides additional areas for education and training.

For producers and owners, the effective delivery of safety training with the goal of reducing hazards and incidents on farm operations supports animal welfare and worker health. During the post-program interview, producers and managers indicated that they perceived the training to be beneficial to their workers and impactful to the overall safety of the farm. One farm manager noted that fewer incidents occurred following the training than before the training when more frequent incidents occurred.

[There have been] less accidents. Prior there were a fair number of accidents. In the last 2 mo, there were 0 accidents reported.

Several dairies noted important changes in behavior, from more cautious approaches to work and better com-



**Table 1.** Summary of producer and manager evaluation of the training's impact on their operation

Theme	Summary	Illustrative Quote
Positive feedback on the program	Resources are well done and align well with regulatory standards such as OSHA and worker's compensation  It was valuable to have a trainer focused on worker safety	<i>[Regulatory agency visitors] were blown away to see what they have [on the farm]: The Emergency Action Plan, the pesticide posters, the sign-in sheets, and the UMASH trainings. They had many good things to say. It was valuable to have a specialized person, with knowledge on these issues. Sometimes veterinarians come who give talks on safety but that is not their job because their work is with animals and it is not the same as a person who is dedicated only to that, safety. One of the things that I really liked is that [the trainer] has a very broad knowledge about safety and it is noticeable that [she] has not only worked in dairies and she can explain what she says very well. Access to a safety program in Spanish, both written and with the trainer, is limited. So this is easy and free and covers important information. Workers feel confident that they can ask for safety trainings and safety materials. They also know whom to ask. They know that if they talk with [the safety manager] then they will be working on it. So, workers take charge of their safety and they know that they have the support of the safety manager. I have noticed that if people have doubts about doing a job, they ask me [the herdsman] or their coworkers if it is safe. And I hear that they have learned a lot from the trainings. More than anything, it has served for teamwork and to see if there is a problem that could cause an accident. We have learned a lot, and it has helped us to work as a team and more safely. I try always to explain safety, but because of the communication barrier, I don't know how much they hear from me. This training gives them much more insight about the specifics of it. Workers are now more cautious when doing work.</i>
Improved safety culture	Trainings are accessible in terms of the training length, cost (free), and delivery in Spanish Workers have a better understanding of safety, regulations, and their importance and applications  Workers care more about working safely; they discuss prevention protocols and ask questions about safety topics	
Behavior change	Improved teamwork among workers Training delivered in Spanish alleviated communication barriers Workers are more cautious, engaging with safety, and using safe procedures, especially around PPE, animal handling, and chemicals Potential hazards are noticed and reported  Workers respond to emergencies appropriately  Improved compliance with safety regulations	<i>I see people using more protective gear and bringing up potential hazards that they think could be done differently. I have noticed that if the workers see that a machine is going to lose a tire, the workers notify the mechanic. Before, they warned after the tire had come off. In winter, they are more careful when walking and do not run. They get on the skid loader holding on (using all 3 points of contact). [Workers are] noticing potential safety hazards and bringing them up. [Workers] were able to respond to an accident that happened last month with another worker in the appropriate way. Since [the] training, [dairies] have applied the safety rules more. [There have been] less accidents. Prior there were a fair amount of accidents. In the last 2 mo, there were 0 accidents reported.</i>
Reduced incidents	Fewer accidents reported	

Note. Quotes are lightly edited for clarity and ease of reading.

pliance regarding use of PPE. They also noted improved handling of incidents and willingness to report hazards.

Workers are now more cautious when doing work. I see people using more protective gear and bringing up potential hazards that they think could be done differently

[Workers] were able to respond to an accident that happened last month with another worker in the appropriate way.

Management noted an overall change in the workplace safety culture with improved teamwork, willingness to ask questions about safety, and a perceived change in how the workers felt about doing their work safely.

I have noticed that if people have doubts about doing a job, they ask me [the herdsman] or their coworkers if it is safe. And I hear that they have learned a lot from the trainings...More than anything, it has served for teamwork and to see if there is a problem that could cause an accident.

Workers feel confident that they can ask for safety trainings and safety materials. They also know whom to ask. They know that if they talk with [the safety manager] then they will be working on it. So, workers take charge of their safety and they know that they have the support of the safety manager.

Overall, producers and workers reported perceived benefits regarding their safety in the participating operations. Producers and managers reported that the training made them aware of safety concerns and OSHA regulations. They also noted the importance of being able to provide training in Spanish that aligns with their workers' needs. This is supported by literature documenting the best strategies for training workers (Arcury et al., 2010; Rosecrance et al., 2013; Juárez-Carrillo et al., 2017).

This study has several limitations. Farms that choose to engage in this study likely hold a certain level of interest and dedication to health and safety. Therefore, the findings may only be generalizable to some dairy farms in the Upper Midwest region. Additionally, there was inconsistent worker participation in the lessons. All 360 workers took part in at least one lesson; however, we did not gather data on the specific number of lessons each worker completed. Consequently, it is unclear how the intervention's impact on knowledge may have varied among workers who received different lessons or different numbers of lessons. In addition, this manuscript focused on producer and manager perceptions. Workers' impressions of safety may differ from the producer/manager's perceptions. Due to the COVID-19 pandemic, some post-intervention interviews were delayed 2 years after the intervention, potentially leading to recall bias.

The operations varied in size, structure, safety records, practices and protocols, and number of immigrant work-

ers. The demographic makeup of the trained workers appeared to be consistent with existing information about the immigrant workforce in agriculture, broadly between the ages of 18 and 34, with most workers originating from Mexico (Maloney, T.R. and Grusenmeyer, DC, 2005; Arcury et al., 2010; Juárez et al., 2017; Baker et al., 2021). However, we note that these demographics are also continuously changing with workers coming from different countries, especially in Central America. In our study, some workers (5%) indicated their preferred language as something other than Spanish or English. Some workers preferred indigenous dialects from the states of Oaxaca and Chiapas (Mexico) and the Department of Quiché (Guatemala). Some of these workers could understand Spanish, but others could not. This communication barrier will need to be considered for future training, considering the changing demographics of workers in dairy operations.

This training intervention's effectiveness and sustainability would be enhanced by delivering safety training to include owners, producers, farm managers, and supervisors to complement the worker training. While training and encouraging workers to voice their safety concerns are important and impactful (Juárez-Carrillo et al., 2016; Menger et al., 2016), it is equally important to equip owners, employers, and managers with the information and skills to address these concerns appropriately (Hagevoort et al., 2013). This approach would support a strong safety culture and reduce employee turnover (Hagevoort et al., 2013). Anecdotal feedback from workers about being appreciated and treated with respect appears to play a key role in increasing worker retention and decreasing job turnover. Although not part of this study, it is worth mentioning the trainer's observation on some farms with low worker turnover that the workers commented on being treated with respect and feeling part of a family. This had a bearing on their decision to stay on the farm.

Future research should include rigorous, ideally longitudinal, evaluation measures, including the incidence of injury or fatality as an outcome. Any future interventions should seek to intervene upon higher levels of the hierarchy of controls, such as administrative or engineering measures (Driscoll et al., 2022; US Centers for Disease Control and Prevention, 2023; Benoit et al., 2023).

## CONCLUSION

The *Seguridad en las Lecherías* intervention delivered in Minnesota and South Dakota increased workers' safety knowledge and positively impacted worker and producer interactions around work safety. Dairy farms in the Upper Midwest region are faced with declining numbers, increasing production costs, and reliance on immigrant

labor, and they have recognized the importance of promoting safety in their operations. The training was met with enthusiasm and appreciation from the producers involved. We also identified areas to improve and support health and safety training and education. By addressing the unique challenges dairy farms face and leveraging culturally appropriate educational approaches, the intervention successfully increased workers' safety knowledge and improved safety practices and a safer working environment for dairy operations in the Upper Midwest region. As dairies continue to face economic and labor-related hurdles, sustained efforts to prioritize and invest in worker safety are crucial for the sustainability and well-being of the dairy farming community.

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