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COVID-19 Awareness and Preparedness of Minnesota and Wisconsin Dairy Farms

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ABSTRACT

Dairy farms that had participated in previous and ongoing projects with the National Farm Medicine Center (NFMC), Migrant Clinicians Network (MCN), and Upper Midwest Agricultural Safety and Health Center (UMASH) were asked to participate in a 17-question survey by phone or email to investigate biosecurity principles on Minnesota and Wisconsin dairy farms in response to COVID-19 and the effects of the pandemic on the dairy industry. Three additional farms were recruited via a press release published in agricultural newsletters. Of 76 farms contacted, 37 chose to participate in this study from June to July 2020. In response to the COVID-19 pandemic, dairies have implemented or increased biosecurity measures and COVID-19 precautions. Dairies reported adequate personal protective equipment for their workers, though face masks were not required on most dairies (n = 32, 86%). Producers were concerned about the safety of their families, maintaining a healthy workforce, and keeping their farms profitable. Access to healthcare was not perceived to be an issue for their workers. One-quarter of dairies reported COVID-19 infections on their farms. Even though the majority had an isolation protocol in place if someone on the farm were to become ill, less than half of respondents felt their farm was protected against COVID-19. Two-thirds of producers have not had to decrease production, and a majority of operations have not furloughed or terminated employees due to COVID-19. Our data suggest that dairy farms in Minnesota and Wisconsin have implemented biosecurity and safety measures in response to COVID-19. These measures can be improved. Farms would benefit from additional guidance and education on implementation of personal protective measures and disease prevention strategies to keep workers employed and safe.

KEYWORDS

COVID-19; biosecurity; immigrant workers; dairy producers; safety protocols

Introduction

The emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), has had a profound global impact with more than 83 million confirmed cases worldwide as of January 2021.[1,2] Agriculture is considered an essential industry, and food production workers including farmers and farm workers have been asked to continue to work.

With the risk for farm workers becoming ill, farm owners and managers need to provide prevention measures to protect their workers and family members. One of the means to do this is through improved biosecurity. Biosecurity on dairy farms is defined as "a strategy of management practices to control and prevent animal and public health-related losses … to prevent introduction of disease and pathogens to the operation and control spread within the operation."[3] Farms use varying biosecurity precautions to protect against the incursion of animal or zoonotic diseases that could cause economic impact. Some examples include using a visitor log, parking vehicles away from barn areas, restricting access to regulated areas, providing farm-owned protective clothing for workers and service professionals, avoiding sharing of resources and machinery between farms, having a policy and facility for farm quarantine, separating sick animals from

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the herd, and routine testing for specific diseases to avoid spread.[4]

Biosecurity principles are typically thought of as those being used to prevent disease in livestock; however, in the case of COVID-19, the concern is more to prevent the spread of COVID-19 among workers. The novel coronavirus is spread person to person by airborne droplets, and there is currently no evidence to suggest any spread from cattle to people.[5,6] The greater concern is worker health and safety. Individuals working in agricultural and livestock positions face a number of health and safety challenges, as agriculture is one of the most dangerous industries in the United States, and workers are exposed to many occupational and environmental health hazards that lead to high rates of injury and illness.[7] This especially applies to immigrant and migrant workers, who make up a significant proportion of the dairy workforce. A US survey of dairy farms in 2015 found that immigrants make up 51% of the dairy workforce, and 79% of America's milk supply comes from dairies that employ immigrant labor.[8]

Our study aimed to investigate what biosecurity and safety principles were being applied on dairy farms to protect farmworkers against COVID-19, to determine dairy producers' concerns and perception of risk, and to more closely examine the effects of this pandemic on the industry. Our intent was to listen to producers to know how to best support their employees and families.

Methods

As part of an ongoing health and safety project for dairy workers, we conducted a survey of dairy producers to investigate the implementation of COVID-19 biosecurity principles and safety measures on Minnesota and Wisconsin dairy farms from June through July of 2020. The research was designed and conducted as a collaboration between Upper Midwest Agricultural Safety and Health Center (UMASH) and University of Minnesota Medical School researchers and was approved by the University of Minnesota Institutional Review Board as a modification to an ongoing project with immigrant dairy workers (STUDY00001580, Modification MOD00017238).

Selection of subjects

Dairy producers in Minnesota and Wisconsin were conveniently selected based on their participation in previous and ongoing research projects with the National Farm Medicine Center (NFMC), Migrant Clinicians Network (MCN), and UMASH, generating a list of 73 farms that had participated in a worker safety and health intervention from 2012–2020. Three additional farms were recruited via a press release published in agricultural newsletters. A total of 76 farms were contacted via phone. Of the 76 farms contacted, 37 (49%) chose to participate.

Questionnaire design

UMASH staff developed a 17-question survey about COVID-19 to interview dairy producers or the person in charge of the dairy operations. If respondents declined to be interviewed by phone, they were offered an opportunity to complete the survey by email. Two respondents returned the survey by email. The survey focused on the implementation of biosecurity principles and protective measures against COVID-19 by dairy producers, workers' access to healthcare, methods of communication between producers and workers regarding COVID-19, sources of information used to learn about COVID-19, and whether or not dairy producers felt their farms were protected against the disease.

The questionnaire was composed of six 5-point Likert scale questions (strongly disagree, disagree, neutral, agree, or strongly agree), four yes/no questions, two multiple-choice questions (one answer option being "other," with the opportunity to provide a free-text answer upon selection), and five open-ended questions.

Data management and analysis

Study data was collected by six members of the research team associated with UMASH and the University of Minnesota. Data was entered and

managed using REDCap (Research Electronic Data Capture), a tool hosted at the University of Minnesota. REDCap is a secure, web-based software platform designed to support data capture for research studies.[9,10] At the end of the interview period, two researchers coded all open-ended questions separately, then compared their results to reach a consensus. All data from REDCap were exported to Microsoft Excel for analysis. Tables were created on Microsoft Excel and Google Doc.

Results

Response rate and dairy farm demographics

Of 76 dairy producers contacted, 37 (49%) completed the interview; 29 (78%) from Wisconsin and 8 (22%) from Minnesota. The median number of employees for farms interviewed was 22 (range: 5–120), and 23 farms (62.2%) provided housing for their workers, housing between 2 to 26 workers.

Sources of COVID-19 information

COVID-19 information sources used by dairy producers included the news (n = 21, 57%), local health departments or hospitals (n = 20, 54%), public health organizations such as the Center for Disease Control (CDC) and the World Health Organization (WHO) (n = 17, 46%), social media (n = 11, 30%), and family members (n = 8, 22%). Other sources (38%) included local/national dairy and farmer associations (n = 7), among others (Table 1).

Table 1. Primary sources of information for dairy producers regarding COVID-19.

Sources of Information	n	%
The news	21	57
Local health departments or hospitals	20	54
Organizations like CDC or WHO	17	46
Social media	11	30
Family members	8	22
Other	14	38
Local/national dairy and farmer associations	7	20
Indirect hospital/business contacts	2	8
Online resources	2	8
Veterinarian	1	3
Financial cooperative	1	3
Radio	1	3

Protection from COVID-19, medical care and response protocols

Of respondents, 41% (n = 15) believed they were protected from COVID-19, while 35% (n = 13) did not. The remaining respondents were neutral. Regarding medical care, 97% (n = 36) of producers believed that workers had access to medical care if they became ill. About 68% (n = 25) indicated they had an isolation protocol if a worker became sick with COVID-19 symptoms (Table 2). Nearly one-quarter (n = 9) of the respondents reported someone on the farm having tested positive for COVID-19.

Table 2. Dairy farms' perceptions regarding management of COVID-19 and biosecurity measures.

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Workers have access to medical care if they become ill.	0	0	1 (3)	14 (38)	22 (60
If someone becomes sick with fever and/or respiratory symptoms, we have an isolation protocol	3 (8)	7 (20)	2 (5)	15 (41)	10 (27
We have had to decrease production since COVID-19 began.	13 (35	12 (32)	4 (11)	6 (16)	2 (5)
Employees are using face masks or face coverings more since COVID-19 began.	8 (22)	12 (32)	5 (14)	9 (24)	3 (8)
There is an adequate supply of PPE available on the farm	0	3 (8)	2 (5)	19 (51)	13 (35)
My farm is protected against COVID-19	4 (11)	9 (24)	9 (24)	13 (35)	2 (5)

Changes in production and employment

Of respondents, 68% (n = 25) did not decrease milk production due to the COVID-19 pandemic (Table 2). Most of the dairies (n = 34, 92%) had not furloughed or terminated employees due to COVID-19. However, 13 producers (35%) reported that employees had left or quit since the beginning of COVID-19 for unrelated reasons.

Biosecurity measures

Biosecurity measures that were introduced, continued, or increased by farms included social distancing (n = 31, 84%), hand hygiene (n = 25, 68%), disinfection and sanitation of common areas and equipment (n = 14, 38%), and use of gloves (n = 9, 24%). Three producers (8%) reported limiting the number of workers in the milking parlors to two workers to further improve social distancing. Only two producers (5%) reported monitoring workers' temperatures at the start of a shift, and one of them also at the end of a shift.

The use of face masks was implemented by 15 producers (41%), with only five requiring their use, and requirements varied by the workers' duties and location on the farm. A majority of producers (n = 20, 54%) noted that employees were not using face masks or face coverings with the onset of the pandemic (Table 2). Most producers (n = 32, 87%) agreed they had an adequate supply of personal protective equipment (PPE) for workers (Table 2). During this time period, mask mandates had not yet been enacted in either state.

Other biosecurity measures included limiting visitors to the farm (n = 9), requiring visitors to make appointments (n = 2), limiting the number of workers on break (n = 2), and staggering break schedules (n = 1). The number of group meetings was reduced (n = 7) or meetings were changed to outdoor (n = 4), one-on-one (n = 3), small-group (n = 2), or virtual (n = 1) (Table 3).

Communication measures

Meetings were the preferred method of communication, with 51% (n = 19) of dairies using at least one or a combination of meeting formats including in-person, outdoor, one-on-one, small group, and virtual (Table 3). The second preferred communication method was printed materials obtained from UMASH, the CDC, Alltech, and local health departments, and posted near clock-in areas, in break rooms, in the office, or distributed with paychecks. A small number used cell phones to communicate via text, WhatsApp, and videos. Over one-third used bilingual posters, videos, and translators.

Table 3. Measures used to communicate to employees during COVID-19 Pandemic.

Communication Measures	n	%
Meetings		
In-person group	19	51
Outdoor	4	11
One-on-One	3	8
Small group	2	5
Virtual	1	3
Printed Materials		
Posters	10	27
Printed handouts	7	19
Postings (articles, flyers)	10	27
Cell Phone		
Text messages	1	3
Whatsapp	3	8
Bilingual Materials		
Posters	5	14
Translator	4	11
Videos	2	5
Bilingual Workers/Managers	2	5

Concerns about COVID-19

All respondents expressed varied concerns regarding COVID-19 (Table 4). Most participants, 81% (n = 30), identified health and safety of family members and/or workers as a concern, while 68% (n = 25) were worried about losing employees due to quitting or illness. A majority, 54% (n = 20), were worried about decreased production and/or profits, and 24% (n = 9) were concerned about the health and safety of livestock. Other (n = 10, 27%) concerns included increased negative media

Table 4. Employer concerns about COVID-19.

Concerns about COVID-19	n	%
Health and safety of family members and/or workers	30	81
Decreased production and/or profits	20	54
Health and safety of livestock	9	24
Losing employees (quitting or becoming ill)	21	68
Other	10	27

attention on the agricultural industry, workers' safety outside of work, impact on the farm and on the ability to care for livestock if one or more workers were to become ill, and a lack of an established isolation protocol. One respondent shared a concern for their workers' finances, childcare, schooling, and access to food.

Discussion

In this study, we wanted to explore the rapid and dramatic impact of COVID-19 on Minnesota and Wisconsin dairy producers. In particular, we were interested in the applied biosecurity and safety principles utilized by dairy producers and the widespread effects of the pandemic on the industry. The respondents reported they were aware of COVID-19 and took preventive measures to protect themselves, their families, and their workers. Important sources of information included the news, local health departments, health protection agencies (i.e., CDC, WHO), agricultural newsletters, and local/national dairy associations. About half of the respondents sought information from health departments and health protection organizations. This appeared to be a trusted and important source of information. It should be noted that since the CDC and WHO were grouped together in the same answer choice, it is not possible to know which source was more frequently used by respondents, though some farms that provided more detailed answers indicated they looked for information only on the CDC website. Only 20% of respondents reported using local and national dairy associations as sources of information, which suggests there may be room for improvement in terms of communication and leadership by farm groups in guiding farms through this pandemic. Bilingual printed information and verbal communication were reported as helpful in educating farmworkers and disseminating information about COVID-19. This highlights the importance of access to bilingual sources of information for dairy workers.

Most of the dairies participating in this study have implemented or increased biosecurity measures, including frequent handwashing, social distancing, sanitation and disinfection of common areas and equipment, changes in group meetings, and use of gloves. Some of these preventative measures, such as gloves and handwashing, were likely already in place prior to the pandemic as standard practice. Dairies reported providing adequate PPE for their workers, though the survey did not clarify what each farm used for PPE and whether this includes protective clothing such as boots or coveralls as well as masks or gloves. Face masks recommended by the CDC were not required or enforced in most dairies, due to questions about their necessity in well-ventilated work spaces, as well as humid and hot weather conditions that would make it difficult for workers to perform their tasks. At the time of this survey, face masks were not required in Wisconsin or Minnesota, but later became mandatory in indoor businesses in both states in late July 2020. Overall, pre-existing preventive measures used in the dairy sector, such as handwashing, gloves, boots, and coveralls, may have had some element of protection against COVID-19, but given this is a respiratory disease, none of these measures are likely to be adequate without additional protection from face masks, making it crucial to use masks when indoors or when outdoors if social distancing is not possible.

Producers indicated ongoing concerns regarding the safety of their families and their employees as well as the profitability of their farms and how to maintain their workforce if employees were to become ill. A quarter of dairies reported that COVID-19 was identified on their farms, though the number of cases on each farm was not reported. This is noteworthy, because the initial perception of rural communities was that COVID-19 was an urban disease and would not afflict their communities and agriculture due to the social isolation of farming. However, many of the respondents in our survey were taking the health recommendations seriously. This included changing work conditions to offer opportunities to maintain social distancing among workers, such as allowing only two workers in the milking parlor or assigning one worker per task. Though in-person meetings remained the preferred method of communication, there have been attempts by a number of farms to change the format so at least they were held outdoors or in smaller groups. Virtual meetings are most effective in minimizing person-to-

person contact; however, these may not be feasible given difficulty with internet access. Overall, our recommendation would be to maintain social distancing, hold meetings outdoors when able, and wear masks during meetings to decrease risk of disease transmission. These measures are important to emphasize in ongoing health and safety training programs, especially considering that 76% of the dairy workforce are between 20 and 40 years-of-age, and many of these workers can be asymptomatic or mildly symptomatic possibly infecting others in the workforce, their family, or community.

Producers did not perceive lack of access to healthcare as an issue for their workers if they were to become ill, which contradicts findings that immigrant dairy workers experience difficulties accessing affordable health care.[11–13] Our survey did not clarify whether immigrant workers specifically or all workers on the farm were felt to have access to medical care, nor if the answer referred to healthcare services available in the area regardless of affordability, distance, or language and cultural barriers. Current research has shown that COVID-19 disproportionately affects communities of color, and this is likely compounded in rural areas where there are well-documented challenges with access to care including lack of transportation, distance to and limited capacity of healthcare facilities, absence of services, access to technology, financial burdens due to poverty and lack of insurance, among others.[14–16] One farm that was surveyed does offer a health insurance option to its workers and either covers half the cost of the insurance for workers that choose this option, or reimburses up to 500 USD a year for health-related expenses. It is not known from our survey whether or not any other employers offered health insurance or similar options to their workers. Overall, we are skeptical of the fact that 97% of respondents believed their workers had access to care and suspect it is possible that this does not take into account many of the factors mentioned above. This incongruence between perceived versus actual access to care needs to be further evaluated considering the urgency to identify and treat COVID-19 positive patients and the documented inequity observed among people of color and COVID-19 testing.

Most dairy producers (68%) agreed that they have an isolation protocol in place if someone on the farm were to become ill, but only about 41% believed their farm was protected against COVID-19. Their perception of whether or not they were protected did not correlate with the presence of an isolation protocol, nor did it correlate with the number of employees on their farms. Arguably, the number of producers implementing isolation protocols should be higher given the serious and contagious nature of the disease. Our survey did not ask what isolation protocols were used by each farm; however, some farm producers elaborated that their isolation protocol consisted of asking workers who are COVID-19 positive to stay home for 14 days. Farms should be more proactive in taking protective measures and minimize risk of transmission, since isolating a symptomatic worker can help curb the spread of the disease, but would not be helpful in preventing asymptomatic spread. Additional work is needed to understand how producers would feel better prepared to prevent and respond to COVID-19 infections in their personnel. This would include availability of screening workers, testing, and asymptomatic carriage. The CDC recently developed some recommendations for agricultural producers to better respond to threats. This includes a ready to understand and use checklist for agricultural producers.*[17,18]

Over two-thirds of producers have not had to decrease milk production because of decreased demand and dropping milk prices, and a majority did not need to furlough or terminate employees due to COVID-19. Dairy operations continue to work, because the animals require care, regardless of milk sales. It was noted that milk prices went down, and some farms in Wisconsin reported dumping milk when demand from exports and service sectors declined.[19] Decreased milk prices, milk dumping, and farm expenses have had a negative financial impact. At present, milk prices have recovered, but the long-term impact is unclear as the pandemic continues.

Our study has several limitations. First, our survey was limited only to farm producers or managers, who have a clear interest in creating favorable views of the health and safety conditions on their farms. Our survey did not include workers, including immigrant workers, who may have

different views about their own health and safety. This would be an important direction to take in future research to better understand the effects of the pandemic on the health and wellbeing of this population. Second, it is difficult to generalize our findings due to the small sample size (n = 37) as well as the limited geographical area of Minnesota and Wisconsin. It is likely that a national survey of dairy farms would reveal differences in implementation of biosecurity measures, preparedness against COVID-19, health statuses of employees, access to medical care, and concerns about COVID-19 due to differing rates of infection across the country. Third, there is likely a selection bias. Our response rate was 49%, and survey participants were mostly obtained from a pre-existing list of dairy farms who had previously or were currently involved in health and safety training for immigrant dairy workers. It is possible that our respondents were producers who were already more interested in worker health and safety compared to non-surveyed farms and represent the "best" safety conditions, while conditions on farms that were not interviewed may have been worse. Finally, our survey included five open-ended questions and two multiple-choice questions with an option for an open-ended answer (if respondent selected "other"). In a short phone survey, it is possible that respondents may have omitted answers, because they did not have time to consider their responses.

Conclusions

In response to the COVID-19 pandemic, dairies have implemented or increased a number of biosecurity measures to support the health and safety of their workers. Many dairies are implementing social distancing measures, increasing the use of PPE, and frequently cleaning and disinfecting common surfaces. There is a need for better mentoring and support to implement practical applications to reduce disease transmission on farms; our recommendations include mandatory face masks whenever indoors or when outdoors if social distancing is not possible, an isolation protocol if a worker becomes ill, and a daily health screening questionnaire to monitor workers for symptoms of COVID-19. Additional resources to support prevention practices, especially those translated in appropriate languages, is needed as the pandemic continues. In addition, local health departments are valued resources. It is important to engage and partner with local health departments in supporting our rural communities. Overall, our data suggest dairy farms in Minnesota and Wisconsin have implemented biosecurity and safety measures in response to COVID-19 during the early phase of the pandemic, though improvements can be made. As the pandemic continues, additional resources are necessary to support producers, their workers, and their families.

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