MICHIGAN State FACE Program
Fatality Assessment & Control Evaluation

Michigan State University
Department of Medicine • Occupational and Environmental Medicine
909 Fee Road, 117 West Fee Hall • East Lansing, MI 48824 • 1-517-353-1846 • https://oem.msu.edu

REPORT#: 18MI055 **REPORT DATE:** 3/9/20

Dairy Farm Worker Mauled by Dairy Cow or Bull

INCIDENT HIGHLIGHTS

DATE:
Spring 2018

TIME:
Between 8:30-9:30 a.m.

VICTIM:
Farm laborer in her 60s

INDUSTRY/NAICS CODE:
Agriculture/11

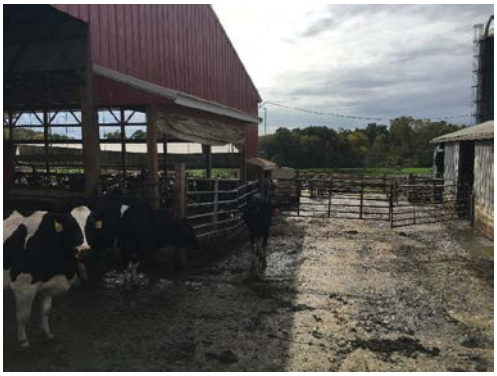
EMPLOYER:
Dairy Farmer

SAFETY & TRAINING:
On-the-Job

SCENE:
Penned area for cows

LOCATION:
Michigan

EVENT TYPE:
Animal/Stuck By



SUMMARY

In Spring 2018, a female farmhand in her 60s died when she was struck/pinned by dairy cows and/or a bull while moving them from a freestall area. One side of the freestall had a curtain/canvas that had not yet been rolled up and was in the down position. On the curtain side were stalls in which the cows could lay down. The farm owner was working on the opposite side of the curtain, approximately 25-30 feet away. The decedent was moving the animals so she could scrape manure from the pen floor. The owner heard the animals rushing/moving forcefully and went to the pen to determine what was causing the commotion..... READ THE FULL REPORT> (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Bull roaming freely with dairy cows
- Worker entered stall to encourage reclining cows to stand and exit stall
- Possible underestimation of bull and cow aggressive behaviors
- Working alone

LEARN MORE> (p.8)

RECOMMENDATIONS

MIFACE investigators concluded that, to help prevent similar occurrences, employers should:

- Establish worker rules/procedures and acceptable work practices for anyone (employee & family) working around dairy animals specific to the farm operation.
- Train workers/family members to recognize animal health issues and attack scenarios and behaviors.

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Michigan Fatality Assessment and Control Evaluation (FACE) Program

MIFACE (Michigan Fatality Assessment and Control Evaluation), Michigan State University (MSU) Occupational & Environmental Medicine, 909 Fee Road, 117 West Fee Hall, East Lansing, Michigan 48824-1315; http://www.oem.msu.edu.

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SUMMARY

In Spring 2018, a female farmhand in her 60s died when she was struck/pinned by dairy cows and/or a bull while moving them from a freestall area (where the cows eat and stay when not being milked). The freestall area had a roof and walls open to the outdoors. One side of the freestall had a curtain/canvas that had not yet been rolled up and was in the down position. On the curtain side were stalls, separated by stanchions in which the cows could lay down. The farm owner was working outside of the freestall area, on the opposite side of the curtain, approximately 25-30 feet away. The decedent was moving the animals so she could scrape manure from the pen floor. The owner heard the animals rushing/moving forcefully and went to the pen to determine what was causing the commotion. The owner found the decedent lying face down in one of the stalls located near the pen opening. The sequence of events was unknown; it was thought she was struck/pinned by a cow or the bull.

INTRODUCTION

In Spring 2018, a female farm laborer in her 60s died when she was struck/pinned by dairy cows and/or a bull while moving them from a freestall area. MIFACE learned of this incident upon receiving notification from MIOSHA. MIFACE personnel contacted the farm owner who agreed to be interviewed. The MIFACE researcher traveled to the farm. MIFACE reviewed the death certificate, police and medical examiner reports, and the MIOSHA file during the writing of this report. Pictures used in the report are courtesy of the MIOSHA compliance officer, Google maps, and the MIFACE researcher.

EMPLOYERS

The farm owner started the dairy farm with his brother in the mid-1950s. The owner's brother left the business and the owner kept the dairy. The dairy farm had 140-150 milk cows and a bull used for insemination.

Four individuals worked on the farm: the owner, his son, and two farm laborers, one of whom was the decedent. The farm owner had many years of farming experience. The owner also farmed approximately 700-800 acres, growing hay, corn, wheat and soybeans. He also leased several fields. He grew feed for his cows.

The father/son team also owned a trucking business.

WRITTEN SAFETY PROGRAMS and TRAINING

The farm did not have a written health and safety program. There were no written safety rules and procedures in place for the specific task being performed nor were there written procedures for any task on the farm. The farm owner had not attended any safety training programs offered by agricultural groups. There was no designated person in charge of safety. There was no health and safety committee. The farm owners had never held a safety meeting with their employees nor provided formal safety training. Per the employer "everything was learned by "trial and error" on the job." The owner stated he told the decedent that she should not "leave her back to the animals." There was no written disciplinary procedure for health and safety violations. There dairy farm had not designated anyone to be a "supervisor".

The owner's son indicated that when moving cows, one should not get in the same stall that the cow was in but encourage the cow to get up from an open stall next to the cow. The son could not remember if that specific instruction was given to the decedent.

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WORKER INFORMATION

The decedent had approached the owners about a job while the owner and his son were in a field harvesting hay. They were running behind, and the decedent, who was riding her bicycle, stopped and asked if they needed some help. She indicated she could drive a truck. The owner took her up on the offer, and the decedent became a laborer on the farm.

According to the employer, the decedent was raised in a farm family. The owner and son both thought the decedent had been raised around animals and grain but was not sure what type of animal. She had been a school teacher, then a training manager and eventually retired from an international shipping company. For three years after retiring, she returned to the international shipping company during the holiday season.

She was a non-union, hourly worker at the dairy farm and had been employed part-time by the farm for 5-7 years. Her work-shift was usually 5pm-10pm on most days of the week. She had been working approximately 2 hours on the day of the incident. Her job responsibilities included feeding calves, moving cows from one barn to another and/or to the milking parlor and scraping manure. The decedent did not participate in the milking. When necessary, the decedent would work longer hours and more days per week; for example, she would drive the silage truck during harvest and work in the fields. There was no recent shift change and she did not work for another employer.

In addition to working with the cows, the decedent also drove a truck for the trucking firm owned by the father/son. The decedent also assisted the farm owner and his son with shopping and preparing meals.

On the day of the incident, the decedent was dressed in blue jeans, black boots, white socks, a teal shirt and a gray sweatshirt.

The second farmhand was loading feed and not within sight of the decedent. The farmhand indicated it was common for the decedent and himself to be in the freestall pen with the bull. He indicated that the bull had not been aggressive before, but that “You have to pay attention if there is a cow in heat. You can tell that the bull does not want you around”. Per this farmhand, the decedent also knew this.

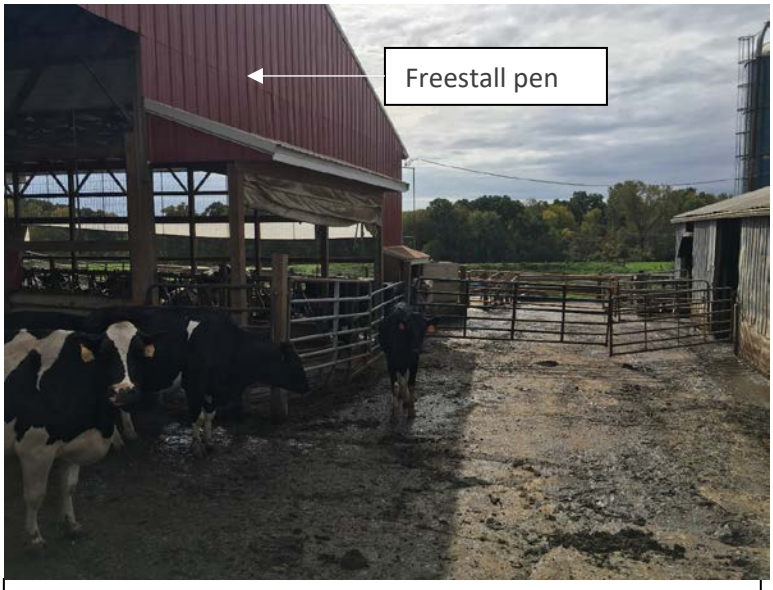

Photo 1. Incident area

INCIDENT SCENE

The incident scene was a freestall (penned) area (Photo 1). It had a solid wood roof and each of the sides of the freestall had two sets of curtains as a wind break. There was an upper set of curtains and a lower set. On the day of the incident, the upper set of curtains had been opened, but the lower set were still in place. During the afternoon, a storm front moved through the area with light rain and wind gusts ranging from 23-31 mph.

The pen had been updated to include 4x7 stalls for the cows to rest with metal stanchions separating one stall from another. On the other side of the pen, were wood slats acting as a wall between an open area between the pen and a nearby building; feed was distributed into troughs for the cows to eat. The owner indicated that they tried to get as many bedding areas as they could in the freestall pen.

WEATHER

The responding police department report reported the weather conditions at the time of the incident as cloudy, Temperature: 56^0 F, Heat Index: 56^0F, Dew Point 36 Humidity: 47%, Pressure: 29.95, Visibility: 10 miles Wind: 8 mph from the west.

INVESTIGATION

The farm used a bull for insemination that roamed freely among the cows. According to the farm owner and his son, the bull had not been a "problem" in the past; The bull had not shown any prior signs of aggression toward humans nor signs of illness or disease. The farm owner did not keep records of which cows were in estrus.

On the day of the incident, the decedent was performing one of her daily tasks, moving 45 cows that were inside of the freestall pen to another area to get them ready to be fed in another building. After the cows were moved, the decedent scraped manure from the freestall pen. Each cow weighed approximately 1,000-1,200 pounds. She was working alone; no one was within visual or verbal contact with her at the time of the incident.

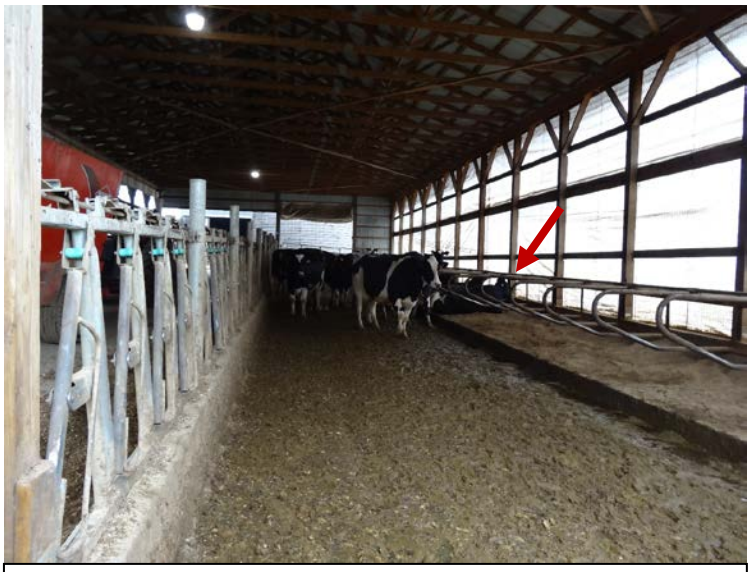

Photo 2. View looking into freestall pen. Red arrow denotes cow laying down in 6th pen where the decedent was found.

According to her employer, the decedent did not use any type of equipment like a cattle prod, etc., to move the animals. The owners indicated she was like a "cow whisperer"; she was very gentle with the animals. The owners indicated she knew how to approach the flight zone of the cow to initiate the desired movement. The owners also indicated she would "holler" at them.

The owner, who was working approximately 25-30 feet away outside of the freestall pen "heard a little more noise than usual" while the decedent attempted to move the cows (Figure 3). He did not hear her call for help nor did he hear any sign of distress from her. When he heard the excessive "scurrying" noise, he shut the gate and went to the freestall pen.

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He saw the decedent in the 6th stall from the end, laying with her head toward the curtain. He yelled out to her. When she didn't respond, he yelled for his son.

His son arrived at the incident scene and asked his dad if he called 911. The owner had not, so the son called 911. The 911 operator instructed the son, who did not know CPR, to begin CPR based on 911 operator instructions while awaiting EMS, who arrived within 5 minutes of the call. The son instructed the farm's hired hand to stand by the road to direct EMS to the incident scene. The EMS personnel took over the resuscitative efforts upon arrival. She was declared dead at the scene.

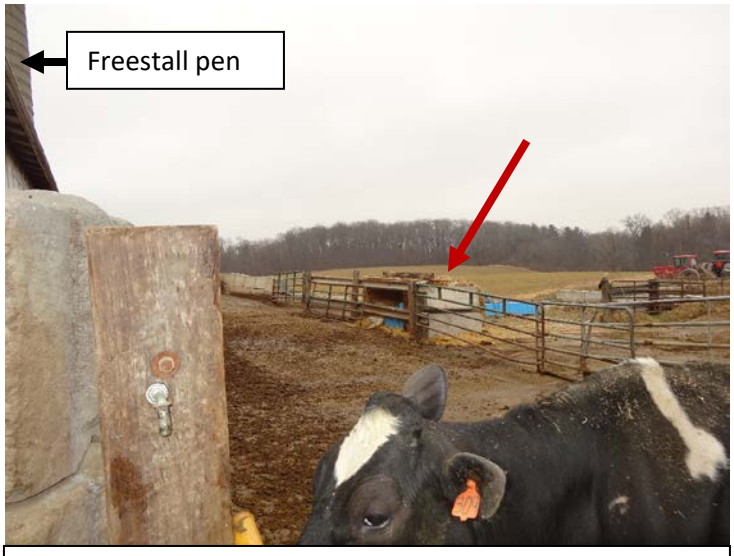

Photo 3. Red arrow shows gate location where owner was working.

Autopsy revealed bruises to the left lateral chest, back, and legs and an abrasion to the abdomen. Internally there were multiple bilateral posterolateral rib fractures, bilateral collapsed lungs with contusions and lacerations of all lobes, a displaced T7 vertebral body fracture with transection of the spinal cord, lacerations of the spleen, liver and pericardial sac, epicardial hemorrhage and right frontal and right occipital subgaleal hemorrhage.

The incident was unwitnessed. Possible injury scenarios include: a) The worker was attacked by the bull (unpredictable bull behavior or a cow may have been in estrus and the bull was protective of the cow) or, b) the decedent went into the stall attempting to move a stubborn cow laying on the ground and was struck and pinned against a stanchion by the cow which was trying to get up. When the worker fell to the ground, the cow may have panicked and mauled the worker or, c) while moving cows, she inadvertently entered the flight zone of another cow which pushed her into a stall and was trampled by the frightened cow.

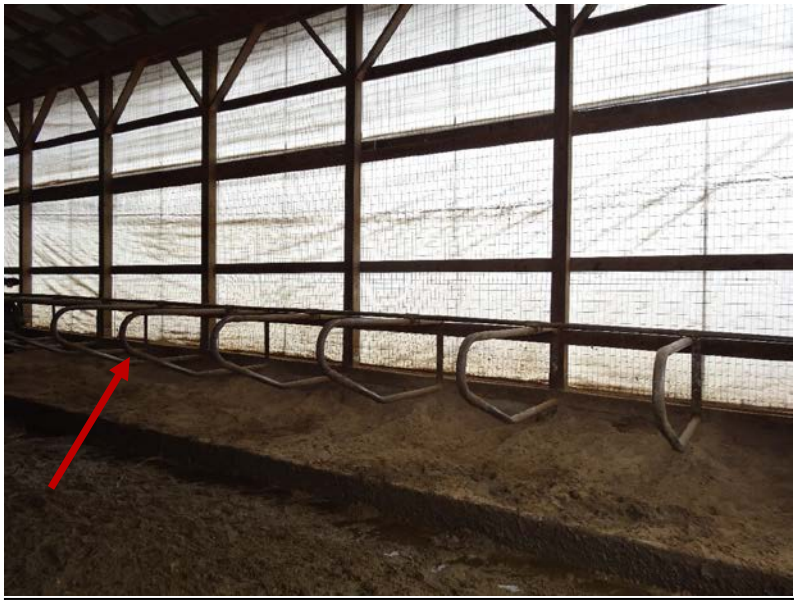

Photo 4. Decedent's location when found

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MIOSHA Citations

MIOSHA General Industry Safety and Health Division issued the following Other-than-Serious violations and Safety and Health Recommendation to the employer at the conclusion of its investigation.

OTHER THAN SERIOUS**:** 408.22139(1): ADM PART 11, RECORDING AND REPORTING OF OCCUPATIONAL INJURIES AND ILLNESSES:

> Basic requirement. Within 8 hours after the death of any employee from a work-related incident or the inpatient hospitalization of 3 or more employees as a result of a work-related incident, you must orally report the fatality/multiple hospitalization by telephone or in person to the Michigan Department of Consumer and Industry Services, Bureau of Safety and Regulation, State Secondary Complex, 7150 Harris Drive, Lansing, Michigan, phone 1-800-858-0397.
>
> A fatality was not reported within 8 hours of occurrence after an employee was fatally injured while working in the penned in area behind the barn

OTHER THAN SERIOUS: 408.22311(1): ADM PART 13, INSPECTIONS AND INVESTIGATIONS, CITATIONS, AND PROPOSED PENALTIES:

> Each employer shall post a notice to be furnished by the department, informing employees of the protections and obligations provided for in the act, and informing them that, for assistance and information, including copies of the act and of specific safety and health standards, employees may contact the department. The notice shall be posed by the employer in each establishment in a conspicuous place where notices to employees are customarily posted. Each employer shall take steps to insure that the notice is readable and is not altered or defaced.
>
> There was no posting in the workplace informing employees of their obligations and protections under the MIOSHA Act.

OTHER THAN SERIOUS**:** 408.1014j: ACT 154, MICHIGAN OCCUPATIONAL SAFETY AND HEALTH ACT:

> An employer subject to the standard incorporated by reference in section 14a and to sections 14b and 141 shall post signs throughout the workplace advising employees of all the following:
>
> (a) The location of the safety data sheets for the hazardous chemicals produced or used in the workplace and the name of the person from whom to obtain the sheets.
>
> (b) That the employer is prohibited from discharging or discriminating against an employee who exercises the rights regarding information about hazardous chemicals in the workplace afforded by the standard incorporated by reference in section 14a and by sections 14b to 141.
>
> (c) That, as an alternative to requesting the employer for a safety data sheet for a hazardous chemical in the workplace, the employee may obtain a copy of the safety data sheet from the department of licensing and regulatory affairs that has the responsibility of responding to such requests.

There was no Right To Know posting in the workplace informing employees of the location of information on Hazardous Materials in the workplace.

Safety and Health Recommendation

Discuss with and train employees on the following cattle related safety information published by Federal OSHA:

Cattle Handling Safety

Dairy bulls account for numerous farm related fatalities and injuries.

- Avoid quick movements or loud noises. Cattle have close to 360-degree panoramic vision. A quick movement behind cattle may "spook" them. They also have sensitive hearing and can detect sounds that human ears cannot hear.
- Be patient; never prod an animal when it has nowhere to go.
- Move slowly and deliberately around livestock; gently touch animals rather than shoving or bumping them. Don't shout.
- Always have an escape route when working with animals in close quarters. Alleys and chutes should be wide enough to allow animals to pass, but not wide enough to let them turn around.
- Most animals tend to be aggressive when protecting their young; be extra careful around cows with newborn calves.
- Bulls of breeding age are very dangerous. Use special facilities for them and practice extreme caution when handling them. Separate them out from groups before working extensively in a pen with other cattle. Never trust them or assume they are tame.
- Keep young children away from animal handling areas.

CAUSE OF DEATH

The death certificate listed the cause of death as multiple traumatic injuries (blunt trauma inflicted by large farm animal). Post-mortem toxicology was negative for alcohol, illegal drugs, prescription medication, and over-the-counter medications.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. The following hazards were identified as key contributing factors in this incident:

- *Bull freely roaming with dairy cows*
- *Worker entering stall to encourage reclining cows to stand and exit stall*
- *Working alone with bull in dairy cow freestall area*
- *Cubicle design/freestall design may not have had room for cow movement and employee escape*
- *Possible employee complacency when working around the animals and/or underestimated/was distracted by other animal behaviors*

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Establish worker rules/procedures and acceptable work practices for anyone (employee & family) working around dairy animals specific to the farm operation. One work practice should be that workers prompt animal movement from the resting position in a partitioned freestall from an empty freestall next to the animal being directed.

Discussion: The farm owner and his son indicated they had not observed her entering a freestall, but that she normally worked alone, so they were not sure that she hadn't done this in the past. Entry into the partitioned freestall from the rear of the animal should not occur. This entry choice puts the worker at higher risk and could alarm/frighten the cow. A worker stumbling, slipping or a sudden movement near a dairy animal can cause the kicking reflex. A worker in close proximity could be struck, trampled or mauled by the animal. Also, a reclining cow could slip when getting up from a resting position. If a worker is between the animal and a freestall partition, then a crushing injury, including a fatality, could result.

The Do's & Don'ts for each process of the movement and flow of animals into and out of the freestall area needs to be analyzed, detailed into procedures performed by a worker, and charted or documented for consistent training of current/future workers. A simple 3"x 5" card story board of procedures can be developed over a year of activity, accounting for seasonal and environmental changes. New or changed procedures can be worked into an animal "best practice (standard operating procedure (SOP)). Communication of safe work around animals and animal handling is key for worker competency and safer work.

Farms should document when training (i.e. reviewing rules/procedures/work practices) for all workers, but especially for newly hired workers with little farm and/or animal experience. Additionally, new workers could be assigned to an experienced mentor for a month or two.

Recommendation #2: Train workers/family members to recognize animal health issues and attack scenarios and behaviors.

Discussion: Animal health can complicate animal handling and movement with certain health conditions, including, but not limited, to "milk fever". Milk fever (or hypocalcemia) is the result of a reduction of blood calcium in the early stages of lactation. Per Penn State publication "Troubleshooting Milk Fever and Other Downer Cow Problems", the three stages of milk fever are described: "Milk fever is divided into three stages based on clinical signs. Stage I milk fever often goes unobserved because of its short duration (< 1 hour). Signs observed during this stage include loss of appetite, excitability, nervousness, hypersensitivity, weakness, weight shifting, and shuffling of the hind feet". The clinical signs of stage II milk fever can last from 1 to 12 hours. The affected animal may turn its head into its flank or may extend its head. The animal appears dull and listless; she has cold ears and a dry nose; she exhibits incoordination when walking; and muscles trembling and quivering are evident. Other signs observed during stage II are an inactive digestive tract and constipation. A decrease in body temperature is common, usually ranging from 96°F to 100°F. The heart rate will be rapid exceeding 100 beats per minute." Stage III milk fever is characterized by the animal's inability to stand and a progressive loss of consciousness leading to a coma. Heart sounds become nearly inaudible and the heart rate increases to 120 beats per minute or more. Cows in stage III will not survive for more than a few hours without treatment.

In this incident, it is undetermined if any animal health issue was involved with this fatality. Freestall dairy housing complicates specific cow identity; difficulty can arise when assessing herd health, such as early stages of milk fever or early stages of estrus. A number of physical and behavioral signs may indicate that a cow or heifer is in or near estrus. Most workers and family would be familiar with some of the physical signs, such as mucus discharge. Other cow estrus behaviors may be more challenging to observe, such as standing for mounting by a bull, standing for mounting by another female, being mounted by another female but moving away rather than standing, attempting to mount another female, restlessness, persistent licking or sniffing other animals, chin pressing on rump or back of another animal, etc. Training workers and family members to recognize common health problems, such as milk fever, and stages of estrus in dairy cows would not only assist in maintaining herd health, but also worker safety.

Temple Grandin, a noted animal behavior expert, offers several observations regarding dairy bulls, how humans should interact with them, and their management on dairy farms. Dairy bulls have been identified as more aggressive and likely to attack compared to beef bulls. Dairy bulls that are individually bucket fed are often more dangerous than beef bulls raised with the cow or in a herd. There is no such thing as a totally safe bull, but the risk of an attack can be reduced with proper management. When dairy calves are six to eight weeks old, they should be put in group pens. If there are no bull calves available for pen mates, a young bull should be raised with steer calves that are older and heavier. To further reduce the danger, dairies that use bulls should consider raising bull calves on a nurse cow. Raising bull calves on a nurse cow will imprint them more strongly to their own kind and further reduce the tendency to attack.

Workers and family members should be instructed to never play butting games with calves and never allow a bull calf to push his head up against them. The bull should be told to get back. An individual should stroke the bull under the chin, on its rear or on the withers (shoulder) – not on the head/forehead. Applying pressure on this area will encourage butting. A young bull can bond so well with its human handlers that he "forgets he is a bull" causing him to challenge or dominate his herd mates (handlers) when he matures.

It is important that workers and family members receive training on cow and bull behavior patterns, and the behavioral precursors to aggression and/or attack.

Cattle have wide range panoramic field of vision and can see, and be stimulated by, movement or activities to the side and rear of them. Sudden jerky movements, quick movements, and sudden intermittent or high pitch noises can startle them. Cows, steers, and calves commonly respond to handlers or stimulus based on the type of stimulus to the animal's "flight zone" (i.e., personal space). Staying outside an animal's flight zone causes cattle to stop and turn toward the handler or perceived predator. Animals that are fearful or approached head-on have larger flight-zones. Invading the flight zone causes animals to turn and move away from the handler (or predator). This is a natural predator-avoidance, or fear-based response, and understanding of the flight zone can be used to effectively herd animals when the handler moves ahead or behind the animals "point of balance" – an imaginary line drawn perpendicular to the body, at the shoulders. Being separated from herd mates causes cattle to become agitated.

Male aggressiveness is unrelated to fear-based response described above. Aggressive behavior of mature bulls is based on asserting dominance over a perceived rival (another bull or a human) in the bull's cow herd. A dominant bull will try to chase away smaller or subordinate rivals from cows the bull wants to breed; bulls raised around humans perceive humans as their subordinate rivals. A bull is more likely to attack a handler if the handler has the scent of another subordinate male on them. From the bull's perspective, humans that bend low or kneel may be perceived as assuming a threatening

pose. Humans that physically position themselves (knowingly or unknowingly) between the bull and a receptive cow (in estrus) are viewed as a rival and are at risk for attack.

Dairy farmers should be aware of signs indicating risk of attack:

- Bulls often do not look at a person prior to charging.
- Bulls perform a 'broadside threat' before attacking – by turning sideways to expose it's full size to the rival, it may lower its head and turn it toward the rival, and flex its neck muscles to show its strength. Showing broadside threat is a warning of a bull attack.
- When a bull faces its "threat" head on, it will normally lower its head and may paw or stomp the ground, or jab its horns at the ground before charge. Bulls may or may not make snorting or vocalizing noises prior to attacking.

When a bull shows threatening behavior, the safest response by anyone in danger is to move your head as if to look away from direct eye contact (but still keep watch on the bull) and slowly back away. One should never turn their back on a bull. In this incident, it is unknown if the decedent was audibly warned, and was not aware of, or observing, the bull's behavior to know she was at risk.

Several scenarios may have occurred. The worker may have been positioned between the bull and a cow in estrus, without realizing it, and thus unknowingly provoked the bull's response. The worker may have tried to interrupt a breeding activity to herd the cow to the parlor. Another scenario is that the bull may have been showing dominance behavior or may have just been trying to be "playful". And something as small or innocuous as a bird flying in the barn may have startled the cow or bull, causing it to panic.

Recommendation #3: Ensure the freestall design permits cows to easily stand up when lying down in the stall to avoid animal handling & comfort issues and provides worker escape routes.

Discussion: Dairy operators should check the cow spacing/area for each freestall to avoid animal handling & comfort issues. It is unknown if, while in the individual freestall, the cow had difficulty rising from a recumbent condition due to the design of the freestall. Several sources of information can be utilized in designing a new or retrofit freestall area:

- Dairy Freestall Housing and Equipment. MidWest Plan Service, MWPS-7 Seventh Edition, 2000.
- Remodeling Your Dairy – Cost Effective Facilities. Iowa State University Cooperative Extension.
- Cow Comfort Issues in Freestall Barns. Roger Palmer and Brian Holmes, University of Wisconsin-Madison.

A flow chart for evaluating freestalls can be found in Code of Practice For the Care and Handling of Dairy Cattle, National Farm Animal Care Council, Canada.

When planning dairy facilities, producers should also include a secure holding area where the bull can be routed and held during milking and accessible escape routes or protected areas, such as passage gates for working in close quarters with livestock.

Recommendation #4: Workers should not be permitted to be in a pen with a bull alone and should maintain constant awareness of the location and behavior of bulls when entering a holding pen.

Discussion: It was unknown if it was a usual work practice to be in the pen with the bull while working alone. As there had been no previous incidents, there was an expectation that there would not be an aggressive attack by the bull. Although it was unknown whether the bull was involved in the attack, due to the unpredictable nature of a bull, and the job responsibilities of the decedent in the freestall area, her attention was, most likely, on the task at hand, not on the bull and its behavior. If a worker is in a pen with a bull, it is recommended that another individual trained in animal behavior and attack scenarios be present to watch the bull and to alert the individual working if attack behaviors are exhibited so both individuals can retreat safely.

Recommendation #5: Consider using artificial insemination, not a natural service bull, to impregnate cows.

Discussion: The farm owners used a natural service bull. Artificial insemination relies upon effective estrous synchronization programs. In recent years, new technologies result in improvements to traditional reproductive management (e.g., heat detection and artificial insemination) and approaches synchronizing timed artificial insemination programs achieving improved reproductive success. A focused effort on reproductive management has been shown to increase pregnancy rates, translating to greater reproductive efficiency on the dairy. Removing a safety hazard, such as a breeding bull, increases worker safety while working with farm animals. If a bull is used, it should be culled if it begins to show aggressive behaviors and replaced with a younger bull that doesn't have this problem.

Recommendation #6: Farm employers should develop a written farm safe operating procedures (SOPs)/safety rules as part of a safety program and provide employee training regarding both the safety rules and the safety program.

Discussion: The farm did not have a written safety program nor written safety rules and/or standard operating procedures. Safety and health written programs can establish and provide procedures, guidelines and documentation for safety practices such as equipment inspection, job task safety, and safety training. There is no legal requirement in Michigan for a written safety plan in agriculture. A written safety plan can help identify factors that can contribute to an injury, illness, or fatality. In some fatal work-related events, there is a single cause of the fatality. More commonly, there is a combination of factors which contribute to an injury or death.

MIFACE recommends a written safety plan. Such a plan would identify the safety and health hazards for the farm, so hazard controls could be developed. A safety plan which is communicated to all who work on the farm would help raise awareness of safety issues and promote safe work practices. Additional benefits include increasing work efficiency, and minimizing costs. If there are employees, a written farm safety plan might reduce worker compensation premiums. A safety plan should include work rules, such as how to move cows within a confined area like a freestall pen and always working in twos when moving cows.

Because each farm is unique, it may be difficult to find a template that exactly matches the farm's enterprises. There are multiple resources a farm owner can utilize to begin development of a farm safety and health program. Among them are:

- Farm Safety Handbook Template from Rural Mutual Insurance focuses on policies and training for employees.
- Farm Safety Plan - a customizable handbook from the Agricultural Health and Safety Network in Canada. The Handbook includes Farm Safety Mapping, information about Personal Protective Equipment (PPE), and employee training.

- Farm Safety Starter Guide from Australia provides templates for farm hazard mapping and examples and templates for risk assessment.
- Safety Resources from Michigan Farm Bureau's Agricultural Labor and Safety Services (ALSS) program. ALSS has many farm-related safety topics, including farm hazard assessment checklists, emergency preparedness plans, and links to other farm safety issues.
- Farm Safety Series developed by the University of Idaho Extension Service. Fifteen fact sheets are in both English and Spanish and are designed to help farm and ranch managers conduct employee training on health and safety topics.

ADDITIONAL RESOURCES

- Grandin, Temple. Understanding Flight Zone and Point of Balance for Low Stress Handling of Cattle, Sheep, and Pigs (Revised June 2015). Dept. of Animal Science, Colorado State University. http://www.grandin.com/behaviour/principles/flight.zone.html
- MIFACE Investigation Report #14MI014: Dairy Farm Worker Mauled by Either a 2-Year-Old Bull or Dairy Cow Attack. https://oem.msu.edu/images/MiFACE/14MI014.pdf
- MIFACE Hazard Alert: Safe Animal Handling to Prevent Farm Injuries and Deaths. https://oem.msu.edu/images/Alerts/AnimalHazardAlert.pdf
- Farmer dies from injuries after being attacked by bull. Iowa FACE Case No. 2011 IA 043 Report Date: 22 October 2012. http://www.cdc.gov/niosh/FACE/pdfs/11IA043.pdf
- Stafford, Kevin. Cattle Handling Skills. ThinkSafe. http://www.acc.co.nz/PRD_EXT_CSMP/groups/external_ip/documents/publications_promotion/wim2_065192.pdf
- Dairy Cattle Reproduction Council, 1800 S. Oak, Suite 100 | Champaign, IL 61820. http://www.dcrcouncil.org/newsletters/reproductive-management.aspx.
- Two Farmers/Brothers Killed By Young Bull. Iowa FACE Case No. 00IA055. http://www.cdc.gov/niosh/face/stateface/ia/00ia055.html

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REFERENCES

MIOSHA standards may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (LARA) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Licensing and Regulatory Affairs, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- MIOSHA Administrative Rule Part 11 - Recording And Reporting Of Occupational Injuries And Illnesses
- MIOSHA Administrative Rule Part 13 - Inspections and Investigations, Citations, and Proposed Penalties
- Act 154, Michigan Occupational Safety and Health Act
- Troubleshooting Milk Fever and Other Downer Cow Problems. Penn State University Extension. http://extension.psu.edu/animals/dairy/nutrition/nutrition-and-feeding/nutrition-and-health/trouble-shooting-milk-fever-and-downer-cow-problems
- Dairy Freestall Housing and Equipment. MidWest Plan Service, MWPS-7 Seventh Edition, 2000. http://www.public.iastate.edu/~mwps_dis/mwps_web/87zgGwEKj.QDg.pdf
- Remodeling Your Dairy – Cost Effective Facilities. Iowa State University Cooperative Extension. https://www.extension.iastate.edu/sites/www.extension.iastate.edu/files/dubuque/RemodelingDairyFacilities.pdf
- Code of Practice For the Care and Handling of Dairy Cattle. National Farm Animal Care Council, Canada. http://www.nfacc.ca/pdfs/codes/dairy_code_of_practice.pdf
- Cow Comfort Issues in Freestall Barns. Roger Palmer and Brian Holmes, University of Wisconsin-Madison. http://manitowoc.uwex.edu/files/2011/10/Cow-Comfort-Issues-2005-Dairy-Road-Show-12-9-04d1.pdf

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