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Initiation of a Roundtable Meeting to Determine Safety Hazards and Provide Education to Range Bison Herd Workers

Lucia Finocchiaro
University of Nebraska Medical Center

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Abstract

This capstone project serves as an important piece of greater project studying bison handling. Bison production is both a growing and dangerous industry. As a new enterprise in many parts of the country and on tribal lands, significant numbers of untrained employees may be hired. This project undertakes methods to better understand the risks associated with bison handling and to thereby improve handling procedures and increase safety. Herd managers (from tribal and non-tribal sites), researchers, safety experts, and stakeholders were brought together for a roundtable meeting in Omaha. This meeting was designed to provide stakeholders a forum to discuss common safety concerns, present data collected from the research, and discuss best practices for protecting bison herd workers. The data collected at the meeting showed that experiential training through in-person interaction and videos were the most preferred tools for implementing worker orientations. Rather than focusing on purchasing proper equipment, workers preferred education on low-cost methods such as walkthroughs, training on low-stress handling, and the establishment of a safety culture

Introduction

Bison production in the United States is increasing due to a rising demand for bison meat and the re-establishment of Native American bison herds, resulting in an increase in exposure risk to workers However, few efforts to date have addressed health and safety issues of bison herd work. Workers often have little to no training on safe handling of these animals. Furthermore, poor working conditions including adverse weather and substandard facilities put these workers at high risk for injury (Centers for Disease Control and Prevention [CDC], 2015). There is a gap in knowledge of safety practices and facilities in handling bison.

This capstone project is part of a larger research project, *Enhancing the Health and Safety of Range Bison Herd Workers*, funded by the Central States Center for Agricultural Safety and Health (CS-CASH) through the National Institute of Occupational Safety and Health (NIOSH) in collaboration with the University of Nebraska – Lincoln School of Veterinary Medicine and Biomedical Sciences. The larger project studies the worker safety and health hazards of tribal and non-tribal herd sites, and is a continuation of the pilot project, *Assessment of Tribal Bison Worker Hazards Using Trusted Research Facilitators*. It seeks to determine risk factors that lead to injuries within bison herd workers and develops safety and health interventions based on these. The research project is currently in its third of five years. As part of this project, safety hazards on tribal and non-tribal herds are compared yearly, a model bison handling facility is being developed, best practices for safe bison handling will be established, yearly workplace safety assessments are conducted, and trainings for herd managers and workers are offered.

This project will bring together leaders in the bison industry through a roundtable meeting where they will received education and safety resources. In addition a discussion will be held on bison worker safety in which qualitative data will be collected. Bison workers present at the roundtable will also fill out a survey to give a better understanding of the risks associated

with bison handling, fill out an evaluation of the roundtable meeting to see if this is an effective method for future bison worker safety and health education.

Literature Review

Agriculture is one of the most dangerous industries in the United States with a reported fatality rate of 21.4 deaths per 100,000 workers (CDC, 2018). Animal production worker injury rates were 6.7 per 100 workers in 2011 (United States Department of Labor, n.d.). Handling animals within an agricultural operation doubles the risk of injuries to workers compared to those who do not handle animals (Sprince, et al., 2003; Browning et al., 2013).

This Capstone project addresses the issue of a lack of data, field research, and effective interventions regarding bison worker safety and health. . The bison industry is growing with Native American communities establishing new herds and an increasing demand for bison meat, but few efforts have addressed health and safety issues in bison herd work. Although livestock injuries and fatalities are recorded, bison are not included in this category. Untrained workers, poor working conditions, and lack of training on safe handling of livestock make this a particularly hazardous occupation (Duysen et al., 2017). This project will make strides in identifying the major hazards of working with bison and implementing new interventions to improve health and safety of bison herd workers. The roundtable meeting along with the collection and summarization of data will help in specifically identifying these issues and give direction for safety intervention to implement moving forward.

History of North American Bison

Over hunting nearly led to the extinction of North American bison in the 1800s. In the 1500's prior to colonization it is estimated that 30-60 million bison lived in North America. As America was settled farmers destroyed bison habitats, guns and railroads made hunting herds more accessible and increased trade made the selling of bison hides,

bones, and meat a profitable endeavor. By 1884 it was estimated that there were only 325 bison left in the United States, 25 of which residing in Yellowstone. Efforts began to preserve these animals and increase the bison population. In 1902, there was an estimated 700 bison in private herds. Seventeen years later the estimated population of North American bison grew to be over 12,500 (United States Fish and Wildlife Service, 2014**)**. These numbers would continue to grow. In 2018 the population of the Yellowstone herd alone was estimated to be over 4,500 with over 180,000 bison in private herds (United States Department of Agriculture: National Agricultural Statistics Service, 2017**).**

Bison Production

As modern day consumers redeveloped a taste for bison meat, farmers and ranchers noticed and increased investment in bison production. As a result bison populations have grown. Since 2012, the bison population on American ranches and farms has increased by 13.3 percent to 183,780. This has coincided with an increase in farm-gate value of bison and products by 26.7 percent from 2012 to 2017, topping over $120 million (United States Department of Agriculture: National Agricultural Statistics Service, 2017). Currently, the Food Safety and Inspection Service (FSIS) estimates an annual U.S. per capita consumption of 0.07 pounds per person (United States Department of Agriculture: Food Safety and Inspection Service, 2013).

Bison meat is currently gaining popularity due to its flavor and nutritional value. Compared to beef, bison meat is said to have a richer flavor with less fat and fewer calories (United States Department of Agriculture: Food Safety and Inspection Service, 2013) making bison an attractive substitute for beef. Each of these factors have led to towards increase in the raising and handling of bison.

Hazards of Working with Bison

Due to the growth of bison production, worker safety has become a concern. Although there is no standard tracking of injuries sustained during bison handling, historically bison have been involved in human related injuries. Between 1980 and 1999, bison caused more injuries to pedestrian visitors at Yellowstone National Park than any other animal (Cherry et al., 2016). Most of these injuries included bison charging and making contact with humans. While bison are similar in some ways to cattle, they have not been bred for docility in the same manner. Therefore existing livestock interventions do not apply when handling bison (Billings, 2018; Oliff & Caslick, 2003).

In addition to bison to human contact, there are many other hazards associated with handling. In a recent pilot project study examining tribal bison work hazards, major risks to workers included presence of dust during handling (Duysen et al., 2017). This is concerning as exposure to dust can contribute to the development of chronic obstructive pulmonary disease (COPD). COPD is the 2nd leading cause of death by disease in American Indians (Ford, Croft, Mannino, Wheaton, Zhang, & Giles, 2013).

Proper handling equipment is vital to ensuring the safety of bison workers. Due to the strength and unpredictable demeanor of bison, structures used for the corralling of cattle are not always adequate for containing bison. Duysen et al. (2017) found that hazards existed within the facilities because of problems with the integrity of the corral structures including substandard equipment and poor facility design. Many facilities had improper barriers in place to ensure that bison are unable to collide with workers after exiting the chute. Slip, trip, and fall hazards were present at many sites, perhaps due to adverse weather during fall and winter months when most round-ups take place. Personal

protection equipment (PPE) such as gloves and safety glasses were not worn by all workers. Baggie clothing was often worn and fire extinguishers were rarely present.

High-stress handling techniques can also lead to injuries among bison workers. High-stress handling entails using techniques that cause stress in the animals such as loud noise, hitting animals excessively, and moving them into inadequate facilities. Injury risks to humans and animals have proven to be higher when handlers use high stress techniques (Central States Center for Agricultural Safety & Health, 2016). Stressful techniques can include the use of ATVs to round up bison at high speeds. Panting during the handling process is an indicator that the animals may be experiencing stress, and therefore pose a greater danger to workers (Grandin & Shivley, 2015). During the preliminary research, panting was observed in corralled animals. Bison and worker injuries occurred during processing, with 30% of managers reporting incidents (Duysen et al., 2017).

Medication use and zoonotic disease transmission are additional safety and health concerns to these workers. It is recommended that bison be vaccinated for many of the same disease as cattle (Hagberg et al., 2006). Needle sticks are a health hazard for bison handlers, which can lead to the transmission of zoonotic disease. There are fifteen existing zoonotic diseases that can occur in bison including anthrax, brucellosis, cryptosporidiosis, dermatochalasis, Escherichia coli, giardiasis, leptospirosis, listeriosis, pseudo cowpox, Q fever, rabies, ringworm, salmonellosis, tuberculosis, and vesicular stomatitis (Pelzer, 2009).

Although there is a large amount of research on safety interventions during livestock handling, this research does not focus on bison (Billings, 2018; Oliff & Caslick, 2003).There is limited research available on the occupational safety and health risks

related to bison handling. Some research is available on bison handling, but most of this focuses on limiting injuries to the bison rather than workers (Lanier & Grandin, n.d.). There is little known research on interventions focusing on bison handler safety, although some preliminary research is available (Duysen et al., 2017).

If the market for bison meat continues to grow, as expected, it is vital that safe practices are surveyed, assessed, and implemented. This project serves as an important step in gathering regional bison workers to have a structured conversation and discuss topics on the current state of bison handler safety and future needs.

Methods

The goal of this study is to provide foundational information related to the safe handling of bison. The aims of this study are:

1. To determine the occupational safety and health hazards of tribal and non-tribal bison workers
2. To identify methods to decrease frequency of safety and health hazards of tribal and non-tribal bison workers

To achieve these aims, a roundtable meeting was planned to bring together bison handlers for an in-person, facilitated round table discussion, supplemented by surveys and an evaluation. The survey data were analyzed and will provide additional insight into the major themes discussed during the round table discussion.

Study Design

The purpose of this study was to collect and analyze input from regional bison handlers. To facilitate this qualitative and quantitative data were collected. Qualitative analysis was used to collect valuable information from discussion that took place during the roundtable, while quantitative data was collected through a survey given to bison handlers.

One Health

One Health is the concept that the health of humans is connected to the health of animals and the environment. This is a multidisciplinary approach to achieving the best possible health outcomes for people, animals, plants, and their shared environment (CDC, 2018). One Health relates to this study as bison and human safety and health are connected. Workers must ensure health and safety of the bison to maintain their own health and safety. For example, low-stress animal handling techniques can help to reduce injuries to workers since bison are more likely to move slowly and calmly. High-stress handling can lead to aggression in the animals which can lead to increased injuries amongst bison and bison handlers. Maintaining the health of a bison herd is vital to limiting the spread of zoonotic disease to workers. The environment is the third part of the One Health model. Inclement weather and presence of dust in the bison handling environment can add to stress and increase risk of injury to bison and workers alike (Lanier et al, n.d.). The study utilizes an interdisciplinary team consisting of researchers, veterinarians, bison workers, and bison managers to promote human and animal safety and health.

Sample Selection & Study Population

Deliberate sample selection is vital to any assessment. Due to the narrowly defined nature of this topic it was essential to target professionals with experience in bison handling as opposed to the handling of cattle. To do this purposive sampling was utilized. Purposive sampling targets subject matter experts which mitigates the risk that selection bias can play in results (Barbour 2001).

Invitations to a roundtable meeting for bison herd workers, managers, and veterinarians were sent out via e-mail and postal mail to 44 contacts who were known to

be associated with bison production. The meeting was presented as an opportunity for bison herd workers to receive education and have discussions on worker safety and bison herd health as well as contribute to a research project studying the health and safety of bison workers. Of the 44 invitees, 28 accepted the invitation and attended the meeting. Participants included veterinarians, herd managers, herd workers, professors, researchers, technology assistants, students, and others working in the bison industry or who were interested in learning about the bison industry. Of the 28 roundtable attendees, 16 were bison herd managers or had previous experience handling bison and were eligible to participate the Bison Worker Safety Hazards Survey. Roundtable attendees were represented by the following organizations:

- InterTribal Buffalo Council
- Oglala Sioux Parks and Recreation Authority
- US Fish and Wildlife Service
- The Nature Conservancy – Ordway Prairie
- Sitting Bull College
- Crane Trust
- American Bison Center
- Fort Peck Community College
- National Bison Association
- Konza Prairie Biological Station
- University of Nebraska – Lincoln
- University of Nebraska Medical Center

After the participants accepted the invitations, conversations were had with each of the participants who would be presenting to decide how best to format each

presentation. An agenda was developed to allow the proper time for each presentation along with time for breaks and discussion. Each participant was allowed a stipend provide travel, lodging, and meals during their stay. An Excel document was created to keep track of attendees who accepted the invitation, which organization they were from, how each attendee would be traveling, whether or not the attendee needed a hotel room, and contact information including e-mail address and phone number.

Survey Development

The Bison Worker Safety Hazards Survey (Appendix A) was developed at the start of the research project, *Enhancing the Health and Safety of Range Bison Herd Workers.* The same survey was used during this Capstone project to allow for consistency with the rest of the research project in which this is a part of.

Evaluation Development

The Bison Worker Safety & Herd Health Roundtable Evaluation (Appendix B) was developed as part of this Capstone project prior to the roundtable event.

Data Collection

The Bison Worker Safety and Herd Health Roundtable was held March 26, 2019. This was a one day event lasting about 8 hours. Several educators presented on topics such as herd health, research on low-stress bison handling research, bison round-up facilities, resources provided by the InterTribal Buffalo Council, worker orientation practices, and other topics.

Qualitative Data C*ollect*ion

A discussion of best bison worker practices was used to collect qualitative data. The discussion was recorded and several researchers took notes. The Roundtable Evaluation Survey (Appendix B) consisted of open-ended questions about what participants liked

best, what practices they had learned from the day that would be incorporated into their programs, and what suggestions they had to improvement. This survey contained one close-ended question asking if they would attend another event such as this in the future with three answer options (Yes, No, Not Sure).

The following questions were used to provide direction for the conversation:

- What do you believe are some of the biggest risks or causes of injuries amongst bison workers?
- What are some examples of low-cost methods that could be used to improve facilities?
- What do you believe are some of the best ways to train workers prior to a bison round-up? What types of personal protective equipment (PPE) are necessary to protect workers?
- What components of the facility or worker systems are most helpful in implementing low-stress handling techniques?
- What do you think are some of the most significant barriers in protecting bison worker safety and health?

Quantitative Data Collection

Participants were asked to fill out a survey about their attitudes and practices related to bison worker safety hazards. Participants filled out the Bison Worker Safety Hazards Survey. The Bison Worker Safety Hazards Survey (Appendix A) assessed the environment and facilities, worker attire, bison handling, animal behavior, injuries, and safe use of medications at each of the bison herd facilities. This survey utilizes close-ended questions with three answer options (Yes, No, Not Applicable) as well as close-ended questions with several other answer choices.

Program Evaluation

All participants filled out an evaluation to give feedback on the value of the Bison Worker Safety and Herd Health Roundtable.

Resources Provided

Safety resources were provided to the each herd manager and herd worker present such as a PPE kit which included gloves, a bison handling tailgate training safety handbook, hearing protection (disposable ear plugs as well as ear muffs), safety goggles and two different types of respirators. Each herd manager was provided with two comprehensive safety manuals: one produced by the National Bison Association and another produced by Alberta Agriculture: Food and Rural Development. Each participant was also provided with contact list of everyone who participated in the meeting so that participants could continue to network with others in the bison industry.

Data Analysis

Both qualitative and quantitative data were analyzed.

Qualitative AnalysisTo capture the most salient topics from the bison roundtable discussion this analysis utilized a coding method. The transcript from the roundtable discussion was combed through to identify and label topics that were discussed and which shared common meaning. First level and second level coding was used to first identify the common topics and second to categorize the topics into themes. To identify common topics to identify during first level coding process this analysis focused on topics that were related to the identification of frequent injuries, the events or actions which caused injuries, and safety tactics to decrease the likelihood of this from happening. This coding identified 14 key topics identified in Table 1. The second level of coding focused on identifying the commonalities among those topics and sorted them into one of

four categories: physical environment, common injury, training method, and personal behavior. These four categories provided the clarity required to assess the major topics of this analysis.

Quantitative Analysis

Due to the limited number of surveys answered the descriptive statistical analysis was used. The survey questions were all written as either single choice selection or multiple choice selection with an option for open ended responses. To assess the responses the mode was recorded. This method was selected to decipher which responses were most frequently selected by the survey responder.

Results

Describe the results; maximum of 3-5 tables or figures in text and any additional in appendix.

Survey Results

Each of the results of the survey questions can be seen in graph form in Appendix D. Results of the Bison Worker Safety Hazards Survey showed that 100% of participants believe that bison handlers are at risk of being injured while working with bison. However, 56.25% of participants stated that they conduct safety trainings while 44.75% do not. 81.25% believe there is a need for safety trainings for bison handlers. Participants thought it was most important to conduct safety trainings on topics such as how to maintain proper environment for low stress bison handling (81.25%), low stress bison handling techniques (81.25%), and safe use of animal medication (such as disposing syringes properly) (68.75%). Topics that participants identified as being of lesser importance to these trainings included proper PPE and safety equipment usage (43.75%) and ATV use (37.5%). Most participants state that they would prefer training manuals (68.75%) and distance learning for trainings (62.25), while others thought it would be helpful for a professional to come in and train handlers (43.75%).

When asked about the issue of shadows and improper lighting causing stress on bison and workers, 31.25% of participants stated that if proper lighting was available it would be used. 37.5% of responders also stated that slip, trip, and fall hazards were often unavoidable because round-ups take place outside. The same amount stated that there are not enough resources to eliminate slip, trip, and fall hazards, and more supplies and equipment (such as salt to melt ice on icy walking surfaces) are need to eliminate these hazards.

Handlers were informed that dust present at roundups can worsen existing lung conditions. When asked about the hazards of this, 37.5% stated that handlers know dust can be hazardous to their health, but do not take advantage of safety interventions (such as wearing PPE) to prevent possible adverse health effects. 31.5% said that handlers do not know dust can be hazardous to their health, and the same amount stated that there is nothing handlers can do to decrease the amount of dust present.

When asked about the issue of handling equipment that has fallen into disrepair or needs modification, 87.5% of handlers state that handlers are aware that the equipment needs repair and/or modification and do their best to make these repairs.

Survey results showed that 62.5% of the population believed that handlers do not know that a fire extinguisher should be present on the facility when handling bison. Additionally, 50% of participants stated that handlers do not know they should be wearing dust masks. 31.35% of participants stated that handlers know they should be wearing dust masks but do not care. 62.5% said that handlers do not know they should be wearing safety glasses. 31.35% stated that handlers know they should be wearing them but do not care. When asked about the importance of wearing gloves, 43.75% of participants stated that handlers know they should be wearing gloves but do not care.

In the Bison Worker Safety Hazards Survey participants about their opinion on low-stress handling techniques. A majority (62.5%) of participants stated that handlers do not know about low-stress handling techniques. 43.5% staid that handlers have been taught it is acceptable to use high-stress methods to move bison.

Participants were asked about the problem of bison handlers moving bison quickly, making excessive noise and slamming gates. In response, 43.75% stated that handlers do not know they should be doing these things. The same amount also stated that bison handlers have been taught it is ok to do this. However, 43.75% also stated that handlers know they should not be doing this things and take proper initiatives to avoid these situations.

When asked about the occurrence of worker injuries at roundups, 76.47% of participants stated that handlers know the hazards of working with bison and follow the rules to decrease these hazards.

Participants were asked about their opinion of ATV use on bison roundup facilities using the Bison Hazards Safety Survey. Results showed that 62.5% of participants believed that handlers know how to use ATVs and other off road vehicles safely and do their best to do so. 37.5% stated that handlers do not know how to safely use ATV and other off road vehicles.

When asked about the disposal of syringes and needs used at bison roundups, 68.75% of participants stated that handlers have knowledge of proper methods of disposal and follow these methods.

Results from Roundtable

During the roundtable discussion participants were asked what some of the most substantial risks or causes of injuries were amongst bison workers were. This qualitative data

summarized using coding. The below section identifies the first level and second level coded data from the roundtable discussion followed by an in-depth overview of the discussion:

Second Level Coding	**Common Injury**	**Personal Behavior**	**Physical Environment**	**Training Method**
First Level Coding (frequency)	Crushing of fingers/hand/arm (6)	Culture that glorifies danger (4)	Modifiable facility (4)	Low-stress animal handling “hands off approach” (12)
	Needle sticks (3)	Culture of respect and trust (5)	Use of electronic ear tags (4)	Walkthroughs/being prepared (being aware of your surroundings) (5)
	Falls/trips from catwalks (3)		Work attire (3)	Matching worker experience to assigned task (7)
				Experiential learning (10)
				Reading animal body language (8)
				Videos (videos using drones) (6)
				Safe methods for pregnancy testing (8)

Table 1

Risks & Causes of Injuries

During 6 difference instances participants stated that broken fingers, hands, and arms were some of the most common forms of injury. They stated that pregnancy testing of bison was a particularly dangerous activity. One participants gave the example a worker’s arms breaking during this process. Participants said they had seen workers’ fingers **crushed** after being hit by the horn of a bison while in the chute or from an inexperienced worker grabbing the horn of a bison. Needle sticks during vaccinations and falls/trips while on a catwalk were common as well. Several of bison workers agreed that our culture glorifies danger of working with bison through the image of the “Wild West”. This may lead beginner bison handlers and the general public to believe that occurrences such as stampedes and high stress situations are the normal, when in reality most bison managers advocated for a safe, low stress environment for the bison and workers.

Environment and Facilities

When the discussion group was asked for examples of low-cost methods to improving bison handling facilities participants agreed that workers don't necessarily need to have costly equipment to handle bison safely. A walkthrough and cleaning of the facility before and after handling were ideas of low-cost methods that could be implemented. One participants mentioned that it is advantageous to have portable fencing within the facility so changes can be made if herd managers would like to try a different set-ups to improve animal flow. Removing catwalks to reduce falls would also allow for improvements to a facility in a cost-effective manner.

When asked what components of the facility or worker systems are most helpful in implementing low-stress handling techniques participants agreed it is important to match level of worker experience with assigned tasks. Those who are new to bison handling can be placed in job areas that require little to no training such as opening and closing gates. A bison manager stated that it would be beneficial to help teams of handlers, especially beginners, start with small challenges and work slowly towards larger ones. This could help to build confidence and prevent workers from becoming stressed. One participant said that it would be helpful to have handlers come out to train and work the bison ahead of time (about 2 weeks earlier) especially if they are new to working with them.

Work Attire & Safety Accessories

When participants from the roundtable discussion were asked what types of personal protective equipment were necessary for protecting bison workers, participants

stated that leather gloves and closed-toed boots were most important. One individual stated that it is important for workers to remove jewelry before handling bison.

Bison Handling

When roundtable participants were asked what some of the best ways to train workers prior to round-up were, participants stated that **experiential learning** is best. Participants commonly mentioned that videos would be helpful for this process since explaining the round-up process can be hard to understand and workers will not always read written materials that are sent to them prior to the day of the round-up. Participants agreed that it is important for new workers **to be around the bison to learn their body language** and understand them. **Respect, reception and giving of feedback and trust** are all important values that should be established as part of the culture of the bison working facility to establish positive working relationships.

All-Terrain Vehicle (ATV) Use

During the roundtable discussion, bison handlers stated that workers typically are knowledgeable of proper ATV usage on roundup facilities. The participants believed that while ATVs can be useful for hauling equipment on fields, they should not be used to drive a herd during a bison roundup.

Roundtable Evaluation

Of the 16 bison workers present at the roundtable meeting, 13 filled out a Bison Worker Safety & Herd Health Roundtable Evaluation (Appendix B). Participants were asked if they would attend another event such as this at a bison handling site in the future. 12 said “Yes”, while 1 stated “Not sure” with a comment stating that it would depend on the location of the event.

12 of the 13 completed evaluations stated that they would be able to implement something they learned during the event into their herd health and worker safety practices, with one leaving the answer blank. Examples of safety techniques participants stated they would implement included low-stress handling, worker orientation practices, updating of facilities, performing a walkthrough, use of a facility safety checklist, reduction in personnel, and time management.

Three of the evaluations stated in open-ended questions that they would like more tribal bison herd representation at the event. Feedback also revealed that participants appreciated the time for discussion given and would like to have more time for discussion if another event like this were to happen again.

Discussion/Recommendations Recall that aims of this analysis were to (1) Determine the occupational safety and health hazards of tribal and non-tribal bison and (2) Identify methods to decrease frequency of safety and health hazards of tribal and non-tribal bison workers. Through the use of a roundtable discussion and survey this analysis has set a strong foundation to build from in order to increase the safe practices of bison handlers. The survey and discussion provided input on common injuries and factors that lead to these injuries (accomplishing research aim 1). Next the survey and roundtable discussion gathered input on how to decrease these injuries and hazards (accomplishing research aim 2). Below is continued conversation on these topics in addition to recommendations on safe procedures.

Low Stress Handling

Results from this study showed that low-stress handling is a particular topic of interest to bison handlers. Participants continually described the importance of low-stress

handling techniques during the roundtable discussions and emphasized that many workers are not aware of these. More low-stress handling education opportunities should be made available to bison workers. Education such as this would likely be most useful if it was disseminated through videos or in-person orientations. In comparison, workers do not see as much value in educational items such as handouts which may be reviewed prior to bison roundups.

Walkthrough Practices

During the roundtable discussion it became clear that the population values walkthrough practices as an important part of bison worker safety. This is a low-cost and simple way for bison handlers to ensure safety during a roundup. Agricultural worker safety specialists should work to train handlers on proper ways to perform a walkthrough inspection as this is a low-cost practice that bison workers see as valuable and can implement into their facilities.

Fire Extinguishers

Education is needed on training bison herd managers on the risk of fire hazards during roundups. Quantitative analysis showed that a majority of the participants believed that bison handlers do not know that a fire extinguisher should be present on the facility when handling bison. Perhaps fire extinguishers should be provided to bison managers to ensure these are in place at each facility.

Financial Barriers

Finances do not appear to be a large barrier to safety amongst bison handlers. Many participants in this study expressed that although there may be financial

limitations, most handlers believe they can make do with the equipment they already have. Although it is important to have proper working and safe equipment, bison worker safety orientations should place less emphasis on obtaining new equipment and more emphasis one using the equipment that is already available safely.

Hazards

Participants expressed that pregnancy checking of bison was a dangerous activity. More education and training should be done to ensure bison workers are using safe practices to avoid risk of injury during this task.

Tribal Representation

More tribal organizations should be represented at roundtable meetings in the future. Since a relationship has now been formed with the Intertribal Buffalo Council, this organization can now be utilized to reach out to additional tribal organizations whose feedback on bison worker safety and health would be greatly appreciated for future research.

Limitations

There are a total of 1,775 bison farms. In order to show significant results a sample size of 91 farms would be required. These data represent a snapshot of the attitudes and hazard perception of bison herd stakeholders in the Midwestern region. Qualitative analysis was used to enrich the data from the survey, but this data suffers from the same lack of statistical power. Of the participants only 3 tribal sites were represented, therefore tribal bison herd workers are underrepresented in this study.

Future Directions

More roundtable meetings are planned. A training may be scheduled at a model bison handling facility to provide hands on field experience to the participants.

Future trainings should focus on methods to avoid injuries such as needle sticks, crushing of fingers/hands/arms, and falls and trips from catwalks. Workers should be educated that PPE should include close-toed boots, leather gloves, and exclusion of dangling items such as jewelry at minimum. Although particular emphasis on purchasing equipment is not needed, workers should be informed that portable fencing would be allow them to make adjustments to the facility. Low-stress animal handling and education on reading animal body language should be other major areas of focus. Workers' roles at roundups should be organized in a way that allows the worker's experience to be matched to an assigned task and allows workers to being with small challenges and work towards larger ones. A culture of respect should be emphasized rather than a culture that glorifies danger.

Experiential training with in-person professionals or interactive videos would be the best way to implement worker orientations and education. Video trainings should be widely disseminated as not all bison workers conduct orientations, and this would be a useful and convenient tool to allow them to begin implementing worker orientations into their programs.

Conclusions

This project showed important insights that will allow for improvement of worker safety in the bison industry. Experiential training through in-person interaction and videos are some of the most useful tools for conducting bison worker safety trainings. Rather than focusing on proper equipment, this project showed that low-cost methods such as walkthroughs, low-stress handling, and the establishment of a respectful safety culture are vital to the health and safety of bison workers. A culture that glorifies the danger of the "Wild West" is a large barrier that leaders in the bison industry must overcome before implementing a program that is safe for all workers. A culture of respect, reception, giving of feedback, and trust is the alternative that will allow for the safety and health of bison workers to become a priority.

Service Learning/Capstone Experience Reflection

I had a positive experience with this placement site. I received an immense amount of support from my committee as well as the researchers who took part in the project. Each major step of the project required collaboration with the team and everyone did their best to be available for the meetings in preparation for the roundtable event as well as the roundtable itself. If individuals could not make it to these meetings in person, they were flexible and able to zoom in or call in for each of the meetings. I appreciated their prioritization in taking part in this project.

I learned that this organization does an excellent job in prioritizing the development and fostering relationships with other organizations and individuals they collaborate this. This was clear when we received a great amount of interest in the roundtable from participants and many of the speakers who were invited to share their knowledge at the roundtable were willing to do so. I received positive responses from those who attended the roundtable meeting who either thanked us personally for the experience or gave positive feedback in the evaluations. Events like these would not be possible without the development of positive relationships.

Although I had a positive experience overall, a few aspects of this project did not go as planned. At the start of the project Dr. Kelling and I along with a few other students had hoped to have the opportunity to visit a bison handling site. Unfortunately we were unable visit and collect data of hazards and areas for improvement using the Bison Facilities Checklist (Appendix C). Fortunately we were able to distribute this checklist to the roundtable meeting attendees for their own in performing walkthroughs of the facility prior to their round-ups. Additionally, although I had hoped several tribal sites would be able to make it to the roundtable meeting, these contacts proved to be difficult reach out to and receive commitment from. New ideas will need to be used in the future to come up with better ways to contact and receive commitment from this group.

Several resources, relationships, and skills permitted these activities to occur. Strong relationships with tribal and non-tribal bison herd managers had already been developed prior to this project. This was a great asset since it helped with a greater amount of attendance at the roundtable and resulted in positive feedback of the day as well as many thoughtful responses on the survey. Strong interpersonal skills were required for this to occur.

Technical writing skills were a must to ensure this project was successful. Eloquent writing allows for clear communication which was especially important for this project. Many participants and speakers at the roundtable came from different parts of the country and it was important to communicate logistical information clearly.

Organization skills also allowed for the success of this project. Since the roundtable required many moving parts and somewhat complicated logistics between booking hotel rooms and a venue for the event, ensuring that participants are reimbursed for travel and gas, as well as ensuring each participant was included on the attendee list, organization skills allowed me to keep each of these details clear. There were minimal problems or unexpected situations that came about during the project due to adequate preparation and clear organization.

Public speaking was an additional asset I brought to this project. Public speaking was required during the roundtable meeting to welcome the participants, introduce each speaker, facilitate discussions, and present background information on the research project being conducted. The public speaking skills I had developed during my undergraduate studies, previous work experience, and involvement in extracurricular opportunities during college, as well as class experience and speaking opportunities at conferences during my role as a work study student for CS-CASH helped me to be successful during this portion of the project. I am extremely grateful for each of these experiences.

Flexibility was another skill required to ensure the success of this project. Although this is something I typically struggle with, I was able to solve each unexpected problem step by step to ensure the roundtable event was a valuable experience. The day before the event two participants' flights were cancelled on their way into Omaha and there was not another flight to come in from their location that night. Although it was challenging, I was able to ensure that two of the attendees (who had never met previously) were able to meet up and rent a car together to drive the rest of the way to Omaha. In another instance two speakers were unable to make it to the event and only gave a few days' notice. Although we were disappointed that they would not be able to share their expertise, we did our best to rearrange the schedule to still make the event as valuable as possible.

Throughout my education as well as my prior experience working at a veterinary hospital, privacy of research subject and/or medical patients has always been prioritized. This was a priority during the project. Surveys and evaluations were kept anonymous. Prior to recording the roundtable, participants were asked if they were comfortable having the meeting recorded. Although none of the participants raised any concerns, the roundtable would not have been recorded if they have since privacy of research subjects must always be a top priority.

Overall this project allowed me to take part in an innovative approach to an area of public health where more research and outreach is needed. I am grateful for this opportunity and learned a lot about a population I had previously had little experience with. This project has helped me come to realize that all issues in public health should be approached with a sense of flexibility and openness.

Acknowledgements

I would like to thank my Committee including Clayton Kelling, Todd Wyatt, and Christopher Wichman for their guidance on this project. I would also like to thank members of the Central States Center for Agricultural Safety & Health, Ellen Duysen and Risto Rautiainen for facilitating this partnership with the University of Nebraska School of Veterinary and Biomedical Sciences and their support in planning and facilitating the Bison Worker Safety and Herd Health Roundtable. I would also like to thank all of the roundtable attendees for their support.

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Concentration Domains		
Competency, Activity/Application1, 2	**Reflection of Competency Strength/ Professional Growth3**	**Committee Assessment4**
Competency 2.f.: Describe how human behavior impacts environmental and occupational exposures and outcomes. Activity/Application: Discussion of low-stress animal handling at roundtable, presentation on introduction given at roundtable explaining important of low-stress animal handling and environmental concerns (such as weather) that impact safety and health of bison workers	Reflection: During this project I learned that high-stress handling including behaviors such as speaking loudly, chasing bison, and the use of ATVs to round-up bison can lead to stress in the animal as well. This can also increase the cause of injuries in bison and humans alike.	☐ Not Competent ☐ Somewhat Competent ☐ Competent ☐ Highly Competent ☐ Uncertain
Competency 2.g.: Develop interventions to reduce environmental and occupational exposures. Activity/Application: Held a roundtable meeting where education and safety resources were provided to assist bison handlers in creating worker orientation practices and implementing safe practices on their facilities.	Reflection: Although it may take many years for bison workers to see the results of these safety interventions, I believe I was able to provide many resources for bison handlers to improve their safety practices. These included education at a roundtable meeting, providing PPE kits, safety manuals, and a Facility Safety Checklist.	☐ Not Competent ☐ Somewhat Competent ☐ Competent ☐ Highly Competent ☐ Uncertain
Competency 2.c. Identify major causes of workplace related illnesses and approaches to reducing occupational health risks. Activity/Application: Background research, survey data analysis, discussion of best practices	Reflection: Background research revealed that COPD and respiratory problems are a concern in bison workers. This is challenging because survey results found that many workers do not care about these risks. Dust masks were provided to roundtable attendees. Injuries to hands, arms, and fingers were identified as another health risk. Workers expressed that matching workers to job appropriate to their experience level, performing a walkthrough, being aware of your surroundings, and not wearing jewelry could reduce these hazards.	☐ Not Competent ☐ Somewhat Competent ☐ Competent ☐ Highly Competent ☐ Uncertain

Competency 2.e.: Identify ethical, social, and legal issues central to occupational health. Activity/Application: Roundtable discussion revealed social issues central to bison workers; research prior to writing my capstone paper showed that the lack of recording of injuries in bison workers makes these difficult to characterize	Reflection: During the roundtable discussion it was discussion that a societal attitude that glorifies risk was a barrier to safe practices amongst bison workers. While writing my capstone paper I found that bison worker injuries are not recorded or regulated by any government organizations, which makes the task of characterizing injuries to this population challenging.	☐ Not Competent ☐ Somewhat Competent ☐ Competent ☐ Highly Competent ☐ Uncertain
Competency 2.a.: Explain the role of biology and the environment in the ecological model of population-based health. Activity/Application: Discussed that bison are biologically different from cattle during roundtable discussion; discussed and performed background research of effects of the environmental during roundups such as dust and adverse weather conditions	Reflection: Several times throughout the day during the Bison Worker Safety and Herd Health Roundtable attendees mentioned that although many workers have cattle experience, this can be a barrier to safe practices because cattle are far more domesticated than bison. The environment of a bison roundup is challenging because often weather in the Midwest is unpredictable and an abundance of dust can cause health problems for bison workers.	☐ Not Competent ☐ Somewhat Competent ☐ Competent ☐ Highly Competent ☐ Uncertain
Assessment of Concentration Competencies (completed by Committee Chair with input from Committee Members)4		
Comments regarding student's progress and professional growth in the above concentration competency areas, including current strengths/weaknesses:		

1Insert additional rows as needed for the number of competencies addressed, as described above.
2Compete this column with the proposal, update as needed for final paper
3Complete this column when writing the final paper and submit completed competencies with the final paper
4Committee Chair, with input from Committee members will complete the evaluation at the completion of the project

Appendix A

Bison Worker Safety Hazards Survey

This survey is being conducted by the Central States Center for Agricultural Safety and Health (CS-CASH) and the InterTribal Buffalo Council.

Research shows that working with bison is a dangerous activity. With your help, we can better understand the safety and health hazards that are encountered by bison handlers.

This questionnaire asks about your opinions regarding the safety knowledge and practices of bison handlers.

Please circle the letter corresponding to your answer.

Do you believe that bison handlers are at risk of being injured while working with bison?

A. Yes.
B. No.

Do you believe that bison handlers think they are at risk of being injured while working with bison?

A. Yes.
B. No.
C. Only some handlers believe this.
D. I have no opinion.

Do you think there is a need for safety trainings for bison handlers?

A. Yes
B. No
C. I have no opinion.

In what areas do bison handlers need training?

Please select all that apply.

A. How to maintain the proper environment for low stress bison handling.
B. Low stress bison handling techniques.
C. Proper PPE and safety accessory (such as a fire extinguisher) use.
D. Safe ATV use.
E. Worker injury prevention.
F. Safe use of animal medication (such as disposing of syringes properly).
G. Other (Please explain):

_____
_____
_____

If you think there is a need, what kind of training would you prefer?
Please select all that apply.

A. Training manuals so that I as a herd manager can train the bison handlers that work my roundups.
B. Distance learning, such as online modules or videos.
C. A professional to come in and train the handlers.
D. Other (Please explain):

_____
_____
_____

Environment and Facilities

This section is about the working environment and facilities or equipment encountered by bison handlers.

Moving or flapping objects, such as a coat or tarpaulin (bison vision barrier) hanging on a fence flapping in the wind, are common during bison roundups. This can increase stress levels in the bison. What is your opinion?
Please select all that apply.

A. Handlers do not know that moving or flapping objects increase the stress level of the animals.
B. Handlers do know that this increases the stress level of the animals, but they do not care.
C. Handlers do know that moving or flapping objects increase the stress level of the animals, and take necessary precautions to avoid this.
D. Handlers have been told that it is okay to hang up jackets and other similar things that may flap in the wind.
E. There is no other place to put things like jackets that may flap in the wind.
F. I have no opinion**.**
G. Other (Please explain):

_____
_____
_____

Bison roundups may continue into the evening hours, with shadows forming in the working area. Shadows can increase the stress level of the bison. What is your opinion?
Please select all that apply.

A. Handlers do not know that shadows can increase the stress level of the animals.
B. Handlers do know that this increases the stress level of the animals, but they do not care.
C. Handlers do know that this increases the stress level of the animals, and take necessary precautions to avoid this.
D. Handlers have been told that it is okay for shadows to be present.
E. There is not enough lighting available in the working area to prevent shadows from forming.
F. If proper lighting equipment was available it would be used.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Slip, trip and fall hazards such as sharp corners, uneven walking surfaces, cluttered alleyways, and slippery or icy walking surfaces are common at bison roundups. What is your opinion?
Please select all that apply.

A. Handlers do not know that these things are hazards.
B. Handlers do know that these things are hazards, but they do not care.
C. Handlers have been told that it is okay to have slip, trip, and fall hazards present.
D. It is impossible to eliminate these hazards because the roundups are outside.
E. There are not enough resources to eliminate slip, trip, and fall hazards.
F. More supplies and equipment (such as salt to melt ice on icy walking surfaces) are needed to eliminate these hazards.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Dust is commonly present during bison roundups. This can worsen any lung issues that the handlers may already have. What is your opinion?

Please select all that apply.

A. Handlers do not know that dust can be hazardous to their health.
B. Handlers do know that dust can be hazardous to their health, but do not care.
C. Handlers do know that dust can be hazardous to their health and take necessary precautions.
D. Handlers have been told that it is okay if dust is present.
E. There is nothing the handlers can do to decrease the amount of dust present.
F. I have no opinion.
G. Other (Please explain):

_____
_____
_____

Bison handling equipment that has fallen into disrepair or needs modification is commonly seen at bison roundups. What is your opinion?

Please select all that apply.

A. Handlers do not know that handling equipment needs repair and/or modification.
B. Handlers do know that handling equipment needs repair and/or modification, but do not care.
C. Handlers do know that the handling equipment needs repair and/or modification, and do their best to make repairs and/or modifications.
D. Handlers have been taught that handling equipment is in good shape and does not need repair and/or modification.
E. It is not the responsibility of the handlers to repair and/or modify the handling equipment.
F. It is too expensive to repair and/or modify the handling equipment.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Worker Attire & Safety Accessories

This section is about the clothes and personal protective equipment (PPE) that bison handlers wear, as well as the safety accessories present during bison handling.

Fire extinguishers are not always present during bison roundups. What is your opinion?
Please select all that apply.

A. Handlers do not know that a fire extinguisher should be present.
B. Handlers do know that a fire extinguisher should be present, but do not care.
C. Handlers do know that a fire extinguisher should be present, and there is one on site when possible.
D. Handlers have been told that they do not need to have a fire extinguisher present.
E. It is not the responsibility of the handler to supply a fire extinguisher.
F. Fire extinguishers are too expensive to buy for roundups.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Dust masks are not always worn by bison handlers, even though dust is commonly present during bison roundups. What is your opinion?
Please select all that apply.

A. Handlers do not know that they should be wearing dust masks.
B. Handlers do know that they should be wearing dust masks, but do not care.
C. Handlers do know that they should be wearing dust masks, and do so.
D. Handlers have been told that they do not need to wear dust masks.
E. Dust masks are not supplied to the handlers; if they want to wear them they must purchase their own.
F. It is too expensive to supply dust masks to the handlers.
G. Handlers who have facial hair will not shave in order to wear dust masks.
H. I have no opinion.
I. Other (Please explain):

_____
_____
_____

Safety glasses are not always worn by bison handlers. What is your opinion?
Please select all that apply.

A. Handlers do not know that they should be wearing safety glasses.
B. Handlers do know that they should be wearing safety glasses, but do not care.
C. Handlers do know that they should be wearing safety glasses, and wear them when necessary.
D. Handlers have been told that they do not need to wear safety glasses.
E. Safety glasses are not supplied to handlers; if they want to wear them they must purchase their own.
F. It is too expensive to supply safety glasses to handlers.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Please continue to the next page.

Gloves are not always worn by bison handlers. What is your opinion?
Please select all that apply.

A. Handlers do not know that they should be wearing gloves.
B. Handlers do know that they should be wearing gloves, but do not care.
C. Handlers do know that they should be wearing gloves, and wear them when working bison.
D. Handlers have been told that they do not need to wear gloves.
E. Gloves are not supplied to the handlers; if they want to wear them they must purchase their own.
F. It is too expensive to supply gloves to the handlers.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Bison Handling

This section is about how the bison are handled.

Bison handlers may poke, beat on, or use electric prods while moving bison (high stress bison handling) rather than using low stress handling techniques. What is your opinion?
Please select all that apply.

A. Handlers do not know about low stress bison handling techniques.
B. Handlers do know about low stress bison handling techniques, but do not use these practices.
C. Handlers do know about low stress bison handling techniques, and use these practices.
D. Handlers have been taught that it is okay to use high stress methods to move the bison.
E. I have no opinion.
F. Other (Please explain):

_____
_____
_____

Bison handlers may move bison quickly, make excessive noise and slam gates. What is your opinion?
Please select all that apply.

A. Handlers do not know that they should not be doing these things.
B. Handlers do know that they should not be doing these things, but do them anyway.
C. Handlers do know that they should not be doing these things, and avoid doing them.
D. Handlers have been taught that it is okay to do this.
E. I have no opinion.
F. Other (Please explain):

_____
_____
_____

Worker Injuries

This section is about the injuries that may happen to bison handlers while they are on the job.

Worker injuries may occur at bison roundups. What is your opinion?

Please select all that apply.

A. Handlers do not know the hazards of working with bison.
B. Handlers do know the hazards of working with bison, but do not care to follow the rules to decrease these hazards.
C. Handlers do know the hazards of working with bison, and follow the rules to decrease these hazards.
D. Handlers have been taught that some things that are proven hazardous to their safety are NOT hazardous.
E. I have no opinion.
F. Other (Please explain):

_____
_____
_____

Safe Use of Animal Medications

This section is about the safe use of animal medications.

Syringes and needles used on bison at roundups are sometimes not disposed of properly. What is your opinion?

Please select all that apply.

A. Handlers do not know how to properly dispose of syringes and needles.
B. Handlers do know how to properly dispose of syringes and needles, but choose to not dispose of them properly.
C. Handlers do know how to properly dispose of syringes and needles, and dispose of them properly.
D. Handlers have been taught that it is okay to improperly dispose of syringes and needles.
E. The proper containers for sharps disposal are not available to workers. If they were available they would be used.
F. It is too expensive to provide the proper containers for sharps disposal.
G. I have no opinion.
H. Other (Please explain):

_____
_____
_____

Please continue to the next page.

All-Terrain Vehicle (ATV) Use

This section is about the use of ATVs and other vehicles used to round up bison.

ATVs and other off road vehicles may be used in dangerous ways during bison roundups. What is your opinion?

Please select all that apply.

A. Handlers do not know how to safely use ATVs and other off-road vehicles.
B. Handlers do know how to safely use ATVs and other off-road vehicles, but choose not to.
C. Handlers do know how to safely use ATVs and other off-road vehicles, and do their best to do so.
D. Handlers have been taught to use ATVs and other off-road vehicles in unsafe ways.
E. I have no opinion.
F. Other (Please explain):

_____
_____
_____

Thank you for completing the questionnaire.

We truly appreciate your responses. We hope to use this information to improve the safety and health of bison handlers. Thank you.

Appendix B

Bison Worker Safety & Herd Health Roundtable

Evaluation

1. What did you like best about today's roundtable?

_____
_____
_____
_____

2. Will you be able to implement anything you learned today into your herd health and bison worker safety practices? If so, what?

_____
_____
_____
_____

3. What suggestions do you have to improve today's roundtable?

_____
_____
_____
_____

4. If the event were to take place at a bison handling site in the future would you be interested in attending (circle one)?

Yes No Not sure

Thank you! Stay safe out there!

Appendix C

Safety Checklist for Bison Handling Facilities

Date:

Facility:

Contact person:

Address:

Phone:

Email:

Review conducted by:

Instructions: 1) Mark the approximate age of the facility (in years); 2) Deduct points for each observed hazard (expressed as a recommendation); Use scale from 1 point for a minor issue to 5 points for major hazard. 3) Add file name for picture showing the hazard. 4) If corrections are made, repeat scoring and add picture for corrected item.	Initial points	Hazard picture file	Corrected points	Correction picture file
Approximate age of the facility				
Are walkways and transportation areas in safe condition?				
Reduce slipperiness of the floor/ground				
Improve/replace floor/ground materials				
Remove obstacles				
Replace/improve door/gate				
Cover openings near walkways				
Improve loading chute				
Improve lighting				
Remove other hazard:				
Is access between elevations safe?				
Replace steps with ramp				
Replace temporary ladder with permanent stairs				
Improve ladder				
Build guardrails for platforms				
Remove other hazard: Access to get on top of round bales				
Are animal handling facilities in safe condition?				
Improve headgates (see appendix about crash gate)				
Improve pens				
Improve gates/hinges/latches				
Improve feeding areas				
Improve waterers				

Construct emergency escape pass throughs for pens				
Improve lighting				
Remove other hazard:				
Are tools and equipment stored properly and is good housekeeping followed?				
Arrange appropriate storage for pitch forks, shovels, brooms				
Arrange appropriate storage for ropes, halters				
Arrange appropriate storage for cleaning equipment				
Remove other hazard:				
Are stationary machines and equipment in safe condition?				
Reduce dust from pens and alleyways				
Reduce noise from generators				
Have well marked emergency stops for hazardous machinery				
Remove other hazard:				
Are electrical safety hazards present?				
Replace wiring/receptacles/switches				
Replace extension cords				
Replace heaters				
Replace light fixtures (appropriate type)				
Remove other hazard: Extension cord to electric fence could be made safer				
Are chemicals and medications stored properly?				
Store chemicals in a safe location				
Store medications in a safe location				
Store chemicals and medications in marked containers				
Provide safe sharps disposal container for syringes				
Remove other hazard:				
Are PPE, first aid supplies, fire extinguishers, and emergency information available?				
Have two-strap dust masks available				
Have hearing protection available				
Have gloves available for all work situations				
Have safety boots available				
Have first aid kit available				
Have fire extinguisher charged and available				
Remove other hazard: keep PPE and first aid kit available at worksite				
Are there other safety hazards present?				
Improve structural elements				
Repair/improve panels and fences				
Provide barrior fences				
Clean up and organize the area				
Improve access areas to avoid mud/ice buildup				
Arrange effective waste disposal system				
Remove other hazard:				
Is animal handling conducted in a safe manner?				

Move bison at a slow pace				
Avoid crowding of animals				
Ensure slow and calm movement of personnel				
Avoid injuries to animals - *is the nose ring necessary? Blood on chute from this*				
Avoid activities that create excessive dust				
Follow other safe practice:				
Points deducted				
Score % (calculated as: 100 - Points deducted)				

Notes:

AgHealth
Central States
Center for Agricultural
Safety and Health

Appendix D

Table 2

Q1 - Do you believe that bison handlers are at risk of being injured while working with bison?

#	Answer	%	Count
1	Yes	100.00%	16
2	No	0.00%	0
	Total	100%	16

Table 3

Q2 - Do you conduct safety trainings for your workers?

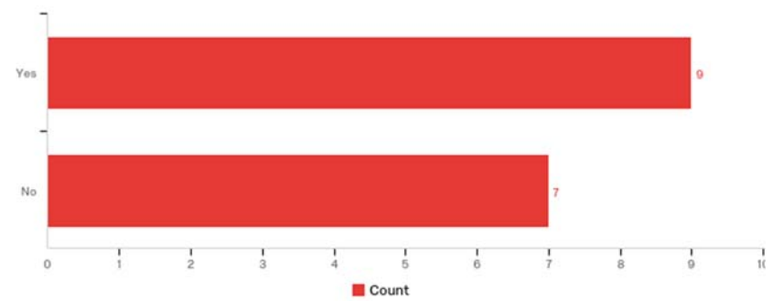

Table 4

Q3 - Do you believe that bison handlers think that they are at risk of being injured while working **with** bison?

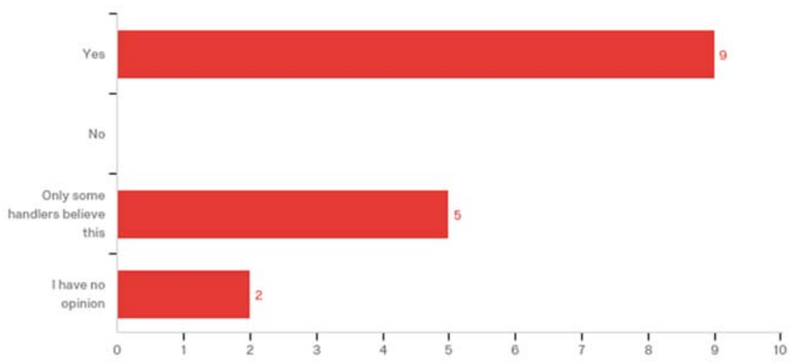

Table 5

Q4 - Do you think there is a need for safety trainings for bison handlers?

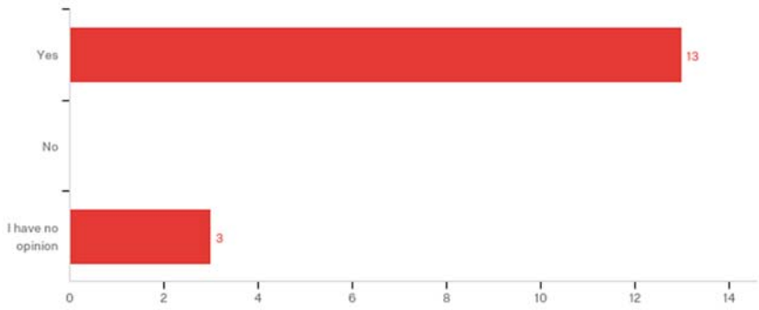

Table 6

Q5 - In what areas do bison handlers need training?

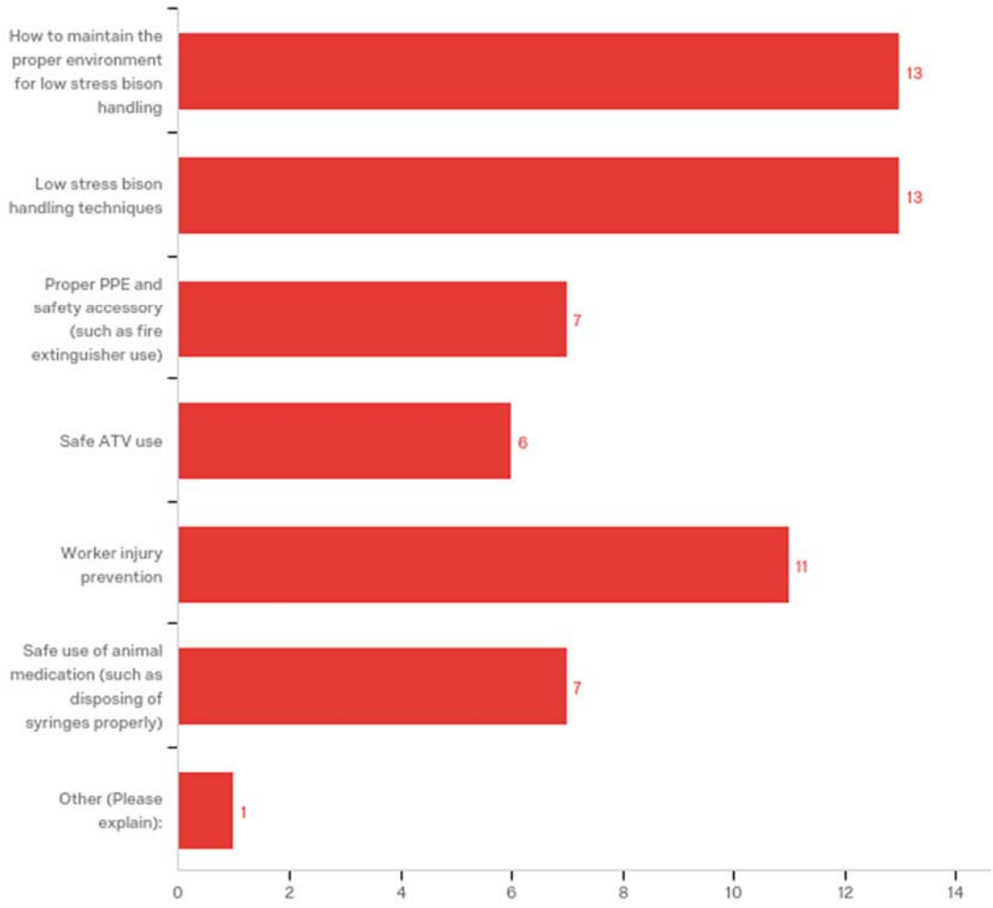

Table 7

Q6 - If you think there is a need, what kind of training would you prefer?

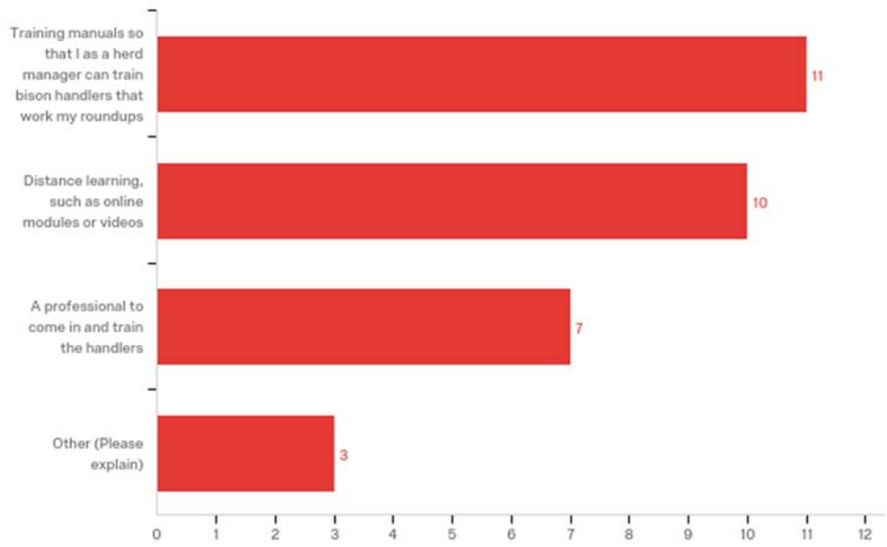

Table 8

Q7 - Moving or flapping objects, such as a coat or tarpaulin (bison vision barrier) hanging on a fence flapping in the wind, are common during bison roundups. This can increase stress levels in the bison. What is your opinion?

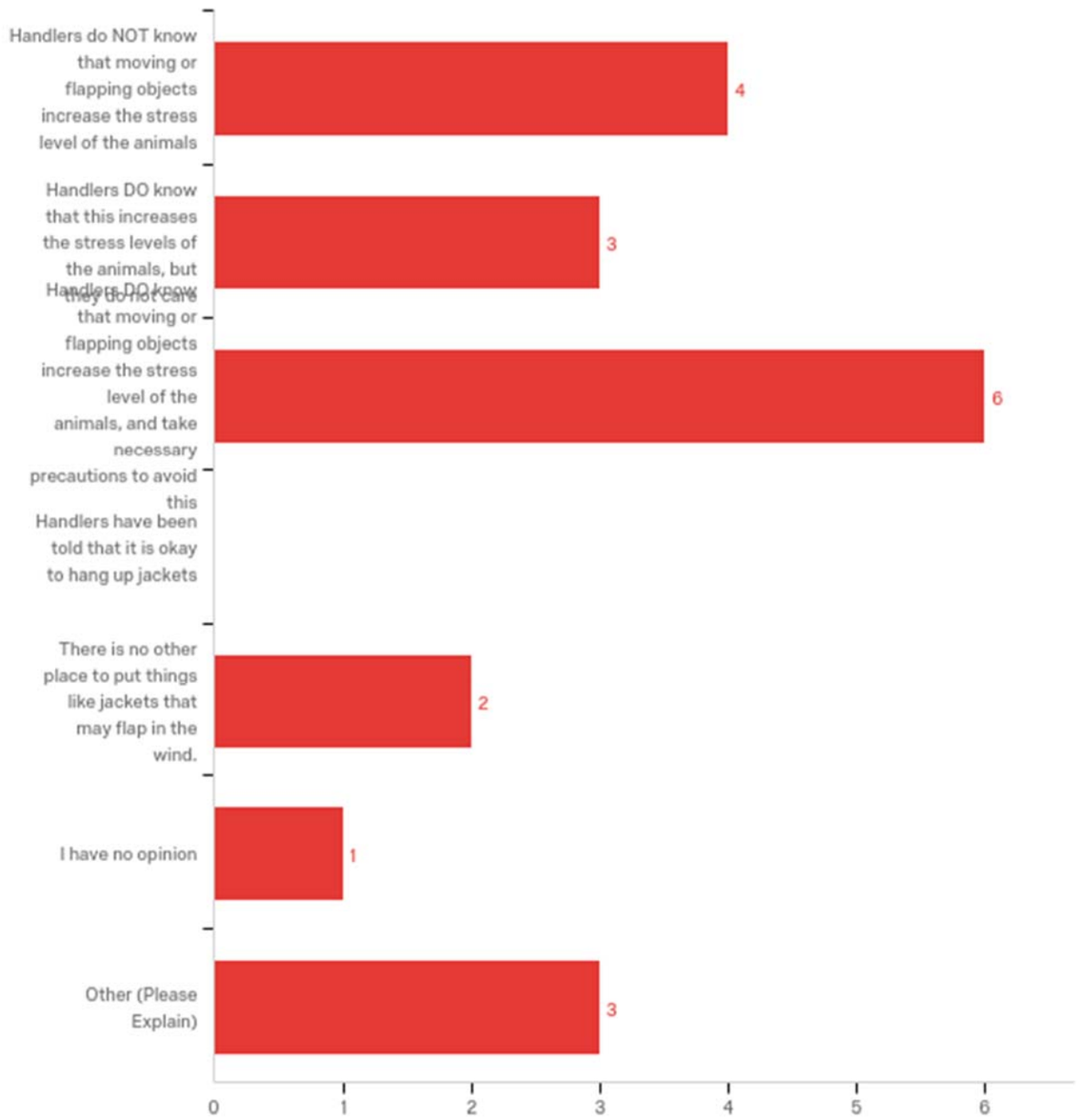

Table 9

Q8 - Bison roundups may continue into the evening hours, with shadows forming in the working **area.** Shadows can increase the stress level of the bison. What is your opinion?

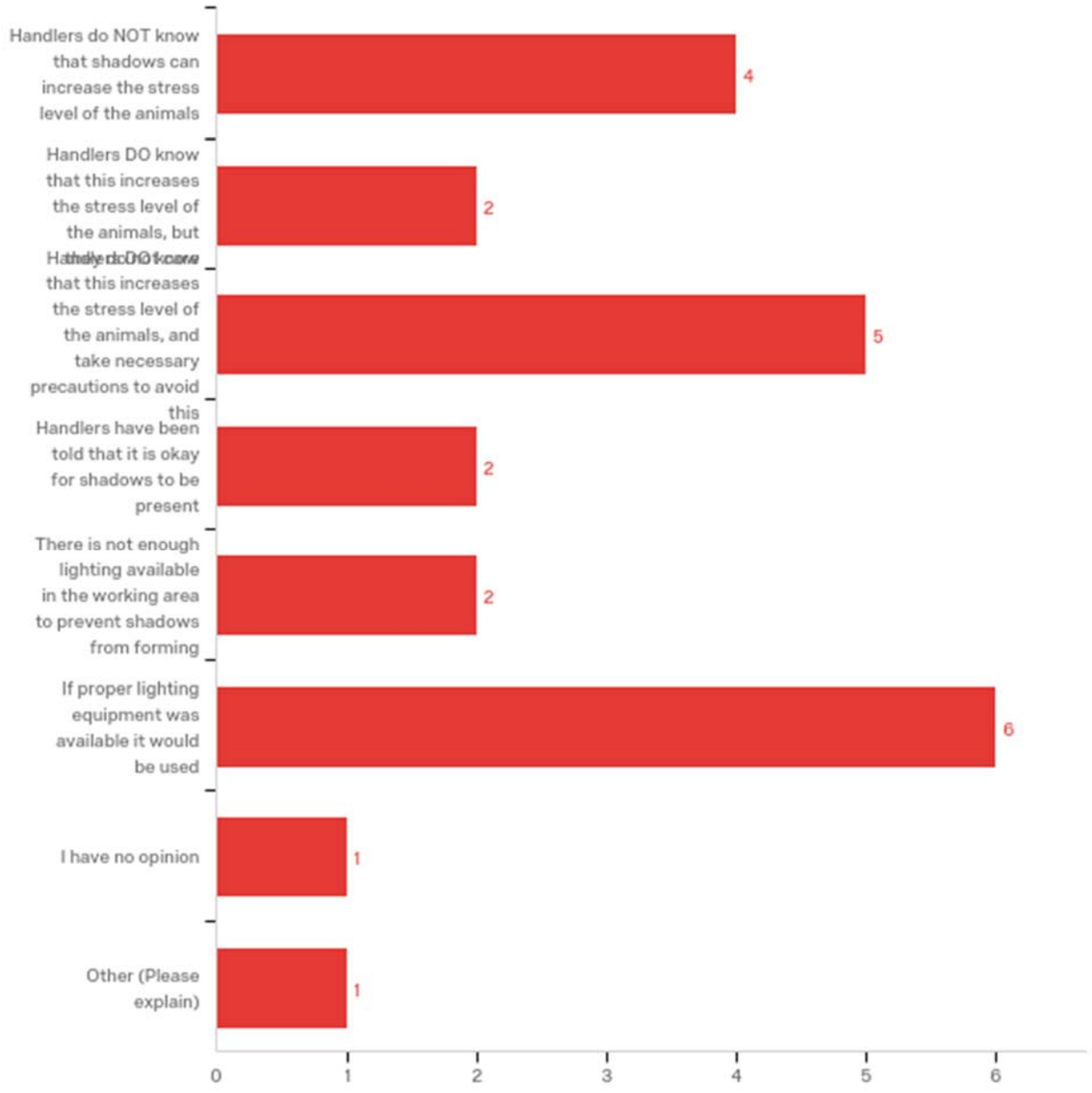

Table 10

Q9 - Slip, trip and fall hazards such as sharp corners, uneven walking surfaces, cluttered alleyways, and slippery or icy walking surfaces are common at bison roundups. What is your opinion?

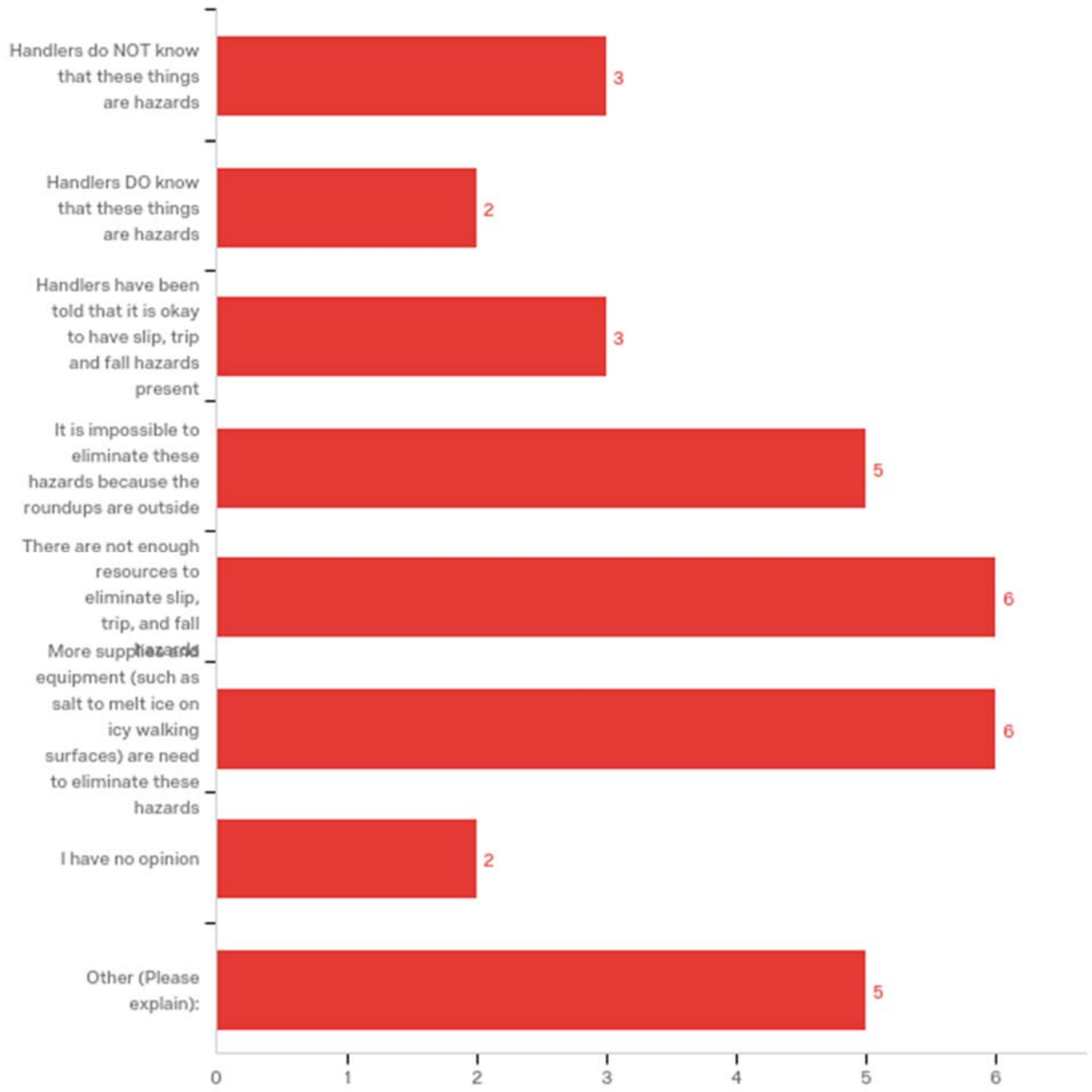

Table 11

Q10 - Dust is commonly present during bison roundups. This can worsen any lung issues that the handlers may already have. What is your opinion?

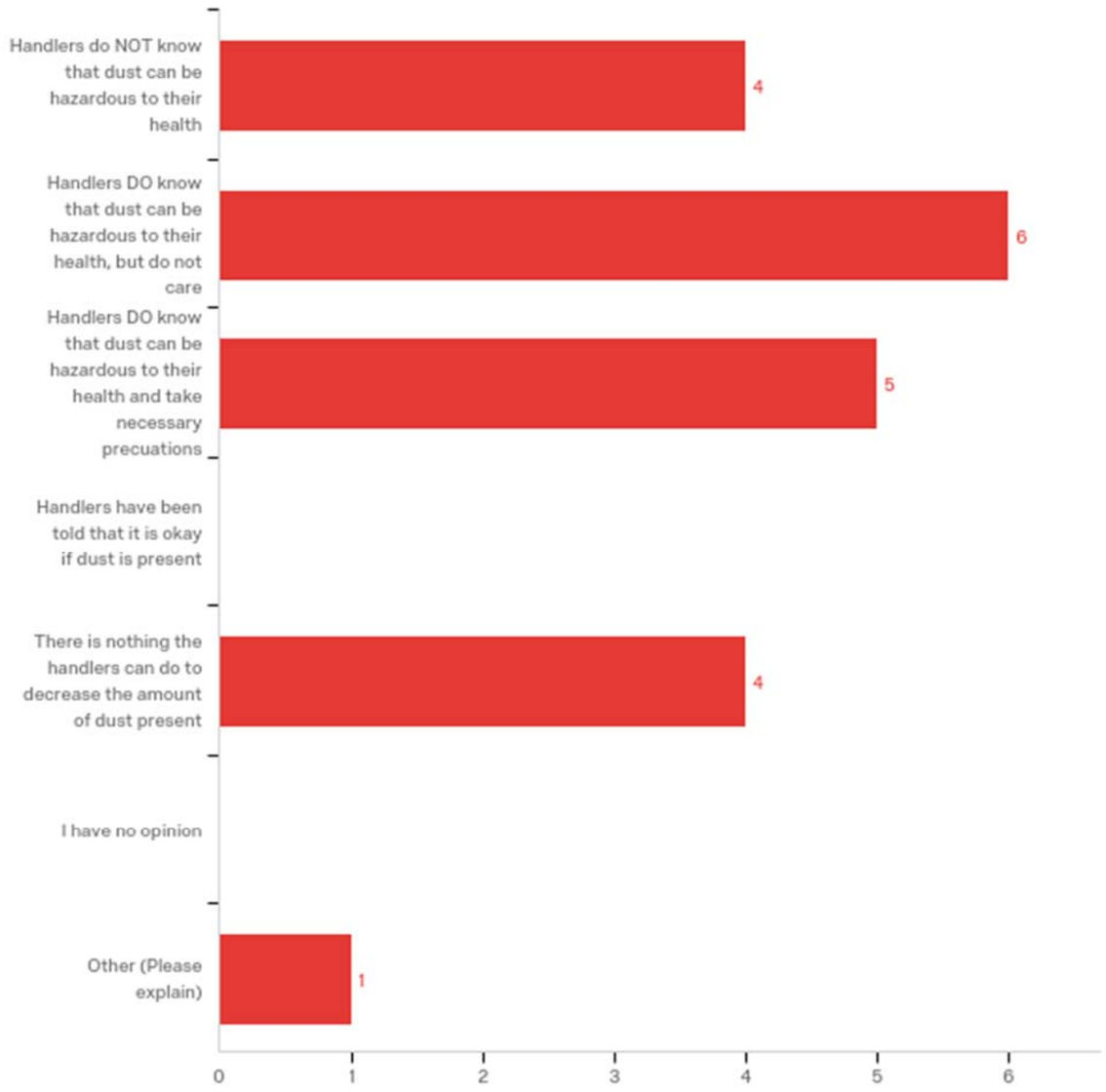

Table 12

Q11 - Bison handling equipment that has fallen into disrepair or needs modification is commonly seen at bison roundups. What is your opinion?

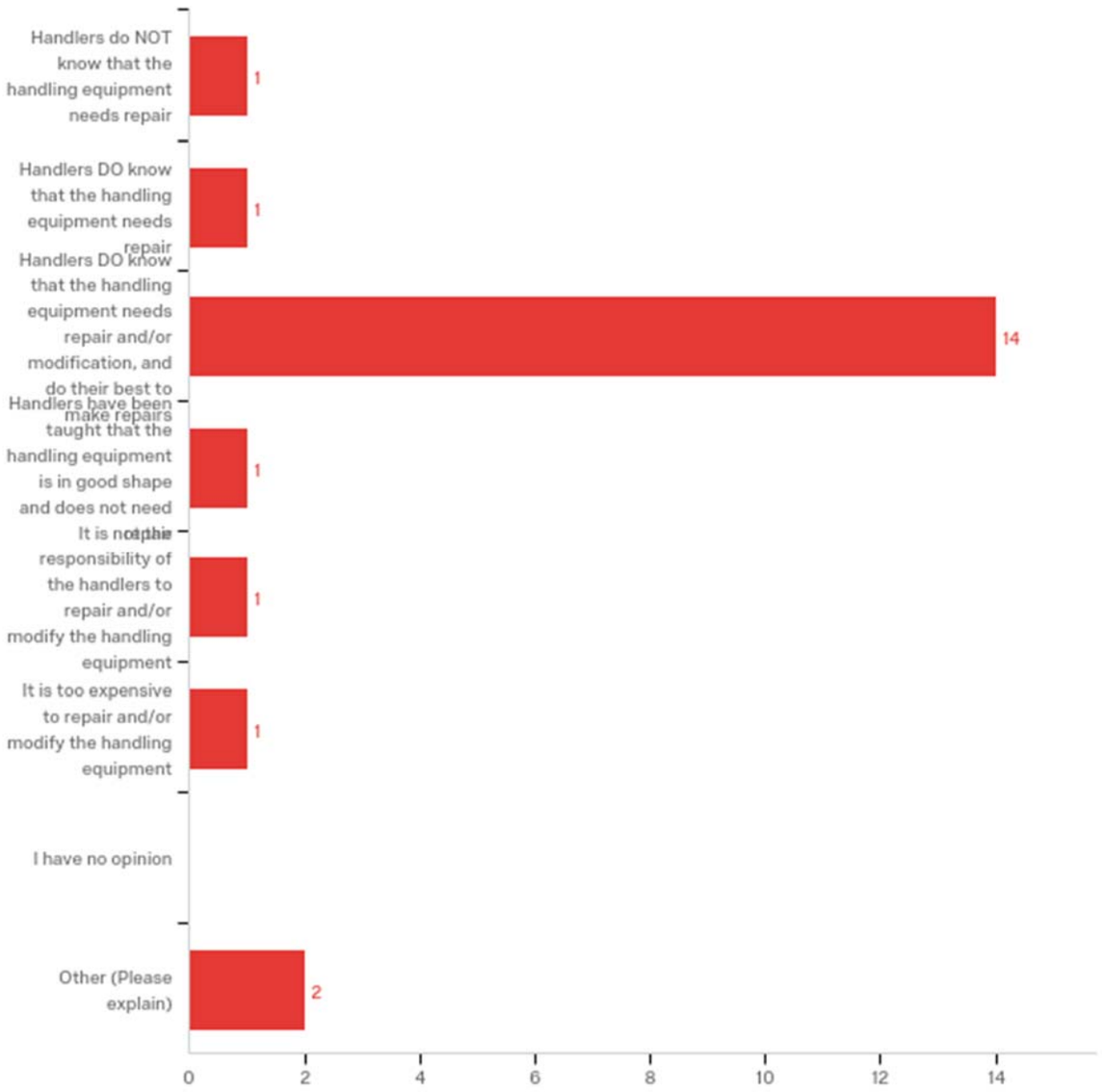

Table 13

Q12 - Fire extinguishers are not always present during bison roundups. What is your opinion?

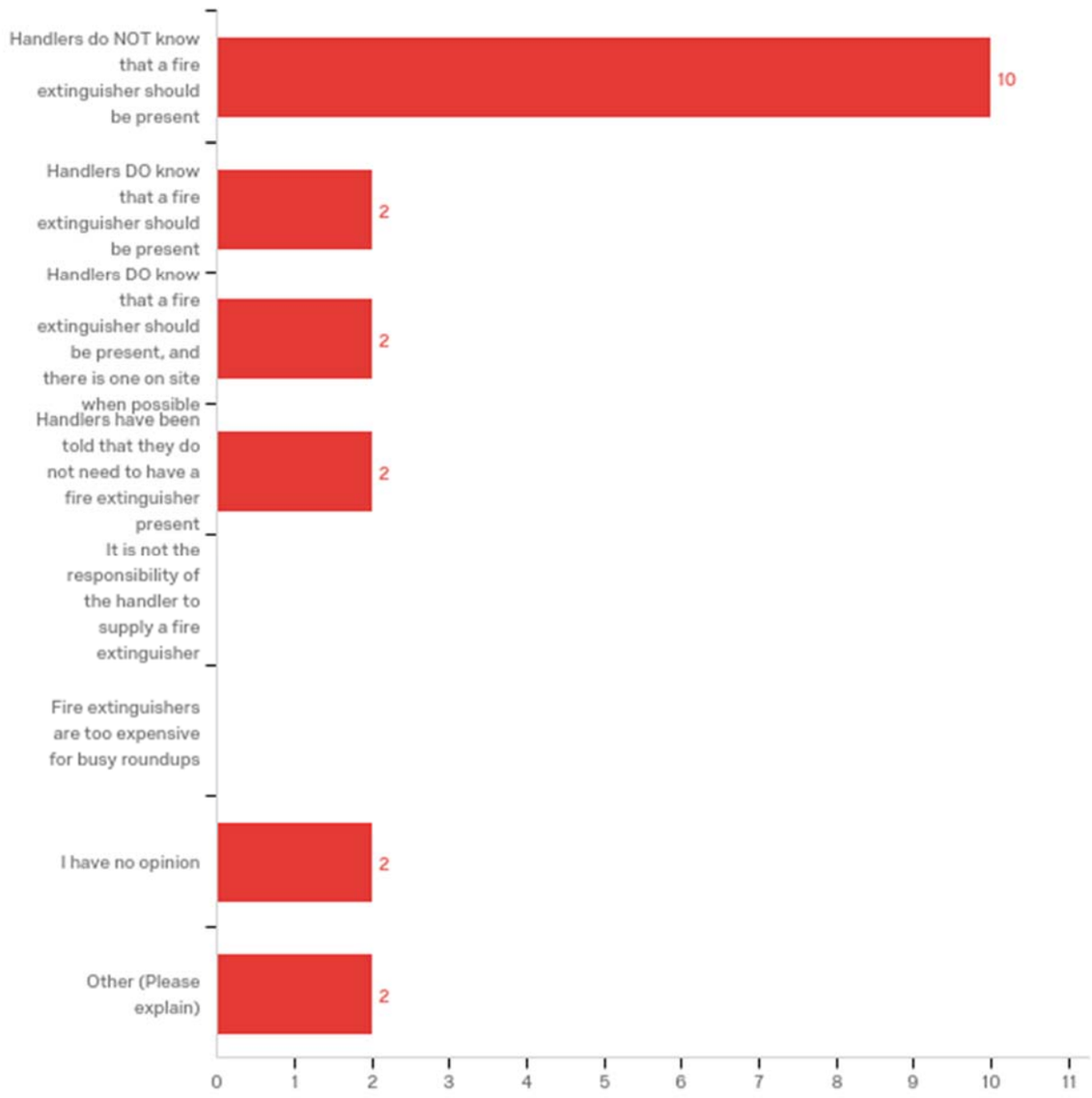

Table 14

Q13 - Dust masks are not always worn by bison handlers, even though dust is commonly present during bison roundups. What is your opinion?

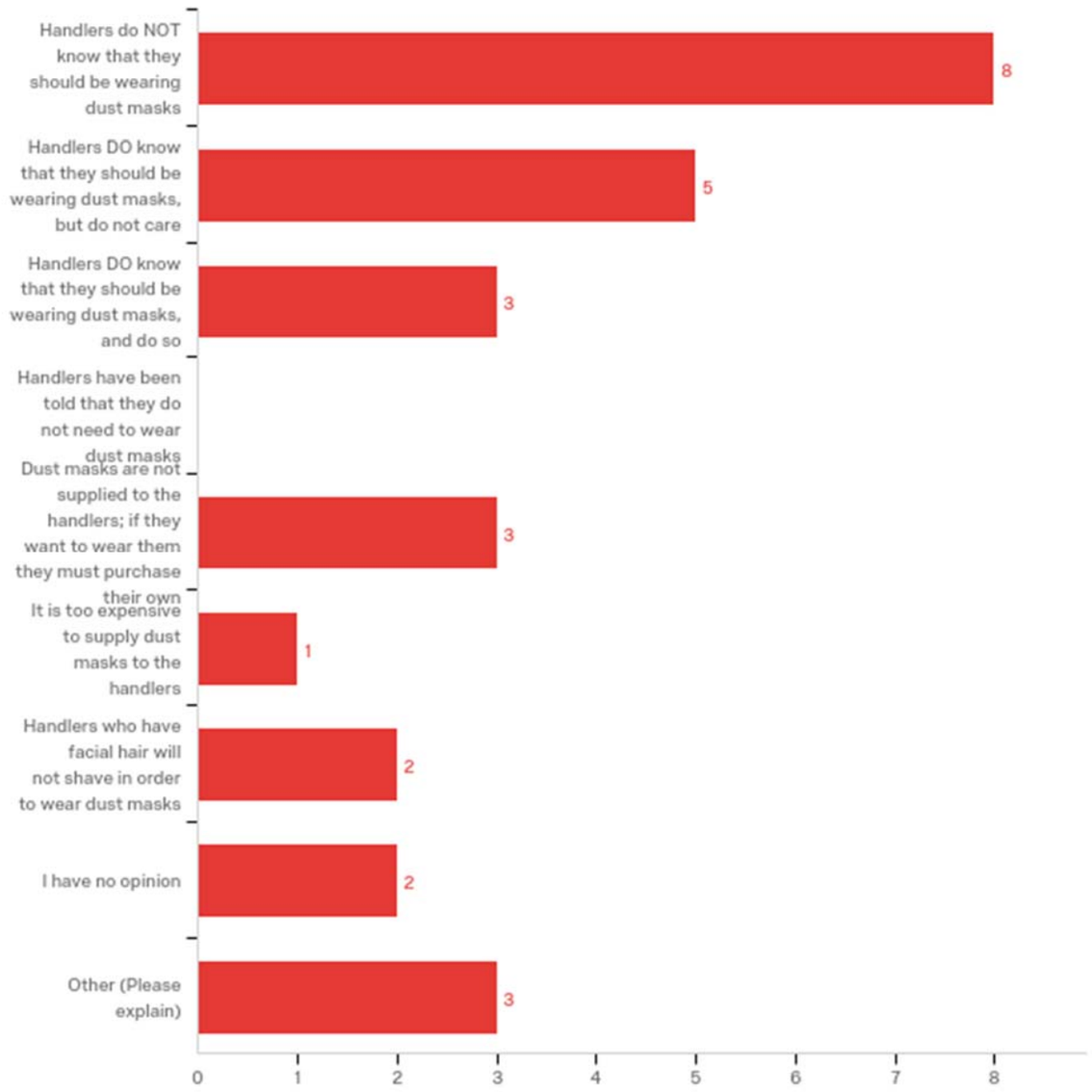

Table 15

Q14 - Safety glasses are not always worn by bison handlers. What is your opinion?

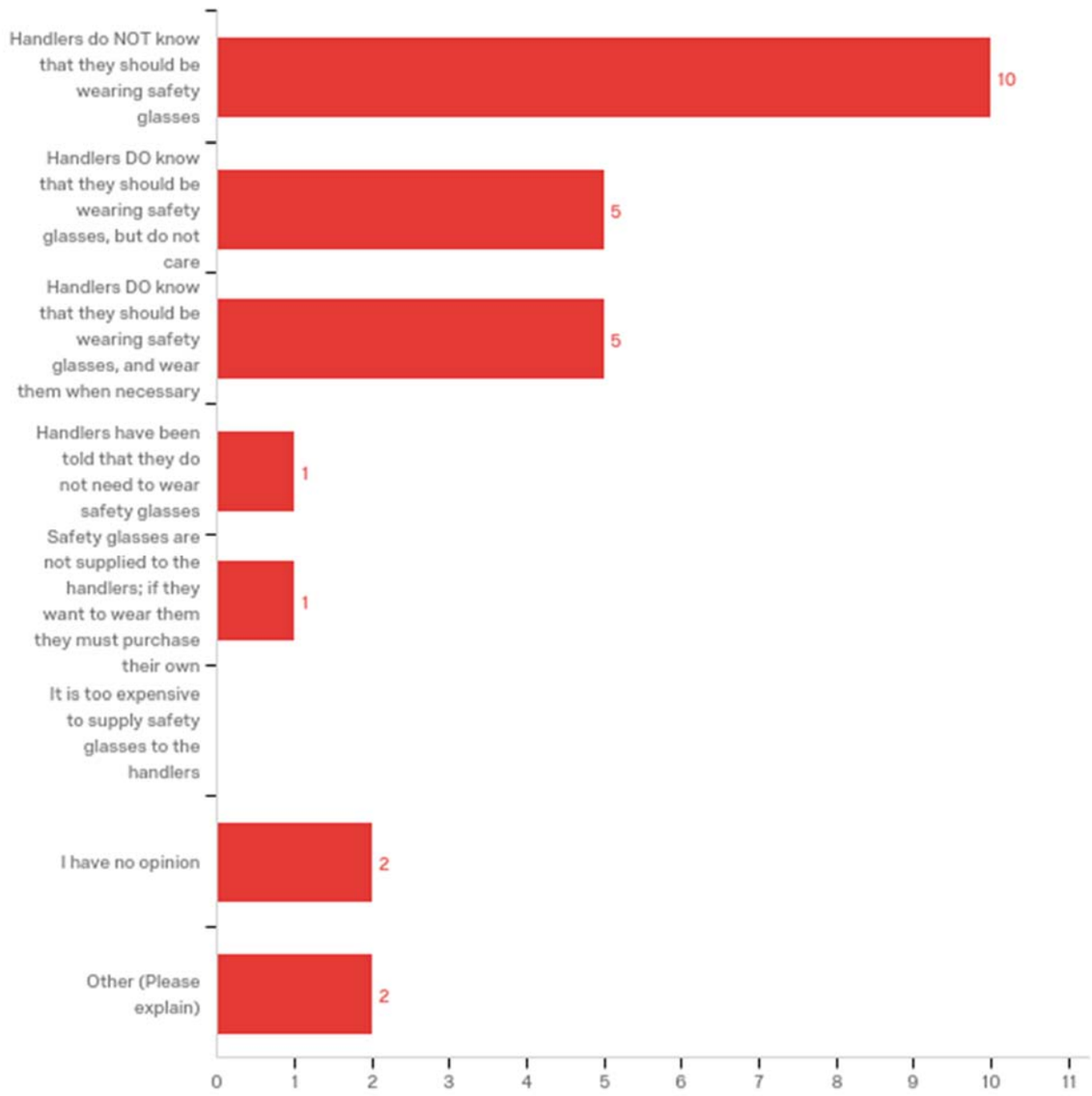

Table 16

Q15 - Gloves are not always worn by bison handlers. What is your opinion?

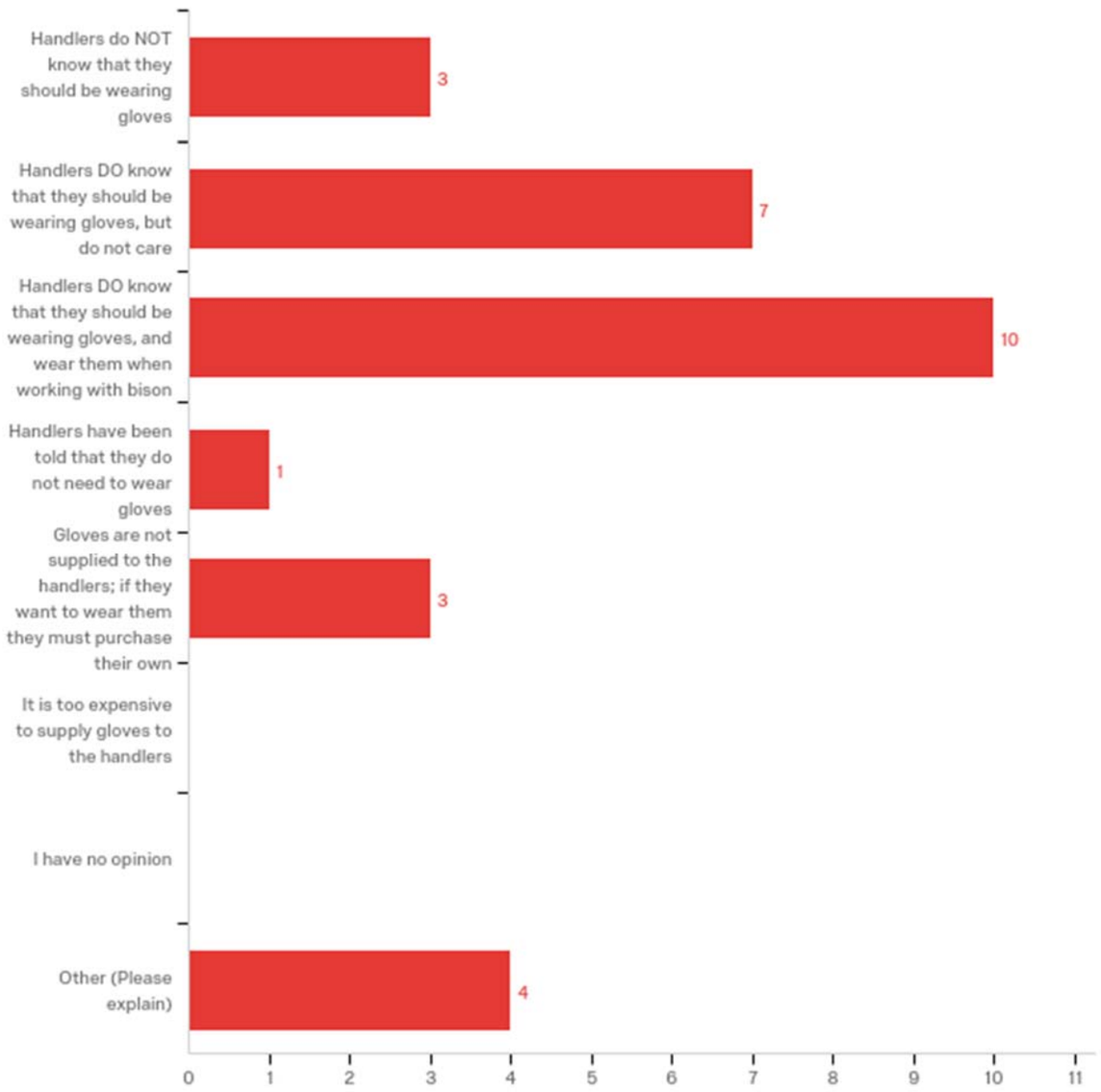

Table 17

Q16 - Bison handlers may poke, beat on, or use electric prods while moving bison (high stress bison handling) rather than use low stress handling techniques. What is your opinion?

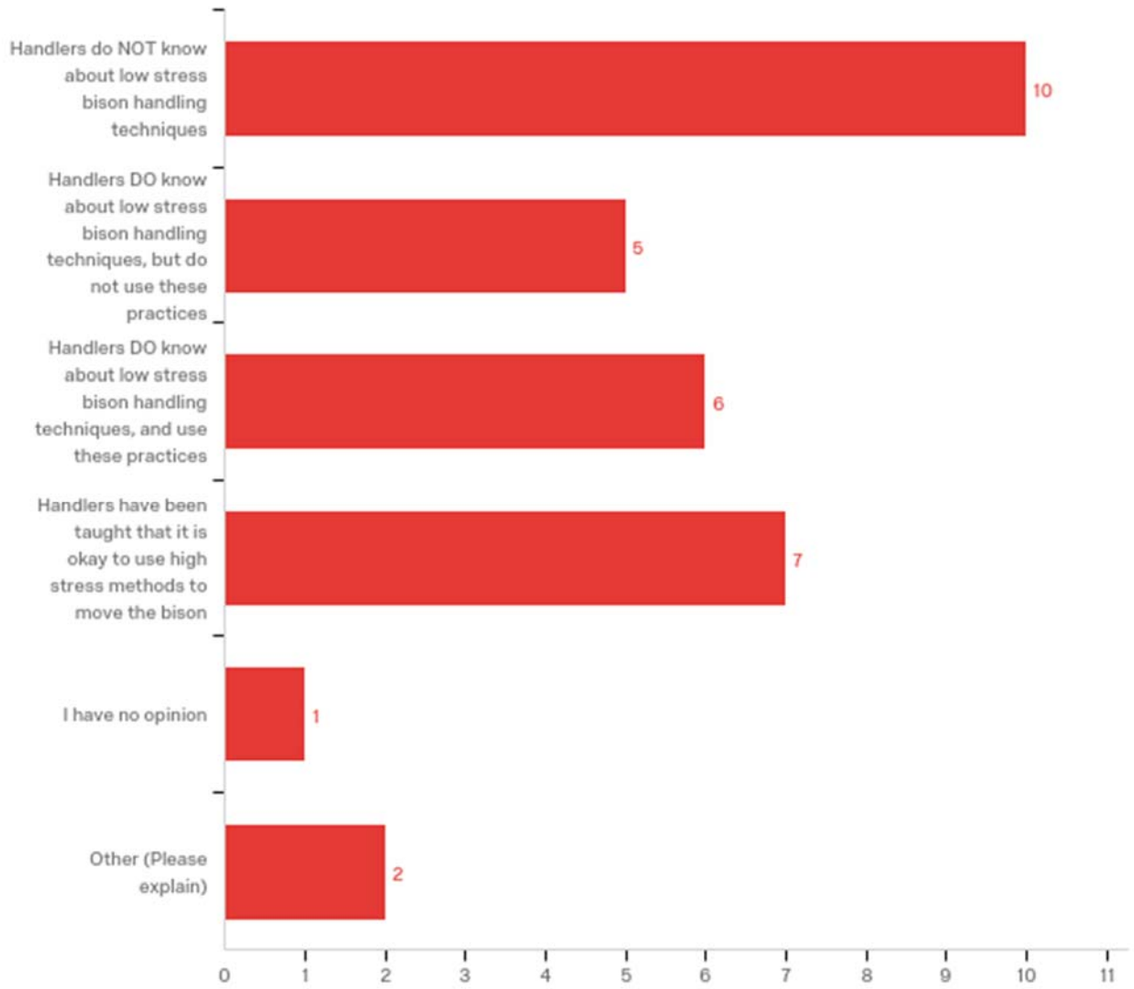

Table 18

Q17 - Bison handlers may move bison quickly, make excessive noise and slam gates. What is your opinion?

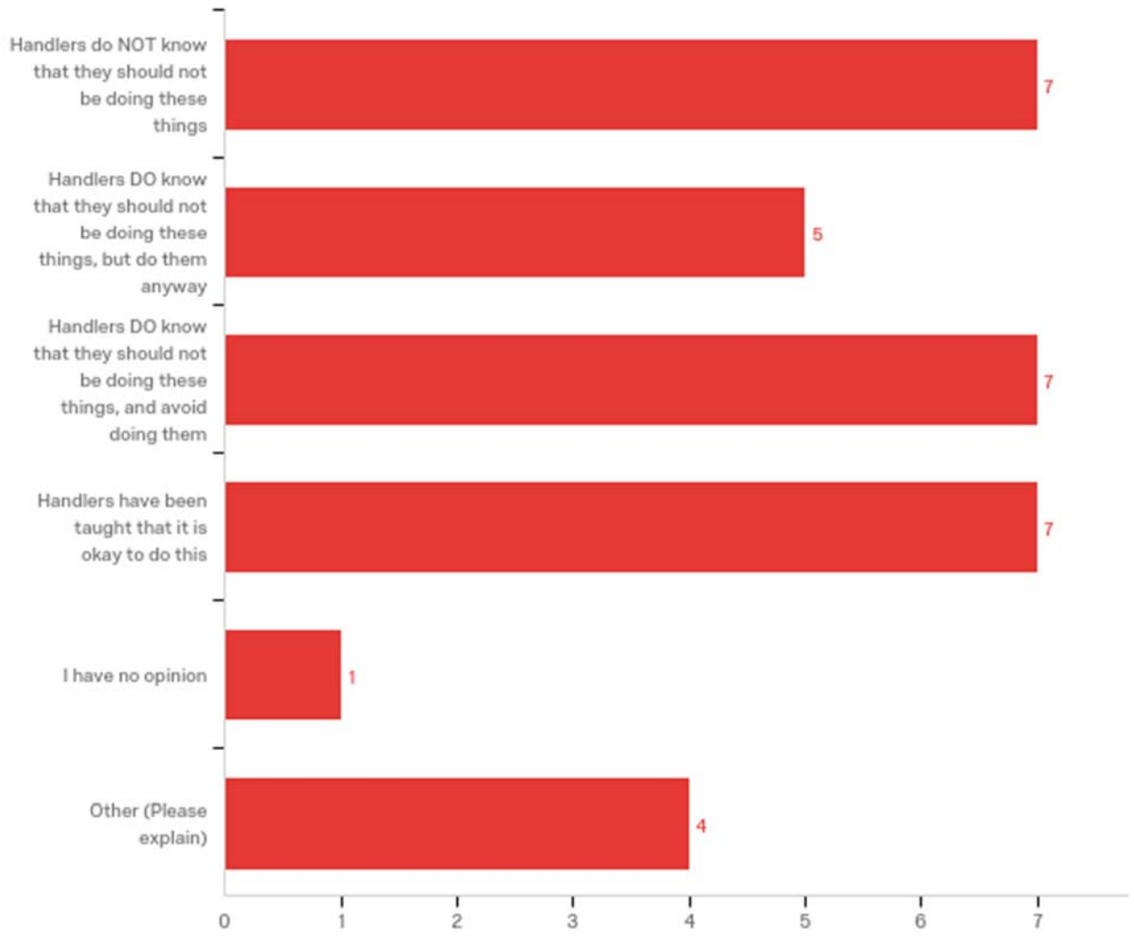

Table 19

Q18 - Worker injuries may occur at bison roundups. What is your opinion?

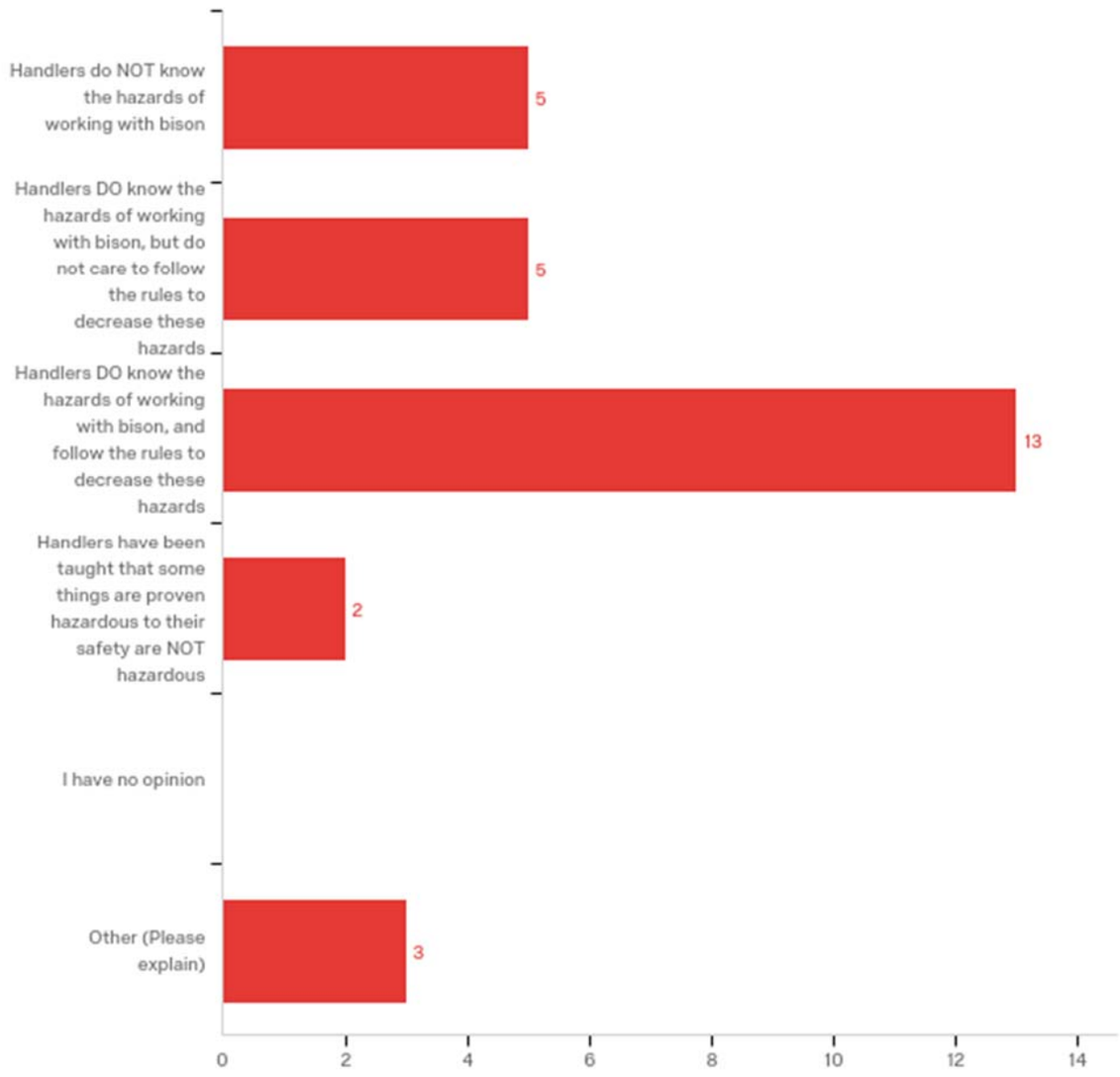

Table 20

Q19 - Syringes and needles used on bison at roundups are sometimes not disposed of properly. What is your opinion?

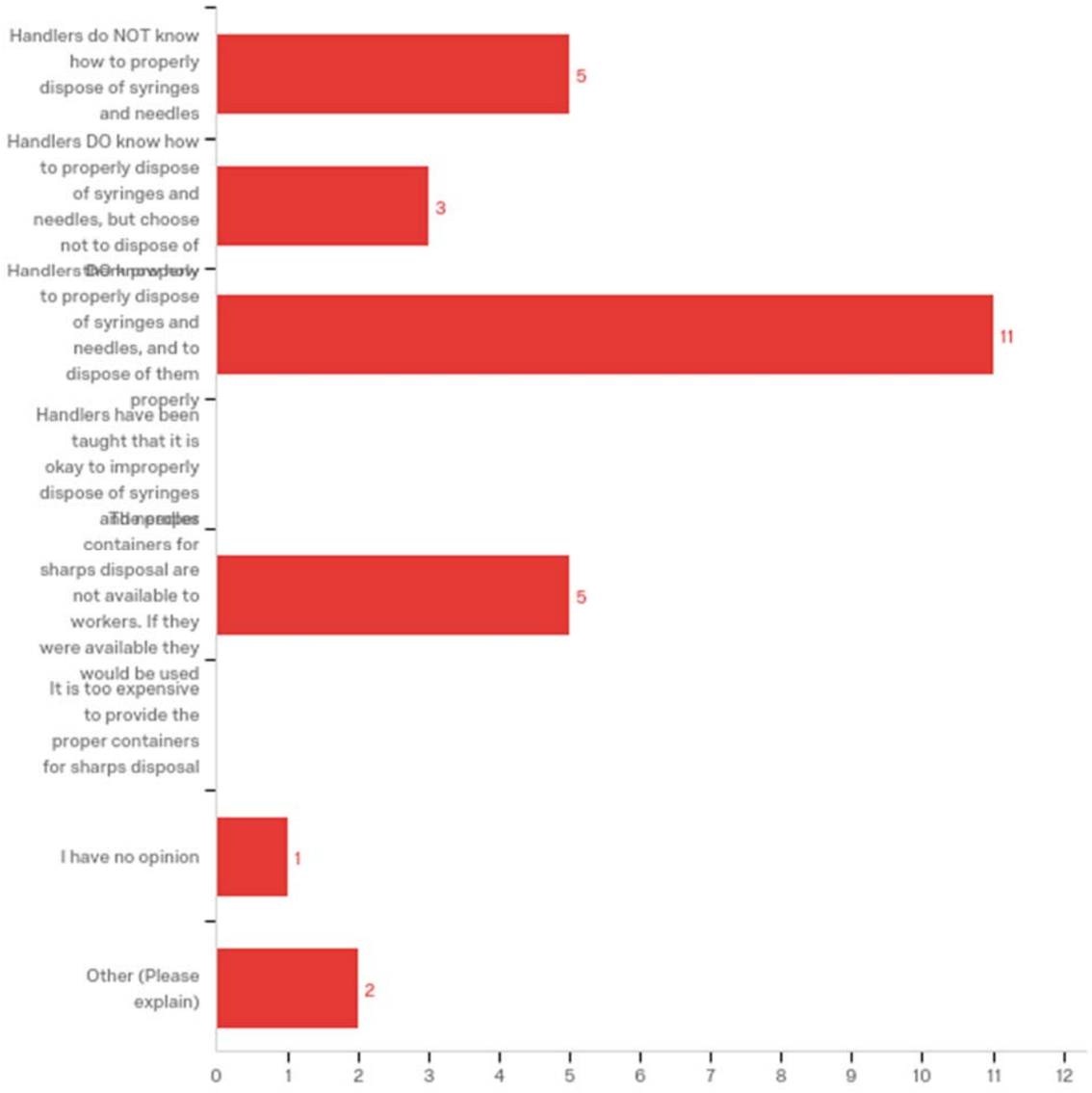

Table 21

Q20 - ATVs and other off road vehicles may be used in dangerous ways during bison roundups. What is your opinion?