The Behavior of Roping Cattle During a Team Roping Run

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Abstract

Team roping is a sport that has been around since the late 1800s. Today, thousands of dollars are up for grabs every day for the team with the fastest run. In order to become competitive in team roping, it takes a lot of good practice. However, this practice can be hindered if the roping cattle pick up a behavior that prevents them from being roped. This study focuses on what cue the roping cattle respond to with a learned preventative behavior. It was hypothesized that since cattle cannot focus quickly on objects due to slit-shaped pupils, they would be more likely to rely on hearing to sense someone trying to catch them, allowing them to respond with a behavior that prevents them from being roped. The data did not entirely support this. Rather than all cattle responding to the same cue in the same way, individuals picked up specific behaviors most likely caused by different cues. There was a trend that when eyesight was manipulated (by turning the horn wraps around) it was more effective on cattle that exhibited behaviors of running to the left or right. Likewise, manipulating hearing (with soft ear plugs) was most effective on cattle that ducked their head. Overall, this study leaves room to suggest that whether the steer responds to an audible or visual cue from the roper should be determined on an individual basis. The findings of this study provide information for team ropers to use so they can make their time and investment in practice cattle the most effective.

Introduction

Team roping is a very popular event in rodeos all over America. This event requires two people, two horses and a roping steer. As in any sport, practice makes perfect. In order to practice team roping, live cattle must be used just as in a real rodeo run. These cattle are roped several times a night, 2-3 nights a week. Throughout the cattle’s roping career they learn a behavior that helps prevent them from being roped. These behaviors include: tipping their horns right, left, forward or backward, ducking their head, running up close along the fence, running in front of a roper’s horse, or suddenly stopping. These types of learned behaviors can cause a
roping steer to be considered “bad” because they are very difficult to rope, which does not make for good practice. So what exactly causes these roping cattle to respond with a certain behavior throughout a roping season? The purpose of this study is to determine what cues these team roping cattle use to avoid being roped.

The behavior of cattle during roping is likely influenced by multiple variables including life history as a prey animal which influences their flight response, past handling experiences that make them sensitive to touch, and reliance on particular senses such as sight and hearing. Cattle (*Bos taurus*) are considered to be flight animals and therefore are very likely to have a flight response to handling. It is important to understand a cow’s flight behavior in order to determine what the cow is more likely to do throughout the run; for example, it may affect the cow’s behavior in the chute prior to roping. The flight zone for a single cow is the minimum distance a cow can be from its handler and still be calm, which may vary between individuals. When a cow is approached from the head or when the handler is horseback, the flight zone is increased (Parish et. al, 2013). The handler's invasion of the flight zone may cause the steer to increase speed, or respond with a preventive behavior. It is also more likely that a highly excited cow will leave the chute quicker than a less excited cow because it is more stressed prior to the run and thus more likely to respond with a preventative behavior.

A cow’s sensitivity to touch may also influence their behavior in a roping chute. For example, Lanier et al. (2000) found that dairy cattle are more sensitive to touch than beef cattle, and heifers are also more sensitive to touch than the steers, bulls, and cows. Handling the steer prior to, during, and after the roping run can cause an effect on their behavior during the run itself. It can be expected that heifers will react to handling the most. Different temperaments of cattle can largely influence what each breed of cow is used for. However, Lanier et al. (2000) also found that certain breed of cattle’s temperament can be influence by how it was raised and its level of exposure to humans. Cattle that show higher flight response in tests were more likely to have a lighter body weight, and are more likely to grow more slowly. Therefore, smaller and lighter framed cattle are more likely to flee
from the handler or in this case, the ropers. However, the larger framed and slower running cattle tend to be less focused on running fast and more focused on doing horn movements. While the faster cattle tend to duck their horns, or cut off a roper and their horse. This type of behavior can be potentially dangerous for the ropers, horses and even the cattle. Touch may play a key role in what causes a steer to pick up a learned preventative behavior (Lanier et. al, 2000).

It is clear that increasing a cow’s level of stress or arousal could affect its behavior throughout the run. Understanding what sensory cues cows use to respond to a stressful stimulus may provide a better understanding of how they respond in the run. Cattle can sense a stressful environment with their eyes, ears, and nose. This study will focus on eyesight and hearing to determine what type of cue cattle sense and respond to. They are dichromats, which means their vision is better at detecting motion rather than color clarity. Their eyes have cones that are most sensitive to yellow-green and blue-purple light (Lanier et. al, 2000). Cattle have all color vision except red, and do best in environments that are uniform in color (Parish et. al, 2013). They have weak eye muscles and slit shaped pupils, which gives them poor depth perception and prevents them from being able to focus quickly on a nearby object (Parish et. al, 2013). This is important since team roping is such a fast paced sport and cattle are likely to shy away from a sudden motion because of the morphology of their eyes (Lanier et. al, 2000). By being able to see 300 degrees around them and 60 degrees vertically, cattle have a good chance of seeing an object moving towards them. However, they cannot see directly behind them and because of this, cattle will orient themselves to face the moving object so that they can observe the object and determine if it is dangerous or not (Lanier et. al, 2000). Nevertheless, while a cow is being chased on horseback, there is not much time for it to turn and orient itself to the stimulus. Therefore, they turn to a behavior that prevents them from what they know is coming, which in this case is being roped. This study will determine if the cattle’s learned preventative behavior is done in response to a visual stimulus.
When eyesight is problematic, cattle will rely on their hearing. Cattle may quickly turn and orient themselves towards an object that they heard (Parish et al, 2013). Cattle have large interaural distances, which can cause their hearing to be limited. When compared, their interaural distance is slightly larger than humans (Heffner & Heffner, 1983). Cattle have less capability to pin a sound source than humans and can only locate the sound source up to 30 degrees from the actual source. (Parish et al, 2013). In a study conducted by Rickye Heffner and Henry E. Heffner, it was found that hooved mammals have poor sound localization. As the animal gets smaller, the localization gets better. Therefore, horses and cattle have worse sound localizing capabilities than pigs and goats. It was suggested that the domestication of animals did not have an impact on the acuity of their localization. Since these animals are poor sound localizers, they tend to have a very good sight horizontally around them. With having such wide horizontal sight capabilities, if a threat is in sight, there is no need for the auditory system to provide the precise location (Heffner & Heffner, 1992).

Cattle are more agitated by higher pitched noises than lower pitch, though they can still hear low-pitched sounds remarkably well. It was found in a study by Lanier et al. that dairy cattle are 7.5% more sensitive to sound than beef cattle. Cattle are capable of hearing lower volume and higher frequency sounds better than humans are (Parish et al, 2013). The hearing range in cattle extends from 23Hz to 23 kHz, with a well-defined frequency at 8 kHz, at 60 dB. They are slightly more sensitive to sounds than humans. Although they hear remarkably well, they do not hear higher frequencies as well as most mammals (Heffner & Heffner, 1983). This study will focus on the animal’s ability to hear the ropes swinging and the horses running up behind them. It will determine if the cattle are responding to auditory cues from a roping run, or if the cues are just a contributing factor to another stimulus.

The main focus of this study is to determine whether a roping steer responds to visual and auditory cues in a preventative way, then to address how this can be fixed in order to make practice with these cattle effective. It was hypothesized that
an auditory cue would trigger a preventative response more than a visual cue. This led to the hypothesis that earplugs would be an effective manipulation for causing cattle to omit the learned preventative behavior.

**Methodology**

One arena was used to collect the observational data of Corriente cattle. Ten steers were purchased for the use of this experiment using the private funds of the researcher, then assigned a number that they were recorded under throughout the season. All ten of these steers were on the same property as the roping arena throughout the entire season. While the roping practice sessions were not going on, the cattle were out in a pasture grazing, and allowed to rest. They were fed two bales of hay per day for all ten head, with free access to water 24 hours every day.

The cattle were roped 2-3 days a week, and about 3-5 sets a day. During each practice session, the cattle were first rounded up from the field and herded into the arena. They were then herded into a single file line in the “run-up” (as shown on the Arena Map), or area behind the roping chute that prevents the cattle from turning around so that they proceed forward to the arena. Before each steer was roped it was important that they were properly cared for and protected. To accomplish this, each cow had a set of neoprene horn wraps put securely on its horns to insure that it did not get an ear stuck in the rope, a rope burn around its horns, or hit in the eyes with the rope. After each cow had its horn wraps on, the roper then showed it the “out-gate” (the exit of the arena seen in the Arena Map). Once the cow reached the out-gate, the run was over and the ropes were removed from the horns and back feet. Each roper (total of two ropers in team roping) received one chance per run to throw his or her rope. After the steer exited the arena, it waited in the “catch pen” (an area just outside the arena where the cattle were allowed to rest as shown on the Arena Map) until each steer had run through as well. Once all of the steers were in the catch pen, they were brought back up to the run-up and run again for a total of 3-5 times a night.
Since each cow had an identification number, every time that steer was used for a run it was video recorded until it was either roped by the first roper or run to the out-gate. At the beginning of this roping season, as a control, the cattle were run through 3-4 times without being roped and their behavior was recorded. Every time an animal ran, its behavior was recorded under the appropriate number assigned at the beginning of the season.

Throughout the season, variables were used to test the cattle’s hearing and eyesight to determine what triggers the cattle’s response that initiates a behavior in order to prevent them from being roped. In order to test to see if the steer responds to an audible cue, earplugs were used. The earplugs used for this study are currently used on rodeo horses that become very nervous when around the sound and commotion of rodeos. The earplugs help block some of the sound, and keep the cattle calmer. In order to prevent the cattle from seeing the horses running up behind them, the steers had their horn wraps turned around to act as blinders to inhibit some of their horizontal vision. All observations were recorded for every steer. After the roping season (May-August), the cattle were run through again and recorded to see if their original (control) behavior changed when they were not being roped. All roping steers completed the roping season at this time.

**Expected Results and Significance**

Although both of the variables (hearing and sight) may play a role in the steer’s response to roping in the arena, it was expected that auditory cues would be the main cause of the learned preventative behavior. Since cattle rely more quickly on hearing than they do sight in a frightened situation and it would need to be able to focus on the object quickly, it seems more likely that the cattle will respond to either the thundering up behind them from the horses, or the noise of a swinging rope getting closer. The cattle may see the horses coming up behind them, however, because cattle have slit shaped pupils they cannot focus quickly on an object. Team roping is a fast pace event and being able to see a horse running up behind the steer
would require it to be able to focus quickly on the horse since the run is over within seconds.

**Results**

Throughout the roping season, only five out of the ten roping steers that were purchased picked up a learned preventative behavior. The first roping steer that picked up a preventative behavior did so during week 2. Different cattle picked up different behaviors from then on. These behaviors were not consistent throughout the rest of the roping season. For example, one steer ran left one day, straight the next and then ran to the right another day. With this in mind, neither the steer’s hearing nor eyesight was manipulated unless it showed the preventative behavior for three runs in a row (did not have to be three times in a row on the same day). Since only five out of ten of the cattle started to pick up the preventative behaviors (and these cattle were not consistent in performing these behaviors), sight manipulation was not done equally to the hearing manipulations. The steers that picked up behaviors are shown in Graph 1. This data shows each individual steer’s preventative behavior combined. The darker bands show the percentage of when the steer ran straight (no preventative behavior) over the entire roping season. Likewise, the lighter bands show the percentage of when the individual did not run straight (performed preventative behavior). The 80% manipulating mark is a percentage marker used to determine which steer’s sight and hearing senses were manipulated. If a roping steer ran straight 80% or less of the total runs ran throughout the entire roping season, their senses were manipulated. Any individual with a percentage over 80% did not have any senses manipulated throughout the roping season.
Graph 1: This graph shows all 10 roping steers total percentage of runs. The darker bands are when each individual ran straight as they are supposed to. The lighter bands are when each individual did not run straight and therefore performed some sort of a preventative behavior. The 80% manipulating mark is a variable manipulating point. Roping steers with a percentage of 80% or less had their sight and hearing manipulated, anyone over 80%, was not consistent enough with preventative behavior and therefore had no variable manipulated.

Sight (Flipped horn wraps)

Since only five out of the ten roping steers were consistent with learned preventative behavior, they were the only individuals who had their senses manipulated. Each of the five steers had their sight manipulated, however, it was not manipulated equally, as shown in Graph 2. This graph shows the total number of runs that each steer had their horn wraps turned around. Since the cattle were not consistent with each other in learning the preventative behaviors, the trials varied for each steer, thus, resulting in the total number of flipped horn wrap trials to not be equal.

When the horn wraps were flipped to limit the eyesight of the cattle, it was expected that this would be proven effective and cause a steer with a learned preventative behavior to omit the behavior and run straight again. Although the results saw a trend towards what was expected, they did not prove to be statistically significant. Graph 3 shows the effectiveness based off of a percentage per individual. The blue columns show the total percent that each individual ran straight, and the
red column shows the total percent when they did not run straight. When all of the steer’s data that had their eyesight manipulated where bunched together, Graph 4 was generated. This gives the overall effectiveness of how well flipping the horn wraps on a roping steer corrects their learned preventative behavior.

Graph 2: This graph shows the total number of runs that each steer had their sight manipulated (flipped horn wraps). As shown in the graph, not all of the steers had their sight manipulated equally.

Graph 3: Graph 3 shows how effective the horn wraps turned around were based on a percentage. The blue shows the percentage of time that each individual ran straight with the horn wraps flipped. Likewise, the red shows the percentage of time that each individual did not run straight with the horn wraps flipped. The significance, or p-value per steer is 0.511.
Graph 4: This graph shows the overall effectiveness of flipping the horn wraps on roping cattle to act as blinders and manipulate their hearing.

Hearing (*Inserted removable earplugs into the cattle’s ears*)

The five cattle that had their eye sight manipulated by turning their horn wraps around to act as blinders, also had their hearing manipulated. Again, not every one of these five cattle had their hearing manipulated equally for similar reasons as the eyesight manipulation inequality. Graph 5 shows the total number of runs that each steer had their hearing manipulated. It was expected that inserting the earplugs into the cattle’s ears would cause the steer that no longer ran straight to omit the preventative behavior and run straight again. The results received were proven not to be significant with the p-value of 0.338. Graph 6 shows how effective the earplugs were per cow based on a percentage. The blue columns show the total percent that each individual ran straight with the earplugs in the cattle’s ears, and the red column shows the total percent when they did not run straight with the earplugs. When all of the steer’s data that had their hearing manipulated were bunched together, Graph 7 was generated. This gives the overall effectiveness of how well inserting earplugs into a roping steer’s ears corrects their learned preventative behavior.
Graph 5: This graph shows the total number of runs that each steer had their hearing manipulated (Earplugs inserted). As shown in the graph, not all of the steers had their sight manipulated equally.

Graph 6: This graph shows how effective inserting earplugs into the roping cattle was based on a percentage. The blue shows the percentage of time that each individual ran straight with the earplugs in the cattle’s ears. Likewise, the red shows the percentage of time that each individual did not run straight with the earplugs in the ears. The significance, or p-value per steer is 0.338.
Graph 7: This graph shows the overall effectiveness of inserting earplugs into the roping cattle's ears to manipulate their hearing.

Discussion

Team roping is a popular event throughout rodeos all over the nation. However, this sport can become expensive fairly quickly, especially when the roping cattle pick up a learned preventative behavior. This type of behavior can include ducking their horns, running to the right or left, or running and then suddenly stopping. Once a roping steer picks up this behavior, it is considered to be a “bad” practice cow. The purpose of this study was to determine what cues these team roping cattle respond to in order to avoid being roped. Ten roping steers were used, and only five picked up a consistent learned preventative behavior. It was hypothesized that cattle pick up any learned preventative behavior by hearing the team ropers rather than by seeing them. This is predicted because cattle have slit shaped pupils and cannot focus quickly on an object. Since team roping is a fast paced sport, cattle were more likely to depend on hearing since their eyesight is problematic (Parish, et. al, 2013). However, this hypothesis was not supported according to the results found. The five out of ten cattle that picked up a preventative behavior did so at different times. One out of the five cattle first picked up ducking his head two weeks after the roping season started. This particular steer
was older than three of the other steers and had been roped before. Another steer around the same age and size that also had been roped before did not pick up a learned preventative behavior (in this individual’s case ducking his head sometimes and running to the right other times) until four weeks after the roping season started. The remaining three steers had never been roped prior to the season and they were smaller in size. These steers all picked up behaviors very inconsistently at first and then more consistent around 5 weeks into the season. These results reflect what was expected due to a cow’s flight response, size, and experience (Lanier, et. al. 2000). However, since only five out of the ten steers picked up the behavior, more data is needed to confirm any patterns.

Although the cattle did seem to show some signs of improvement when their sight was manipulated (as shown in graphs 3 and 4), when all of the “flipped horn wrap” trials were clumped together, as shown in graph 4, there was sign of slight improvement in the cattle’s running behavior. However, this did not prove to be statistically significant with a p-value of 0.511. It was noticed throughout the roping season that not all of the roping cattle picked up the same preventative behavior. Some of the cattle ran to the left while others ran to the right. Some even switched back and forth. One steer in particular only picked up the behavior of ducking his head. Since each steer did not exhibit the exact same behavior to prevent themselves from being roped, it is possible that the type of cue each individual responds to could be different and have a different impact on the response behavior. For example, as shown in graph 3, flipping the horn wraps around to act as partial blinders seemed to be affective for two out of the five steers. The only preventative behavior that these two steers picked up throughout the entire season was either running to the left or running to the right. In contrast, flipping the horn wraps had the least effect on the steer that ducked his head throughout the entire season. The remaining two steers picked up ducking their head at times, and running in a particular direction other times.

A similar observation was made when earplugs were inserted into the cattle in order to manipulate their hearing. Although earplugs did not prove to be effective
in preventing the cattle from using the learned preventative behavior (significance p-value of 0.338), they did seem to show effectiveness on an individual basis. Similar to flipping the horn wraps on the cattle, inserting earplugs into the cattle’s ears seemed to have more effect on the cattle that ducked their head than the ones that ran to the left or to the right (as shown in graph 6). When graph 3 and graph 6 were compared (manipulating the hearing versus manipulating the eye sight), the relative effectiveness is almost opposite of each other. This further supports the idea that the learned preventative behavior throughout a roping season may also be correlated with the type of cue that each steer responses to on an individual basis.

In efforts to move forward with this experiment, another study could be done to test separate hypotheses. While considering the findings of this study, future research could address whether cattle that duck their head will respond better to hearing or sight manipulation. Likewise, additional research could address whether cattle that run to the left or right will respond better when their eyesight or hearing is manipulated. These two predictions make sense when looking at the preventative behaviors performed. When a cow is at a standstill and can see a handler approaching it, it is likely to move away from it (to the left or right) (Parish, et.al, 2013). It is not very likely that when the same cow sees the handler approaching it that it will duck its head. It may perhaps duck its head and move away if the handler is reaching directly for the head. However, in a fast paced situation like a team roping event, the cattle cannot focus on the roper swinging the rope behind them at a distance quickly enough to duck their head in response to sight, but they can hear them (Parish, et al. 2013).

Although the initial hypothesis that cattle pick up any learned preventative behavior in response to auditory rather than visual cues was not supported, it suggests that the learned behavior may be determined on an individual basis. The information found in this study could be further supported by grouping related preventative behaviors to see if they are responses to similar cues. In order to continue this study, more cattle would need to be included and roped at different times of the year. This would help to eliminate some of the bias of the hot and dusty
weather, as well as give more data to further confirm these behavioral patterns. Since the data was collected outdoors only, in the hot summer weather, an indoor arena in the cold winter months could show different results. This is a very important factor that should be addressed since team roping is practiced year-round and in all weather.
**Literature Cited**


http://braymere.blogspot.com/2012/03/steers-ears.html
Appendix - Arena Map

- Catch Pen
- Stripping Chute
- Run Up
- Arena
- Roping Chute
- Roping Boxes
Appendix - Corriente Roping Steer

**Neoprene Horn Wraps**