

Cattle Producer's Handbook

Quality Assurance Section

210

Reduction of Handling Stress Improves Productivity and Welfare

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Reducing stress during handling will provide advantages of increased productivity and maintenance of quality. Recent work has indicated that cattle that become agitated and excited in the squeeze chute have significantly lower weight gains and tougher meat, which results in more borderline dark cutters. Agitation and excitement in the squeeze chute are influenced by both genetic factors and the animal's previous handling experiences. The author has observed that cattle that have previous experience with quiet handling will be calmer and easier to handle in the future.

Reports from commercial feedlots indicate that quiet handling methods help improve productivity. Deaths due to respiratory sickness were greatly reduced in a Texas feedlot when quiet handling procedures were implemented. At another feedlot, toe abscesses were reduced by half when quieter handling methods were used. One cause of toe abscesses is scuffing of the toes when agitated cattle are waiting in line in the chute.

Short-term stressors that occur during handling and transport have been shown to interfere with the biological mechanisms of both reproduction and immune function. Electric prods, restraint, and other handling stressors will lower female reproductive function. In both pigs and cattle, transport or restraint stress lowers immune function.

In cattle, the stress imposed by transit has a greater detrimental effect on the animal's physiology than the stress of feed and water deprivation for the same length of time. Transport stress can also lower rumen function compared to controls subjected to feed withdrawal.

The Role of Fear

Many detrimental effects of handling stressors on animal performance and health are likely due to fear. The relevance of fear in the analysis of behavior during handling is clear. Fear is a universal emotion that motivates animals to avoid predators. All vertebrates can be fear conditioned.

Fear is a very strong stressor. Fear caused by exposure to novelty can elevate levels of cortisol higher than many husbandry procedures. For example, in extensively raised beef cattle not accustomed to handling in a squeeze chute, the psychological stress of restraint raised cortisol levels almost as high as branding.

The amount of stress caused by a handling procedure such as restraint in a squeeze chute is determined by how the animal perceives it. Handling stresses that are nonpainful are mostly determined by the amount of fear. An extensively raised animal that has had little contact with people is more likely to have more fear stress when it is restrained than an animal that is reared in close contact with people and trained to handling procedures. Calves that are raised with close human contact have lower cortisol levels during restraint than animals that receive less contact with humans.

Training and Habituating Livestock to Handling

Practical experience on ranches and feedlots shows that making cattle accustomed to both people on foot and on horseback will produce calmer and easier to handle cattle at the slaughter plant. An animal's previ-

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ous experiences with handling will affect its reaction to future handling. Researchers have found that training young calves by walking quietly among them or putting them in a chute and petting them produced calmer adult animals with smaller flight zones. The flight zone is the distance an animal will approach a person. Completely tame animals have no flight zone, and they will allow people to touch them.

Temperament

An animal's temperament is one determinant of how it will react during handling, and this is determined by an interaction between genetic and environmental factors. Genetics has a substantial effect. In cattle, temperament is highly heritable. Several studies have shown that cattle with Brahman genetics (*Bos indicus*) are more excitable than *Bos taurus* breeds when evaluated by observing their behavior in a squeeze chute.

A major component of temperament is fearfulness, which is defined as "a basic psychological characteristic of the individual predisposing it to perceive and react in a similar manner to a wide variety of potentially frightening events." Although temperament has a strong genetic component, it is also influenced by previous experiences and handling.

Ranchers reported that cattle with a flighty, excitable temperament are often calm and easy to handle on their home ranch, but they may panic and become frenzied when they are suddenly introduced to a novel noisy environment such as an auction ring or a livestock show. It is important to get cattle acclimated to different vehicles and different people before they leave the ranch. This is especially important for cattle that originate from more flighty genetic lines.

The author speculates that purebred Brahman cattle may have more of the social reinstatement trait than the British or European breeds. Purebred Brahmans have an intense tendency to follow people when they are handled quietly. The author has observed that this trait can be so strong that purebred Brahmans may be difficult to drive. It is often easier to move them by having them follow a horse or a person.

Effects of Novelty

Novelty is a strong stressor. Novelty is anything new or sudden in an animal's environment. Examples of sudden novel stimulus would be a stamping foot, a train passing a pen where newly arrived calves are received, or an auction ring. The paradox of novelty is that it will cause an intense behavioral and physiological reaction when suddenly introduced to an animal with a flighty, excitable temperament, but the same flighty animal may be the most attracted to a novel object when allowed to approach it voluntarily.

In cattle, breeds with the largest flight zone had the greatest tendency to approach novel objects or a person

laying on the ground. The author has observed cattle that will approach and manipulate a piece of paper lying on the ground when allowed to voluntarily approach it, but they will balk and jump away if someone attempts to drive them over it.

Temperament and Habituation to Handling

A review of many studies and practical experience have shown that animals with a more placid temperament will habituate more easily to a forced, nonpainful handling procedure than animals with a flighty temperament. In cattle, agitation and cortisol levels decreased when the animals were handled in a squeeze chute every day over a series of days (e.g., they habituated to being restrained). However, some animals do not habituate easily. In one group of cattle, some individuals violently shook the squeeze chute and never habituated to being restrained when they were handled every 30 days. Even though the cattle were handled quietly, they still struggled violently and became behavioral agitated every time they were put in the squeeze chute.

Extremely flighty excitable animals, such as elk, bison, and antelope, are less likely to habituate to a forced handling procedure. Because it is more difficult for flighty, excitable animals to habituate, the author hypothesizes that these animals must have novelty introduced slowly and gently to avoid triggering a dangerous flight reaction.

On farms, ranches, and feedlots, observations by the author indicate that an animal's first experience with a handling facility, a new corral, a person, or pieces of equipment should be made as positive as possible. Farm animals can be very frightened in these novel situations and, if a painful or very aversive procedure is done the first time, it may become difficult to persuade the animal to re-enter the facility. First experiences are critical in how animals form future responses to similar situations.

Several researchers agree that less severe procedures should be done first. Some ranchers report success in training cattle by walking them through the squeeze chute a few times and giving them a feed reward, which made future handling in the squeeze chute easier. Providing feed rewards to sheep improved movement through a handling facility.

Animals can develop fear memories that are difficult to eradicate. They form a subcortical circuit in the brain that allows an animal to quickly flee if it sees or hears the same frightening stimulus. These memories can be suppressed by learning, but never completely erased from the brain's subcortical circuits.

Improve Handling Practices

Handlers need to learn basic principles of handling such as the animal's flight zone, and using the animal's point of balance to induce it to move forward or backward. On ranches and feedlots, move small bunches of cattle

that can be easily handled. The staging alley leading to the truck loading ramp or processing area should only be filled half full.

Do Not Overload the Crowd Pen

The crowd pen should be filled only half to three-quarters full. Half full is best. It is important to avoid using the crowd gate if possible. On a round crowd pen, the crowd gate should be closed and set on the first notch and left there. It should not be used to push animals. Cattle need room to turn and should be handled in small discrete bunches, with space in between the bunches.

Eliminate Electric Prods

Use other driving aids, such as plastic paddles or sticks with plastic steamers or flags tied on them. Use these devices to work the animal's flight zone and to turn the animals. These devices work better than plain sorting sticks, because the animals can see them easily.

Open Anti-Back Gates

Many chute facilities have too many anti-back gates. Movement will often improve if most are tied open. The only place an anti-back gate may be needed is up close to the squeeze chute. Cattle handled calmly and quietly are less likely to back up. The anti-back gate at the single file chute entrance can be equipped with a remote control rope so it can be held open by a person standing by the crowd pen. This facilitates entry of the cattle into the chute.

Eliminate Visual Distractions

Distractions and lighting problems may ruin the performance of a well designed facility and should be removed. To locate distractions that impede animal movement, handlers should get in the chute and crouch down to look at them from the animal's eye level. When cattle balk or refuse to enter the single file chute, look for distractions such as shiny reflections, a dangling end of a chain, water puddles, drain gratings, a coat hanging on a fence, or people visible up ahead. Cattle, sheep, or

pigs moved calmly through a handling facility will look directly at visual distractions, which should be removed. When animals are excited and panicky, however, they may not do this.

Cattle will often refuse to enter a chute that is too dark. On one feedlot, the author found it was impossible to eliminate electric prods in the crowd pen until more light was admitted to the processing building by opening a garage door. When new feedlot processing areas are built, skylights are recommended to provide diffuse, shadow-free light, because shadows that fall across a chute can make animals balk. Animals will not approach blinding light, however, and will not walk directly into the sun. Another distraction that may impede animal movement is air blowing in their faces.

Handler Movement Patterns

The author observed that use of the movement patterns shown in Fig. 1 enabled handlers to eliminate electric prods in the processing area. Animals will move forward in a chute when a handler walks past them in the opposite direction of desired movement. The handler must pass the point of balance at the shoulder to induce animals to

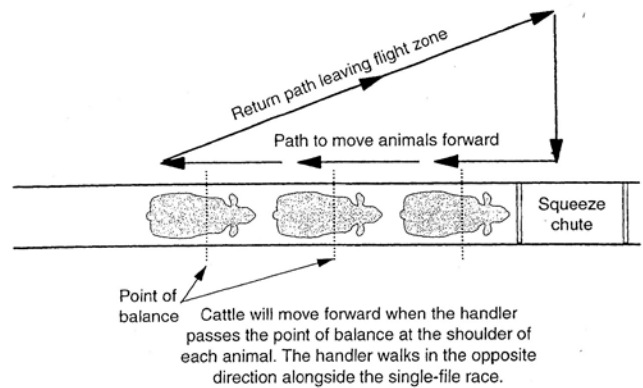


Fig. 1. Movement pattern to move cattle easily into the squeeze chute. Use of this movement pattern will make it easier to eliminate cattle prods. (Reprinted with permission from the Temple Grandin website)

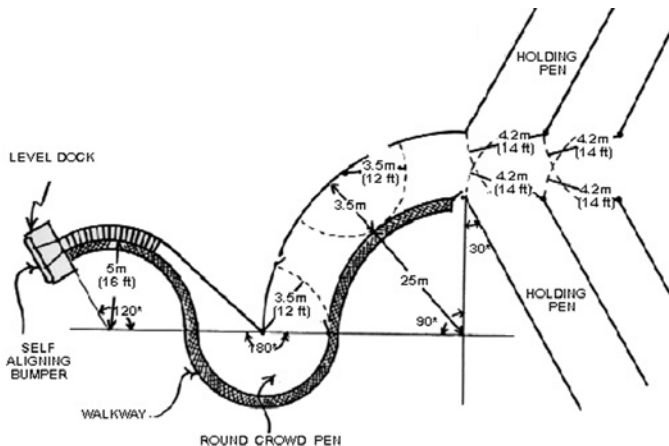


Fig. 2. This design is for loading livestock. The cattle walk in a single file line and the ramp width is 30 inches. (Reprinted with permission from the Temple Grandin website)



move in the opposite direction. To make animals move forward, the handler must be behind this point of balance.

Animals speed up and move faster when a handler inside their flight zone walks in the direction opposite to the desired movement. Handlers should not put continuous pressure on an animal's flight zone. To induce a cow to walk into a squeeze chute, the handler should stand back out of her flight zone. The cow will usually move forward into the squeeze chute when the handler steps toward her and walks back past the point of balance at the shoulder.

Behavioral Principles of Restraint

Four behavioral principles of restraint can be used to keep animals calmer. These are: blocking vision, slow steady movements of the restraint apparatus, optimum pressure, and providing secure footing so that animals do not lose their balance and struggle due to slipping. On squeeze chutes, cover the open barred sides or install angled rubber conveyor belt strips on the side bars to prevent cattle entering the squeeze chute from seeing the operator.

Cattle often balk at the entrance to a squeeze chute because they see the operator deep in their flight zone. The crowd pen, the lead up chute, and the squeeze chute should have solid sides. The most important part of the squeeze chute to cover is the back half closest to the tailgate. Covering the sides of the squeeze chute will also reduce sudden lunging at the headgate. Cattle should enter and exit the squeeze chute at a walk.

During restraint, cattle will remain calmer if the squeeze chute is closed with steady, strong pressure instead of suddenly bumping the animal. Sufficient pressure must be applied to provide the feeling of being held, however. Many people make the mistake of squeezing the animal tighter when it struggles. It is important to remember that if an animal is squeezed too tightly, the pressure should be backed off slowly. A sudden release of pressure may scare the animal.

Reduce Noise

Avoid yelling at animals, whistling, or whip cracking. Cattle are more sensitive to high pitched noise than are people. They are most sensitive at 8,000 Hz, and more sensitive to sound than human's ears at 7,000 to 8,000 Hz. Clanging noises on steel should be silenced, and hydraulic systems should be quiet and designed to avoid the sound frequencies for which cattle have maximum sensitivity.

On squeeze chutes, the clatter of the side bars should be quieted with rubber pads. The author has observed that reducing a high pitched whine in a hydraulic system resulted in calmer cattle.

Slow is Faster

Move cattle at a slow walk. Fearful animals are more likely to balk and are more difficult to handle. Handlers

should move slowly and deliberately. Sudden jerky motions frighten the animals. In the wild, sudden movements are associated with predators.

Use Following Behavior

When handling cattle, do not fill the crowd pen until the single file chute is partially empty, because when there is space in the chute, a group of animals in the crowd pen will follow the leader into the chute. Cattle in the crowd pen will turn around if the single file chute is full. It is important to avoid overfilling the crowd pen. Cattle should be moved in small, separate bunches.

Avoid Isolating Individual Animals

A lone animal left by itself will become stressed and can also be dangerous to people. The author has observed that many handling accidents are caused by a panicked lone animal attempting to rejoin its herdmates.

Quieter livestock handling techniques for loading and unloading trucks and handling animals in alleyways and chutes may take up to 2 weeks for handlers to fully learn. They may have to spend several days to learn the most efficient handler movement patterns and to make minor changes in the facility to improve livestock movement. Management has to be fully committed to permanently change handling procedures on a farm, feedlot, or ranch.

Management has to implement changes and impress upon employees how serious they are about stopping rough handling. The author has observed that most employees can be retrained. A few people have been rough for so many years, however, that they may not be able to change their ways. These animal handlers may need to be reassigned to jobs away from animals.

Objective Scoring of Handling

Quiet handling has a tendency to become rough unless management maintains constant vigilance. Therefore, there is a need for methods to objectively score handling procedures. The most simple handling procedure to score is electric prod use. The author has observed that trained handlers working in well-designed facilities can move large numbers of cattle without an electric prod. In a large commercial feedlot, the processing crew handled over 300 animals and only used an electric prod on 1 percent of them. Sometimes visual distractions make it impossible to lower prod scores.

The percentage of cattle that bellow can be used to assess handling stress. In cattle, vocalizations are correlated with physiological stress measurements. Bellowing was associated with electric prodding, slippage and loss of footing, and excessive pressure applied by a restraint device. The author has observed that when cattle are handled quietly in a squeeze chute for vaccinations and implanting, fewer than 3 percent of the animals will vocalize during handling in the lead up chute, catching in the squeeze chutes, or during vaccinations.

Improper use of squeeze chutes can result in cattle injuries. The author has observed that hitting the headgate too hard can result in injuries that can be avoided by quiet handling so that cattle walk calmly into the squeeze chute. On some squeeze chutes, the hydraulic pressure is set too high, which can result in internal injuries.

Genetic Factors

Observations on thousands of cattle and pigs in large slaughter plants indicate that some animals that have been bred for extreme leanness are very excitable and difficult to handle when they are brought to a new place. They become highly agitated when they are subjected to the noise and novelty of a large slaughter plant. The author has observed that the most excitable pigs and cattle have long, slender, smooth bodies and fine bones. Animals bred for leanness with heavy bones and bulging muscles tend to be calmer.

For example, in the Charolais breed, the author observed that heavy-boned muscular Charolais were calmer than Charolais with a more slender body shape. Both types of lean animals, however, are probably more excitable than animals with more body fat. Double-muscled Angus cattle have more excitable temperaments than normal Angus.

To reduce stress and to improve both productivity and welfare, it is important to breed animals with a calm temperament. One must not make the mistake of over-selecting for any single trait. Excessive selection for calmness may result in some other problems such as lack of mothering ability. To prevent handling and stress problems, it would be advisable to cull the most flighty animals that became extremely frenzied and agitated when they are restrained, but it would probably be a bad idea to select only for the very calmest animals.

Conclusions

Genetics and experience interact to determine how an animal will behave during handling. Quiet, calm handling at an early age will help produce calmer, easier-to-handle adult animals. People working with animals need to understand the behavioral principles of handling.

Summary

Reducing stress on livestock during handling will help reduce sickness and enable cattle to go back on feed more quickly. Many detrimental effects of handling stressors on animal performance and health are likely due to fear. Practical experience on ranches and feedlots shows that making cattle accustomed to people both on foot and on horseback will produce calmer and easier to handle cattle.

An animal's first experience with a new corral, a person, or pieces of equipment should be made as positive as possible. If a painful or very aversive procedure is done the first time, it may be difficult to persuade the animal to re-enter the facility. The following tips will improve handling:

- Move small numbers of animals at a time.
- Do not overload the crowd pen.
- Eliminate electric prods.
- Open anti-back gates.
- Eliminate visual distractions that make animals balk.
- Use flight zone and point of balance principles.
- Reduce noise.



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