



Safe handling of large animals: Part II

Temple Grandin, Professor of Animal Science at Colorado State University, has over 30 years of experience in handling large animals. In the second of two articles, Dr Grandin continues her review of current research alongside findings from her own extensive practical experience.

TRAINING ANIMALS

Training animals to cooperate with handling procedures helps reduce stress and accidents. Sheep can be trained to voluntarily enter a restraint device (Grandin 1989). At the Denver Zoo, antelope were trained to voluntarily cooperate with veterinary procedures such as blood sampling and injections (Grandin *et al.* 1995). Training Bongo and Nyala antelope to enter a wooden crate and stand still while they were given injections improved safety for both people and animals. Bongo are large, flighty animals, and when they become scared they are an extreme safety hazard. Training also greatly reduced stress on the animal. The cortisol levels in crate-conditioned Bongo were only 2.9 ng/ml (Phillips *et al.* 1998) which

is close to resting baseline levels in cattle. (Alam and Dobson 1986; Grandin 1997). Creatine phosphokinase levels for four trained Bongo averaged 71 IU/L in trained animals and 288 IU/L in animals immobilised with a dart or pole syringe. Glucose levels were 61 mg/dl in trained and 166 mg/dl in immobilised Bongo (Phillips *et al.* 1998). Since antelope are animals that survive in the wild by flight, they are highly vigilant and aware of any new sight or sound. If they are suddenly confronted with something new, they are likely to panic. The antelope had to be gradually habituated to each new procedure. Ten days were required to habituate the animals to the sound of the sliding door moving on the handling crate. The first day, the door was moved only one inch. The instant the animal turned its head toward the sound, movement was

stopped. Flighty animals must never be pushed beyond this orienting response. It is important to avoid triggering a massive flight reaction during early training. If the antelope has a scary experience associated with the handling crate, they may become impossible to train.

The animals were gradually habituated to all the sights and sounds associated with the crate. They were enticed into entering the crate by the placement of highly palatable treats (yams or spinach), which were not part of their regular diet, at the entrance. The food was gradually moved further and further into the crate. The crate had to be long enough so that the animal had to completely enter to get the food. The animals were then habituated to being locked in the crate for increasing lengths of time, starting with one second. There is a critical point during training when the purpose of the treat changes from being an enticement to enter the crate, to a reward for standing still during blood sampling from the rear leg. To entice the animal into the crate, the treats were continuously available. After the animal was fully trained to enter the crate, the treats were withheld until it kept its leg still.

Each animal was then trained using operant conditioning to stand still when its leg was touched. If it stood still after its leg was touched, a treat was given immediately. Timing of giving the treat is critical. It must be given the instant the animal stands still so that it will associate the treat with standing still. The antelope was then conditioned to tolerate increasingly hard pinches to simulate a needle. Early in the training procedure, great care was taken to avoid triggering a massive flight and panic reaction. Later on in the training program, operant conditioning had to be applied to some animals to prevent learned avoidance behavior. These particular animals were continuously fed treats, and they learned that they could avoid a needle stick by moving their leg. The treat had to be understood by the animal to be a reward for not moving.

The trained antelopes still feared the veterinarian who had previously shot them with a tranquiliser or dart. He was the only person who was not able to handle the trained animals. However, a new veterinarian was able to handle the animals. For training to be successful, it must be done by people who are not associated with aversive previous experiences. Research has shown that cattle can differentiate between different people (Boivin *et al.* 1998). Dairy cattle are able to identify the handler and/or the location connected to an aversive event, and thus predict the type of handling they will receive (Rushen 1986). Practical experience has shown that animals can easily recognise a familiar person by their voice.

TRAINING TIME AND TEMPERAMENT

A basic principle is that animals with a flighty, excitable temperament must be trained and habituated slowly, in small steps over many days, whereas animals with a placid temperament can be trained more quickly and in bigger steps (Grandin 1997). It is advisable to keep training periods short: 10-15 minutes per day is ideal. Repeatedly forcing an animal to do something over and

over on the same day can cause fear and agitation. Even for calm animals, such as cattle, it is advisable to limit the length of a training session. Cattle can be easily trained to voluntarily enter a squeeze chute, but making the animal go through it many times in one day may cause increasing agitation. Animals need time to calm down between training sessions.

GENETIC EFFECTS ON TRAINING

As mentioned, flighty animals are more likely to panic when suddenly confronted with a new experience than calm, placid animals. However, even cattle and horses known to be calm and well-mannered at home have gone berserk at shows. Sudden exposure to a new thing often is the cause of these animals injuring people by running through crowds or jumping arena fences and leaping into the stands. Farmers, show managers and feedlot operators have reported that cattle and horse breeds with excitable temperaments are more likely to be difficult to handle in new surroundings. It appears that excitable animals have no tolerance for sudden new experiences. At a slaughter plant, the author observed nervous Saler cross heifers kicking at handlers with both back feet when prodded. Calmer breeds of cattle at the same plant walked quietly up the chute.

Dangerous incidents with excitable animals can be reduced by culling cattle that become highly agitated in the squeeze chute. Some cattle become extremely agitated every time they are handled (Grandin 1993). Genetic selection of cattle for temperament produces calmer animals that are less likely to become agitated when handled in new surroundings. Another approach is to train excitable animals to tolerate the sights and sounds of a new place. A flighty horse can be gradually introduced – on the home farm – to flags, balloons, horns, public address systems, and other stimuli that it would be exposed to at a show. Gradual introduction is critical because if a horse is severely frightened by a flag the first time he sees one, he may have a fear of flags for the rest of his life. The author has observed that flighty, nervous animals are more likely to develop permanent fears. For example, it is important that a colt's first experience with a trailer be a positive one. Accidents during loading and unloading of horse trailers can be reduced by gently training colts to load into a trailer.

HANDLING OF ESCAPED ANIMALS

If horses, cattle, or other large animals escape from an auction ring, show ring, or slaughter plant, they must never be chased. The author has observed several incidents where chasing escaped cattle caused them to run wildly through crowds of people and resulted in injured people and extensive property damage. If an escaped bovine or horse is located where it is not an immediate threat to people, it is usually best to leave it alone for 30 minutes to allow it to calm down. Twenty minutes is required for the animal's heart rate to return to normal (Stermer *et al.* 1981). When it has calmed down, it can be quietly moved.

Interestingly, a lone animal often returns of its own volition to other horses and cattle. A panicked bovid or horse may crash through a chain link fence, because it does not see the thin mesh. The author has observed escaped cattle knocking over a chain link fence when people chased them. Chain link fences hold a calm bovid, but a frightened animal may either knock it over or go under the bottom edge of the mesh. Fences that present a visual barrier, such as a board fence, are less likely to be broken down by charging animals.

Allow experienced livestock people to handle an escaped animal. A panicked horse, steer, or bull can sometimes be calmed when it hears its owner's familiar voice. Some of the most dangerous incidents with escaped animals have occurred when security guards or the police became involved. In one incident, a security guard almost shot a person instead of an escaped steer. Some officers make the mistake of chasing animals and making the situation worse. There was a bad incident on the author's own campus where campus police chased a tame, halterbroke steer and caused him to panic. He ran through a glass door into one of the dormitories and ended up in a student's room. The room was completely trashed. Fortunately, nobody was hurt.

At zoos, escaped animals can often be coaxed back into their enclosures by a familiar keeper. If a dangerous animal escapes, visitors should be quietly evacuated. The 'John Wayne' approach (loud and aggressive) may make the situation worse and result in the animal escaping from the zoo property. A better approach is for an experienced person to calmly shoot the animal with a tranquiliser dart. Zoos should develop plans for dealing with escaped animals.

TIPS TO IMPROVE FACILITY SAFETY

- 1. Solid sides:** For cattle, horses, and other animals with large flight zones, use solid-sided loading ramps and a single file chute to the squeeze and crowd pen (Grandin 1980). The crowd gate in the crowd pen also should be solid to prevent animals from turning back. Solid sides should be installed on all facilities where wild ungulates are handled in a small confined area.
- 2. 'Man-gates':** Install numerous 'man-gates' so that people can easily escape. This is especially important in confined areas with solid fences where the handler may be deep in the animal's flight zone. In areas with solid fences, another option is a toe slot that makes it easy to climb a solid fence. A grab rail should be used in addition to a toe slot or toe rail if the top of the fence is over six feet high.
- 3. Non-slip flooring:** It is impossible to handle large animals safely when they are slipping on the floor or panicked because they are losing their footing. In existing facilities, slick concrete floors in high traffic areas, such as at the scales or in front of the squeeze chute, can be covered with a grating of one-inch diameter steel bars. The rods must be welded flush with the floor. Overlapping of the bars will damage hooves. Old, smooth concrete floors can be regrooved with a concrete grooving machine, which can be rented from a concrete supply company. New facilities should have a non-slip floor surface.
- 4. Noise reduction:** Facilities should be constructed to minimise noise. Excessive noise is one cause of animal agitation. It is especially important to reduce high-pitched noise. Pad gates with rubber stops to prevent clanging and banging. Hydraulic equipment should be engineered for low noise.
- 5. Repairs:** Keep gates and gate latches well maintained. Accidents are more likely to happen in poorly maintained facilities with broken gates and fences.
- 6. Distraction removal:** Distractions can cause animals to balk and refuse to move through a chute or corral (Grandin 1996). Baulking animals that back up or turn back can be hazardous to handlers. After all, the animals have been removed. locate distractions by crouching down and walking through the chute. The chute should be observed at a cow's eye height. Some of the things to look for are: a loose end of a dangling, moving chain; shining reflections off metal; sparkling water puddles; people up ahead; dripping water; a coat hung on a fence; a coffee cup on the ground; shadows; a change in flooring type or texture; a drain grate. Also, listen for air hissing. In slaughter plants, air blowing down the chutes into the faces of approaching animals causes baulking. Such distractions should be removed.
- 7. Handrails:** Catwalks and walkways that are more than 24 inches (60 cm) off the ground should be equipped with handrails to help prevent falls.
- 8. Pen design:** Small crowd pens that lead up to loading ramps or a single file chute should be designed so that after the crowd gate is closed, cattle or other hoofed animals can be moved by a person standing outside the pen.
- 9. Antiback-up gates:** These are a safer alternative to pipes placed behind animals in the single file chute. However, too many backstop gates may cause baulking. Animals in the crowd pen enter the single file chute more easily if the backstop gate at the entrance is either tied open or equipped with a remote control rope so it can be held open as the animals enter.
- 10. Lighting:** Animals may refuse to enter a dark place (Van Putten and Elsoff 1978; Grandin 1982). Bright, diffuse lighting facilitates animal movement. Lamps can be used to attract animals into chutes, but the light should not glare directly into their eyes. When handling



Figure 1: In some cases, aggression causes a bull to attack a person because he perceives the person as a herdmate, and he attempts to dominate.

facilities are located inside a building, translucent plastic panels can be installed to admit diffuse, shadow-free light.

AGGRESSION IN GRAZING ANIMALS

Male aggression

Most of the hazards discussed previously are caused by fearful animals. Bulls are involved in many animal fatalities, and when they are agitated in squeeze chutes, it is likely that their behaviour is motivated by fear. However, in some cases, aggression causes bulls to attack because they perceive the person as a conspecific (herdmate), whom they attempt to dominate (**Figure 1**).

Dairy bulls are notorious for attacking people. Why is the dairy bull more dangerous than most beef bulls? The difference in beef and dairy bull behaviour may be explained by the difference in rearing methods. Beef bull calves are reared on the mother cow, whereas most dairy bull calves are bucket fed by people. Research by Edward Price and his associates at the University of California found that Hereford bulls reared in groups were less likely to attack people than bulls bucket fed in individual pens (Price and Wallach 1990). Seventy-five per cent of the individually-reared bulls threatened handlers, whilst in 1,000 dam-reared bulls, only one bull attacked (Price and Wallach 1990).

Bulls that grow up with other cattle learn that they are bulls. Individually reared bulls may think they are people, and when they become sexually mature, they may challenge a person to exert dominance. Bull calves reared with other cattle usually direct their challenges toward other bulls instead of people.

To reduce risk on beef cattle operations, an orphan bull calf should either be castrated or placed on a nurse cow. Castration at a young age reduces aggression toward people. Practical experience in dairies indicates that bull calves reared together in large groups are less likely to attack people. After a short period of individual rearing, six-week-old bull calves are penned together. Orphan male calves, llamas (Tillman 1981) and buck deer have also been known to attack people. A basic principle is that most

grazing animals reared by their own species have less of a tendency to attack people. Same-species rearing is especially important very early in life.

There is a fundamental difference between grazing animals and carnivores such as dogs. The owner of a dog may become, in effect, leader of the pack, and there is no risk involved in this transference. However, the owner of grazing animals may be perceived as a herdmate, and there is risk from a mature, intact bull.

MATERNAL AGGRESSION

In many species, the mother animal is dangerously aggressive when she has newborn babies. Producers have observed that sows with newborn piglets are more aggressive toward handlers than a sow with slightly older piglets. Farmers and pork producers have both observed that sometimes the gentle cow with a small flight zone or the 'pet' sow is one of the most aggressive animals when she has a newborn.

INHERENT DANGER OF LARGE ANIMALS

People who work with large animals must realise that it is impossible to make horse or cattle handling completely safe. There are certain inherent dangers when working with large animals. Even when all precautions are taken, accidents may happen. A well-trained, normally calm horse or cow can spook unexpectedly. Recently, this author was called by an attorney about an accident at a fairground. A team of draught horses had run through a parking lot and injured a person. The horses had been scared by an electric garage door. They had seen the door opening many times, but on this day it scared them. Possibly the sun shined on the moving door at just the right angle to create a flashing reflection that was new and scary. Even well-trained animals may panic if they suddenly see something new. The lawyer was informed that it is almost impossible to prevent this type of accident. Training and habituation of horses to many different sights and sounds reduces the risk, but the risk can never be totally eliminated. Even the Denver Zoo's trained antelopes (see 'Training animals'), which are accustomed to being handled and

seeing people every day, crashed into a fence the first time they saw people on a roof. When liability for a livestock accident is being determined, ask, 'Was the accident caused by true negligence or was it caused by the inherent risk of working with large animals?' It is this author's opinion that an accident caused by broken or poorly maintained equipment may be rightfully called negligent. However, if a horse spooks at a backhoe or a cement truck, a riding stable should not be held liable for the inherent dangers of riding horses.

CATTLE AND CAR ACCIDENTS

Every year the author receives about ten telephone calls after an incident where people in a car have been injured by hitting cattle on a road. The cattle are either bulls looking for cows to breed, or new arrivals attempting to return to their previous home. Bulls are the biggest culprits. Bulls that have learned to break fences are very difficult to keep in. One bull tore five new barbed wire fences out in one afternoon. He had learned to push over the posts to avoid getting cut.

These animals can sometimes be stopped with an electric fence. To make all types of cattle respect an electric fence, it is essential that their first contact with the fence result in a big shock (Smith *et al.* 1986). Some animals learn that they can break an electric fence and that it only hurts until the wire snaps.

There is no pasture fence that is strong enough to keep a bull in if he has learned to break fences. Fences are successful because cattle never learn that they are capable of breaking them. When calves are small they learn to respect fences, because they are either pricked by a barb or shocked. After they mature, most cattle are unaware that they have grown big enough to easily knock over a fence. Only the heaviest wood, steel, or concrete corrals are strong enough to withstand a charging bull; building such pasture fences is too expensive to be practical. A good pasture fence for cattle is a psychological barrier that works over 99% of the time.

HANDLING TIPS TO IMPROVE SAFETY:

1. Lead rope: A boy in Colorado was killed by dragging when he tied his steer's lead rope to himself. The lead rope on a horse or steer should never be wrapped around a person's hand or tied in any way to a person.
2. Slow movements: Move slowly and deliberately around animals. Sudden movements may cause horses or cattle to 'spook'.
3. Gentle handling: Managers must properly train and supervise employees. Rough or abusive treatment of animals must never be tolerated. Accidents are more likely to occur when animals are agitated.
4. Well-trained horses: Well-trained, quiet horses should be used for farm work. Cattle feeders have learned from experience that partially trained or flighty horses increase accidents.

5. Proper shoes: Wear shoes with heels when riding to prevent your foot from going all the way through the stirrup. People have been killed when they fell off a horse and their foot hung up in the stirrup. Wear sturdy shoes to reduce injuries caused by animals stepping on your foot.

CONCLUSION

An understanding of the behavioural principles of animal handling helps reduce accidents. Calm, quiet handling also makes animal handling safer. It is essential to keep facilities well-maintained and to have nonslip flooring. There are certain inherent dangers when handling large animals. Applying the information in these articles can help make animal handling safer, but it is impossible to eliminate risk.

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