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Stockmanship Journal
2800 N. Montana, PMB 242
Helena, MT 59601
(406) 431-1865
stockmanshipjournal@yahoo.com
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# THE ESSENTIAL GRANDIN

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Temple Grandin, Ph.D. is a veritable force in the livestock industry. She is an exceptionally well-known and highly regarded animal scientist, teacher, researcher, author, and consultant. Her scores of published contributions (books, book chapters, scientific papers, and industry articles) in the areas of animal behavior, livestock handling, facilities design, animal welfare, humane slaughter, and livestock transport have had a tremendous influence throughout the livestock industry in the United States and beyond. Consequently, it behooves any serious stockman to be familiar with her work. However, given the sheer volume of those works makes it a daunting task. The objective of this article, then, is to condense what I, as a stockman, believe are the essential elements of Dr. Grandin’s work for other stockmen. To that end, I selected her relevant books (6), book chapters (14), and articles (55), read each twice, then did a topical analysis. What emerged were three principles that clearly guide and motivate all her work, and that work can be organized into four basic categories. This article is an exposition of those principles and categories.1

**Principles and Categories**

The three guiding principles are ethics, animal welfare, and economics. Grandin believes that there is an ethical reason, even requirement, to treat animals humanely and provide for their welfare, and that by so doing the producer will benefit economically. The four categories are: (a) a basic knowledge of animal cognition, memory, perception, emotion and behavior which helps one see the world from the animal’s point of view; (b) a fundamental knowledge of animal behavior principles and natural behavior patterns as they relate to animal handling and the design of handling facilities; (c) an appreciation for the interconnectedness and reciprocal relationship between animal handling, facilities design, training, management, measurement and incentives for animal performance and welfare; and (d) the handling and welfare of livestock in slaughter plants.

**Ethical Concerns**

Grandin feels very strongly about treating animals humanely and with respect. [8] She believes that “Raising animals kindly and caring for them [and] handling animals in a calm, low-stress manner is the right thing to do.” [36] Additionally, the “public is becoming increasingly concerned about how animals are treated.” [67] Quite apparently, all of Grandin’s work is motivated out of concern for improving the treatment of livestock. “Treating animals humanely,” she asserts, “should be a top priority for all handlers simply because animals deserve to live free from fear and pain.” [36]

The basis for an ethical responsibility to animals, Grandin contends, is the symbiotic or mutually beneficial relationship between cattle and humans in which humans provide for their cattle and, in turn, the cattle provide for their humans. Grandin views this as an “ancient contract” that must never be broken by abuse: “We owe it to the animals to give them decent living conditions and a painless death.” [8]

**Animal Welfare**

Grandin also feels very strongly about animal welfare and she has written extensively on the subject, including an entire book devoted to its effective measurement and implementation. [41-48] Her career has been driven by a concern to reduce suffering and improve the respectful and humane treatment of livestock. [8] For Grandin, animal welfare is not only about their physical well-being, but their mental well-being, from birth to slaughter. Not only do animals need a good physical life with proper food, water, exercise, and veterinary care, but also a good mental and emotional life, right up to the
moment of their death.

Stockmen need to understand that “animal welfare is an increasing concern all over the world” [41] and their treatment of animals is increasingly on the public’s radar. Grandin notes that there are international standards (e.g., the Terrestrial Animal Health Code of The World Organization for Animal Health), national standards (e.g., the USDA’s Animal Welfare Act, and the National Welfare Code of Practice), and private standards (e.g., animal welfare audit requirements by McDonald’s Corporation), and that these standards are likely to be more strictly enforced with time. [41]

**ECONOMICS**

Not only is mistreating cattle ethically wrong and results in bad animal welfare, Grandin argues that it’s also bad business. [36] She stresses that the good treatment of animals is ethical, is good for animal welfare, and also is good for productivity. [4] Therefore, she urges that stockmen have a clear understanding of the economic consequences of good versus bad animal handling practices.

The economic benefits for using good handling practices are significant. These include: reducing labor needs, decreasing stress and fear, lowering morbidity and mortality rates, reducing medicine costs, fostering faster growth, increasing weight gain and milk yields, improving meat quality (by reducing the incidence of tougher meat, dark cutters and bruises), improving conception rates and rumen function, enabling cattle to go back on feed more quickly, and preventing injuries to both animals and handlers, all of which increases productivity and profit. Additionally, good handling is very important for both animal and employee welfare. [16, 21, 24, 36, 44, 55, 62]

The converse also is true: “The bad effects of rough handling are becoming very clear.” [36] For instance, as early as 1989 Grandin reported that “handling stresses lower conception rates and reduces both immune function and rumen function.” [1] Later, she reported that cortisol levels were two-thirds higher in animals subjected to rough treatment. [10] Additionally, it is now known that bad handling increases fear and stress which increases morbidity and mortality, decreases weight gain and increases shrink, decreases milk yields and meat quality, increases injuries to both animals and handlers, and compromises animal and employee welfare and lowers productivity and profit. More specifically, in the instance of handling-caused morbidity, animals not only lose weight, but they have to be treated with expensive medications which eliminates them from any natural or organic beef program, and injection-site damage compromises meat quality, and prolonged sickness permanently lowers meat quality. [11, 16, 36]

The rewards of good animal handling are so great that Grandin “would like to see all ranchers adopt low-stress cattle-handling methods.” [36] Additionally, ranchers who “practice low-stress management techniques will be rewarded with calm, cooperative animals—allowing for safer, more productive livestock operations,” [36] and “cattle with previous experience of gentle handling will be calmer and easier to handle in the future than cattle that have been handled roughly.” [32] In sum, Grandin asserts that good stockmanship will improve the bottom line.

**ANIMAL COGNITION, MEMORY, PERCEPTION, EMOTION AND BEHAVIOR**

Stockmen and their cows are not as different as they appear. Grandin informs us that the genome of humans and animals is more similar than different. For instance, the chemical messenger systems in the brains of people and higher mammals are the same. The basic emotional systems centered in the amygdala (the emotional center of the brain) have similar neurological mechanisms. Also, the reptilian brain is essentially shared by both, but is covered and
dampened by the large neocortex in humans. Consequently, “It's time to start thinking about animals as capable and communicative beings. . . . We need to study animals for their own sake, and on their own terms, to the extent that it's possible. What are they doing? What are they feeling? What are they thinking? What are they saying?” To Grandin, these are some of the real questions. [28]

Cognition

Grandin stresses that understanding animal behavior is easier when we understand how animals think. Whereas most humans are predominantly verbal thinkers, animals think only in pictures. [8] Compared to animals, Grandin says that people are too cerebral or “abstractified.” [28]

Additionally, whereas humans are “cognitive generalists” (i.e., they have an ability to generalize knowledge to dissimilar events and circumstance), animals are “cognitive specialists” (i.e., they have a poor ability to generalize knowledge). [28] This explains, for example, why cattle worked only on horseback in a corral might go berzerk the first time they see a human on foot in the corral. “They didn't automatically expand their man-on-horseback-is-safe category to include man-on-foot-is-safe.” [28] This isn't to say that cattle have no ability to generalize knowledge. For instance, it has been demonstrated that some cattle can recognize a squeeze chute even if it's a different design and in a different location. [8]

Memory

Unlike the more generalized verbal memories of humans, animals' memories are very specific, filed away in their bovine biocomputer like files in a computer. Then, “they use the previously stored pictures as a reference for how they should react to a new object, person, or place in the future.” [36] They think by associating sensory-based memories.

Extremely detailed memories are stored as pictures, sounds, smells, tastes, or touch sensations. To understand the animal mind, Grandin believes, we must get beyond words. “Working to turn off the words and to think in pictures, sounds, touches, and tastes will improve your livestock handling.” [36]

According to Grandin, animals are supersensitive to sensory-based detail and their memories are hyper-specific. They don't form general categories like Don't be afraid of novel things. Rather, they have to learn not to be afraid of each and every novel thing they encounter in their lives. [36]

To the frustration of stock handlers, animals are not good at sequencing. [28] Grandin thinks that is why dogs get tangled up in their leashes and can't figure out how to get untangled. Perhaps that is why a cow often can't find the hole in the fence she escaped through to get back in the pasture; she probably lacks sufficient working memory to remember the sequence of events that got her where she is, so she can't retrace her steps.

“Fear memories” are of particular concern for the stockman. “Animals form object- or person-specific fear memories and event- or place-specific fear memories. . . . Fear memories in animals can never be erased. Memories can be suppressed, but if the animal is exposed to an event similar to the original, the memory may resurface.” [36] Consequently, first experiences or first impressions are vitally important. If an animal's first experience to a place, person, thing or situation is bad, the animal will probably retain that memory for life and may never learn to trust the person, place, thing or situation. [29] Also, “once an animal has become traumatized it’s impossible to un-traumatize him. Animals never unlearn a bad fear. . . . No animal goes back to acting nonchalant about a person, place, or situation once he’s been scared half out of his wits.” [28] And it only takes one experience: “A single, very aversive event can produce a strong conditioned fear response, but extinguishing this fear response is much more
difficult.” Consequently, it behooves the stockman to prevent fear memories from forming in the first place by preventing or mitigating any possible fear-inducing experiences.

It’s important for the stockman to understand that “an animal’s first experience with something new can have a long lasting effect on future behavior. Animals tend to judge future experiences based on their first experience. If a calf’s first experience with a person on foot or on a horse is a bad one, the animal may be difficult to handle for the rest of its life.” This explains, for example, why it’s important that an animal’s first experience with a processing facility be neutral or, better yet, positive. For instance, when introducing cattle to a new processing system it’s best to give them a dry run through the system without doing anything to them. Even better is to have some tasty feed waiting for them on the other end because animals are highly trainable to food rewards.

Besides learning directly from experience (e.g., things, events, or people that have hurt them), cattle learn certain fears from other cattle. Additionally, cattle can anticipate an unpleasant experience. “In one study, dairy cows that had been shocked in a restraining chute had a much higher heart rate when they approached the same restraining chute six months later than cows that had been restrained in the same chute with no shock.”

Perception

It is a mistake to assume that animals perceive like humans do. They don’t. Grazing animals see, hear, and smell differently than humans.

Vision. Vision is the most prominent of the senses in bovine. Cattle have wide-angle, panoramic vision and can see nearly 350 degrees around them without turning their heads. Grazing animal vision is designed to detect the rapid motion of predators, so any prey species will perceive rapid movement as dangerous. Hence, sudden movements frighten cattle, and handlers should use slow, steady, nonthreatening movements around them, especially when in close quarters.

Cattle have dichromatic vision (i.e., they have no red receptors). This enhances night vision and makes them more sensitive than humans to contrasts between light and dark colors, and shade and hue. Grandin says that this is why they may refuse to walk over a puddle or patch of sun, or to step onto a contrasting piece of flooring which might prove alarming to them.

Cattle have poor depth perception and they have to lower their heads to gauge depth. Therefore, an alert stockman will recognize this behavior and give the animal time to stop, lower its head, and examine what is frightening it, instead of misinterpreting the animal’s behavior as resistance and using force to make it move. The knowledgeable handler will give the animal the time it needs to examine the circumstance and overcome its fear.

Animals see the world in sharper detail than most people, and different sides of the same object will look different (e.g., if the same object is approached from different directions or angles). This explains why animals often shy at what to us is the same object; it’s not the same to the animal.

Lastly, Grandin believes that people suffer from “inattentional blindness.” Normal people see what they are used to seeing and what they expect to see. Cows, on the other hand, see everything as it is. That’s one of the reasons why a ranch owner has to correct every wrong detail in a handling facility, because a cow will see every wrong detail.

Hearing. Cattle have much more sensitive hearing than humans (e.g., human and cattle hearing are most sensitive from 1000-3000 Hz and 7000-8000 Hz, respectively). Consequently, loud or high-frequency noises are stressful to them. For one thing, “high-pitched sounds in the wild are used as alarm calls,” and loud noises simply hurt their ears. Consequently, loud or high-frequency
sounds should be avoided because they distress livestock. For instance, something as innocuous to us as an outdoor telephone bell will raise a calf’s heart rate 50 to 70 beats per minute. [1] Also, it is now known that screaming in an animal’s ear is as stressful as a jolt from an electric prod, and yelling and whistling at cattle increases their heart rate. [36] Grandin has observed that livestock will stay calmer and move through handling facilities better if all yelling and whistling are stopped. [36] Consequently, “People working around large animals should speak softly with a low tone of voice.” [19] Additionally, all facilities and equipment should be engineered for quietness. [65]

Cattle also recognize the voices of people who have treated them well versus those who haven’t. Grandin believes that animals are highly responsive to a handler’s tone of voice: “Animals can instantly recognize the voice of a familiar trusted person. They may also become frightened when they hear the voice of a person who abused them.” [1]

Smell. “When thinking about animal handling,” Grandin believes that “it is smart to consider that certain smells might cause an animal to behave with wariness or fear and to include that information as part of the puzzle of how to provide animals with the best possible experience.” [36] For example,

Blood or urine from relatively calm cattle appears to have no effect, but blood from cattle that have become very frightened may contain a ‘smell of fear’ substance [a fear pheromone]. If the cattle remain relatively calm they will voluntarily walk into a chute with blood on it, but if an animal becomes severely stressed for over five minutes the next animal will often refuse to enter. [8]

Emotions

Stockmen need to create good emotional welfare in their animals, according to Grandin. When we normally think of animal welfare we think of taking care of an animal’s basic physical needs, such as adequate nutrition, shelter, and veterinary care. Others will include how the animals are treated by their handlers. Grandin takes a unique approach. She believes that animal welfare programs should be based on the core emotion systems in the animal’s brain. Her theory is that “the environment animals live in should activate their positive emotions as much as possible, and not activate their negative emotions any more than necessary.” [36] To understand animal welfare, she argues, we have to understand the brain, and research in neuroscience has shown that emotions drive behavior, and normal behaviors evolved to satisfy core emotions. Therefore, Grandin argues, we should “focus on the emotion, not the behavior.” [36]

It turns out that animals don’t have purely behavioral needs, but they do have purely emotional needs that are fulfilled with specific behaviors. [8] Therefore, for the sake of the animal’s welfare, it needs to be free enough to express those behaviors to satisfy its basic emotional needs. For example, hens need the freedom to hide to lay eggs. Gerbils don’t have a biological need to dig, which was once believed, rather, they have an emotional need to feel safe inside a burrow. [37] And it can be argued that cattle have basic emotional needs, such as for companionship and feeling safe. It is the responsibility of stockmen, then, to meet those needs which will lead to happier, hence healthier, cattle.

Contrary to what once was generally believed, animals have emotions. Biologically, they are born with the same core emotion systems in the brain as humans; they are innate, not learned. This is proved by the fact that experimental electrical stimulation of the different emotional centers of an animal’s brain always results in the manifestation of the same behavior. Stimulate the anger system, the animal snarls and bites. Stimulate the fear system, the animal runs away or freezes. The four primary emotion systems are “seeking” (the basic
impulse to explore the environment), “rage,” “fear,” and “panic” (social attachment). Three other transitory socioemotional systems are the “sexual drive,” “care” (maternal love and caretaking), and “play.” [37]

Grandin argues that producers need to be cognizant of these core emotion systems in the brain and follow this rule: “Don’t stimulate RAGE, FEAR, and PANIC if you can help it, and do stimulate SEEKING and also PLAY.” [36] The bottom line for Grandin: “During the animal’s life, both its physical needs and its emotional needs should be satisfied. . . . I think the most important thing for an animal is the quality of its life. A good life requires three things: health, freedom from pain and negative emotions, and lots of activities to turn on SEEKING and PLAY.” [36] It behooves stockmen to realize that “poor physical welfare often goes along with poor emotional welfare.” [36]

As implied above, fear is the most important emotion for the stockman to understand, avoid or mitigate. [12] “The single worst thing you can do to an animal emotionally is to make it feel afraid. Fear is so bad for animals I think it’s worse than pain,” [28] Grandin exclaims. For one thing, fear causes a great rise in stress hormones. [61]

Grandin has found that “mistreatment by people is the number-one cause of animals becoming frightened.” [8] Basically, excessive fear and the resultant anxiety reduce animal welfare and performance. “Fear is an exceedingly strong stressor” [37] and can raise stress hormones to higher levels than can many physical stressors as measured by cortisol (a stress hormone) levels. [32] Whereas the baseline cortisol level of cattle is ~ 4 ng/ml, and ~ 22 ng/ml during quiet handling, it skyrocketed to ~ 62 ng/ml when handled roughly with electric prods. [36] This is objective proof of the importance of calm handling practices.

Also, “when cattle become agitated during handling they are motivated by fear,” [32] and that fear can spread through a whole herd instantly. “A common mistake people make is mixing up fear and aggression. Most behavior problems that occur during handling, veterinary procedures, loading, and riding are caused by fear or pain—not aggression.” [36] This mistake is compounded, Grandin explains, when the handler responds by punishing the frightened animal by hitting or yelling. Punishing a fear-based behavior will only make it worse. [26]

**Behavior**

As grazing animals, cattle display distinct patterns of behavior that are useful for stockmen to know about. For one thing, as Grandin writes, “An understanding of the behavior of livestock will facilitate handling, reduce stress, and improve both handler safety and animal welfare. . . . The use of behavioral principles should improve efficiency of livestock handling and reduce stress on animals.” [1] The mistake people make, Grandin says, “is that they often attempt to use force instead of using behavioural principles to get an animal to move through a facility.” [48]

**Herd animals.** As herd animals, cattle are ever vigilant for predators, but they aren’t pure flight animals like horses; when threatened by a predator they generally turn to face the predator to examine the threat, then bunch together, then flee or fight. [36]

**Social animals.** According to Grandin, cattle are genetically motivated to seek companions; companionship “is as much a core requirement as food and water.” [28] It is known that cows prefer the company of other cows that they were raised with, and to graze with cows they were raised with. Since cattle are social animals that form social groups, artificial groupings and regroupings are stressful and should be minimized. Based on scientific research, Grandin recommends that (a) calves should never be raised alone, (b) groups of cattle should be no smaller than four and no larger than 200 inside one pen, and (c) it’s best to keep
cows together with some of their buddies when regrouped because cows are calmest when they are with cows they know. [36]

**Dominance.** Contrary to conventional wisdom, the lead cow isn’t the dominant cow; the dominants are usually in the middle of a group where it’s safer and the subdominants are forced to the outside. [59] The “lead” is probably one with high seeking behavior and low fear, but really isn’t a leader at all. In fact, Grandin cites research that indicates that herd animals seem to make decisions about movement democratically. For example, red deer move not when one “leader” has gotten up and signaled everyone else to move, but when 62% of the herd has stood up. Similarly, a study of cattle behavior found that there were no lead animals initiating changes in herd activity. [36]

Grandin also questions the conventional conception of dominance in relation to cattle. She says that “dominant” cows aren’t really dominant in the way that most of us think about dominance. Rather, “it looks like dominance is a social characteristic of the relationship between animals, not a personality characteristic of an individual animal.” [36] Unlike a herd of horses in which the dominant horse has a dominant personality and is dominant over all its herd mates, and there’s a fairly clear and consistent dominance hierarchy (i.e., horse A dominates horse B who dominates horse C), dominance amongst cows is much less hierarchical and more fluid, with different cows assuming different dominance relationships at different times. For instance, cow A might dominate cow B, who then turns around and dominates cow A, or cow A dominates cow B who dominates cow C who turns around and dominates cow A. [36]

**Fixed action patterns.** Skilled livestock handlers, Grandin suggests, make use of innate, predator-avoidance fixed action patterns (instincts) to successfully gather and move livestock. The most important of these patterns for the stock handler to know about are “flight zone,” “loose-bunching behavior,” and “point of balance.”

The “flight zone” is an animal’s “safety zone,” [29] “personal space,” [1] or the point at which it “can no longer tolerate the approach of a person or other animal and moves away.” [59] The size of the flight zone will depend on (a) the size of the enclosure the animal is in, (b) the amount of previous contact with people, (c) the quality of that contact, and (d) genetically-determined temperament. [4, 44] Skilled handlers will sensitively find and work the edge of an animal’s flight zone, or the collective flight zone of a group, to get them to calmly move away. This is done by alternately pressuring the flight zone to get movement, then releasing pressure once that movement is obtained. [36, 60]

“Loose-bunching behavior” refers to the instinctual tendency of herd animals to form a loose bunch for protection under the threat of a predator. [58] Skilled handlers will use a knowledge of this behavior to advantage, especially in gathering (explained below).

“Point of balance” refers to a point on an animal’s shoulder which, when crossed by a predator, triggers a hard-wired, innate avoidance maneuver of running in the opposite direction. [36] Skilled handlers will work the point of balance to easily direct an animal’s movement, for instance, in a single-file chute: “Livestock will move forward if the handler stands behind the point of balance. They will back up if the handler stands in front of the point of balance.” [60]

**Novelty.** Anything new to a cow is a potential threat until proven otherwise. Yet, at the same time, the cow is curious about the new thing and will often approach to investigate if allowed to do so on its own time, but if forced into association with the new thing the cow will be overwhelmed by fear. This understanding is very important to the stockman when introducing livestock to something new, whether a new object or new experience. As Grandin says, “When you’re working with animals, novelty can be attractive or scary depending on how it
is presented. . . . Novel things are most frightening when they are introduced suddenly. . . . New things are attractive if the animal can voluntarily approach them.” [36] Flighty, high-strung, nervous animals must be given even more time. [59]

**Genetics and learning.** Grandin believes that it is useful for stockmen to know something about genetically-based behavior and learned behavior because both will determine how an animal behaves during handling. [13, 14, 59] For instance, genetics largely influences distinct behavior differences between cattle breeds or lines within a breed. For example, Continental European breeds (e.g., Saler, Charolais) and Brahman and Brahman cross cattle tend to be more nervous and flighty than the British Breeds (e.g., Hereford, Angus). With this in mind, owners of flightier breeds can behaviorally condition their animals, especially the young, to react more positively and be less fearful around people. “One way to promote positive associations with people is to spend time quietly walking among the herds so the new calves . . . learn that people aren’t a threat.” [36]

Strong, lifelong negative associations and fear memories can form toward people if they experience rough handling when they are young. So, making the first few direct experiences the young have with people good ones reaps future dividends. “Quiet, calm handling at an early age will help produce calmer, easier-to-handle adult animals.” [16]

Temperament is an important genetically-determined trait of cattle that affects an animal’s reaction to handling. [10, 59] Stockmen should select for temperament, Grandin advises, for several reasons. For one thing, she has found that behavioral agitation of cattle during handling and restraint is persistent over time; that is, the same cattle repeatedly become agitated whereas others do not. [5] “Animals with a calm temperament may adapt more easily and become less stressed with repeated handling treatments and animals with a very excitable temperament may become increasingly stressed with each repeated handling treatment.” [10] Additionally, it is known that cattle with calm temperaments are quieter and calmer during handling and have a higher average daily weight gain than cattle with excitable temperaments who become agitated during routine handling. [56] Similarly, dairy cows with calm temperaments have a 25-30% increase in milk production, [56] and cattle with the most excitable temperaments produce carcasses with tougher meat and a higher incidence of borderline dark cutters than cattle with calm temperaments. [57]

Therefore, Grandin recommends culling these overly excitable animals because nervous system reactivity is determined by genetics and will be passed on to their offspring: “It is important for producers wanting to deliver high-quality meat to their buyers to select for temperament.” [36]

However, Grandin cautions that only the most highly excitable individuals should be culled instead of selecting for the absolute calmest because over-selection for any single trait has undesirable consequences and eventually ruins the animal. [15] “Animals can be altered by genetic selection to such an extent that serious structural or neurological defects develop. . . . If one selects for just one trait there is usually a price to be paid by weakening some other trait.” [14] Grandin warns that “when you over-select for any trait at all, eventually you get neurological damage, and neurological damage almost always means emotional damage, or at least important emotional changes.” [28]

There are several convenient ways for stockmen to evaluate the temperament of their cattle. One way is to examine general morphology; finer-boned cattle tend to be more flighty. [52] Another way is to examine facial hair whorls (see Research Pearls). Grandin has determined that cattle with hair whorls below their eyes are generally calmer and easier to handle than those with whorls above their eyes. [7, 49, 51] (Facial hair whorls also may be indicators of quality of
sperm morphology in Angus bulls and breeding soundness measures. [53,54]) Another way to test temperament is to rate each cow during restraint in a squeeze chute using a four-point scale (i.e., 1 = calm, 2 = restless, 3 = struggling, 4 = acting berserk). [36] Temperament also is correlated with exit speed out of squeeze chutes; the higher the exist speed the higher the cortisol and stress levels. [36] Additionally, it is known that sensitivity to sudden, intermittent stimuli (e.g., sound, motion, and touch) increases as excitability (temperament score) increases. [50] Also, Grandin has observed that “the most reactive animals of a group will appear more sensitive to changes in the environment and are usually the first animals to orient toward novel sights or sounds.” [59] Signs of high reactivity include constantly rotating ear positions, raising the head quickly from the ground when grazing, excessive tail flicking in the absence of flies, moving away when approached by people. [59] In other words, “animals that consistently exhibit bad dispositions when handled are the ones that need to be culled.” [6] However, Grandin recommends that culling decisions for temperament should be based on multiple evaluations. [36]

Cattle are genetically fearful; their nervous systems are tuned to detect potential threats. Consequently, cattle startle easily at fast, sudden, or unexpected movements, such as the sudden and unexpected appearance of a human or a handler’s fast movements. Then, through learning, “highly fearful individuals can influence the behavior of other animals in the group. Animals are able to perceive the stress state of their herd mates and the fear contagion will spread.” [6]

A concern of any working stockman is that “fearful large animals are dangerous animals.” [14] Although genetics influences the intensity of fear reactions, [14] Grandin points out that “the wrong kind of handling with large prey animals like cows and horses can actually make them dangerous.” [28] Regardless, “genetic selection of cattle for temperament produces calmer animals that are less likely to become agitated when handled.” [19] If one must work with genetically fearful, excitable, or flighty animals, they must be introduced, trained and habituated slowly to new experiences and things, whereas animals with genetically calm temperaments can be introduced, trained and habituated more quickly. [19, 20]

**The Cow’s Point of View**

Grandin insists that it is very important to think about the cow’s point of view, [28] and she means this quite literally. In fact, she might have been the first person to get down inside a processing facility to see what the cow sees. “When you’re trying to understand how the environment is affecting an animal’s behavior, you have to look at what the animal is seeing.” [29] Grandin believes that animals are visual thinkers and that they see everything and react to everything. They see the actual things themselves and not its idea of the thing, as humans tend to do. “This is the single most important thing to know about the way animals perceive the world: animals see details people don’t see. They are totally detail-oriented. That’s the key.” [28] Therefore, Grandin urges stockmen to be more visual and less verbal, and to try to see the world through the eyes of their animals: “You have to go where the animal goes, and do what the animal does [and] always keep asking: How does the animal perceive this situation?” [28]

**Livestock Handling**

The importance of proper livestock handling, or stockmanship, cannot be overestimated. [75] In fact, Grandin asserts that “a central welfare issue for beef cattle is poor stockmanship. People screaming and yelling at cattle, hitting and punching them, shocking them with electric prods—all these things terrify cattle. . . . Even if cattle weren’t innately fearful of humans, the rough handling a lot of cows experience would put FEAR on the top of the list of bad emotions cattle experience too much of the
time.” [36] And, as noted above, fear in cattle caused by rough handling compromises animal performance, welfare and safety. Also, it is known that inconsistent handling causes stress. Inconsistent aversive handling (e.g., mistreatment or intimidation) is even more stressful and sets up a chronic stress response. Conversely, “livestock which have had previous experience with gentle handling will be less stressed when they are handled in the future.” [1]

Grandin clearly and repeatedly states that proper technique is essential for livestock to move well through even the best designed handling facility; without good handling skills it won’t work. “If the animal handling is bad, no amount of top-notch, well-maintained equipment is going to work.” [29] (See Applied Stockmanship for a discussion of proper technique.)

A prerequisite to good handling is proper mindset. Primarily, one’s mindset has to be one of cooperation, not coercion. Grandin has observed “that many ranchers and cattle feeders think that the only way to induce animals to enter handling facilities is to force them in.” [8] Many owners and managers of ranches and feedlots have a hard time comprehending that cattle will voluntarily do what we want if they are handled correctly. [33] They also don’t realize that “every time you are working your animals you are training them. You can train them to be easy to handle and have good movement or you can train them to be difficult and have bad movement. . . . You can train them to be wild and stressed or you can train them to be calm and quiet.” [58]

An essential component of a mindset of cooperation is calmness. Grandin asserts that animals are more willing to voluntarily cooperate when handled calmly: “Cattle like quiet people and quiet handling.” [36] So, “the first step in adopting low stress cattle handling practices is to develop a calm attitude when moving cattle.” [40] Another component is trust: “When animals trust a handler, fear and stress are nearly nonexistent.” [36] And one way to build trust is to use nonthreatening behavioral techniques which can enable you to train animals to trust you during handling. [36]

So, let’s look at some behavioral techniques used to handle cattle.

**Leading**

Grandin believes that leading or calling cattle is one of the easiest ways to move cattle to a new pasture or bring them into corrals. However, it is essential that cattle movement be controlled so that they walk into the next pasture or into the corrals in an orderly manner, especially with pairs so as to avoid stripping off calves. [73]

**Gathering**

To gather cattle, Grandin advocates acting like a predator by approaching with a slow, sweeping or zigzagging movement back and forth behind the animals on the edge of the herd’s collective flight zone. This creates a slight anxiety in the cattle and activates their innate, anti-predator loose-bunching behavior. [68] In doing so, however, Grandin cautions that the handler needs to be careful not to pressure the cattle too hard or else they will scatter. [17] “A handler acting like a quiet stalking predator who induces the cattle to bunch is much less stressful than chasing cattle like an attacking predator.” [68] With experience the cattle become calmer and the “instinctual bunching behavior is gradually replaced with calm learned behavior.” [58]

**Initiating movement**

Once gathered, Grandin advocates initiating movement by using a zigzag pattern, alternately applying pressure to the flight zone and releasing as soon as movement is initiated. [36, 58] “All handler movements must be at a slow walk and great care must be taken to NEVER cause the cattle to run or start milling.” [68] Alternatively, movement can be initiated by concentrating on the leaders instead of driving from the rear. [1]
Controlling direction
Once the animals are gathered into a loose bunch and movement initiated, direction is controlled by moving in a zigzag pattern behind the herd on the collective flight zone perpendicular to the direction you want them to go. [36, 58]

Controlling speed
To speed animals up, move in the opposite direction of desired movement inside the collective flight zone. To slow movement down, move in the same direction just outside the collective flight zone. [36]

Trailing
Use the instinctive single-file following behavior to your advantage. Stay out of the animals’ blind spot and never apply pressure from directly behind an animal. Calmly and quietly move the cattle to the desired location. In this way, the cattle will learn to stay together in a herd, move as a herd, and more likely stay where they are put. Do not chase stragglers; rather, let the good movement of the herd attract them back. [36, 58]

Handle animals slowly
Unfortunately, “many people believe getting the job done faster is more efficient and profitable. This kind of thinking is a trap livestock producers need to escape. Slow is faster in the long run.” [36]

Control
“Livestock movements should be under your control at all times. It’s important for animals to understand that you’re in charge.” [37] For instance, Grandin counsels never letting your cattle run wildly out of a corral or through a gate to a new pasture and discover that they can escape from you; they need to learn that the handler controls their movements. [32, 70] Instead, make them walk past you at the gate going into or out of a corral or pasture. [29]

“After the animals have passed through the gate but before you walk away, let all the animals turn back and look at you.” [36]

Dealing with fear-motivated behavior
A big problem that Grandin has noticed during her long career is that many handlers do not know when an animal’s “bad” behavior is motivated by fear. [28] It’s very important and useful, however, for the stockman to be able to recognize fear-motivated behavior and know what to do about it.

First of all, handlers should be able to recognize common signs of fear and distress, such as: tail swishing, whites of eyes visible, head raised in a vigilant posture, increase in defecation and loose stools, quivering skin and increase in respiration, ears pointed to the object of concern or pinned back, or a boiling ball of circling, agitated animals, with their heads toward the center of the group. [8] Grandin says that if cattle show any of these signs stockmen need to improve their handling methods. [36]

Vocalization is another common sign of fear; vocalizations occur for a reason. Vocalizations in cattle are highly correlated with physiological stress. For instance, 23% of cattle vocalize during hot-iron branding compared to 3% during freeze-branding. Vocalization also increases with isolation and in direct response to aversive events, such as electric prod use, excessive pressure in a squeeze chute, slipping or falling. [25, 35] Additionally, Grandin’s research has shown “that 99% of the time that cattle vocalized during active handling at a slaughter plant was due to a frightening or painful event. . . . Vocalization is an outcome measure of an event that either frightens the animal or causes pain.” [44]

Additionally, it’s helpful to understand that “fear-motivated behaviors are more likely to occur in high-strung flighty animals. Flightiness and the tendency to startle easily are inherited, genetically based traits.” [28] In addition to observing overt behavior, “it’s useful for the stockman to know that animals with fine
bones and slender bodies are usually more fearful than heavier-boned animals with heavier bodies.” [28]

Grandin advises never punishing fear-motivated behavior because the animal will become increasingly frightened, hence dangerous. [28] Instead, gentle, calm handling can often prevent fear-motivated behavior, even in high-fear flighty animals. When confronted with fear-motivated behavior Grandin advises releasing pressure. For instance, if an animal rears up in a chute do not try to push or scare it back down; rather, back off and release pressure. It’s also important to understand that when cattle become agitated it takes a 20- to 30-minute rest for them to calm down. [36]

**Pain-motivated behavior**

Fear-motivated behavior (as well as rage-motivated behavior) is sometimes confused with pain-motivated behavior. Grandin advises never punishing pain-motivated behavior caused by a medical problem, injury or veterinary procedure. [28]

**Troubleshooting animal handling problems**

Animal handling problems arise from one or more of three factors: a temperament problem, a facility problem, or a personnel problem. [6] Regarding temperament, Grandin’s observation is that over-selection for lean beef is increasing the occurrence of flighty, excitable animals, which in turn leads to serious handling problems (as well as meat quality defects, like dark cutters). [59] Grandin recommends culling these animals.

Facility problems usually involve problems with distractions (see below) and design problems. Common design problems include (a) the entrance to the single-file chute from the crowd pen is too sharp (cattle in the crowd pen must be able to see at least two body lengths ahead in the chute), (b) chutes that are too wide (the largest animal should have only 1 to 2 cm of clearance on each side), (c) slippery flooring, (d) problems with lighting (e.g., a chute entrance that is too dark), and (e) crowd pens that are too small or too large (the ideal radius for a round crowd pen or “tub” is 12 feet). [18, 29]

The most common problems related to personnel, according to Grandin, are rough handling, excessive electric prod use, and overcrowding of cattle in crowd pens. [6, 29]

For suggestions on troubleshooting common animal handling and behavior problems see Grandin. [23, 69]

**FACILITIES DESIGN**

One of Grandin’s specialties and claims to fame is the design of humane, efficient livestock handling facilities. The primary impetus for her systems is to improve the treatment and welfare of animals, and secondarily to increase animal performance for the producer. She also claims that such systems reduce the time spent processing cattle by up to 50% while reducing labor. [36]

Before committing to designing a new facility, however, Grandin advises examining the existing facility to determine if it can be easily and cost-effectively modified to make it work better. Grandin has often found that a few changes is all that’s necessary to improve a physical system to an acceptable level.

A few little changes in the facility can drastically alter the movement of the animals. A distracting detail as tiny as a contrasting-colored floor mat in front of the chute or a daily patch of sunshine in the main alley can cause animals to balk or turn back. . . . To improve animal movement, it makes good sense to inspect the entire facility and see what changes you

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2  Stockmen interested in designing and building a solid-sided, curved handling facility are referred to Grandin and Deesing’s excellent book, Humane Livestock Handling: Understanding Livestock Behavior and Building Facilities for Healthier Animals (reviewed in Instructional Materials Review), for a comprehensive guide to planning, design, and construction. Also see www.grandin.com.
can make to minimize distractions and fear. [36]

In other situations, Grandin has found that existing holding and gathering pens are in good shape but a new crowd pen, curved lead-up alley, and single-file chute leading to the squeeze chute are needed. Yet, in other situations, the facility is fine and the problem lies in improper animal handling. Therefore, before committing to designing a new facility it is prudent to troubleshoot the existing facility to determine whether you have a basic design problem, distractions that can be eliminated, or an animal handling problem before you begin work on the solution. “If you zero in on the exact cause of the slowdown or stressed animal behavior, you’ll save yourself time, energy, and money on expensive, exhausting nonsolutions. [36]

One of the main problems that Grandin finds with existing systems is distractions. Early in her career, she made a concerted effort to determine why cattle don’t flow smoothly through some facilities; that is, why cattle would often slow down, balk, even turn around, to which handlers generally responded with rough handling and excessive electric prod use. To do so she understood that she had to assume the animals’ point of view: “You must get inside the mind of the animals to understand how neglected details can cause slowdown or panic.” [36] So, she would literally get inside facilities (e.g., alleys, crowd pens, chutes), crouch down and walk through them at cow’s eye level. “When I put myself in a cow’s place, I really have to be that cow and not a person in a cow costume. I use my visual thinking skills to simulate what an animal would see and hear in a given situation. . . . You have to imagine what experiencing the world through the cow’s sensory system is like.” [8]

In so doing, Grandin discovered that distractions, often seemingly minor and overlooked by others, made the cows balk, and that their removal usually remedied the problem. [71] She concluded, “When animals balk and refuse to enter a chute or walk down an alley, it’s often caused by small distractions that people fail to notice.” [36] Most humans won’t even notice the distractions, but Grandin stresses that animals notice everything and every detail is equally bad and equally important. Therefore, they all have to be acknowledged and taken care of. Details are the key. “The single most important thing to remember is that animals are afraid of tiny details in their environments.” [28]

A serious distraction and common problem with handling facilities that are partially enclosed in buildings is lighting. [1] Grandin notes that animals have “a strong tendency to move from dimly lit areas to brighter areas as long as the light is not shining directly into their eyes. The wrong lighting can ruin the performance of a well-designed facility.” [36] Consequently, animals will be reluctant to enter dark buildings. Cattle will enter a building or squeeze chute more willingly if they see a lighted area ahead. Therefore, Grandin recommends installing translucent panels in the sides and/or roof of buildings built over handling facilities; they let in plenty of light without creating shadows. At night, frosted lamps that do not glare in the animal’s face can be used to attract animals into buildings, trucks, or chutes as long as they illuminate the floor and don’t shine directly in their eyes. [3, 29] Also, single-file chutes, squeeze chutes, and loading ramps should not be faced directly into the sun because animals will not voluntarily approach blinding light.

Consequently, “the first step in fixing an existing facility is to remove distractions.” [48] Unfortunately, the common solution is to resort to more pressure [29] and electric prod use. [63] Common distractions include: shadows, clothing hung on the fence, coffee cups on the ground, people visible ahead, clanging metal, high-pitched noise, hissing air from compressors, sudden or unexpected sounds, changes in flooring (e.g., surface, texture, color, grates), high contrasts in lighting or color (e.g., between different sections of the chute), reflections
(whether off puddles or smooth metal), slow fan blade movement, plastic (or anything) flapping in the wind, small objects on the floor (e.g., a styrofoam cup or plastic water bottle). [1, 3] Whatever the distractions, they all need to be identified and removed.

A good way to identify distractions, Grandin notes, is by watching the cattle; calm cattle will show you distractions because they will stop, look, and point their ears at them. [1] The operative word here is “calm.” If cattle are not calm, Grandin cautions, they won’t show you the distraction. Hence, another reason for calm, quiet handling. One reason handlers don’t see these simple things is that they get the cattle too excited by poking and prodding them when they balk, but “when cattle are excited, it is impossible to determine what is bothering them.” [8]

If it is concluded that there is a basic design problem and that a new system (whether in part or total) is necessary, Grandin advises that the designer do so with the animal foremost in mind. When designing an animal handling facility, Grandin says that people need to suspend their verbal thinking and adopt the sensory-based point of view of the animals that are going to be going through the facility. Designers need to become aware of how animals react to the sights and sounds of the human spaces they are entering, as well as handler movements. [36] Additionally, designers need to keep in mind animal behavior patterns including natural following behavior and the desire to return to where they came from. [64] The operational principle behind her designs “is to use animals’ natural behavior patterns to encourage them to move willingly through the system.” [8] She argues that “facilities that take advantage of the natural behavioural characteristics of cattle will reduce stress on the animals and improve labour efficiency.” [33] Grandin believes that her designs work because they respect the animal’s natural behavior. Unfortunately, “people design animal facilities and handle animals based on their own needs and perceptions rather than on the needs and perceptions of the animals they handle.” [37] The following features, Grandin argues, respect the animals sensory-based point of view and take advantage of their natural behavioral characteristics.

**Solid sides**

Because “cattle emotions and behavior are controlled by what they see,” [37] Grandin strongly advises controlling what they see by making the sides of crowd pens and chutes solid. [1, 36, 39] This prevents animals from seeing outside distractions. “The principle of solid fences is like putting blinkers on a harness horse. The solid fences prevent the cattle from seeing people, vehicles and other distractions outside the fence with their wide-angle vision.” [11] Logically, since research findings show that blindfolding can have a calming effect on restrained cattle, Grandin concludes that they don’t fear what they don’t see. Therefore, she reasons that animals will go through a solid-sided handling facility that blocks their vision and prevents them from seeing people and other outside distractions, which is especially important for wilder cattle. [33, 37] Additionally, Grandin believes that cattle feel safe behind solid sides. [36]

**Single-file chutes**

Grandin argues that single-file chutes should (a) have solid sides, (b) be relatively long to take advantage of natural following behavior, (c) curve 180 degrees (so the animals think that they are returning to where they came from), (d) have nonslip flooring, and (e) have no distractions. [11] Curved, single-file chutes work for two reasons: “First, it prevents the animal from seeing what is at the other end of the chute until it is almost there. Second, it takes advantage of the natural tendency to circle around a handler moving along the inner radius.” [1]

**Squeeze chutes**

A high-risk time for animal welfare is when cattle have to be worked through a squeeze.
chute. “By definition,” Grandin explains, “anytime a human gets close enough to a cow to give it a shot or provide veterinary care, that human has violated the cow’s flight zone.” Therefore, she recommends preventing animals from seeing people deep within their flight zone as they enter the squeeze by blocking their vision with either solid sides (even cardboard will do) or louvers on the squeeze chute. Consistent with the idea of blocking vision to eliminate distractions and mitigate fear, Grandin recommends six to eight inch rubber louvers mounted on the squeeze chute bars at a 45-degree angle which will prevent an incoming animal from seeing people standing deep within its flight zone as it enters the chute. Also, people at the squeeze chute should stand motionless and not look at the incoming animal; moving people and staring eyes are threatening.

Non-slip flooring is essential to help cattle remain calm in squeeze chutes. “When animals slip they are more likely to panic and become agitated.” Blindfolds also can be used because they reduce heart and respiration rates, and the pump and motor should be located away from the squeeze to minimize noise.

Grandin prefers squeeze chutes that press in evenly on both sides which keeps the animal in a balanced position; squeeze chutes that close in on only one side tend to through animals off balance which can cause panic. Also, squeeze chutes that are contoured to apply pressure to broad areas of the restrained animal’s body and that supports them in a balanced position are preferable.

**Loading ramps**

In Grandin-designed systems, loading ramps are an extension of a solid-sided, single-file chute. Consequently, they likewise should be solid-sided and single-file. Grandin recommends that the loading ramp be 76 cm (30 inches) wide for cattle because that’s the standard width of the entry door on cattle trucks, and it’s narrow enough to prevent adult cattle from turning around. “It is a serious mistake to make a ramp or race ½ animal wide. This will result in jamming.” Also, having the ramp wider than the truck entrance will cause bruising.

Although Grandin notes that it’s best to build facilities at truck deck level to eliminate ramps, when ramps are used, the maximum angle is 20 degrees for permanent ramps and 25 degrees for adjustable ramps. Also, some form of cleats (e.g., wood strips or metal rods) for secure footing are essential. “The space between cleats should be wide enough for the animals’ feet to fit between them but not so wide that the feet slip.” For cattle, cleats should be eight inches apart. Also, ramps should have a level dock at the top that is a minimum of one body length. This is especially important for helping prevent falling during unloading.

**Transport**

Transport is one of the most highly stressful events experienced by livestock and is of particular interest to Grandin, even devoting a pamphlet and an entire book to the subject. Bruising, weight loss, injuries, stress and resulting sickness due to rough handling and long hours in transport all cause losses. The question, then, is what to do about it? Grandin has several recommendations. The single most important factor for the welfare of animals during transport, she says, is the condition of the animals; that is, only fit animals should be transported. Unfit animals (e.g., sick, injured, weak, severely lame, blind, late stage pregnant, unhealed wounds, the very large or obese, the very young or old, or excitable or aggressive) should be culled.

The second most important factor is to improve handling during loading and unloading.

Third, animals need to be given more

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3 For a comprehensive discussion of transport see Grandin. [30, 45]
space on trucks. A major factor determining the well-being of cattle in road transport is stocking density. [34] High stocking density is associated with a twofold or greater increase in carcass bruising, and horned cattle have twice as much bruising as polled cattle. Contrary to popular opinion, cutting the tips off horns does not reduce bruising. [34]

Fourth is the standard of driving. Truckers need to drive more carefully (e.g., while braking, changing gears, and cornering). [34]

Fifth, when shipping calves it is highly advisable to wean and vaccinate five to six weeks before long-distance transport. Doing so greatly reduces sickness. [34]

Sixth, there should be economic incentives that reward a reduction in transport-related losses. Grandin has found that “programmes that reward animal handlers and truck drivers for low levels of damage to animals can be very effective.” [31]

The Importance of Management, Training, Measurement and Incentives

As we have seen, an efficient, effective, humane animal handling facility has two critical elements: proper design and good animal handling. However, Grandin learned through extensive experience that those elements alone are no guarantee of a well-oiled system. To maintain that system there are four additional critical elements.

Management

During her 35-year career, Grandin “has observed severe animal abuse in poorly managed state-of-the-art facilities. Technology should never be used as a substitute for good management. . . . Good equipment makes it easier to handle animals but its use must be managed and supervised.” [31] Grandin has found that the most important variable that determines how animals are treated is management attitude: “Some people buy new equipment and think that it is a substitute for good management.” [8]

Grandin also has observed that some people will purchase a new cattle-handling system, which is designed with animal behavioral principles, but they will continue to handle cattle roughly. People are more willing to purchase new equipment than they are to use easy-to-learn, low-stress handling techniques. Even when financial benefits are clear, some people find it difficult to believe that a behavioral management method really works. [27]

Experience has taught her that “there is no technological substitute for understanding and working with an animal’s behavior.” [37]

Therefore, management “has to be willing to take the time and make the effort to improve handling methods.” [8] Additionally, “management has to be fully committed to permanently change handling procedures on a farm, feedlot, or ranch. Top management has to implement the changes and impress upon employees how serious they are about stopping rough handling.” [16] In essence, “the stockpeople have to manage the cattle, and the plant and ranch managers have to manage the stockpeople. To manage employees, managers have to design good work environments, they have to provide training, and they have to audit performance.” [36]

Training

Grandin acknowledges that engineering solutions cannot solve all animal-handling problems. For instance, experience has shown that “the best restraint equipment in the world is useless if it is operated in a careless or rough manner.” [9] Similarly, even in well-designed facilities, untrained operators often seriously overuse electric prods. However, with proper training, Grandin reports that most ranches, feedlots and slaughter plants have been able to reduce electric prod use significantly with as little as 15 minutes of instruction on flight zone, point of balance,
and movement patterns. [19] Grandin concludes that “although well-engineered facilities provide the tools that make calm, low-stress handling easier and safer, they do not replace management and gentle handling training.” [36]

**Measurement**

Grandin has found that “in order to effectively manage and improve animal welfare it needs to be measured.” [42] Just as producers routinely quantify such production measures as weight gain, milk yield, sickness and death loss, she advises that they also measure such things as lameness, bruises, vocalizations, and poor handling practices (e.g., electric prod use) that severely compromise an animal’s welfare. Unfortunately, “people often fail to be effective managers of conditions that they do not measure.” [42]

During her vast experience with producers at all levels of the industry where she has trained personnel, Grandin has observed that, over time, the staff reverts to their old bad handling practices (e.g., screaming at the cattle and aggressively using electric prods), often without realizing it. “The only answer to this problem is to audit animal welfare. . . . The industry has to audit animal welfare continuously. Ranchers need to start auditing welfare, too. . . . It is important to measure handling to prevent the slow return of rough animal driving and processing procedures.” [36] For ranchers and feedlots, Grandin suggests that they measure five behaviors and meet a specific numerical target:

- electric prod use: 5% of cattle or less
- cattle that fall: no more than 1%
- vocalization during handling and restraint: no more than 3%
- cattle that run into gates and fences: 1% or less
- cattle that move faster than a trot: 25% or less [44]

This simple audit provides managers with the information they need to determine if they have a problem and, if so, if it is due to a facility, personnel, or management issue.

**Incentives**

In spite of good management, training and measurement, Grandin has found that only “about 20 percent of employees can maintain good stockmanship on their own, but the rest have to have incentives because good stockmanship is so against their nature.” [36] So, in addition to measurement, training, and management, stock handlers need to be rewarded for good animal handling. People don’t maintain the improvements they make unless they are either rewarded for better handling practices or held accountable for the bad.

Grandin has found that “economic incentives are powerful motivations for good stockmanship.” [31] Financial incentives based on audit measurements are an effective tool for the improvement of animal treatment and the reduction of losses. For example, “bonuses based on animal performance and low levels of either sickness or injuries motivate people to handle animals carefully.” [31] The basic idea is that “workers should be rewarded for high-quality handling.” [47]

Another approach is to hold stock handlers accountable for losses.

When people are held accountable for losses, they will take steps to stop them. When losses can be passed on to the next market segment, there are no financial incentives to reduce them. [However,] systems of financial incentives must have accurate measurements of losses. Without continuous measurements, an incentive system will not work. [24]
Improving Animal Handling and Welfare through Audits

Animal handling and welfare auditing programs are being conducted in many different countries. Increasingly, "both government and private companies require producers to adhere to strict guidelines for animal welfare and food safety." [31]

New international standards and animal handling audits by major meat-buying customers (e.g., McDonald’s, Wendy’s) with large economic influence on the market have been the impetus for many improvements in handling and transport of livestock. For example, the percentage of bruised fed cattle has dropped from 48% to 34%. [32]

Another significant, positive force for improving animal welfare, Grandin observes, is that consumers are demanding that animals be treated better which, in turn, motivates some corporate buyers to improve practices. Grandin reports that “the programmes that have been implemented by supermarkets and restaurants to inspect farms and slaughter facilities have resulted in great improvements in how animals are treated.” [47] She is quick to note, however, that an effective auditing program requires good auditor training. [43]

Grandin believes that measures of death losses, non-ambulatory animals, bruises, injuries, dark cutters, and dark firm and dry beef should be used to provide either bonuses or deductions from transporter or producer pay, which is already the case in many other countries. [47] For instance, when producers or transporters had to pay for losses due to bruises in slaughter cattle, bruising was reduced by half, and when supermarkets audited bruises and made deductions from transporters’ pay, bruising was reduced in cattle from 20% to 1%. [47] Grandin found that “bruises on cattle were greatly reduced when producers switched to a carcass-based selling system where bruise damage was deducted from their payments. . . . Marketing systems that allow losses to be passed on to the next buyer provide little incentive to reduce losses.” [31]

Cattle that are sold on a live weight basis where the packer pays for the bruises will have twice as many bruises compared to cattle sold in the carcass where the producer pays for the bruises. Holding people accountable for losses will greatly reduce bruising. People are more careful when they have to pay for it. [72]

Handling and Welfare of Livestock in Slaughter Plants and Its Relevance to the Stockman

Grandin has made a large impact on the handling and welfare of livestock in slaughter plants. Although a detailed discussion is outside the scope and purpose of this article, there are two recurring, relevant points for the stockman.

First, Grandin emphasizes the importance of both handling and facilities: “Gentle handling in well-designed facilities will minimize stress levels, improve efficiency and maintain good meat quality. Rough handling or poorly designed equipment is detrimental to both animal welfare and meat quality.” [35]

Second, Grandin stresses the importance of managerial oversight:

The best equipment in the world is worthless unless management controls the behavior of plant employees. When I first started designing equipment, I naively believed that if I could design the perfect system, it would control employee behavior. This is not possible, but I have designed equipment that requires very little skill to operate, provided employees are gentle. Good engineering is important, and well-designed facilities

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4 For a comprehensive discussion of animal welfare and auditing see Grandin. [41]

5 For a comprehensive discussion of animal handling and welfare in slaughter plants, see Grandin. [38, 41]
provide the tools that make low-stress, quiet handling at slaughter possible, but employees must operate the system correctly. Rough, callous people will cause distress to animals even if they use the best equipment. [8]

Encouragingly, Grandin has noted that more progressive slaughter-plant managers are recognizing the importance of good handling practices and that they are adopting constant monitoring of handler performance, which maintains high standards of animal welfare. [35]

With the combination of good handling and well-designed facilities, studies indicate that careful slaughter can be less stressful than on-farm restraint and handling. “When good facilities are combined with well-trained personnel, cattle and sheep can be induced to move through the entire system with no signs of behavioural agitation. [Grandin] has observed cattle entering a stunning restrainer like cows in a milking centre.” [36]

Conclusion

Throughout her numerous works, Grandin makes the ethical, welfare and economic case for improved animal handling and facilities, as well as the necessity of good training, measurement and management. Her primary purpose is to help “improve the quality of life for many animals. . . . I wish animals could have more than just a low-stress life and a quick, painless death. I wish animals could have a good life, too. . . . I think we owe them that.” [28]
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The purpose of this section is to provide a forum for stockmen to share with their peers pertinent information, insights, observations, field tests, anecdotes and experiences in applied stockmanship. Even though some of these entries may be relatively short, they should conform to the submission guidelines (see Submissions on the website). Photographs, video, or illustrations (e.g., charts, graphs, drawings) that help elucidate the main point(s) are encouraged.
The Design and Operation of a Tub System
by Whit Hibbard

Due to Temple Grandin’s work, solid-sided, curved processing facilities (i.e., alleys, crowd pens and single-file chutes—colloquially referred to as “tub systems”—that evolved independently in Australia, New Zealand and the United States in the early 1970s [8]) are used widely. In her many works Dr. Grandin repeatedly stresses two key points. First, these systems will not work well if they are not designed properly. Second, even well-designed systems need to be operated by personnel trained in basic animal handling skills. It is the combination of these two critical elements that makes for a successful system. The purpose here, then, is to review essential elements of proper design and animal handling. Beyond this introduction, the interested reader is referred to Humane Livestock Handling (reviewed in Instructional Materials Review) and www.grandin.com for excellent discussions of the design and construction of tub systems, and basic animal handling skills necessary for properly working animals through those systems. For anyone interested in designing and building a tub system, it is essential that they study these two sources. To do otherwise is to risk an expensive system failure.

System Design

Tub systems are unique because of two essential design features—solid sides and curves. Before the introduction of tub systems the industry standard was open sides, triangular-shaped crowd pens, and straight chutes.

Solid sides. Grandin argues that solid sides in alleys, tubs, and chutes are essential to minimize distractions—such as people standing around the squeeze chute—which cause balking. This is especially important, she says, in

large feedlots and abattoirs where there’s a lot of activity. [7]

**Curves.** The reason for curves, Grandin explains, is (a) to take advantage of the animals’ desire to go back where they came from, which necessitates a 180 degree curve, (b) to protect them from seeing activity at the end of the chute until almost there, and (c) capitalizing on animals’ tendency to circle around a person on an inner radius. [1]

The combination of these two features, solid sides and 180 degree curves, Grandin asserts, allows for the easy movement of calm animals through the entire processing system. The photo above is an aerial view of a classic, basic design of a tub system. Note the solid-sided, 180 degree curved alley leading up to the solid-sided, 180 degree tub, which swoops the cattle into either a solid-sided load out or into a solid-sided, 180 degree single-file chute to the squeeze chute. There are numerous variations of this basic theme (see Humane Livestock Handling and www.grandin.com), but to stray from this basic design is at one’s peril.

**COMMON MISTAKES:**

1. Curves that are less than 180 degrees.
2. Too sharp of a bend in the entrance to the single-file chute; the entrance needs to be straight for at least two cow lengths.
3. Too many nobacks in the single-file chute. Grandin recommends using only two, one that is one cow length behind the squeeze, and one at the entrance to the single-file chute (but rigged with a remote control rope so the tub operator can open it as he or she is bringing cattle into the tub). [8]

**ANIMAL HANDLING SKILLS**

Grandin makes the crucial point that even the best designed tub systems won’t work well unless the staff handles the animals properly. In other words, for a tub system to function properly the animal handlers need to be trained in basic animal handling skills. In her training, Grandin focuses on using behavioral principles to facilitate animals’ movement through a handling facility. The primary behavioral principles used are flight zone and point of balance (discussed in The Essential Grandin).

Let’s now look at how Grandin recommends working cattle through a basic tub system (as illustrated in the above photo).

**The alley.** Grandin does not say much about how to bring cattle up the alley to the tub. However, throughout her writings she stresses handling livestock calmly and trying to see the world through their eyes. She emphasizes that how animals react at the squeeze chute begins way in the back with how they are handled; if they are worked through the whole system calmly they will be calm at the squeeze chute.

When driving animals up the alley the handler needs to be careful not to over pressure them. If the handler over pressures, the animals in the rear have no place to go and will want to turn back. If this happens, Grandin says that the handler must get out of their flight zone by backing up. This will release the pressure and the animal will usually stop and turn around instead of running past the handler in an attempt to escape.

Grandin specifically advises to only fill the tub half full. Therefore, the handler loading the tub has to bring the correct number of animals. Also, she cautions about driving the next draft of animals up to the tub prematurely; that is, before it is empty and before there is some room in the single-file chute: “If the next group is driven up too quickly, the cattle . . . will turn around, because there is no place to go.” [4]

Once the animals are in the tub Grandin cautions against the overuse of crowd gates: “The crowd gate should follow the cattle not push them. If the cattle are moving, do not shove the crowd gate up on them.” [7]

**The tub.** Grandin asserts that tubs work more efficiently if used as a “passing-through” pen which capitalizes on the natural following behavior of cattle. Cattle will enter the
single-file chute leading out of the tub (whether it goes to a squeeze chute or load out) more easily if they can be “moved through the crowd pen without stopping. Cattle that wait in the crowd pen often turn around.” [10] Therefore, timing is important. “Livestock will move into a chute more efficiently if handlers wait until the chute is half empty before bringing another group into the crowd pen. This provides sufficient chute space so that several animals can follow a leader into it.” [3]

Photographs and video of Grandin working a tub show her at the front of the tub near the entrance to the single-file chute, not at the rear of the tub attempting to push the animals in. She obviously is using her body position to entice the animals to go past her, and she will sometimes use a flag to help guide them to the opening.

The single-file chute. As illustrated in the following diagram a handler will induce cattle to move through the curved, single-file chute by invading their flight zone and walking opposite to the desired direction of travel. In so doing each animal will instinctively move forward as the handler crosses their point of balance. Then, the handler returns to the starting point (i.e., near the squeeze chute) by walking straight across which is outside of the animals’ flight zones and repeats the process as needed. If the handler were to retrace his or her steps, they would be inside the animals’ flight zones and as their point of balance was crossed they would stop. By moving properly, however, a handler working the inner radius of the curved single-file cute can easily use the flight zone and point of balance to keep animals moving forward. [9]

“If the animals are moving through the chute by themselves,” Grandin advises, “leave them alone.” [11]
Similarly, following these same principles, a handler working a straight section of chute (e.g., immediately before the squeeze chute in the above photo) needs to move as indicated in the diagram below.

![Diagram from Humane Livestock Handling, T. Grandin & M. Deesing. Used with permission of T. Grandin.]

The proper use of the behavioral principles of flight zone and point of balance in conjunction with proper handler movement in a well-designed system should allow for the calm, steady flow of animals through the system to the squeeze chute.

**The squeeze chute.** Research has shown that cattle balk less at entering a squeeze chute and are less agitated if handled gently, but the reverse is true if electric prods are used. [8] If cattle are brought calmly into the squeeze chute they are more likely to remain so, and they should walk out of the squeeze. Also, a lot depends on the squeeze chute operator. “A skillful squeeze-chute operator can slow cattle down before they reach the head gate by partially closing the squeeze.” [5] The operator also has to be cognizant of the amount of hydraulic pressure applied and the speed with which it is applied and released. Too little pressure will give the animal too much room to move and might encourage a struggle to escape, whereas too much pressure can cause pain and panic. Also, the application and release of pressure should be steady and smooth, not fast and jerky. [10] Cattle seldom resist pressure when it’s applied slowly and with optimum pressure, but a sudden application or release of pressure by the operator will excite the animal. [6]

**Troubleshooting**

The most prevalent animal behavior problem that handlers deal with when processing cattle, according to Grandin, is *balking*. As
discussed elsewhere (see *The Essential Grandin*) the first step is to identify and remedy any physical distractions that cause balking. If animals still balk, then the technique of the handlers has to be examined. “Unfortunately, people often try to correct these problems with force instead of by understanding the animal’s behavior.” [4]

As a case in point, Grandin describes what happens when cattle are mishandled and under stress in handling facilities:

Their instinct is to keep their heads up and remain alert. In this vigilant state, the cattle may not want to risk putting their heads down to judge depth of shadows and contrasts in flooring. The lead animal may refuse to move because of the dilemma: He needs to put his head down to differentiate between a dark shadow and a hole in the ground, but he cannot put his head down because he is in a state of high alert. [9]

The unknowledgeable handler will respond with force in the belief that he has to push the stubborn animal ahead. Conversely, a knowledgeable handler will allow the leader to look at whatever is bothering it (the dark shadow or hole in the ground in this example) and, on its own time, determine that it is not a threat.

Often it takes only 30 seconds or so for a leader to determine that it is safe. After the leader has checked it out, he will walk over the shadow and the other animals will follow. If the leader is not given the opportunity to stop and look, he may panic and turn back the herd in the opposite direction. [9]

**Driving Aids**

Grandin recommends using flags and paddles as driving aids, but they should be used to guide animals, never to hit them, and should be held low when not in use.

**Electric prods.** Grandin objects to “the brutality of prod use,” [9] maintaining that electric prods should be used only as a last resort, usually at the entrance to the squeeze chute. “The worst place for an electric prod to be kept is in someone’s hand,” [9] she says, because that person will tend to use it. Between usages it should be put aside. “If handlers really work thoughtfully with grazing animals, they won’t have to use a prod at all. If producers are using the prod more than once or twice per 100 head of animals, they should seriously rethink their facility layout and training program.” [9]

Additionally, injuries also can be reduced by handling cattle quietly in the chute leading up to the squeeze. “Excessive use of electric prods especially on Brahman, Brahman cross and Zebu cattle can increase squeeze-chute injuries because excited cattle slam into the head gate and make greater attempts to escape.” [5]

**Tail twisting.** According to Grandin, “Gentle tail twisting is less aversive than shouting or use of an electric prod.” [8] However, “If tail twisting is used to move cattle through a race, pressure on the tail should be instantly released when the cow moves.” [8] If the handler continues to twist the tail they are actually punishing the cow for doing what they want so it will become less effective.

**Nose tongs.** Grandin strongly recommends using a halter instead of nose tongs if head restraint is required. Because nose tongs are painful, the animal will associate the pain with the squeeze chute and be less willing to enter in the future. [8] “Cattle are extremely aversive to nose tongs [and] make head restraint more difficult in the future.” [2]

**Common Mistakes**

1. Putting too much pressure on animals when driving them up an alley.

2. Putting too many cattle in the tub: “One of the most common handling mistakes is placing too many animals in a crowd pen.” [3] Overfilling a tub causes animals to become stressed, agitated, and confused.

3. Working the outside radius of a curved alley or chute. Handlers should only work
the inside radius.

4. Driving the next draft of animals up to the tub prematurely.

5. Pushing the cattle through the tub with the crowd gate: “The crowd pen gate should only be used on stubborn animals.” [12]

6. Excessive electric prod use.

7. Rough handling.

8. Standing in front of an animal’s point of balance while attempting to get it to move forward in the chute.

9. Handlers who get animals agitated, excited, and scared which results in cattle charging into a squeeze chute and hitting the headgate which causes bruising, hematomas, and injuries: “Carelessness and rough handling are the major cause of injuries to cattle in squeeze chutes.” [8]

10. Applying more pressure when an animal struggles in the squeeze chute. “An animal will often stop struggling if the pressure is slowly, slightly reduced.” [9] Indications of excessive pressure are vocalizations, labored breathing, straining or struggling, or ears laid back. [4, 8]

11. Not introducing cattle to a new facility. Animals should be walked through a new processing facility without anything being done to them. They also should be given some desirable feed which will help make a positive association with the new facility and learn that it is safe. [9] The same holds true with new cattle (e.g., new purchases, home-raised calves) in old facilities.

**VIDEO**

Dr. Grandin presents a good discussion of her solid-sided, curved processing facilities in the following two DVDs, both available free from [www.beefusa.org](http://www.beefusa.org):

*Cattle Handling Tips for Cow Calf Producers* (see the *Facilities* chapter)

*Designing Cattle Handling Facilities for Quality Beef* (see the *Permanent Handling Systems for Large Operations* chapter)

Or, both videos are available online at: [www.bqa.org/bqacow-calfhandlingtips.aspx](http://www.bqa.org/bqacow-calfhandlingtips.aspx) [www.bqa.org/bqafacilitiesdesign.aspz](http://www.bqa.org/bqafacilitiesdesign.aspz)
References


The purpose of this section is to present a current profile of the subject expert featured in this issue.
Temple Grandin, Ph.D.

Temple Grandin is a professor of animal science at Colorado State University and owner of Grandin Livestock Handling Systems, Inc., which provides consulting and design services for livestock handling facilities. Facilities she has designed are located in the United States, Canada, Europe, Mexico, Australia, New Zealand, and other countries. Grandin was instrumental in developing what people colloquially call the “tub system” (i.e., solid-sided, curved handling facilities). She claims that half the cattle in the United States and Canada are handled in systems she has designed. Additionally, Grandin originated the center-track restraining system which is installed in nearly half of all slaughter plants in North America. Grandin also has developed an objective scoring system (an “audit”) for assessing cattle handled at abattoirs. This scoring system is being used by some large corporations to improve animal welfare and consumer relations.

Grandin earned her B.A. in psychology at Franklin Pierce College in 1970, her M.S. in animal science at Arizona State University in 1975, and her Ph.D. in animal science at the University of Illinois in 1989. She currently teaches courses on livestock behavior and facility design at Colorado State University, and consults with the livestock industry on livestock handling, facility design, humane slaughter, and animal welfare.

Grandin has appeared on numerous television shows (e.g., 20/20, 48 Hours, 60 Minutes, and the Today Show), and was featured in many magazines (e.g., Forbes, U.S. News and World Report, and Discover magazine). In 2010, Time Magazine named her one of the 100 most influential people. Interviews with Dr. Grandin have been broadcast on National Public Radio and other stations. Her life story was made into an HBO movie, Temple Grandin. Her website gets 5,000 visitors per month and she gives approximately 35 lectures annually on animal management.
A very prolific researcher and writer, Grandin has authored approximately 400 articles in both scientific journals and livestock periodicals on livestock behavior and handling, facilities design and construction, animal welfare and humane slaughter, and animal transport. She also has authored, co-authored, or edited six books on livestock subjects, including Livestock Handling and Transport, Genetics and the Behavior of Domestic Animals, Humane Livestock Handling, Improving Animal Welfare: A Practical Approach, and two national bestsellers, Animals in Translation and Animals Make Us Human.

Grandin is the recipient of eight honorary doctorates and 62 awards to date, including the Meritorious Service Award from the Livestock Conservation Institute (now the National Institute of Animal Agriculture), the Industry Advancement Award from the American Meat Institute, the Animal Management Award from the American Society of Animal Science, and the National Cattlemen’s Beef Association’s Lifetime Achievement Award. She also has membership in five professional organizations, including the American Society of Animal Science, the American Society of Agricultural Engineers, and the American Society of Agricultural Consultants.

One of Grandin’s primary concerns is improving animal welfare through improved livestock handling facilities and methods, and she is considered to be the world’s leading expert on humane livestock handling in meat packing plants. In addition to the significant adoption of her processing and center-track restraining systems, Grandin developed an animal welfare audit that is used by the USDA and large meat-buying corporations like McDonald’s, Burger King, and Wendy’s to improve animal welfare in meat packing plants.

Unlike so many academics who are notoriously lacking in practical experience, Grandin knows of what she speaks. She began her career as a reporter for the Arizona Farmer Ranchman, worked in a feedlot, then as a systems designer for Corral Industries, a large feedlot construction company. During the last 35 years Grandin has visited over 500 farms and slaughter plants in 25 countries, has 10 years of experience developing and implementing welfare auditing systems for major retailers and restaurants, and has trained over 200 animal welfare auditors. This is unique and admirable.

Similarly, most animal scientists research animals from the outside in, but that’s only half the story. The other half is researching animals from the inside out. Grandin does both which, again, is unique and admirable.

What allows this uncommon perspective, Grandin says, is her autism. Grandin is a high-functioning autistic person (and well-recognized and published in this arena as well). To her credit, however, she refused to see this as a disability that would prevent her from accomplishing something worthwhile and meaningful in her life; rather, she learned to use it to her advantage. She credits her extraordinary visualization abilities, hyper-acute senses and fear responses (not unlike cattle), and her thinking in pictures rather than words, with helping her understand the animals she works with. She believes that her autism helps her understand their thinking and perceptual processes and behavior, which enables her to take their point of view. Although Grandin has a great deal of empathy for animals, she regards herself as a “totally logical and scientific person” in which her “thinking is governed by logic instead of emotion.”

Of particular interest to this Journal, Grandin champions the importance of a knowledge of animal behavior and good stockmanship. “I am very concerned about welfare problems caused by poor stockmanship or neglect,” she says. Grandin has written extensively on the subject, and has given many seminars and lectures on low-stress handling and quiet movement of livestock through corral systems on ranches, farms, feedlots, and slaughter
plants. Her goal, she says, “is to reduce suffering and improve the way farm animals are treated.”

“I feel very strongly,” Grandin writes, “about treating animals humanely and with respect. I’ve devoted my life to reforming and improving the livestock industry. . . . I am motivated by tangible accomplishment, and I want to make a positive contribution to society.” In that she has succeeded spectacularly.

For an intelligent, informational, yet entertaining look into her life, I highly recommend her book, Thinking in Pictures. Although primarily a book about autism, the reader will be frequently surprised by her discussions of her work in the livestock industry and her insights into the minds and emotions of cattle. (In fact, the original title for this book was A Cow’s Eye View.)
The purpose of this section is to print an original interview with the subject expert featured in this issue.
**Temple Grandin**

1. **Given your vast experience with stock handling all over the world, and your extensive academic knowledge, I would like to know what you would consider the most important things for stockmen to know about animals and animal handling?**

Good stockpeople everywhere understand that cattle and other animals have feelings. When cattle become agitated in a squeeze chute or other handling situation, many people make the mistake of thinking that the animal is being aggressive. The behavior in this situation is caused by fear. If a bull comes after a person out on an open pasture, that would be aggression, but when cattle become agitated during handling in a corral their behavior is due to fear. One of the most common mistakes that inexperienced people make when working with animals is mixing up the emotions of fear and aggression. Behavior that is motivated by fear will become worse if the stockperson responds in a harsh, abusive way.

2. **How have your experiences with animals changed or transformed you, presumably for the better, over the course of your career, and are there any lessons in that for stockmen?**

When I first started working with cattle in the early 1970s, I became more empathetic and understanding when I touched the cattle that were being held in the squeeze chute. My first beef cattle experiences were in hot Arizona. I ran the squeeze chute and we were vaccinating hundreds of cattle every day at the large feedlots. When I put my hand on the back of the animal it forced me to acknowledge that the cattle were living beings and not just economic units. When I started my initial work on what cattle see when they walk through a chute, I did not know that most other people were not visual thinkers like me. I thought everybody thought in pictures. Over ten years later I learned that most other people think in words. This would explain why they thought I was crazy when I got down in the chutes to look for shadows, puddles, and other distractions that would make cattle balk. It seemed so obvious to me to look and see what the cattle were seeing; they were afraid of visual details that most people failed to notice.

3. **What have you learned along the way about how stockmen should regard their livestock (e.g., as conscious, intelligent, thinking, sentient beings instead of stimulus-response automatons or production units)?**

In the 1970s when I started working with beef cattle most people treated cattle really badly. They used an electric prod on every animal and they yelled and screamed at the cattle. What kept me going was that there were a few people who treated the cattle well. There was a crew leader named Allen who was one of the few people in the Arizona feedlots who was not mean to the cattle. In my early career, I was also influenced by Bill and Penny Porter at the Singing Valley Ranch. They raised registered Herefords and they always treated their cattle gently and with respect. Seeing a few good people handling cattle well was a glimmer of sunlight that served as a beacon to motivate me. I knew it was possible to improve cattle handling. When I look back on the 1970s and 1980s cattle handling was really horrible.

The 1970s were also the era of B.F. Skinner and stimulus-response theory. In fact, I was in the psychology department in the early 70s at Arizona State. I never believed that stimulus-response would explain all animal behavior, so I dropped out of the psychology department and switched to animal science.

Throughout my career I have learned that it is much easier to sell people the
fancy new handling system than it is to get them to use it right. People want the “thing” more than the management. I have observed that about 20% of people can easily learn to be good stockpersons. There is another 60% to 70% who will be good if they are constantly supervised. Unfortunately, there is a bottom 10% who should not be working with animals. I have worked with McDonald’s and Wendy’s on implementing their animal welfare programs. When we started inspecting slaughter plants and forced people to stop abusive practices, the plant managers had to fire, retire or reassign 10% of the workers handling cattle or pigs. When your back was turned, the electric prod was constantly being used. Out of 75 suppliers, three plant managers had to be removed because they encouraged and condoned abusive practices. On the positive side, many plant managers saw the benefits of good animal handling after they changed their practices.

4. I’m interested in some of your personal experiences with animals, both good and bad, that had an impact on you and maybe helped shape your beliefs or attitudes about animals.

I was at a feedlot named Arlington Cattle Company in Arizona. I was operating the squeeze chute and the cattle were walking in calmly all by themselves. I felt very peaceful and calm. I learned that when I stayed calm, the cattle sensed this. When I was calm I also operated the squeeze chute in a smoother, less jerky manner. This motivated me to work to eliminate rough handling. During the 70s and 80s, I saw many really atrocious things done to cattle. This convinced me that there are certain people who enjoy hurting animals and they should not be working with them. In the early 80s I was on a construction project and there was a sadist named Micky who shot the eyes out of cattle at a packing plant. This bastard would then jump up and down and laugh. The women who worked in the meat cutting room all knew about him and asked me if I could get him fired. I went and told the plant manager and it did little good. The problem I had was if I raised too much of a fuss I would have been fired. Things have really changed. Today a numerical scoring system I developed is used to evaluate the plants. Stockmanship has moved light years into the future compared to the 70s and 80s. Back in the early 80s many industry people were not shocked by atrocities; they had become completely desensitized. Today the attitude of the entire industry has greatly improved.

5. What are some personal experiences with stockmen and their stock handling, both good and bad, that influenced your beliefs and views about stockmanship?

In the 1970s I had a really great experience with a wonderful stockman at the J.D. Huggins Ranch in Texas. Their purebred Brahman bulls were very tame and Brother Dancey would walk out among them. On that ranch I was able to see cattle at their best. A tour bus full of people were visiting and they were all walking around in a big pen with tame, gentle Brahman bulls. During my early career, I saw both very good things and atrocious things. The good stockmanship I observed motivated me to work hard to eliminate really common, abusive practices.

6. In Animals Make Us Human you write, “A central welfare issue for beef cattle is poor stockmanship.” Would you please explain?

I have observed that many people want the magic new thing they can buy more than they want good stockmanship. Good stockmanship involves learning many small details which add up to a really big improvement. One of my biggest frustrations as an equipment designer is getting people to use my designs properly. Many people are too impatient to learn all the details of good stockmanship.
7. In Animals Make Us Human you also write, “Poor practices when moving cattle on the range are a major welfare issue for cattle.” Would you please explain?

There are still some people who just won't stop yelling at cattle and getting them excited. These people should not be working with animals. In my work with meat plants, we had to remove 10% of the people handling cattle. When your back was turned, they brought out the electric prods.

8. In Animals in Translation you stress the importance of environment to livestock, which includes their physical environment and their handling. Yet you’ve observed in your 35 years of working with the meatpacking industry that “a lot of plant owners don’t think twice about their cattle’s environment.” In your experience do you think that’s true with farmers, ranchers, and feedlot folks as well?

Plant owners have really improved cattle handling practices because they were forced to. When I worked with McDonalds and Wendy's on implementing animal welfare auditing in 1999, I saw tremendous improvement. Some plant managers become believers in good stock handling after they were forced to make changes, such as training of employees, installation of non-slip flooring, and repair of broken equipment. The penalty for refusal to improve handling resulted in kicking plants off the McDonald's approved supplier list. Out of 75 McDonald's suppliers three plant managers had to be removed because they kept failing audits. Another factor that has caused plants to further improve around 2009 was the USDA becoming much more strict about Humane Slaughter Act enforcement. The USDA was responding to videos that had been posted on animal activist websites. A high official in the USDA called the Westland Hallmark video a “policy changing event.” In this video, an old dairy cow was deliberately knocked over with a forklift.

When I did cattle handling workshops in the 1970s, 1980s and early 1990s, many feedlots reverted to old rough methods because many managers had not “bought in” to the importance of low-stress handling. I demonstrated how to get the cattle to move forward in the chute by walking back by them in the opposite direction of desired movement. The work the NCBA did on cattle handling workshops also has helped foster improvement. Feed yards have greatly improved handling in the last few years. My student did a survey in 2012 of 20 feedlots in Colorado and Nebraska on practices during cattle processing. Nineteen out of 20 feedlots used an electric prod on only 5% or less of the cattle. Ten or fifteen years ago, electric prods were used on every animal multiple times.

There was only one really bad thing observed. A young man at one yard tore ear tags out of cattle ears without cutting them first. This resulted in torn ears. I think another major factor that has motivated people to change is widely available cell phone video cameras. Managers do not want their feedlot getting shown on YouTube doing bad things. From 2010 to the present, the cell phone camera was probably a major factor for motivating change. Smart phones that can instantly upload videos to the internet have only recently become available during the past few years.

9. You write that one of your most important talents with animals is being able to spot tiny changes in their behavior quickly and connect the changes to something in the environment. Could you give a few examples?

I still give lots of talks and discuss the distractions that make cattle balk. A chain hanging down in a chute entrance will make cattle stop. Many people simply do
not see small visual details unless I give them verbal checklists of all the visual distractions that may attract the attention of the cattle. I think it has to do with how different people think. I am a visual thinker and many other people are verbal thinkers. Some people do not see visual detail. When I visit a facility on a ranch, feedlot or plant, people are often surprised at how quickly I pick out visual details that are making cattle balk in their facility. The most common ones are reflections, shadows, sunbeams, hanging chains, parked vehicles, shadows, and visible people or moving equipment. Removal of these distractions will often greatly reduce balking or backing up.

10. You stress the importance of thinking about the animal's point of view and trying to see the world through its eyes. Would you please talk about that a little? I mean, what is their point of view?

Most people are verbal thinkers. The first thing I will tell people is that if they want to understand animals, they must get away from verbal language. Animals are sensory-based thinkers, not word-based thinkers. Their memories are in pictures, audio clips, smell or touch sensations. Theirs is a nonverbal, sensory-based world.

11. In Animals in Translation you said that for the first 25 years of your career that you were a hardware engineer, but that now you're installing the management software. Would you please explain what you mean by that?

When I first started, I thought I could fix everything in cattle handling with design. Design can fix only half of the problems. When I talk about software, I am referring to getting people to change their ways and have better stockmanship. Major factors that have forced change are large buyers insisting on change and cell phone video cameras. Twenty years ago in the early 90s, I did many cattle handling workshops in feedlots but handling often reverted back to bad practices. It was frustrating and discouraging.

In 2013, there is now great interest in learning better cattle handling. Most people would not want to admit it, but I think the development of YouTube and the invention of the iPhone and the Android smart phones with their excellent video cameras was a major motivator. People now worry that their feedlot or ranch will be caught abusing cattle on the national news. I have observed that many people really learn to like low-stress handling methods after they were forced to use them. For 25 years I fought against all the minds that were "set in cement." When I implemented the McDonald's audits in 1999 I now had the power to tell plant managers that they had to get rid of really bad things, such as shocking pigs with chains hanging down in the chute. People today have no idea how bad the old days used to be. Back in the 70s, 80s, and 90s, I sometimes felt like I was pounding my head on a brick wall because many feedlots would not stop atrocious, rough handling.

I have observed that 20% of people can become natural, good stock people. When they are taught low-stress methods, they become "believers" and they remain good stock people. Another 70% remain good only when they are constantly supervised and monitored. At Cargill and JBS Swift, video cameras monitored over the internet have worked wonders to stop overuse of electric prods. Approximately 10% of the people driving cattle had to be removed because they continued to abuse cattle.

12. I've come to realize that an important variable in working livestock effectively and in a low-stress manner is what we might call "presence," and it's that intangible presence that helps those who have it get the astonishing results that they do with livestock. Ray Hunt had a presence with horses. Cesar Millan has a
presence with dogs. Bud Williams had a presence with cattle. I’m beginning to think that good stockmanship has as much to do with the presence that the stockperson projects as does technique. What’s your take on this?

I agree with the concept of presence. Animals can sense when you are confident or timid. Effective presence is a calm confidence. Both Ray Hunt and Bud Williams had difficulty explaining what they did. One day a rancher asked me a question which illustrated the importance of presence. He asked, “I could not get a bull to go in a stock trailer and when I put a pistol in my pocket, he went right in. Why did this happen?” I told him that the gun in his pocket gave him confidence. He was no longer afraid and there were subtle changes in his behavior that the bull sensed.

13. I am puzzled about what seems to be a deeply entrenched and persistent resistance to the principles and techniques of low-stress livestock handling. What do you think the source(s) of this resistance is?

I am frustrated by the resistance to low-stress methods. There are many scientific studies that show that when animals are fearful of people they are less productive. Paul H. Hemsworth in Australia has done many studies, and abstracts of his papers are available on Google Scholar. Many of the studies were done in the 1980s. In the early 1990s I showed a plant that they could save $1,000 per day with good handling. We had hard numbers, but the management’s mind was “set in cement” and would not change. Today things will change because people will be FORCED to change due to customer requirements, cell phone cameras and YouTube. In the past, only the 20% of the “believers” really changed. Others will change because they do not want their operation on the evening news, and customers now have strong requirements.

I think one of the reasons some people resist low-stress handling is that it forces them to view the cattle as feeling beings. Science has shown for years that animals have emotions but most of those studies remained hidden in the neuroscience literature. In my work I try to bridge the gap between the academic world and the practical people working in the field. That is not an easy task. Today I spend much of my time working with meat buying customers on writing standards on animal welfare. Their economic clout can bring about change. Standards I have written on animal handling are outcome-based and do not involve facility design. The only facility design thing in my audits is non-slip flooring and good maintenance. The audits are based on outcome measures, such as falling, electric prod use, vocalization, and speed of movement. Slaughter plants and feedlots will also fail an audit if an act of abuse is observed, such as the person who ripped out ear tags. You can learn more about how to conduct audits on www.grandin.com and in my book, Improving Animal Welfare: A Practical Approach.

14. Could you address the relative merits of tubs versus BudBoxes? And when or under what circumstances, if any, would you recommend a BudBox versus a tub?

In the second printing of my Humane Livestock Handling book, I have a Bud Box design. There is a place for Bud Boxes. They are very economical to build and would be suitable on a ranch where the rancher has learned Bud William’s methods. They are not suitable in a feedlot that has high employee turnover. Both a Bud Box and a well-designed tub which turns in a full half-circle use the principle of cattle going back to where they come from. Many tubs are laid out wrong and work poorly. Both systems have to be laid out correctly and there are many systems that are laid out completely wrong. Little quarter circle tubs work poorly because
the cattle do not go back to where they are coming from. There are two basic approaches to equipment design.

Bud Boxes are simple and economical to build but more skill dependent. You must be highly skilled to use it correctly and safely. They are much easier to set up when used as a portable facility on many different pastures. This is an application where a Bud Box may be the best option. There are many Bud Boxes that have an extra gate added because they are not used correctly. People that add the extra gate do not understand how it should be used.

Full half-circle tubs are more expensive to build but less skill is required to operate them safely. They have safety advantages, especially for less skilled people. I recommend them for large, permanently built systems.

Another big frustration of mine is people overloading crowd pens regardless of type. Good cattle handling requires more walking to bring up smaller groups of cattle. For 40 years I have been telling people to fill the crowd pen only half full. With both systems, people need to use following behavior. They should wait until there is space in the single-file chute before filling the crowd pen. This enables the cattle to immediately start entering the single-file chute.

To utilize following behavior, the single-file chute must have enough space so that a minimum of four or five cattle can enter it. When space is limited, a double alley will hold more animals. All types of crowd pens work best when they are used as “passing through” pens. When cattle stand in any type of a crowd pen they will likely get turned around in the wrong direction.

To solve the safety issues some people use a rider on a horse in a Bud Box. That works really well, but there will be a serious danger problem at the slaughter plant if cattle encounter their first person on foot at the plant. It is important for cattle to learn how to go in and out of feed pens and corrals moved by a person on foot before they go to a plant. Serious accidents have occurred at plants when cattle ran over handlers. Some of the most dangerous cattle to handle at a plant have been handled totally on horseback. When they see a person on foot for the first time the flight zone is greatly expanded because the person on foot is a novel experience.

15. As you know, there are critics of your solid-sided processing systems, a primary purpose of which is to hide the people from view of the cattle. Essentially, the critics—and Bud Williams was one—argue that cattle need to be able to see you so that you can use your body position to drive them, hence they prefer open sides (e.g., rail fences). What’s your answer to them?

In the second printing of Humane Livestock Handling I have drawings where the solid side has been partially removed from the inner radius of the curved single file chute. I also show the same design in my 2004 video. Solid sides are most important on the OUTER PERIMETER to block outside distractions. If the solid side is removed, then people have to be in the correct position. With unskilled people, the totally solid side system will work best. At most feedlots, the Bud Box is inside a building which provides solid sides on the ENTIRE outside perimeter. Solid sides on the outside perimeter would help focus the attention of the cattle on the handler. The one fence on the end of the Bud Box must be open to prevent the cattle from heading into a dead end. There must be no distractions in front of the open fenced end such as vehicles, people, reflections, or flapping objects. At packing plants where there are lots of distractions this is a place where totally solid
sides are essential. Some systems would absolutely NOT work until I covered the fence to prevent cattle from seeing people or vehicles going by. On a remote ranch, an open sided facility will work with a skilled handler because there are no outside distractions. To prevent leg injuries, I strongly recommend having a solid side on the bottom half of the fence, unless the cattle are very gentle.

Today I really like the design where the round crowd pen and crowd gate is totally solid and the outer perimeter of the curved chute is solid. The inner radius of the curved chute has a 4 ft. (1.2 m) solid fence and the cattle can see the handler walking on the ground to move them up the chute. This eliminates a catwalk along the single-file chute. In slaughter plants, I still recommend totally solid sides because there is so much commotion and activity around the chutes coupled with high employee turnover. If the side is left open, the employee has to be trained to stay away until it is time to move the cattle.

16. What’s your answer to Bud Williams and his students who argue that open and straight chutes are much better than curved, solid-sided ones?

I disagree with my critics on the issue of straight chutes being better. When cattle move out of a Bud Box into the single-file chute, they always circle around the handler. There is a “virtual” curved chute in the Bud Box. Cattle do not move in a straight line when they leave a Bud Box. One advantage of the curved chute is that cattle entering the chute from the crowd pen do not see the people standing by the squeeze chute. On the Daniels squeeze chute the sliding door tailgate creates a solid barrier to prevent incoming cattle from seeing the people around the squeeze chute. This helps make the straight Daniel’s double alley work. A curved chute also takes advantage of the natural behavior of cattle to go back to where they came from.

Curved chutes MUST be laid out correctly. If a chute is dead ended by bending it too sharply where it joins the crowd pen it will not work. An animal standing at the junction of the single-file chute and the crowd pen MUST be able to see two body lengths up the chute. The junction between the crowd pen and the single-file chute is very critical. The drawings in Humane Livestock Handling and on www.grandin.com must be followed exactly.

17. In your writings you argue that Bud’s zigzag technique works because it stimulates a natural anti-predator bunching behavior in cattle, yet you state that Bud did not agree with this. Do you know what his disagreement was?

Bud was upset when I said that cattle bunching in response to the zigzag motion was an anti-predator behavior. Since he loves cattle, it upset him that he could be doing anything that would resemble a predator. Sheep have an even stronger response. When I was in New Zealand, I saw sheep bunch instantly when they saw a dog. In animal behavior science, the behavior of cattle to bunch would be called a fixed action pattern. This is a hard-wired behavior. In the beginning, cattle would respond to the zigzag as an anti-predator response. If the handler uses low-stress methods, learning will eventually override the anti-predator responses. When cattle stop turning to face a handler, learning has overridden a second hard-wired anti-predator response. In the beginning, the handler triggers innate hard-wired behaviors. When the cattle learn to trust the handler, learning takes over.

18. Lynn Locatelli, a vet who ultrasounds many thousands of cattle every year thinks that you are wrong about the pressure of squeeze chutes calming cattle. The difference between you and your squeeze machine, she thinks, is that you are in control of when and how much pressure whereas cows aren’t. Metaphorically,
it's like voluntarily submerging yourself under water versus someone else submerging you and holding you under. How would you respond to Dr. Locatelli?

I agree that the cows are not in control of the pressure, but I think it still has a calming effect. I have observed other situations where pressure is calming. The BLM has a heavily padded squeeze chute they use on mustangs. The horses exit from it calmly. Some squeeze chutes are better designed than others. Another problem in many hydraulic chutes is squeezing cattle too hard. If the animal struggles, they squeeze it harder. If cattle vocalize in direct response to being squeezed or caught by the headgate, the chute is hurting them. Cattle should remain silent during catching and squeezing. There is an optimal pressure of not too tight and not too loose. Some squeeze chutes squeeze on only one side, which throws cattle off balance. This causes panic because it triggers the instinctive fear of falling. I have reduced struggling in squeeze chutes by installing a non-slip floor. On squeeze chutes with only one adjustable side, it must be adjusted so that the cattle can stand in a balanced position.

I had joined the dark side. He had a real dislike for academics and he no longer wanted to communicate with me. In the early 90s, my student Jennifer Lanier and I went to a Bud Williams workshop and took tons of notes. After the workshop we sat in the Chinese restaurant at the Denver Airport and made the “T” and “zigzag” diagrams. In my Humane Livestock Handling book and Livestock Handling and Transport book I have given credit to Bud Williams. Like many good stock people, Bud was very poor at explaining what he does. Some very good stock people say you do not need diagrams, but I have to work well with the 70% of people who are not the natural stock people. They need diagrams. The diagrams that show how to make cattle move forward in a chute by walking back by them in the opposite direction of desired movement are based on my work in feedlots and plants. Many people have told me that the diagrams have been very helpful. I learned a great deal from Jennifer Lanier’s father, Burt Smith. He wrote a book on stockmanship titled Moving ’Em and he was an extension specialist at the University of Hawaii. I wrote the forward for his book.

It is impossible for a diagram to show everything, but for many people diagrams give them a starting place. The reason I have spent so much time creating diagrams and writing in industry publications is that I want to make low-stress handling mainstream.

Some people have said that my materials do not cover everything that the best low-stress stock people know. I am sure that is true. To teach the 70% majority of people, things have to be simple.

19. The various diagrams in your articles and books of cattle handling techniques (e.g., Humane Livestock Handling) look like some of Bud Williams techniques (e.g., the “T”, the zigzag, forward-parallel and reverse-parallel). Is Bud the source of these techniques or did you come up with them independently?

I first met Bud Williams in the late 70s and I attended several workshops in the 1980s and 1990s. I traveled with Bud Williams to some ranches in Texas in the 1980s. From this trip I developed the diagrams of joining the herd up and several other diagrams. I sat down with Bud and I sketched out the diagrams. He did not have any diagrams; I had to create them from both watching Bud and talking to him. In 1990 I became a professor and Bud decided

20. What do you think the future of low-stress livestock handling and stockmanship holds?

I have a saying, “Heat softens steel and then the reformers can bend the steel into pretty grillwork.” To get low-stress
handling outside a core group of 20% believers has required “heat.” The “heat” is now smart phones that can instantly post videos on the internet and on-line. The big companies now realize that at any time, abuse of cattle can be instantly put on video and sent to the national news. Let’s get positive and put up video on how to do things right. I have found that many people in the general public are interested in seeing animals being treated right. Most of the general public has no idea about the good things that ranchers do. Ranchers need to make videos that show how they are stewards of the land. Many people in the large population centers think cattle destroy the environment. When cattle are grazed right, they are much better for the environment than turning rangeland into monocultures of soy corn or crops for biofuel.
Research Pearls

The purpose of this section is to review briefly some published animal science research that is relevant to stockmanship in general, and to the theme of the current issue in particular. Also, original research, field observations and experiments may be reported here.

A four-point rating scale was used to rate the temperament of 1500 commercial feedlot cattle while restrained in a squeeze chute. The rating scale was: 1 = calm, no movement; 2 = restless, shifting weight; 3 = head throwing, squirming and occasionally shaking the squeeze chute; and 4 = lunging and continuous, violent shaking of the squeeze chute. It was found that hair whorl position significantly affected temperament rating during restraint. Cattle with spiral hair whorls high on the forehead (i.e., above the eyes) appear to be more likely to panic during restraint compared to cattle with low spiral hair whorls (i.e., below the eyes). The authors conclude that “spiral hair whorl position on the forehead may be of value in selecting breeding cattle with a calm temperament.” They suggest that the observed relationship between hair whorl position and temperament is explained by the fact that hair patterns in the fetus form at the same time as the brain.


The authors observed 1636 cattle from six commercial cattle auctions to study the relationship between facial hair whorls and temperament. The cattle were rated while in the auction ring on a four-point scale ranging from 1 (calm, stood still, or walked around) to 4 (highly agitated, hit the ring fence, walls, partitions, or people). In part, it was found that animals with a high hair whorl or no hair whorl had higher temperament scores (i.e., they tended to become more agitated than cattle with normal hair whorls). The authors conclude, “Facial hair whorls in cattle may be a useful management tool in assessing which animals may become disturbed in novel environments.”


Breeding soundness exams (BSE) were conducted on 219 yearling bulls (150 Angus and the remainder other breeds) to determine if there is an association between facial hair whorl patterns and sperm morphology. This hypothesis was based on the fact that patterning of hair follicles and testicular development occur at approximately the same time during gestation, and hair whorls and skin form from the same embryonic layer in the nervous system. Hair whorl patterns were categorized in two ways, round or nonround epicenters. It was found that Angus bulls with one or two whorls with a round epicenter had a significantly higher percentage of morphologically normal spermatozoa than bulls with one or two whorls with a non-round epicenter. Also, it was noted that Angus bulls with a whorl that is a round spiral had a greater proportion meeting the minimum threshold value for spermatozoal morphology than bulls with long epicenters. These relationships were not observed for other breeds. It was concluded that “hair whorl patterns that deviate from the round spirals . . . were associated with more abnormal spermatozoa.” The authors suggest that these visual indicators “could augment the process of predicting bull fertility; perhaps it could be used for early identification of calves that have a lower probability of passing the BSE,” hence facilitating early culling decisions.
**Book Reviews**


**Authors**

Temple Grandin (see Profile) is uniquely qualified to write this book along with Catherine Johnson, Ph.D. a writer specializing in the brain and neuropsychiatry.

**Content summary**

Beginning with an autobiographical chapter, Grandin describes how "animals saved me" and how she came to "understand the way animals think." The book continues with in-depth and insightful chapters on animal perception, feelings, aggression, pain and suffering, and thinking. The book chronicles Grandin's determined efforts to go beyond behaviorism and get inside animals' heads, to answer such questions as: How do they think? What emotions do they experience? What motivates their behavior? How do they perceive their world? This book provides the answers.

*Animals in Translation* is an impassioned argument to understand animals (including livestock) and their behavior from the inside out, to appreciate their point of view, to apprehend what animals feel and why, and understand the important but overlooked role that emotions play in animal behavior, which will lead to more enlightened treatment of animals.

Grandin and Johnson discuss the different types of animal aggression and what motivates each, especially the important role of fear, and of pain and suffering, as well as animal intelligence, concluding that they are much smarter than we generally think they are.

You will go away from this book with a heightened sensitivity to and understanding of animals' inner world and agreeing with the authors that "it's time to start thinking about animals as capable and communicative beings" and treating them "fairly, responsibly, and with kindness."

**Writing quality**

Well-written in an informal, non-academic style.

**Recommendation**

The authors impart an understanding of how animals think, feel, and perceive their world. This book is an informative, interesting, important read for any stockman interested in increasing their understanding of the animals in their care. Grandin and Johnson make their case that "Training, solving behavior problems, and understanding why animals do what they do will be easier if you know the motivations for different behaviors."

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**Author**

Temple Grandin (see Profile) is uniquely qualified to serve as editor of *Livestock Handling and Transport*. Also, she is a significant contributor with five of the book's twenty-one chapters.

**Content summary**

Dr. Grandin writes, “The purpose of this book is to serve as a source of the latest scientific research information and as an archive of practical information . . . on animal handling, the design of facilities and transport.” Grandin chose exceptionally well-qualified subject experts to address specific livestock handling and transport issues, including (a) the effect of customer requirements, international standards, and
marketing structure on handling and transport, (b) general principles of stress and well-being, (c) causes of poor welfare and welfare assessment during handling and transport, (d) low-stress restraint, handling and weaning of cattle, (e) handling cattle raised in close association with people, (f) dairy cattle behavior, facilities, handling and transport, automation and well-being, (g) behavioral principles of cattle, sheep, pig, horse, deer and poultry handling, (h) transport of cattle, sheep, pig, horse, deer and poultry, (i) stress physiology of animals during transport, (j) design of handling facilities for cattle and sheep, and (k) dogs for herding and guarding.

The book also includes a list of useful websites for additional information.

Recommendation

This exceptionally well-referenced 386-page book does a commendable job meeting its stated purpose and is a must read for any stockperson interested in livestock handling and transport. Livestock Handling and Transport provides a wealth of quality information for the serious stockperson who wants to make practical improvements in their operation that they can take to the bank.

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Authors

Temple Grandin (see Profile) with Mark Deesing. Mark has worked with Dr. Grandin on writing projects, research, and facility designs since 1993 and is a custom-design consultant for Grandin Livestock Handling Systems, Inc.

Content summary

Grandin writes that one motivation for writing Humane Livestock Handling was “to share my understanding of why animals become distressed during handling and to offer strategies and techniques for calming them.”

This book is divided into four parts. Part I focuses on animal perception and the effects of genetics and learning on behavior, and why a basic knowledge of each is important for stockmen. Part II addresses principles and techniques of low-stress handling in pastures and handling facilities, then discusses humane slaughter. Part III is devoted to planning, designing and constructing a solid-sided, curved handling system. Part IV provides many diagrams of different facility plans, plus numerous helpful drawings of different kinds of gates, latches and other useful things. In addition to clearly showing the reader how to plan, design, and build such a system that is unique to one’s operation, the authors provide an important discussion of the major design flaws that people make.

Although half of the book is devoted to facility design and construction, the authors rightly stress that that is only half of the equation; the other half is proper handling. As Grandin writes in the Preface, “I soon learned that although well-engineered facilities provide the tools that make calm, low-stress handling easier and safer, they do not replace management and gentle handling training.” To that end, the authors devote the other half of the book to understanding animal behavior and to what they call “low-stress handling” skills.

Drawing from the scientific literature and their combined personal experience, the authors “aim is to create the most effective livestock-handling facilities as possible.” They write, “The management of cattle using the methods and facility designs in this book is proved to reduce stress and fear. . . These methods not only benefit welfare but also increase
productivity and profit, improve meat quality, reduce illness, lower mortality rates, and prevent injuries to both animals and people.”

**Writing quality**

This book is reasonably well-written and with the lay reader in mind. Consequently, it omits cumbersome literary citations, although every statement or claim that is made (e.g., about animal behavior, the influence of genetics on behavior) is based on scientific research.

**Recommendation**

This book is a must read for any livestock producer interested in designing and building a solid-sided, curved facility with a tub. However, even if one is not intending to build a new facility or remodel an old one, this book is worth it for just Parts I & II. These two parts will increase the reader’s understanding of animal perception, behavior, and good handling techniques which can improve efficiency, safety, productivity, and animal welfare.


**Authors**

Temple Grandin (see Profile) and Catherine Johnson, Ph.D. a writer specializing in the brain and neuropsychiatry.

**Content summary**

Beginning with a chapter on What Do Animals Need?, the authors make a case for the importance of the often neglected emotional welfare of animals. Since new research in neuroscience has shown that emotions drive behavior, the authors discuss at length the core emotional systems in the brain. Their primary purpose is to provide “a set of simple, reliable guidelines for creating good mental welfare that can be applied to any animal in any situation, and the best guidelines we have are the core emotion systems in the brain.” The authors then devote chapters to different animals, including, of interest to the Journal, dogs, horses, and cows. Lastly, Grandin includes an Afterword in which she answers the question, Why do I still work for the industry?

**Writing quality**

Well-written in an informal, non-academic style.

**Recommendation**

This book is well worth the read for stockmen interested in gaining a better understanding of the emotional life and behavior of the animals in their care. Such an understanding will help stockmen better provide for their animals’ quality of life which, in turn, benefits the stockmen in many ways.

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**Author**

Temple Grandin (see Profile) is uniquely qualified to serve as editor of *Improving Animal Welfare: A Practical Approach*. Also, she is a significant contributor with seven of the book’s fifteen chapters.

**Content summary**

Dr. Grandin writes, “There is a huge need for information on how to effectively implement programs to improve animal welfare at the practical level. This is a hands-on ‘how to do it’ guide that provides practical information for veterinarians, animal scientists, producers,
transporters, auditors, government agencies, quality assurance managers and others who work in the field with animals.” As several of the contributors stress, this is vitally important because animal welfare is becoming an increasingly important global concern of the public, consumer, retailers, and legislative and regulatory bodies.

The goals of the book include:

1. To help people implement effective practical auditing, regulatory and assessment programs that will improve the welfare and treatment of livestock.
2. To provide information that will improve welfare in critical areas, such as slaughter, transport, handling, euthanasia and painful surgical procedures.
3. To help the reader understand the importance of animal behavior in assessing animal welfare and its role in the design of housing and handling systems.
4. To discuss the role of ethics in animal welfare in a practical manner.
5. To understand how economic factors can be used to improve both welfare and reduce losses in farm animals.

To meet these goals, Grandin chose exceptionally well-qualified subject experts who address specific animal welfare issues, such as: the social and ethical context of agricultural animal welfare, the importance of good stockmanship, how to properly handle painful husbandry procedures and euthanasia, and animal well-being and behavioral needs on the farm. Additionally, Grandin addresses the importance of measurement to improve the welfare of livestock, implementing effective standards and scoring systems for assessing animal welfare on farms and slaughter plants, improving livestock handling and reducing stress, improving animal welfare during transport, improving livestock welfare in slaughter plants with auditing programs, and the effect of economic factors on the welfare of livestock. Lastly, two articles address the important question of how to bridge the gap between scientific research and practical application.

The book also includes a list of useful websites for additional information.

**Recommendation**

This exceptionally well-referenced 328-page book admirably meets its stated goals and is a must read for any stockperson interested in improving the welfare of their livestock. *Improving Animal Welfare: A Practical Approach* is the definitive source for teaching stockpeople how to evaluate, assess, measure and implement practical animal welfare changes in their operations. It will tell you what you need to know and how to do it.

**Cattle Handling Principles to Reduce Stress DVD**

Cattle Handling Principles to Reduce Stress is produced by Grandin Livestock Handling Systems, Inc.

**Production values**

This DVD does not appear to be professionally shot and has more of the “home video” flavor. Also, it is not without its problems (e.g., slides out of sequence and slides that don’t match the narrative), but that does not detract from its value.

**Content summary**

This DVD includes three segments. The first segment is a video of a 53-minute lecture delivered by Dr. Grandin on cattle handling principles and techniques in 2004. Grandin first answers the question: Why is it important to reduce stress on animals? She then discusses, with supporting slides, (a) the importance of identifying and removing distractions in handling facilities (e.g., high contrasts, dangling chains, shadows, noises), (b) design mistakes
in handling facilities (e.g., the “black hole,” too many nobacks, (c) good design features (e.g., skylights in chute houses, solid sides, nonslip flooring), (d) behavior principles of livestock handling (e.g., flight zone, point of balance, pressure and release), (e) handling mistakes (e.g., putting too many cattle in the crowd pen, pushing cattle with the crowd pen gate), and (f) good handling (e.g., working from the front of crowd pen, walking against the animals direction of travel to speed them up, quiet handling). Grandin also discusses facilities design (with an emphasis on curved, solid-sided systems); squeeze chute design, operation, and behavioral principles of restraint; the importance of selecting and culling for temperament; the benefits of reducing electric prod use and how to do it; the relationship of physique and hair whorl position to temperament; and the role of novelty and its implications for handling livestock. Lastly, she provides a good discussion of the scientific basis of the fear response and research results on fear stress (e.g., fear stress decreases reproductive capability).

The second segment is a 53-minute 1998 lecture on animal handling in meat plants by Dr. Grandin with a Spanish voiceover (however, the accompanying slides of graphs and tables are in English).

The third segment is a short slide show of 17 facilities designed by Grandin Livestock Handling Systems, Inc.

Included with the DVD is a CD with 82 instructive pictures and diagrams, both with captions, used by Grandin in her lectures.

**Evaluation**

This DVD and CD are a good overview of many aspects of Grandin’s work, especially with solid-sided, curved processing systems and the handling of livestock through those systems.

**Recommendation**

For those familiar with Dr. Grandin’s work, this DVD and CD will be a concise overview of her key ideas and findings relative to animal handling. For those unfamiliar with her work, it is a good introduction and worth the view.

This DVD is available for $68 (includes shipping) through [www.grandin.com](http://www.grandin.com).
The purpose of this section is to list resources that the editor has evaluated and believes to be valuable contributions to stockmanship and therefore worthwhile for the reader. Resources relevant to the subject matter of each issue will be added to develop, over time, a comprehensive listing.
LOW-STRESS LIVESTOCK HANDLING

www.stockmanship.com

www.managingwholes.com/bud-williams-1.htm

www.managingwholes.com/bud-williams-2.htm

www.managingwholes.com/bud-williams-3.htm

www.managingwholes.com/bud-williams-4.htm

www.managingwholes.com/vt.htm


Low Stress Cattle Handling: An Overlooked Dimension of Management DVD (available from www.cattlexpressions.com)

LOW-STRESS LIVESTOCK HANDLING
CONSULTING SERVICES

www.cattlexpressions.com

PLACING CATTLE

Stockmanship: A Powerful Tool for Grazing Lands Management by Steve Cote (available for $20 from the Natural Resources Conservation Service, 125 So. Water St., Arco, ID 83213, (208-527-8557)

www.naturalcattlehandling.com

LIVESTOCK HANDLING, TRANSPORT, FACILITIES DESIGN, AND ANIMAL WELFARE

www.grandin.com