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Human Health Implications of Live Hang of Chickens and Turkeys on Slaughterhouse Workers

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An HSUS Report: Food Safety Concerns with the Slaughter of Downed Cattle

Abstract

Nonambulatory cattle may be at higher risk of harboring foodborne pathogens such as *E. coli* O157:H7, *Salmonella*, and, very rarely, the infectious agent that causes bovine spongiform encephalopathy, colloquially known as “mad cow disease.” The exclusion of nonambulatory cattle from slaughter for human consumption may strengthen the safety of the food supply and is a prudent measure already in place throughout the European Union.

Introduction

Investigations by the Humane Society of the United States (HSUS)¹ and others²⁻⁴ have documented that “downed” cattle, those too sick or disabled to stand or walk, are routinely beaten, dragged with chains, shocked with electric prods, and pushed by forklifts in efforts to move them at slaughter facilities, compounding the pain these animals already suffer as a result of the injury or illness causing their immobility. Citing “egregious violations of humane handling regulations” documented during an HSUS investigation, the U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) suspended inspection and the Agricultural Marketing Service (AMS) temporarily suspended the slaughter plant’s vendor status, making it ineligible to sell beef to the government.⁵ As a result of the illegal handling and slaughter of nonambulatory cattle, and the introduction of these animals into the food chain, the company is now responsible for the largest beef recall in U.S. history.⁶ The investigative findings of downed cattle mistreatment and allegations of nonambulatory animals being slaughtered for human consumption also prompted congressional reaction,⁷ led school districts to pull beef from their menus,⁸ and purportedly led to questioning of the reliability of the USDA inspection process.⁹

Aside from the serious welfare concerns of such treatment of downed animals, this practice raises food safety issues, as a limited number of studies have shown that nonambulatory cattle may suffer from higher rates of foodborne pathogens.¹⁰

Texas A&M University researchers were among the first to alert the medical community of the potential for downed cattle to present a vehicle to contaminate the human food supply with bacterial pathogens. They studied 30 downed cattle who had no outward signs of illness, except for inability to rise, and had all passed antemortem inspection. Even though these nonambulatory animals appeared otherwise healthy, when the researchers took bacterial cultures, they found cows infected with *Salmonella* and *E. coli*. The researchers concluded: “Results of this study of 30 cattle indicate that pathogens may be circulating in the blood of some recumbent cattle at the time of slaughter.”¹¹ Commenting on areas of concern, the scientists noted:

It should be remembered that much of the meat from recumbent cattle goes into the production of ground beef, which, because of the grinding process and extra time it spends at a temperature higher than the whole carcasses, usually attains a high bacterial cell count per gram by the time processing is finished. Contaminated meat used to make ground beef would also contaminate subsequent clean meat exposed to common machinery (eg, grinders) and, thus, would increase the danger of contamination.¹¹

This research shows that even when downed animals appear otherwise healthy, they may be harboring dangerous pathogens.

The majority of nonambulatory cattle are dairy cows.¹⁰ Virtually all dairy cows are ultimately slaughtered for human consumption in the United States.¹² Annually, 6 million culled dairy cows enter the food chain as ground beef,¹³ accounting for at least 17% of the ground beef produced in the United States.¹² Since the muscles of dairy cows have a lower fat content, they are commonly used in producing the more expensive “lean” hamburger.¹⁴

According to a 2003 review, downed dairy cattle “may harbor greater numbers of pathogens, and their slaughter may increase spread of pathogens at the slaughter establishment.”¹⁵ In *Meat & Poultry*, research is cited to explain why nonambulatory cattle tend to have higher levels of bacteria on their carcasses: “Lame animals spend more time lying down, which increases the likelihood they will be contaminated with fecal matter.”¹⁶ In addition to the potential for contamination of the meat with fecal pathogens, when dairy cows are slaughtered, “[k]nives, carcasses and the hands of personnel may be contaminated by contents of the mammary gland when this is removed from the cow during processing.”¹² Intramammary infections (mastitis) affect up to nearly two-thirds of cows in U.S. dairy herds¹⁷ and are one of the most common reasons dairy cows are sent to slaughter.¹² Inappropriate excision of the udder during the slaughter process can contaminate the rest of the carcass with milk that could contain *Listeria* and other milk-borne pathogens. A 1997 review of the microbiological hazards of eating meat from culled dairy cows concluded: “In the USA, dairy cattle are raised and managed with increasing intensification, and this intensification may promote the maintenance of a variety of micro-organisms which could be pathogenic to humans through food.”¹²

***E. coli* O157:H7**

In 2003, a study funded by the USDA was published that investigated the “potential impact to human health that may occur following consumption of meat derived from downer dairy cattle” by measuring infection rates of one of the most virulent foodborne pathogens, *E. coli* O157:H7. The investigators found that downed cows were 3.3 times more likely to harbor the potentially deadly *E. coli* strain than walking culled dairy cows. The researchers concluded that “downer dairy cattle harboring *E. coli* O157:H7 at slaughter may be an important source of contamination and may contribute to the health risk associated with ground beef.”¹⁸ The results of this study led USDA Microbial Food Safety Research Unit Research Leader John B. Luchansky to question whether, based on *E. coli* alone, nonambulatory cattle should be excluded from the U.S. meat supply.¹⁹

E. coli O157:H7 infects tens of thousands of Americans every year, causes dozens of deaths,²⁰ and may be the leading cause of acute kidney failure in previously healthy U.S. children.²¹ Speculatively blamed in part on the increasing intensification of dairy farming,²² prevalence rates in U.S. dairy herds have ranged up to 100%.²³ Quoting USDA researcher Caitriona Byrne and colleagues: “Due to the ubiquity of *E. coli* O157:H7 among cattle, as well as its low infective dose and the severity of the resistant illness in humans, effective control of the pathogen may be possible only by eliminating this microorganism at its source rather than by relying on proper food handling and cooking thereafter.”¹⁸

A 2005 review in the *Journal of Dairy Science* likewise concentrated on the risk of contracting virulent strains of *E. coli* from eating ground beef from dairy cows that may be tainted with fecal material. These toxin-producing strains can cause hemorrhagic colitis and progress to kidney failure, coma, and death, particularly in young children.²¹ Dairy cattle “enter the food chain as ground beef,” the review reports, and “[a]s a result, downer dairy cows harboring STEC [Shiga toxin-producing *E. coli*] at slaughter can be a health risk to humans.”¹³ Meat from diseased and disabled cattle has also been implicated in a similar life-threatening disease in dogs.²²

Salmonella

Salmonella infection hospitalizes thousands of Americans every year, kills hundreds, and can lead to chronic conditions such as arthritis, bone infections, cardiac inflammation, and neurological disorders.²⁴ According to the Centers for Disease Control and Prevention (CDC), *Salmonella* strains in the United States are growing resistant to nine different antibiotics.²⁵ One strain, known as *Salmonella* Newport MDR-AmpC₂, is even growing resistant to ceftriaxone, a powerful antibiotic vital for combating serious infections in children.²⁵

Multiple outbreaks of this new multidrug-resistant *Salmonella* strain have been tied to dairy farms,²⁶ ground beef made from dairy cows,²⁷ and dairy products.²⁸ Investigating one deadly outbreak of antibiotic-resistant *Salmonella* involving hundreds of people, California public health officials traced the cases back to meat from infected dairy cows slaughtered for hamburger. In their report published in the *New England Journal of Medicine*, they were able to correlate risk of contamination with the slaughter plants that received the most moribund and dead cattle. The researchers noted: “Stressed animals are more likely to shed *Salmonella* in large numbers.”¹⁴

In addition to the immunosuppressive effect of stress, nonambulatory animals may also be more likely to shed pathogenic bacteria, “[s]ince animals going to slaughter are generally in a temporary state of starvation, and it is known that starvation causes *E. coli* and *Salmonella* to proliferate” due to changes that occur in the animal’s rumen. By the time most cattle are slaughtered, they have been starved for variable periods of time, in part because empty rumena are easier to eviscerate.²² This may be particularly relevant to downed cattle populations who may be left to starve for extended periods before they are finally slaughtered.

Carolyn Stull of the University of California-Davis School of Veterinary Medicine has studied *Salmonella* infection in downed cows and reported results at a 2004 American Meat Institute conference. Fifty downed cows were sampled and seven were found to be infected with *Salmonella*. Despite infection, however, five of the seven infected cows, including at least one cow who was septicemic, were known to have passed USDA antemortem inspection for human consumption.²⁹ Stull and colleagues reportedly identified 6 out of 20 nonambulatory cattle sent to a slaughter facility to be fecal shedders of *Salmonella*.³⁰

Anthrax

Anthrax is a farm animal disease that can infect, though very rarely, the human meat supply.³¹ In 2000, 32 farms were quarantined for anthrax in the United States.³² That summer, at least five people were exposed to meat “highly contaminated” with anthrax from a downed cow who was approved for slaughter and human consumption. These cases were reported by the CDC as “Human Ingestion of *Bacillus Anthracis*-Contaminated Meat.”³³ Had a ban on the slaughter of downed cattle been in effect, these people may have been spared. Based on these cases, the CDC recommended veterinarians consider anthrax as a possible diagnosis in cattle unable to rise. Subsequently, a family stricken with gastrointestinal, oropharyngeal, and meningeal anthrax tied to the consumption of a sick sheep was reported,³⁴ suggesting it may be prudent to exclude all nonambulatory animals—not just cattle—from the human food supply.

Frank Garry, the coordinator for the Integrated Livestock Management Program in the College of Veterinary Medicine and Biomedical Sciences at Colorado State University, reportedly suggests that the slaughter of nonambulatory farm animals may present a threat to national security:

The threat of bioterrorism adds one more reason to end the use of nonambulatory animals in human food. An animal that is unable to walk because of illness should probably not be processed for human food consumption, regardless of whether the animal was intentionally or unintentionally contaminated. As long as the USDA continues to slaughter diseased livestock, it is possible that a bioterrorist attack could make people very sick and undermine confidence in American agriculture.³⁵

Culled dairy cows may present particularly vulnerable agroterrorist targets as they are slaughtered and ground into hamburger. “Given that only a single infected carcass can contaminate a large lot of ground beef,” wrote USDA researchers in a 1996 review, “it is possible that, whereas in the past an infected animal would produce only a small number of cases, such an animal could now cause a large, widespread outbreak.”²² According to Robert Tauxe, Chief of the Foodborne and Diarrheal Diseases Branch of the Centers for Disease Control and Prevention, each burger may reportedly be made from the flesh of hundreds or even thousands of different cows.³⁶ One mathematical model suggests that a single downed cow infected with a pathogen such as *E. coli* O157:H7 could theoretically contaminate more than 100,000 hamburgers with an infectious dose.²²

Bovine Spongiform Encephalopathy

Bovine spongiform encephalopathy (BSE) is a transmissible spongiform encephalopathy (TSE) of cattle that may manifest with behavioral symptoms, earning the disease its colloquial name “mad cow disease.” The rendering of sheep infected with an ovine spongiform encephalopathy (known as scrapie) into cattle feed may have led to the emergence of BSE.³⁷ In modern animal agriculture, protein concentrates, or “meat and bone meal”—terms that encompass “trimmings that originate on the killing floor, inedible parts and organs, cleaned entrails, fetuses”³⁸—are fed to dairy cows, for example, to improve milk production.³⁹ According to the World Health Organization, nearly 10 million metric tons of slaughter plant waste is fed to farm animals every year.⁴⁰

Although the first case of BSE was documented in the United Kingdom in 1986, there reportedly exists “very sound” evidence that a rare form of the disease was already circulating in the United States.⁴¹ One year before BSE was initially reported in Britain, Richard Marsh, chair of the Department of Veterinary Science at the University of Wisconsin-Madison, was alerting dairy producers of the possibility that a “previously unrecognized scrapie-like disease in cattle” existed in the United States⁴²—a concern borne out of investigations of sick mink.

Mink have proven to be sentinel animals, like canaries in coal mines. They were reportedly the first, for example, to show toxicity from the vaginal cancer-causing synthetic estrogen diethylstilbestrol (DES) and the industrial carcinogens polychlorinated biphenyls (PCBs).⁴³ Since 1960, there have been four outbreaks of mink spongiform encephalopathy known as transmissible mink encephalopathy (TME) on U.S. fur farms.⁴⁴ This was perplexing, as researchers had been unable to orally infect mink with scrapie-infected sheep brains.⁴⁵

A clue to the origin of the disease came in 1985, when TME devastated a population of farmed mink in Wisconsin who had reportedly not been fed any sheep.⁴⁶ The meat portion of their diet evidently consisted almost exclusively of downed dairy cows.⁴⁷ Marsh hypothesized that there was a form of BSE in the United States that manifested itself as more of a “downer” cow disease than a “mad” cow disease.⁴⁵

Mink were found to be experimentally susceptible to BSE; when mink were fed BSE-infected brains from British cattle, they died from a spongiform encephalopathy.⁴⁴ The disease was experimentally spread from mink to cows and from cows back to mink.⁴⁷ The critical experiments, though, involved inoculating the brains of U.S. sheep infected with scrapie into U.S. cattle.⁴⁸ In England, scrapie-infected cows go “mad,” twitching and kicking. But, in the United States, the “real surprise,”⁴¹ as Marsh recounted, was that scrapie-infected cattle instead developed difficulty in rising and terminal recumbancy⁴⁹ like downed cattle do.⁴⁸ “The signs that these cattle showed were not the widely recognized signs of BSE—not signs of mad cow disease,” Marsh reportedly said. “What they showed was what you might expect from a downer cow.”⁵⁰ Scientists have identified multiple strains of scrapie.⁵¹ Marsh posited that one of the U.S. strains may have jumped to cattle, creating a form of BSE native to the United States.⁴³ Said Marsh to a reporter: “That’s the only conclusion you can draw.”⁴¹

Every year in the United States, estimates range from 195,000⁵² to more than 1 million⁵³ cattle who collapse for a variety of metabolic, infectious, toxic, and/or musculoskeletal reasons and are too sick or injured to rise.¹⁰ Extrapolating from the proportion of nonambulatory cattle found in European⁵⁴ and U.S.¹⁰ surveys, the number of nonambulatory cattle in the United States may be on the order of 500,000 a year. A governmental survey of dairy producers across 21 states reportedly found that 78.2% of dairy operations had nonambulatory cows

during 2004.⁵⁵ Though these animals may not have been fit enough to stand, a limited investigation of USDA slaughter plant records between January 1999 and June 2001 showed that most were still ruled fit for human consumption.⁵⁶

Experimental⁵⁷ and epidemiologic⁵⁸ evidence suggests that pigs may harbor a porcine spongiform encephalopathy, again raising the question whether there are public health, in addition to animal welfare, reasons to exclude all downed animals from the food supply.

Based on findings in Europe⁵⁴ and the speculative evidence of a rare form of mad cow disease striking downed cows for decades in the United States,⁵⁹ nonambulatory cattle should be considered to be a particularly high-risk population. According to the U.S. Food and Drug Administration (FDA): “Experience has shown that nonambulatory disabled cattle...are the population at greatest risk for harboring BSE.”⁶⁰ The FDA cites Swiss data showing a 49-58 times higher chance of finding BSE in downed cattle than in cattle reported to veterinary authorities as BSE-suspect under passive surveillance.⁶¹ Indeed, 12 of the 15 BSE-infected cattle discovered in North America by February 1, 2008, have reportedly been nonambulatory.⁶²⁻⁷³

Though the riskiest tissues—the brains, eyes, and spinal cords—of most cattle are now excluded from most food items in the United States,⁷⁴ there may be contamination of muscle meat via aerolization of the spinal cord during carcass splitting.⁷⁵ Significant amounts of central nervous system debris found accumulating in the splitting saws used to halve the carcasses may have the potential to then transfer contagion from one carcass to the next.⁷⁶ Although, technically, processors are instructed to knife-trim “material grossly identifiable as brain material, spinal cord, or fluid from punctured eyes,”⁷⁷ researchers have reported finding nervous tissue contaminating muscle in a commercial slaughter plant.⁷⁸ Contamination of meat derived from cattle cheeks with brain tissue can also occur if the cheek meat is not removed before the skull is fragmented or split.⁷⁹

Captive bolt stunning, the predominant method used to render cattle insensible before exsanguination,⁸⁰ may blow a shower of embolic brain tissue into the animals’ bloodstream. In one experiment, a biological marker applied onto a stunner bolt was later detected within the muscle meat of the stunned animal. The researchers concluded:

This study demonstrates that material present in...the CNS [central nervous system] of cattle during commercial captive bolt stunning may become widely dispersed across the many animate and inanimate elements of the slaughter-dressing environment and within derived carcasses including meat entering the human food chain.⁸¹

Captive bolt stunning may also lead to ejection of brain tissue into the abattoir from the hole made by the captive bolt onto slaughter plant equipment, as well as the hands and aprons of workers removing the animals’ heads.⁷⁸ A follow-up study published 2004 in the *Journal of Food Protection* determined that “this method of slaughter of an animal infected with bovine spongiform encephalopathy would be likely to contaminate edible parts of the carcass with infective material.”⁸² Texas A&M University researchers found bodily brain fragments as large as 14 cm (5.5 in). The researchers concluded that it was likely that BSE pathogens could potentially be “found throughout the bodies of animals stunned for slaughter.”⁸³

Despite the potential for CNS contamination and the fact that peripheral nerves⁸⁴ and blood⁸⁵ found in all muscles may carry infection, the USDA⁸⁶ and the National Cattlemen’s Beef Association⁸⁷ have attempted to assure consumers that beef is safe to eat, arguing that the infectious agent is not found in muscle meat. However, Stanley Prusiner, the director of the Institute for Neurodegenerative Diseases at the University of California, San Francisco, and winner of the Nobel Prize in Medicine for his discovery of prions, the cause of the BSE and other TSEs, proved in mice that muscle cells themselves were capable of forming the potentially infectious agent.⁸⁸ “I found prions in the hind limb muscles of mice,” Prusiner stated, “at a level approximately 100,000-fold higher than that found in blood.”⁸⁵ Prusiner reportedly described the studies relied upon by the Cattlemen’s Association as “extraordinarily inadequate,”⁸⁹ and follow-up studies in Germany confirmed his findings, showing that animals who are orally infected may indeed end up with prion contamination throughout the muscles of their bodies.⁹⁰

Although the risk of contracting BSE appears vanishingly small in the United States given how few cattle have tested positive, the neurodegenerative disease it can cause in the consumers of contaminated beef is likely invariably fatal. Because cooking temperatures do not adequately destroy prions, the onus of responsibility must rest with the beef industry or, if unable or unwilling to police itself, the federal government, to ensure infected cattle are not slaughtered for human consumption. There is evidence that the infectious proteins that cause BSE can survive incineration⁹¹ at temperatures hot enough to melt lead.⁹² In response to a question from Cornell University's Food Science Department asking what food preparation methods could eliminate the risk of contracting BSE, then National Institutes of Health Laboratory of Central Nervous System Studies chief Joseph Gibbs remarked tongue-in-cheek that one of the only ways to ensure a BSE-free burger would be to marinate it in a concentrated alkali such as Drain-O™.⁹³

Nonambulatory Cattle Slaughter Ban Loophole

Within weeks of the discovery of the first case of BSE in the United States in 2003, the USDA released a package of regulations designed to protect the nation's food supply.⁹⁴ The Center for Progressive Regulation, a nonprofit research and educational organization of university-affiliated academics, refers to the announcement of the new USDA regulations as "at best misleading, and at worst deceptive" and the regulations themselves as "meaningless public relations measures"⁹⁵ "marred by huge loopholes" rather than a sincere effort at protecting U.S. consumers.⁹⁶

Banning meat derived from nonambulatory cattle would seem necessary to significantly reduce the danger of cattle with an elevated risk of infectivity entering the U.S. food supply,⁹⁷ yet one such USDA loophole is the allowance for the continued slaughter for human consumption of a subclass of downed cattle.⁹⁸ Given studies suggesting that nonambulatory cattle may have a prevalence of BSE more than 100 times that of ambulatory animals,⁹⁹ tissues from all so-called "fallen stock" in Europe cannot even be used in animal feed.¹⁰⁰

The USDA downed cattle regulations published January 12, 2004, instructed USDA veterinary inspectors to condemn any cattle arriving at slaughter plants "nonambulatory disabled," defined as any cattle who "cannot rise from a recumbent position or...cannot walk, including, but not limited to, those with broken appendages, severed tendons or ligaments, nerve paralysis, fractured vertebral column, or metabolic conditions."⁸⁰ Since BSE can result in an animal going down either directly, because of brain damage, or indirectly, by predisposing an animal to injury, these downed cows were to be euthanized rather than slaughtered for human consumption.

The claim that meat from *all* downed cattle would no longer be allowed in the food supply was broadcast in speeches,¹⁰¹ in letters to the public, and in "fact sheets" posted publicly on the USDA FSIS website.¹⁰² The assertion was also included in testimony before a Committee of the U.S. Senate.¹⁰³ The same day that the regulations were published, however, the USDA issued Notice 5-04, instructing inspecting veterinarians how to carry out the regulations. In contrast to both the public claims by the USDA and the interim rule itself, the agency instructed inspectors to allow downed cows to be slaughtered for human consumption if they initially appeared otherwise healthy but went down within the slaughter plant itself due to an acute injury (e.g., if the animal falls and breaks a leg).¹⁰⁴ This may be imprudent since underlying disease in general and BSE in particular may make an animal disoriented, weak, or uncoordinated and thereby predispose an animal to an injury sustained in a fall.

Now retired after 20 years with the USDA, Linda Detwiler was the senior staff veterinarian in charge of the USDA BSE surveillance program. In written comments submitted to the USDA, she strongly opposed any attempt to weaken the definition of "downer" to exclude those downed presumably solely from injury. "I urge the USDA to not alter this definition," she wrote, "and to continue to prohibit for human food any bovine which cannot walk to the 'knock box' [slaughter area] regardless of reason."¹⁰⁵

Because illness may predispose an animal to injury, Detwiler argued that the underlying cause of the nonambulatory condition may be impossible to ascertain. In other words, a broken leg might just be a symptom

of a more serious problem, such as BSE. A 2003 review of the nonambulatory cattle problem concluded: “It should always be considered that two or more conditions may present simultaneously in a downer cow. . . .”¹⁰⁶ Bovine veterinarian Jim Reynolds of the University of California’s School of Veterinary Medicine reportedly agrees: “It is very, very difficult for a veterinarian to differentiate the many reasons a cow may be non-ambulatory.”¹⁰⁷ At least three of the documented cases of BSE in North America were identified as downers due to injury, not illness,^{62,64,66} underscoring how difficult it is for inspectors to reliably determine which nonambulatory animals may be “safe.”

The first case of BSE discovered in Canada was thought to be “suffering from a broken leg.”⁶² The first case of BSE discovered in United States similarly did not seem to display any BSE symptoms—the cow was reported down due to a birthing injury that reportedly interfered with her ability to walk.⁶⁴ She was seemingly picked at random as one of perhaps less than 1% of the downed cows tested for mad cow disease in the United States up until that time.¹⁰⁸ Similarly, a third North American case was suspected of injury rather than disease. The farmer reportedly “didn’t suspect anything was seriously wrong when one of his cows slipped on the ice and hurt itself. . . .”⁶⁶

In 2006, the USDA Office of the Inspector General (OIG) criticized the agency for its inconsistent application of policies and regulations related to downed animals after observing nonambulatory cattle processed at two slaughter plants. In a review of 12 slaughter plants observed over the period June 17, 2004, to April 12, 2005, the OIG found that 29 downed cattle were slaughtered for human food. They “observed use of a forklift and a rail above the pens to transport nonambulatory cattle to the slaughter area.” The audit noted the lack of documentation on the animals’ fitness for human consumption.¹⁰⁹ Nevertheless, the loophole was codified in 2007 by amending the final rule to allow inspection personnel to “determine on a case-by-case basis the disposition of cattle that become nonambulatory after they have passed antemortem inspection. . . .”⁹⁸

Conclusion

Temple Grandin, Associate Professor at Colorado State University and leading livestock handling and slaughter specialist, noted more than 15 years ago in *Meat & Poultry*, that as many as “[n]inety percent of all downers are preventable.”¹¹⁰ Providing proper bedding, for example, is considered critical for downer prevention. Smooth surfaces like concrete can become slippery when slicked with urine. Unfortunately, according to experts, “the best surfaces for cows are not easy to clean, and concrete, the easiest surface to clean, is hardest on cows.”¹¹¹ Unyielding surfaces like concrete also minimize chances of recovery by contributing to the pressure damage associated with immobility in such heavy animals. Deep sand is considered the best bedding material because it provides good footing and a soft surface. Concrete, on the other hand, has been considered “extremely dangerous.”¹¹² The major drawback to the use of sand is considered to be that it is “heavy to move.”¹¹¹

Nonambulatory cattle should be considered veterinary medical emergencies, as stated by Stull *et al.*,¹⁰ and those in extreme discomfort should be euthanized immediately. Methods deemed acceptable—when performed properly by veterinarian or trained personnel—include captive bolt, gunshot, or, if not proscribed by the rendering facility, barbiturate-containing euthanasia solution.¹⁰

An unequivocal ban on the slaughter of downed animals for human consumption would presumably remove the incentive for slaughter plant workers to torment or improperly transport nonambulatory animals rather than euthanize them, and may bolster the safety of the food supply.

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The Humane Society of the United States is the nation's largest animal protection organization—backed by 10 million Americans, or one of every 30. For more than a half-century, The HSUS has been fighting for the protection of all animals through advocacy, education, and hands-on programs. Celebrating animals and confronting cruelty. On the Web at humanesociety.org.