Is ongoing ritual slaughter of livestock justifiable in modern America?

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ABSTRACT
All livestock animals raised for food in America must be rendered immediately unconscious prior to slaughter to prevent needless suffering. An exception to this legal requirement exists for ritually-slaughtered animals. These animals, slaughtered under religious exemption from this part of animal welfare regulations, are incised while still conscious and allowed to bleed out. While a growing body of scientific studies suggests this method of slaughter allows for an otherwise avoidable period of considerable stress and pain prior to death, some religious advocates also contend that ritual slaughter can be considered humane. These perspectives are analysed by a public health veterinarian.

Introduction

As discussions of controversial religious practices tend to be, the following topic is difficult to address without creating an emotional, antagonistic interface between the opposing viewpoints. This topic has already seen its share of that. However, given the oath I’ve taken and the terms at stake in this discussion, I have felt compelled to report my observations, and to correlate them with the information reported in available studies. Subsequently, I wish to address persistent arguments which seem to me to be fundamentally inadequate responses to the information at hand. The aim here is not to further the established antagonism, and I do not seek to unfavourably interpret the intent of those who have previously stepped forward to speak. I only wish to bring further light to the topic so that citizens like myself can be either convinced by some new argument, or hope to see the end of a process deemed to be inhumane. I also know that, due to the position I have held, the majority of Americans have not witnessed a process with which I am, unfortunately, all too familiar. Something which occurs every day in America despite being recognized as a legally punishable activity in a number of progressive countries. The topic is the ritual slaughter of animals for food in adherence with religious custom. My position, simply put, is that no American group or entity should be exempt from our animal welfare laws, regardless of whether or not religious affiliation is claimed. Regulatory entities should be able to hold every group accountable for their treatment of domestic animals. This is simply because, by all reasonable indications, and until there may be sufficient data suggesting otherwise, ritual slaughter consistently and predictably causes stress and pain that other methods of slaughter do not. If this is an unfair claim to make, I hope this consideration of current relevant sources of information can address exactly which assumptions made by people like myself are in need of reassessment.

Conventional slaughter

Before addressing the conditions of ritual slaughter, I think there is value in context; specifically, in describing the practice of animal slaughter when not performed in accordance with religious ritual. As a former public health veterinarian with the Food Safety and Inspection Service (a division within the USDA), a significant proportion of my time was spent evaluating animal handling practices before and during slaughter. Because animal welfare issues can be very interpretive and every slaughter plant is ideally held to the same standards, the list of relevant regulations (listed publicly in Title 9, Part 313 of the Code of Federal Regulations) is both prescriptive and succinct, having been based on the Humane Methods of Livestock Slaughter Act. These regulations demand of each slaughter establishment conditions which aim to minimize stress and suffering visited upon the animals being slaughtered. Inspectors and veterinarians observe every part of the process, from arrival of the animals onsite to their euthanasia, to verify the regulations are met. The first approximate page of these regulations pertains to facility conditions and the handling of animals on site prior to slaughter. The other 9 pages are about requirements for stunning procedures. This may indicate the importance of stunning in efforts to humanely euthanize our livestock animals for food production. For those unfamiliar, ‘stunning’ is a term for any procedure which immediately renders an animal unconscious, so as to spare it from the pain and stress associated with being killed. These procedures, which, for livestock, most often come in the form of a gunshot or captive bolt device discharge to the brain, are based on scientific knowledge and practical experience (Aghwan and Regenstein 2019). As such, they are performed specifically as a kindness to the animals being euthanized.

During this process, an animal may be directed into a chute to limit its movement prior to a properly trained employee administering the concussive force to the head. In other operations, a
strong electrical current is applied to the animals. In yet other slaughter operations (ones which I have never personally inspected and will not be assessed in this work) carbon dioxide gas is utilized. Regardless of the stunning method, the outcome is an animal which is made immediately unconscious and insensible prior to being cut, shackled and hung for processing. When a livestock animal is shot in the head, it is, within an instant and by all clinical indications, unaware of its current state. Unaware of painful stimuli. Unable to perceive and comprehend further sensory input of any kind. Its pupils immediately dilate behind wide, unblinking eyelids. Its palpebral, corneal and pupilary light reflexes are absent. Its head hangs limp, and its body lays on the floor with no tone or tension outside of fleeting spinal reflexes. No central cognition seems to be occurring. Then, and only then, can a knife be taken to the major blood vessels of the neck to be bled. Although immediate death accompanies the instantaneous loss of consciousness following the penetrative discharge associated with gunshot and captive bolt stunning, the subsequent bleeding step always occurs and ensures (although considered unnecessary from a welfare perspective and done primarily for drainage of blood) that no minority of animals that may survive the stunning should regain consciousness at any point (Gregory and Shaw 2000). The key distinction in describing the use of mechanical (gunshot or captive bolt) stunning is ‘instantaneous’. As in, coinciding with the speed of a bullet or bolt which produces unconsciousness in one of three ways; concussive force to the skull, rapid changes in intracranial pressure, and physical damage to the brain tissue (Lambooy 1982; USDA 2019). Either way, when performed properly (exceptions will be discussed in detail subsequently), all indications suggest there is essentially no lag time between the insult to the animal and the corresponding insensibility.

Importantly, both USDA inspectors and veterinarians have the authority to intervene during any process of slaughter operations when unnecessary or avoidable conditions place an animal in a position where it is likely experiencing pain or stress. This is perhaps the most solemn responsibilities for those who oversee slaughter, as I and many of those whom I was proud to work alongside have done. In fact, the two most compelling factors which drew me to work within the agency were the animal welfare efforts and an interest in gross pathology (evaluating disease processes within tissues of slaughtered animals to make judgements about epidemiologic significance and safety for food purposes). If in our judgement, animals are being mistreated, USDA personnel are able to immediately stop the activities and temporarily suspend a plant’s operations. And we have regulations to back us up. We are able to be the unbiased advocates for the animals. Those who do not stand to profit from their prompt disposal. Those who cannot be fired from the plant for airing grievances. In short, we are able to act on behalf of America’s value of treating animals with kindness and reverence. At least, this is what we are able to do in the majority of slaughter plants.

**Ritual slaughter**

In plants which are exempt from the humane animal handling regulations pertaining to stunning and slaughter methodology, however, USDA personnel are instructed to look the other way during the act of slaughter. While this statement is reflective of reality, it too may require some context to properly consider. The Humane Methods of Livestock Slaughter Act, as briefly mentioned above, is written as follows:

**§1902. Humane methods**

No method of slaughtering or handling in connection with slaughtering shall be deemed to comply with the public policy of the United States unless it is humane. Either of the following two methods of slaughtering and handling are hereby found to be humane:

(a) in the case of cattle, calves, horses, mules, sheep, swine, and other livestock, all animals are rendered insensible to pain by a single blow or gunshot or an electrical, chemical or other means that is rapid and effective, before being shackled, hoisted, thrown, cast, or cut; or

(b) by slaughtering in accordance with the ritual requirements of the Jewish faith or any other religious faith that prescribes a method of slaughter whereby the animal suffers loss of consciousness by anemia of the brain caused by the simultaneous and instantaneous severance of the carotid arteries with a sharp instrument and handling in connection with such slaughtering. (Unites States Department of Agriculture 2020)

While, by my personal judgement, I would call into question whether the conditions described by section (b) actually constitute humane treatment, what is not subject to interpretation is the legal ramifications of this wording. What it allows, objectively speaking, are conditions in which regulatory authorities cannot intervene to maintain animal welfare during either slaughter or ‘handling in connection with slaughter’ at slaughter establishments which claim religious exemption from section (a). The directive that USDA personnel receive containing instructions specifying how to enforce humane animal handling regulations at such establishments tells that inspectors are not to intervene in any manner with the preparation of the animal for ritual slaughter, including the positioning of the animal, or the ritual slaughter cut and any additional cuts by or under the supervision of the religious authority to facilitate bleeding. (FSIS Directive 6900.2 Revision 3, 2020)

This represents a stark contrast to the direction given in inspection of all other establishments, where inspectors are to take immediate regulatory control action the moment any mistreatment of animals is observed. It also represents an uncharacteristic impediment, a road block, preventing the performance of an essential job duty for inspectors. In many cases, this road block is also a source of moral stress and frustration for inspectors. This moral stress has been freely expressed to me by those I have supervised, unprovoked. As well, it is something I have felt. But similar to the objectivity required by inspectors in providing fair and consistent judgement, this topic also demands the consideration of far more than the emotional response to which we are all subject. To remain on a course of objective assessment, all that I have intended to establish thus far is as follows; in slaughter establishments operating under religious exemption, some of the most important regulations (of those written to protect animal wellbeing) are ignored.

Categorically, there are two such types of these slaughter establishments commonly inspected by the USDA. Halal ritual
slaughter satisfies Muslim dietary law; religious requirements for food. Kosher ritual slaughter, referred to as shechita (multiple variations of spelling can be found), does the same to meet Jewish requirements. The reason for the verbiage of the Act block-quoted above is that stunning is generally disallowed by religious customs. This is true, except in uncommon cases where the act of stunning is reversible and is found not to be responsible for the animal’s death. Some ritual slaughter establishments perform ‘head only’ electrical stunning (as opposed to the application of the electrical stimulus to the head and cardiac region), and although these plants face their own unique functional challenges as well as scrutiny from various perspectives within the respective religions, they will not be scrutinized within this review. Regardless, and for reasons which are within the realm of religion and are therefore not subject to scientific scrutiny, ritually slaughtered animals must not die of any cause except for blood loss from the vessels of the neck. A note of importance here is that none of the arguments made in this analysis are to be interpreted, in any way, as condemnation of any religion. Though it often goes without saying, I will agree nevertheless that the plurality of different philosophical and cultural viewpoints is a great strength of our country. So, given that many Americans personally feel this religious requirement needs to be met, stunning methods are generally not utilized because, as noted previously, the stunning methods most commonly utilized on cattle (mechanical stunning methods) are generally effective in achieving euthanasia in addition to immediate unconsciousness (Gregory and Shaw 2000). Although electrical stunning is a common method of rendering sheep unconscious during slaughter, and head-only slaughter is pursued by some establishments, a large proportion of ritual slaughter establishments elect not to utilize any stunning methods (Zivotofsky and Strous 2012). And because stunning methodology tends to be ignored in ritual slaughter operations, the following will describe what I have found religious slaughter looks like, in practice.

A ritually slaughtered (a term which can be synonymous with ‘slaughtered without stunning’ for sake of this discussion) animal will be taken to the slaughter area. For small ruminants (sheep and goats) this area is a room in which one to two plant employees work to restrain the animal, flip it onto its side by grasping its distal limbs and lifting, and step on its abdomen while continuing to hold the limbs (with intent to limit movement, not to cause pain). The animal, obviously, tends to struggle during this process. Once in this position, another plant employee will lift up on the animal’s chin and make cuts to the underside (ventrum) of the neck with a blade ranging from about 6 in. in length to about 18 in., maintained to varying degrees of sharpness. In my experience, between one and three cuts are typically made until arterial bleeding is observed. However, higher average numbers of cuts (3.2 for shechita and 5.2 for halal, with a maximum individual recording of 19 cuts) made to sever the arteries have been reported in observational studies of comparable cattle slaughter (Gregory et al. 2008). Often these cuts are made in a back and forth, sawing motion. Other times I have observed one-directional cuts. The nature of the cut, similar to the number of cuts required, varies from animal to animal. Following the cuts, the individual slaughtering (who is often but not always either a member of the religious group or under the supervision of a member of the religious group) then releases the head, and the animal is restrained for the next few moments until it loses consciousness. In my experience, it generally takes between 10 s and 1 min before the bleeding animal (sheep, goat or bovine in this discussion) begins to display signs consistent with unconsciousness, though I have seen it take well over a minute (this timeframe is also congruent, or even an underestimation, with respect to reported data i.e. Gibson et al. (2015) describes 13.5 s and 18.9 s averages in cattle, Gregory et al. (2010) described a 20 s average in cattle with 14% standing up again after initial collapse and 8% of individuals taking greater than 1 min to initially collapse). The small ruminants tended to be on the shorter side of this 10 s to 1 minute time range, but the range is applicable to both categories of livestock ruminants (large and small). A 2015 review published in the New Zealand Veterinary Journal, too, can validate such a timeframe (2-20 seconds for sheep and commonly over 1 minute for cattle) prior to lost consciousness following the ritual slaughter (Johnson et al. 2015). There are 3 cardinal indications of a conscious animal according to the source material utilized during USDA training. These 3 indications are conscious vocalization, eye tracking (scanning the room), and the righting reflex (the tendency of an animal to want to raise its head/body even with the ground). Other signs, which may potentially suggest, but do not definitively indicate that an animal is conscious include blinking, rhythmic breathing, and palpebral and corneal reflexes. While an animal cannot vocalize if the trachea is severed, every other indication I just listed here is readily apparent for the duration of this 10 s or greater period of time. These small ruminants will eye track with wide, blinking eyes. They’ll occasionally gasp and cough, as blood enters the trachea. They’ll often shake their head back and forth. And when this activity stops, the reflexes will take a few more seconds to subside. This is the process of slaughter without stunning for small ruminants.

When slaughtering large ruminants (cattle) the cutting process is similar to that of sheep and goats but generally involves the use of a restraining chute which rotates and exposes the animal’s neck mechanically prior to the cut. Cattle tend to take longer to lose consciousness from blood loss, reportedly potentially due to increased relative blood supply to the brain provided by vertebral vessels in addition to the vessels of the more ventral neck. The creation of ‘false aneurysms’ in the caudal ends of the severed carotid arteries following the cut in cattle has been documented and may also play a role in prolonging consciousness when present (Gregory et al. 2010). A relatively dated study of bovine calves slaughtered without stunning found that loss of consciousness generally took over a minute to occur, and that evidence of periodic resurgence of possible sensibility occurred for up to 123–323 s after slaughter (Newhook and Blackmore 1982). This would represent a substantial amount of time to be agonal. While the cattle I have seen ritually slaughtered tended not to take this long to indicate lost consciousness, my experience can support they do seemingly tend to remain alert for a prolonged time following the cut(s). This will be further discussed later on.
Regardless of the particular mammalian species slaughtered, and in addition to the act of cutting itself, the amount of time spanned prior to the subsequent loss of consciousness is difficult to ignore. During that span, animals are fully aware, though unable to vocalize. Regulations regarding the delivery of immediate unconsciousness are rendered irrelevant, and inspectors are unable to interfere with the process in any way. In some slaughter establishments, prayers are recited during the incision. In some establishments, a religious authority is the individual who makes the cuts. In others, any indications of ritual performance are not readily apparent and the only discernible difference from conventional slaughter processes is the ignorance of any stunning efforts. Such is the allowance of the religious exemption.

This lack of stunning, by the way, is a desirable condition for the slaughter establishment from a regulatory perspective. There are regulatory consequences for establishments that attempt to render an animal immediately unconscious, but, either due to human error or the unpredictable nature of stressed animals, fail to do so during the first attempt (via gunshot, captive bolt discharge, or otherwise). The vast majority of butchers in this country work diligently to be consistent in avoiding circumstances where an animal experiences being shot but does not instantaneously lose consciousness. Although it does occur on occasion (I witnessed 2 such instances during my tenure), USDA inspectors work daily to verify that butchers are consistently successful in stunning. Again, overseeing animal welfare is one of the main duties of USDA inspectors in addition to ensuring food safety for the consumer. Under my watch, two of the five slaughter plants I oversaw were temporarily prevented from slaughtering (one of which was suspended for months) due to the inhumane treatment of animals which my inspectors and I had reported. The USDA takes great care not to unnecessarily interfere with the business of slaughter plants, but such is the importance we proudly recognize in animal welfare. Meanwhile, the halal plant I routinely inspected was effectively untouchable as it treated animals in such a way that any other plant would not have been allowed to operate. This is not to say that any of the halal plant employees were intending to cause suffering to their animals, but such was the routine process of slaughter at this plant. That all animals had to pass this final, relatively-unsupervised step of the slaughter process which did not include any interventions to the agony of death. Prior to evaluating the relevant scientific literature, I had come to the strong suspicion that when this religious exemption allowed slaughter establishments to do as they please with the animals they are euthanizing, there is unchecked animal suffering which occurs. Predictably and consistently.

These are conditions of which I was not aware prior to attaining my position of trust working with the USDA. This is understandable, as slaughter plants are generally very reluctant to show the process to anyone who is not a plant employee or a USDA inspector. Recording video and taking pictures in these establishments is generally prohibited as well, though a simple internet search of halal or kosher slaughter will yield video evidence of conditions atrocious enough to have compelled people to risk their positions recording in these plants, regardless. These videos may provide evidence of the most egregiously bad of ritual conditions, and should not be used to make judgements about the entirety of ritual slaughter establishments. However, I cannot definitively say I have the evidence to suggest that ideal ritual slaughter conditions do much more to reduce the potential for inflicting pain and stress upon the slaughtered animals than the videos suggest.

Recent scientific contributions
But prior to taking such a stance, what must always be of interest in evolving debates such as these is what the scientific literature indicates. Recent studies, despite drawing harsh criticism from outside the scientific community, seem to be both highly relevant and strongly suggestive about what animals are likely experiencing during slaughter without stunning. To jump right into the relevant research, a 2016 study conducted by a collaboration of 5 animal science and veterinary-oriented universities seems to fit well the standards for scientific credibility, having been performed by parties free of any discernable conflicts of interest and having been designed so as to limit confounding factors. It was based upon the knowledge that the central nervous system structure and function of all mammals are relatively similar. Given that slaughter without stunning results in an animal which is conscious before, during, and after the act of cutting, the authors of the study chose to recreate these conditions while monitoring blood parameters (such as epinephrine and norepinephrine, which are commonly utilized as indicators of stress) and electrical activity in the brain (via EEG) in patterns that indicate the central experience of distress resulting from painful stimulus. What they found was that, as you may expect, both the blood parameters and every monitored category of waveform representing electrical activity in the brain were significantly increased upon slaughter without stunning relative to pre-slaughter baseline values. The authors, in the conclusion of their study, were able to confidently claim that the neck cuts represented a painful stimulus, and that there is strong evidence that the stimulus is perceived centrally for up to 2.14 min (or whenever consciousness is ultimately lost by the individual animal) (Sabow et al. 2016). I will say I was initially hesitant to equate elevated electrical activity in the brain (in the form of alpha, beta, delta, and theta waves) specifically with the perception of pain within the studied subjects. After all, I do not have the familiarity with electroencephalography nor the neurophysiologic expertise to know that this electrical activity could not be reflective of the normal process a brain undergoes when starved of oxygen, whether or not pain perception is simultaneously occurring. However, the case has been made by the veterinary community of New Zealand that, thanks to the human side of medical research, we can recognize ‘electroencephalographic (EEG) variables correlate well with subjective evaluations of pain,’ (Johnson et al. 2015). And the authors of the EEG studies cited in this review invariably make reference to a wealth of previous studies which have linked these signature electrical changes consistently with painful stimuli in multiple mammalian species and in various non-lethal experiments.

One such source, a work from New Zealand University entitled Neurophysiological techniques to assess pain in animals, directed its focus on the source of such concern; this
uncertainty of mine about the parameters utilized. Its authors first established that there is currently no gold standard for quantifying pain perception in animals (Murrell and Johnson 2006). That, obviously, the observation of pain behaviours is severely limited by the variance of animals expressing them as well as by our subjective observation of them (an important recognition, as the only substantial arguments made to suggest animals may not be in pain during slaughter without stunning, described later in this work, rely on this limitation in our understanding of pain behaviour). That confounding effects and judgements of the subjective experience that is pain perception are inseparable from every such evaluation to date. And further, that observing for behaviours associated with pain in animals is insufficient in supporting animal welfare pursuits, just as it also is insufficient for determining the efficacy of pain medications and anesthetic protocols. Having established this premise, these authors then turn to the electrical activity parameter (EEG). Because scientific integrity demands communication of the shortcomings of any study methodology utilized, these authors relay that EEG (short for electroencephalography) is not always a sensitive indicator of information of painful stimuli being transmitted and perceived centrally (Murrell and Johnson 2006). This has seemed to be the central point of contention as ritual slaughter advocates have responded to welfare studies utilizing EEG. In humans, changes in alpha and theta wave activity have been associated with cognitive memory and performance. But there is no categorical EEG activity associated with pain in the subjects studied. Under different anesthetic protocols and experimental conditions, anesthetized humans and horses have occasionally shown variable EEG changes in response to noxious stimulus. Sometimes the frequency of the waveforms increased while amplitude decreased, sometimes the opposite happened, and sometimes no EEG changes occurred at all. This latter point is the reason for the statement regarding the imperfect sensitivity of EEG in detecting pain. But this does not mean EEG is not a useful tool in this context. Keep in mind, the sensitivity of a test refers to its ability to report accurate results. A highly sensitive test correctly identifies a high proportion of positive results when they occur, thereby allowing you to rule out the possibility of a true positive when test results are negative. Since EEG in anesthetized patients is not always sensitive for reporting pain, as Murrell et al report, a lack of EEG changes in response to a stimulus does not guarantee the stimulus was not painful. But in the Sabow et al. study, there were consistent EEG changes in response to the stimulus of the cut to indicate pain. Every group of animals; both anesthetized and conscious, that was slaughtered without prior stunning showed drastically increased root mean squares of every waveform. Increases in the neighbourhood of 150–200% of the baseline values prior to slaughter. This represents significant changes in brain functioning which is strictly and predictably associated with a deep neck incision with a sharp knife. Electroencephalograms are not my area of expertise, and factors such as anesthetic protocols seem to complicate results. But luckily, we do not have to consider the confounding factor of anesthesia here. Because what isn’t considered in this discussion, but what is obvious when considering the context of ritual slaughter, is that anesthetic protocols are a non-factor in ritual slaughter. The animals slaughtered without stunning are not anesthetized, nor are they given interventions for pain in the form of medication. If they were, there would be no reason for the account you are currently reading. And even with the obstacle of anesthetic protocols in pain studies, these authors stake the claim that EEG can still be a useful means of investigating pain manipulations in veterinary research. That EEG is a useful tool in investigating pain and improving animal welfare. That the complexity of the data EEG affords, as with its analysis, may currently limit application of the tool in the clinical environment, but that its wide use in pain assessment is applicable in considering pain experienced by animals (Murrell and Johnson 2006). If this is not the reasoning behind the shared sentiment of many researchers cited in this essay that EEG analysis is useful for monitoring potential pain in animals, then I may yet be corrected. But regardless of my thought process, that is the sentiment of these experts. Those who are intimately familiar with the developing tool that is EEG. Instead of having a complete understanding of the data representing electrical activity corresponding to pain perception, all we have to work with is percentage changes in all waveforms relative to the unstimulated baseline state. What does seem to be of full utility is the recognition of predictable and dramatic changes in overall electrical brain activity in immediate response to the painful stimulus. When there are such statistically significant percentage changes from baseline values of the waveforms in response to incisions, as Sabow et al. now have shown, specifically at the time of the cut, the probability of these changes reflecting significant pain perception may be nearing the distinction of ‘certainty’.

And to return to my concern for a potential confounding factor; namely, any EEG changes which could be associated strictly with hypoxia subsequent to blood-loss, it seems there is a study to address this as well. In one of two relevant 2009 studies from Gibson et al, methods were designed specifically to determine whether the established, ritual slaughter-associated EEG changes could have been directly attributable to the resulting blood loss rather than to the incision of neck tissues. Here, the researchers carefully dissected the carotid arteries and jugular veins from the surrounding neck tissues of anesthetized test calves. In one group, only the vessels were incised. In the other, only the tissues of the neck were incised in a manner which would reflect a ritual cut that did not include the vessel severance. To quote the authors regarding their conclusion,

The EEG responses seen following neck tissue and blood-vessel transaction were qualitatively distinct, and suggested that cutting neck tissues caused greater noxious sensory input than transaction than only the major blood vessels of the neck. These observations support the conclusion that the EEG responses seen after ventral-neck incision in intact animals are primarily due to noxious stimulation as a result of incision of ventral-neck tissues and not mainly as a result of loss of blood flow through the brain. (Gibson et al. 2009a)

For our purposes here, there may not need to be a complete understanding of synchronization of every waveform. And just as I recognized that I am not an EEG expert, I do recognize Murrell et al. as such when they stake claims of utility in assessing pain in animals. So have human anesthesiologists, and so
have the large body of studies referenced within Murrell’s works. I can still bring myself to recognize the value in this metric as a good adjective, if not yet fully understood, indicator of pain in these nonverbal animals. A metric which, again, has the full support of those who are the subject matter experts. And remember, this study found significant differences in not only electrical brain activity but also blood parameters fully-reflective of stress. And since we seem to have no indication that the emotional and unpleasant experience we all recognize as pain and stress is not consistent across all mammalian species (and we do have a wealth of indications that other mammals respond with negative emotion and discomfort to painful stimuli), I think we can safely take this Sabow et al. study as for what it is; support for a justified position of concern regarding the ethics of ritual slaughter due to unmitigated pain and stress.

The next relatively recent study of note was published in the New Zealand Veterinary Journal in 2009. Similar to what was described above, electroencephalography was used to monitor responses to slaughter without stunning by means of a neck incision mirroring ritual slaughter procedures. Again, a wealth of references are provided to support why the quantitative measurement of this electrical activity in the brain is an appropriate proxy for pain in animals (both human and non-human). Again, this slaughter process resulted in responses in all electroencephalographic indices previously noted to coincide with painful stimuli (Gibson et al. 2009b). Never will you hear these authors guarantee that this increase in the electrical indices equals pain perception. Instead, what they effectively report is that incising the neck of these animals, according to all measurable indications, represents a painful stimulus which has strong potential to be experienced as pain by the subjects. This is because these animals cannot verbally express any stress or pain they may be experiencing, and science must always recognize the limitations of our understanding. But when authorities recognize a window of around 15–60+ seconds after the incision of the neck during slaughter without stunning and before the onset of loss of consciousness, and when this window consistently coincides with measurable parameters indicating recognition of the painful stimulus, I think we are called to acknowledge likely suffering until persuaded otherwise. To assume, with plenty of empirical and intuitive support, that ritual slaughter results in the emotional distress which accompanies pain for the duration of the last moments of these animals, is to assume safely. Again, the suggestion of these authors is one which seems to correlate accurately with what I have observed in my professional duties.

In 2020, faculty of the University of Bari in Italy designed a study to monitor circulating cortisol to assess stress in response to halal (Muslim) slaughter. As you may have guessed, concentrations of this hormone were significantly higher after ritual slaughter, with an average value over twice that of the traditionally slaughtered (with stunning) group. Interestingly, this published work makes suggestions for reducing stress during ritual slaughter as a ‘first step towards a point of balance between devotion to one’s religion and respect for animal welfare,’ (Barrasso et al. 2020). This statement is not only unusual for a scientific article, but also suggests an inherent opposition between religious pursuits and the ethical treatment of animals. In fact, members of both Judaism and Islam will relay their respective religions were among the first organized groups to advocate for animal welfare during slaughter; that they were making clean cuts to their animals many hundreds of years ago while other groups were apparently killing their animals with blunt objects. I am not casting doubt on this claim, nor am I accusing any modern religious followers of sadism. However, there are many historical practices which used to be considered to satisfy ethical gold standards, but which have since been replaced as new methods and technologies developed. Practices which were made inferior when new information has come to light, or recognized as unreasonable to begin with. It is perhaps for one of these reasons that many modern states and countries have moved to ban or disapprove sharia law. And likewise that the slavery for which the Old Testament sees to advocate is abolished in America. And that many religious practices rooted in rich culture and lore can be appreciated in America but simultaneously not practiced. Yet, when these aspects of religious practice have been banned, the claims of infringement upon the Constitutional freedom of religion did not always halt all progress. Aside from the unusual presence of that quotation in the discussion of this study; the attempt to extend an olive branch to meet the religious groups halfway, it is highly important that none of the suggestions address the fact that a conscious animal is being incised. And so, to date, I have not seen a suggested modification for slaughter without stunning which seems to approach the welfare standards afforded by stunning methods. The only accomplishment of these suggestions is to convey a respect for religious traditions and reflect what seems to be the real sticking point in this evolving discussion. Something not at all based in pursuits of animal welfare. The cortisol response, though? Suggestive of an agonizing death. And this study has not been the first to suggest as much.

Another Italian study, one from 2017, similarly studied cortisol levels during kosher (Jewish) slaughter and had found similar, and statistically significant results – increased cortisol after ritual slaughter relative to traditional slaughter with stunning (Ceci et al. 2017). And another found catecholamine concentrations were significantly higher in the subjects of shechita, specifically, compared to conventional slaughter (Petty et al. 1994). Bozzo et al similarly analysed the Jewish method and found that cortisol, dopamine and norepinephrine, but not epinephrine, were markedly higher in the animals slaughtered by the religious rite (Bozzo et al. 2018). Yet another recent study again found that increased EEG activity consistent with the painful stimuli of the tissue cut and injury indicates likely pain and stress in halal-slaughtered animals which was not seen in animals stunned prior to slaughter (Zulkifi et al. 2013). These authors tend to acknowledge the possibility that our current methods for analysing pain perceived by animals are not definitive. With more apparent room for advancement in the field of neuroscience in bridging the gap between the recognition of multitudes of action potentials firing through circuitries of neurons and the precise, emotional sequelae of pain perception, such definitive methodology may not be seen in the near future. This fact, though, should not prevent us from utilizing the best indications currently available to us in
recognizing the negative externalities associated with a process that is carried out solely to meet human desires at the expense of the slaughtered animals’ conscious state. This data is presented in conjunction with clear behavioral indications expressed by our domestic animals in response to predictably agonizing conditions to support central recognition has occurred. Until other data is collected to shed some new light; to reframe the significance of the characteristic parameter changes observed thus far, the data collected in these studies should, again, be taken for what it is. The best information we currently have. It just so happens to be information which is congruent with what many of us have already suspected; that the deep neck cuts of slaughter without stunning present a significantly painful and unpleasant way to die.

Consider the contrasts at hand. As early as 1978, we have found support that ‘Captive bolt and electric stunning will induce instantaneous insensibility when they are properly applied’ (Warrington 1974; Van der Wal 1978). That since the animal is expected to be unconscious, it does not feel the stress associated with resulting epinephrine release following the stun (Kilgour 1978). On the other hand consider the words of the UK’s Farm Animal Welfare Council; a group that consisted of farmers, theologians, animal welfare experts, and veterinary surgeons whose sole purpose was to review the production systems and scientific support surrounding the welfare of farmed animals. In 2003, they relayed that

When a very large transverse incision is made across the neck a number of vital tissues are transected including: skin, muscle, trachea, esophagus, carotid arteries, jugular veins, large nerve trunks (e.g. vagus and phrenic nerves) plus numerous minor nerves. Such a drastic cut will inevitably trigger a barrage of sensory information to the brain in a sensible (conscious) animal. We are persuaded that such a massive injury would result in very significant pain and distress in the period before insensibility supervenes.

This group, too, was simultaneously ‘satisfied that penetrative captive-bolt stunning is effective,’ in addition to finding electrical stunning acceptable with proper current, and subsequently considering slaughter without pre-stunning to be ‘unacceptable’ (FAWC 2003). Despite what I have seen suggested by some, this does not seem to represent the libel of a group bent on persecuting religious minorities. This seems to be expert testimony made by a diverse collection of professionals in the field of farm animal welfare.

There is no shortage of studies examining the parameters of slaughter without stunning, and it does not take long to recognize a pattern in the reported findings. A pattern inherent in the practice of slaughter without stunning which suggests a greatly increased potential in both intensity of pain and stress and in time for internal recognition relative to conventional methods. Further, there were no studies I encountered which I chose not to include in my assessment due to contradictory results. This was not a terminal, systematic review of all of the scientific literature, and I would encourage any interested parties to review any well-designed studies, whether or not they are cited in this work. However, this was a summary of the relevant scientific developments from my perspective as a public health official; a recognition of consistent data which I think lends sufficient perspective to any interested citizen seeking to know the quantifiable conditions before taking moral claims. Every interested person can access the studies which have been conducted and scrutinize as they wish. The authors of these studies are also not difficult to contact; I reached out to a few of them with concerns about possible confounding factors and they graciously entertained my questions. If there is another way to interpret these studies, I have an open mind. But as it stands, I respect both the validity of the findings and the inferences made by those who conducted them far more than I value the arguments that have thus been made by the opposing perspectives. That is based upon what I have seen in practice, as well as what I hope is at least a minimally passable understanding of biology on my part. If the counter arguments supporting ritual slaughter hold (as you will find) that ‘perfectly sharp’ knives are used, that cuts are painless, and that loss of consciousness is immediate, then I place no less credence on these previously listed studies because these arguments are neither congruent with what I’ve seen nor compatible with reason. That is a strong claim, I understand. And, again, my intent is not to further antagonize any group. I only make that claim because I feel compelled to communicate what I see as a blind spot in the realm of animal welfare. Clearly put, I am taking this opportunity to reveal to anyone who is not a USDA veterinarian what ritual slaughter looks like, and why I believe the wealth of studies correctly recognizes a significant and likely potential for suffering during the process.

A prominent animal welfare advocate

Having established this position, I would be remiss in questioning the ethical basis of ritual slaughter without discussing the evolving viewpoints of Dr. Temple Grandin. Indeed, one of the first reactions to inspecting ritual slaughter was to consider what prominent voices in the field of agricultural animal welfare had to say on the topic. Temple Grandin is a name with which you may likely already be familiar. She is a highly successful professor and has contributed to the designs of a large number of the livestock handling facilities currently in use in the United States. When reviewing Grandin’s publications on this topic over the years, I believe we can recognize a pattern in Grandin’s activity. Namely, we may recognize a conservative approach that attributes high priority to the value of religious practices, while simultaneously acknowledging animal welfare deficiencies and requesting improvements at every opportunity.

Let us start Grandin’s ritual slaughter narrative with her work Religious slaughter and animal welfare: a discussion for meat scientists, as this piece seems to lay the groundwork for her positions to come. At the time of this work (Grandin and Regenstein 1994), Grandin had reportedly perceived political bias interfering with objective evaluation of ritual slaughter. She notes the importance of religious slaughter to Jewish and Muslim people, and seems to advise against selectively reviewing literature which supports preconceived notions of religious slaughter (something I have thoroughly hoped to avoid in this discussion). Although much analysis has been conducted since 1994, and many politically neutral institutions have collected pertinent data, it may still be worthwhile to note that this
topic may historically have been mishandled, and possibly by both sides. Having placed this disclaimer, Grandin becomes prescriptive in addressing her serious welfare concerns. As she writes, ‘There are three basic issues [with animal welfare during ritual slaughter]. They are stressfulness of restraint methods, pain perception during the incision and latency of onset of complete insensibility,’ and adds ‘With Muslim slaughter in countries not using stunning, we are also concerned about the training given to the slaughtermen. More work is needed on training programs to teach proper sharpening of knives and to improve the actual slaughter techniques,’ (Grandin and Regenstein 1994). While these concerns would seem to be insurmountable given our discussion of ritual slaughter thus far, Grandin carries on to seem to be insurmountable given our discussion of ritual slaughter thus far, Grandin carries on to.

As we interpret these findings, there are some existing conditions that are highly worthy of consideration. Although ‘some’ animals were reportedly held loosely enough to retain the ability to ‘easily pull away’ from the knife, the nature of the restraint cannot be ignored. We know, based on the summary provided, that these animals had already responded to the invasion of their flight zone caused by the slaughterers entering the area. So we must consider these animals had already attempted to retreat and recognized an inability to do so given the extensive restraint in place. The close proximity of the slaughterers to the restrained cattle triggers an initial attempt by said cattle to move away from the stimulus. When they are unsuccessful in moving away due to their unyielding constraints, is it not highly likely that any subsequent response to move away from a painful stimulus might be suppressed by the animal’s physical predicament? Because we can confidently say that an isolated bovine already wants to move away from the butcher prior to any cuts, can we really count a perceived lack of attempt to back away from the knife during the cut as strong evidence the cut is not painful? As has been established multiple times from 1927 on, animals do physically respond to the neck incisions. If they are not restrained, they do resist and generally run away afterward (Klein 1927). The validity of this concern for confounding in restraint is supported by Grandin’s later description of an ideal restraining chute, as follows.

All restraint devices should use the concept of optimal pressure. The device must hold the animal firmly enough to provide a ‘feeling of restraint’ but excessive pressure that would cause discomfort should be avoided. Many people operating pens make the mistake of squeezing an animal harder if it struggles. Struggling is often a sign of excessive pressure. (Grandin and Regenstein 1994)

In light of this description, made outside the context of the author’s pain behaviour monitoring, we have a highly significant potential source of unaddressed confounding when trying to draw conclusions about the recognition of pain. Saying that some of the observed animals seemed to be held loosely enough so as to retain the ability of pull away ignores the ‘feeling of restraint’ we may suspect has already been established when the animal’s flight zone is invaded. Even if the restraining equipment utilized had not been applying ‘optimal pressure’, we know it was at least successful in holding the calves’ head upward and in place to expose the neck for the cut. I will relay that ritual slaughter requires a great deal of restraint (more than conventional slaughter requires); a prey animal is generally not otherwise inclined to expose its neck to another animal. This restraint establishes a highly imposing state of behaviour suppression, by definition.

So I wonder if it is dangerous to conclude that the throat cut would not have been recognized as a painful stimulus simply because the flinching seen was significantly less-pronounced than what is seen during ear tagging. Keep in mind, while bovines are generally placed in restraining chutes prior to ear tagging, their heads are not constrained in these chin lifts as they are during ritual slaughter. So the reaction you can observe during ear tagging, including head shaking and flexion of the neck away from the stimulus, makes behavioural sense. What may make less sense is repeatedly attempting to pull one’s head from a movement-limiting constraint already found to be unyielding, including at moments in which a predator has established control of your neck. In observing interactions between non-domestic animals, you tend to find that...
the inherent struggle of the predator-prey relationship ends when the prey’s neck is controlled. A gazelle will generally stop resisting carrion when the cheetah has its jaws around the gazelle’s neck; perhaps because pulling away would mean leaving without its ventral neck. And occasionally, my own instinctive response to a sharp pain at my neck seems to be to freeze, lest I further damage such a biologically significant area. Once, working in a veterinary clinic, a stressed cat hooked its nails into my neck as I was attempting to transfer it from my arms to a table for surgical preparation. The last thing I was inclined to do at that moment was distance it from me further and tear my skin away with it. And on the occasions when I have experienced the worst suffering of my life, there were not always behavioural cues which could have been observed by a third party to indicate as much; I am sure we can all relate. While, obviously, I did not make these anecdotal comparisons for the drawing of conclusions about the phenomenon effected during ritual slaughter, it perhaps may serve as an expansion upon the recognition of confounding in the report here. Too, it may warn of the danger in suggesting kosher slaughter may not be painful strictly because behavioural reactions to ear tagging, an entirely different (albeit also likely painful) stimulus, are different. As has been established on multiple occasions elsewhere, ‘low levels of behavioral response following throat cutting do not necessarily indicate that the individual was not experiencing pain,’ (Von Holleben et al. 2010 and the EFSA Scientific Panel for Animal Health and Welfare). The only conclusions I am confident in drawing here is that there is strong evidence of immediate recognition of the knife (the slight flinch), and that pain behaviours in these restrained calves were not observed to the extent seen in response to other understandably painful stimuli. Anyone is free to draw their own conclusions from Grandin’s work here, but what we take as supported conclusions is highly important. After all, this very report is cited without fail by proponents of ritual slaughter as relative proof that kosher or halal slaughter is not painful to the animal.

As perhaps anyone should, I highly respect Grandin’s work and advocacy for animals. And to be fair, she appropriately summarizes,

Since animals cannot communicate, it is impossible to completely rule out the possibility that a correctly made incision may cause some unpleasant sensation. However, one can definitely conclude that poor cutting methods and stressful restraint methods are not acceptable. Poor cutting technique often causes vigorous struggling[...]. Discomfort during a properly done shechitah cut is probably minimal because cattle will stand still and do not resist a comfortable head restraint device. (Grandin and Regenstein 1994)

In this statement, an important shift occurs; one that seems to have shaped the narrative surrounding ritual slaughter in America for the subsequent decades. The perspective established here is that ritual slaughter should be considered humane when done properly. In other words, the distress-inducing components of ritual slaughter are separable or reducible to an appropriate extent in justifying it. This seems to stand in direct conflict with her later claims that ‘the meat industry and other animal industries need to constantly strive to improve their methods and to use the best available technology.’ Why? Because of ritual slaughter’s disuse of captive bolt and electric stunning, which Grandin also notes ‘will induce instantaneous insensibility when they are properly applied,’ (Grandin and Regenstein 1994). If modern stunning methods are indeed the best available technology, which we might agree they seem to be, then any operation slaughtering without stunning would clearly not be following her imploration to utilize them. She writes that ‘extensive special training in slaughter techniques’ not currently completed in halal slaughterer operations should be implemented. That slaughter without stunning requires greater management attention to the details.’ That ‘there needs to be continual monitoring and improvements in technique to achieve rapid onset of insensibility,’ (Grandin and Regenstein 1994). That so many things are wrong about the way animals are handled during ritual slaughter, but that these problems will be remedied by the listed improvements. Improvements which are outside the realm of enforceable regulation. In other words, these suggested improvements have a large capacity to be ignored, if ever they had the potential to elevate ritual slaughter to the expectations of modern animal welfare pursuits. This very shift is one that I am not sure was warranted. I have never been able to make the transition from the consideration of slaughter without stunning as something inherently problematic to the perspective of acceptability under ideal circumstances. That is the issue I take with this early work, and we will later see some of its echoes in the perspectives of modern ritual slaughter advocates.

I am moderately concerned about the subjective nature of the data collected by Grandin relative to that collected during the scientific studies previously referenced. And I am highly concerned about sources of confounding with Grandin’s observations. While there may be much more yet to learn about the intricacies of the EEG data representing electrical activity, the changes associated with pain (and indicative of pain in a conscious animal) will either be present during a potentially painful stimulus or not. In contrast, Grandin data relies on interpretations of which movements represent flinching or motor pain responses in response to a neck incision in an animal who is physically restrained and whose flight zone has been invaded. And, in summary, Grandin seemed to support a position that (1) the neck incision is likely not painful based on her observation and in the supposed absence of the confounding factors I have questioned and (2) that there are improvements that can be made to ritual slaughter operations, not involving stunning, that will satisfactorily quell animal welfare concerns.

With this starting point, we may now jump forward to another work of Grandin’s, updated in 2012, and titled Cattle should be cut in the cervical (C1) position to improve welfare during Kosher and Halal slaughter without stunning. In this work, Grandin names that ‘two major welfare problems can occur during slaughter without stunning,’ these being prolonged periods of sensibility following the cut and the entrance of blood into the cut airway. As we discussed, it seems her 1994 work was used to deem that pain associated with the cut is not presumed to be a major welfare problem, so, in her judgement, we are left with these two issues in addition to the stressfulness of restraint. The problem of prolonged sensibility post-cut is one which she concludes will occur in all ritual slaughter
facilities. Though she does not explicitly define the parameters for 'prolonged' here, she does suggest in this report that she considers periods of sensibility over one minute to be prolonged, and reports observing prolonged sensibility even in 'expert Kosher slaughter'. In preparation for this report, Grandin observed as three steers were slaughtered in such conditions. She tells that 'on one animal the procedures worked perfectly and the animal collapsed and lost the ability to stand within 15 s. The other two had prolonged sensibility of over a minute,' (Grandin 2012). Putting aside terminology uncharacteristic of most scientific discors, these findings should not be overlooked. This major welfare problem identified by one of the leading animal behaviourists in the field occurs even in seemingly ideal ritual slaughter conditions. In ‘perfect’ conditions, animals tend to seem to lose consciousness in approximately 15 s. That is no insignificant amount of time to register the effects of extensive trauma. And in perfect and less-than-perfect conditions alike, some proportion of animals will consciously sense this agonal state for some period of time to register the effects of extensive trauma. As to her second major welfare problem; the distressing sensation caused by blood entering the open airway, Grandin suggests that cutting ‘close to the jawbone’ can sever the sensory nerve to the respiratory tract and may therefore eliminate this sensation. She claims research is needed to determine the validity of that supposition, which is an agreeable sentiment. My concern, however, is that the unpleasant stimulus associated with aspirating blood may even be dwarfed by the severance of major sensory nerves. The symptoms of neurotmesis, or the severance of a nerve, can include severe neuropathic pain and a reported burning sensation. Simply put, severing a nerve does not reliably halt all of its biomechanical functioning. It would be safe to say the animal would not be expected to sense input from the peripheral sensory neurons which normally send their impulses through the severed nerve, but the proximal segment of the nerve itself still has great potential to send impulses to the brain. This is the basis for severe pain syndrome, a condition which coincides with the early stages of nerve injuries and is generally difficult to treat (Campbell 2008). While I am very open to the possibility that Grandin’s supposed respiratory tract anesthesia can result from such an incision prior to the establishment of severe neuropathic pain, I would prefer to see supporting research before taking comfort in the hypothesis, and am additionally skeptical that any state where blood is entering the lungs of a conscious animal would avoid contributing to a stressful experience. Hopefully, we can at least agree this 'major welfare problem' is not currently addressed, even in ideal ritual slaughter practices. As the title suggests, the purpose of this report of Grandin’s was to request that ritual butchers modify the position of their cuts. But in the course of making a case for cutting at a specific location, Grandin unavoidably fleshes out two welfare concerns inseparably tied to slaughter without stunning.

And before moving on from this 2012 update, I’d like to point out one aspect of Grandin’s reported observations of the slaughter of the three steers. Of the animal that took the longest to collapse following the cut, Grandin noted the following after confirming a cut made anterior to the larynx (voice box).

Since the larynx was still attached to the trachea, the animal made repeated groaning sounds … Future things to try include experimenting with the angle of the cut so that the knife is oriented toward C1 and the larynx remains with the head and contact with the jawbone is avoided. When the larynx remains with the head, the groaning sounds will be eliminated. (Grandin 2012)

This passage caught me off guard for a few reasons. To start, it should be noted that ritual slaughter cuts are generally made well-behind the larynx. When the trachea is severed behind the larynx, air cannot flow from the lungs through the larynx as is a prerequisite for an animal to vocalize. This is the reason animals do not moan or cry out after ritual slaughter cuts; they have lost the physiologic basis for doing so. This is a biologically understandable phenomenon. My struggle to understand this passage only comes from a lack of understanding of its purpose. The suggestion seems to be that the repetitive groaning is indicative of distress, and that proper cut placement will remove this groaning and address the problem. But just because the physiologic ability to vocalize in ‘perfectly’ ritually slaughtered animals will be absent, that says nothing of the conscious state of the animal which wanted to vocalize in the first place. By Grandin’s own account in a previous work, ‘vocalization scoring could be used as a simple method for detecting welfare problems that need to be corrected,’ (Grandin 1998). In my experience, this seems to have been a reasonable point to make in relation to slaughter. And while anyone observing conventional slaughter (with stunning) for long enough will eventually witness stunned, unconscious livestock let out a passive sigh as the diaphragm seems to finally stop working, the repetitive, forceful vocalizations associated with a conscious, agitated or suffering animal are fairly distinct. As Grandin has previously noted, stressful restraint and handling methods increase the rate of mooing/bellowing (Grandin 2018). So shouldn't it give us pause that ritually slaughtered animals groan repeatedly on the rare occasion that the cut is made above the larynx? It would suggest these animals would groan commonly during slaughter without stunning, given intact laryngotraceal architecture. And therefore an unaddressed ‘welfare problem’. If it makes us feel better to witness a conscious animal die silently, we should at least refrain from taking comfort in assumptions that a lack of bellowing, groaning, or gurgling indicates the animal's basis for distress has been eliminated. So imploring ritual butchers to cut just behind the larynx may not be so much an attempt at welfare improvement as it is a concealment of pain behaviours. With this said, it is highly important not to freely attribute negative motivations to any third parties. I am fairly certain Temple Grandin cares dearly for these animals and is not actively looking to redeem any groups causing harm. I also do not want to fixate on minutia; it is far more important to view other perspectives with the 'benefit of the doubt' to a reasonable extent. So let this not be viewed as scrutiny against any individual that, to date, has cared enough about animal welfare to enter this discussion. This is only documentation of a perceived lack of support for certain animal handling practices at slaughter. The ideas presented in recent history are the object of scrutiny here; and by my estimates they do not seem to justify the practice in question.
To return to our timeline of Grandin’s reports, her subsequent 2017 publication was prompted by multiple studies; the 2009 New Zealand study which in Grandin’s words, ‘shows that slaughter without stunning causes pain,’ and the 2016 Sabow study also previously discussed. Regarding the first study, and after the recognition of an apparent painful condition resulting from the cut as evidenced by a new EEG method ‘which can determine when the animal is feeling pain,’ Grandin shifts the focus to take issue with the length of the knives used (24.5 cm) and the fact that a Tru Hone knife sharpener was utilized instead of a whet stone (Grandin 2017). She suspects these are confounding factors which may have elicited more pain than she would expect under better conditions, as based upon her behavioural observations of ritually slaughtered animals. While I understand her desire to reflect the best possible ritual slaughter conditions, as well as her desire to correlate her previous hypotheses with data that would hopefully support them for the sake of the animals slaughtered, I am skeptical that either the absolute length of the knife or the mode of sharpening would influence the process to the extent required in avoiding the creation of a painful stimulus. Since knives were sharpened after every cut during this study, they not only were likely sharper than the utensils utilized in many ritual slaughters today (I have never witnessed ritual slaughter during which the knife was sharpened after each cut), but they also were very unlikely to introduce conditions necessary for the recognition of a painful stimulus when otherwise that threshold may not have been met. But still, by Grandin’ assertion, ‘The special long knife used in kosher slaughter is important,’ (Grandin 2017). As far as this terminology is considered, I do not think it is productive to insist that an instrument with special characteristics is the sole reason to reject the data of these studies without naming the supposedly special characteristics of the knife. To date, the only suggested advantages of kosher slaughter knives are (1) that they are sharp and (2) that their length allows for a smooth sawing motion without the pointed tip of the knife entering the incision; both conditions that have been replicated in studies to the extent necessary in establishing confidence in the results. Simultaneously, though, it would be unwise to dismiss the objections of someone as dedicated and experienced in this field as Temple Grandin. So we may recognize her informed perspective and continue on.

Regarding the Sabow study, Grandin recognized the important implications of the data collected, but immediately seeks to invalidate them in relation to her notion of ideal ritual slaughter. In addition to the one-sentence-summary she provides, her only analysis of this work is as follows,

The methods section of this paper contains NO description of either the knife or the restraint methods. It states that the standards of the country of Malaysia were followed. There is a need to do research with EEG measurements when the special 1 mg kosher knife is used by a trained person. (Grandin 2017)

In effect, she recognizes it was shown that slaughter without stunning causes electrical brain activity consistent with noxious sensory input which would be expected to be experienced as pain, but that the exact need for research that this study and others before it had sought to address persists because she suspects the knives were not sharp enough. Now, I think we can agree there is nothing wrong with attacking the weakest components of any premise. The data collected during this study has major implications, and its integrity must be expected to hold up to criticism if validity is to be recognized. But to dismiss the collaborative efforts and robust data here in such a fashion seems strikingly unceremonious. The issue with this assessment is that it is not only a hasty rationale for discrediting the study, but that it is also bordering on objective falsity. Under the Animals and slaughtering procedure within the paper’s material’s and methods, it does indeed reference the Malaysian Standards of 2009. It also notes that the neck cut position was based on the guidelines for the slaughter of animals set forth by the World Organisation for Animal Health (OIE). The key requirements noted by this organization’s resource for slaughter without stunning are

High level of operator competency. A very sharp blade of knife of sufficient length so that the point of the knife remains outside the incision during the cut; the point of the knife should not be used to make the incision. The incision should not close over the knife during the throat cut. (OIE 2007) (This source also sets requirements for restraint during slaughter, though that clearly does not seem to be the fulcrum of any arguments here)

So as to confirm that the researchers followed suitable protocols regarding the relevant knife characteristics and incision methodology, I reached out to two of its authors. I do not believe either would mind me relaying that in correspondence, both were courteous enough to confirm for me their rigorous adherence to these OIE standards. They also, unprompted, told me the knife used should be straight, razor-sharp, and twice the width of the animal’s neck, as previous reports have suggested. As is typical in scientific efforts, due diligence was taken to avoid the introduction of confounding factors, such as introducing what may likely present a more intense painful stimulus with less-than-very-sharp knives or untrained staff. In other words, I struggle to recognize any legitimacy to Grandin’s blanket objection to this study. Even if her suspected inconsistencies would have invalidated the information gathered, can we still justifiably ignore these studies? And, not to belabor this point, but I’ll reiterate that these forceful implications that perfectly sharp knives are utilized by highly trained individuals in practice are unwarranted. I can tell you plainly and with full integrity that those standards are not met in the commercial operations I have observed. If they are not met in the ivory towers of academic research, do we expect the average slaughterhouse to meet them? If your expectation is ‘no’, I can tell you that you seem to be correct. A study conducted over 10 relatively recent years suggested that over 80% of slaughterhouse employees use inadequately sharpened knives (Claudon and Marsot 2006). I suspect the true percentage may likely be higher; slaughterhouse employees are often very hard-working people, but the job is often even harder. Performing repetitive manual tasks for hours on end invariably results in corners being cut; especially when it is not believed that observers are present. While I have yet to be convinced that ideal ritual slaughter avoids unnecessary animal suffering, this argument of widespread implementation of high non-regulatory welfare standards is something we
cannot seem to move past. Suffice it to say, my confidence in both of these studies remains, and I would assert much more compelling objections must be produced before their findings are to be made irrelevant in discussing ritual slaughter. The same goes for all of the other studies not mentioned in Grandin’s update which seem to support the same conclusions.

Finally, the correspondence Grandin put forth last year seems to cast doubt as to whether improvements to humane animal handling during slaughter without stunning have been made over the years, despite her persistent efforts. This report is in response to, in her words, ‘many recent reports from veterinarians and welfare auditors that halal or kosher unstunned slaughter is being done poorly[...]’ This has resulted in animals remaining conscious for several minutes,’ (Grandin 2019). Her conclusive solution to this problem? Again, in her words, ‘If an animal does not lose consciousness within 30 seconds, it should be immediately stunned with a captive bolt. A better alternative for abattoirs that have poor management would be pre-slaughter stunning,’ (Grandin 2019). Without intending to take a position of scrutiny, I once again have to take issue here for a couple practical reasons. For one, ritual slaughterers have a well-established record of objecting to stunning and will not choose to do it unless legally mandated. By now that should be apparent. If lethal captive bolt stunning was an option for those who subscribe to these religions, there would be no objection to ritual slaughter; it would not be slaughter without stunning. But that would not satisfy the religious requirement that the animal must die by no other means than exsanguination. Since captive bolt stunning can often be expected to kill the animal in addition to rendering it unconscious, ritual slaughterers are fundamentally opposed to it. I am a big fan of her suggestion, but I am not the intended audience here. Secondly, I am more than interested to know what is significant about 30 s. As far as I can tell, there is no biologic basis for this limit. Action potentials can propagate in one millisecond, stress and pain are recognized very quickly, and agony is agony, regardless of a 30 s threshold. It is also not as if any slaughter plant employees are going to be standing with a stopwatch counting to 30 s. I can pretty much guarantee this advice will be entirely ignored in practice. And if it is not ignored, 30 full seconds of avoidable, pointless suffering is still a moral shame that I cannot justify. Regardless of any objections to this report, though, we have clear expert testimony taking note of ongoing issues with slaughter without stunning and suggesting improvements. Having made so many suggestions previously, the proposed improvement this time has boiled down to stunning, itself.

Thanks to the commendable efforts of Temple Grandin over the years, I would venture we have more than sufficient documentation that ritual slaughter as a legally-exempt process was given its benefit of due process in the name of religious freedom. I do not expect the validity of that assertion is minimized by the approach of scrutiny we may take, and have taken, in analysing her work. Ritual slaughter was long noted by both Grandin and impartial researchers alike to be in need of improvements for the sake of animal welfare. Egregious examples of less than ideal slaughter conditions have been identified periodically, and even outside of these poor examples, many ritual slaughterers have not taken suggestions from experts in the field to reduce stress associated with restraint techniques and the method of cutting. Due to respect for religious freedom, leeway has always been given to those performing exempt slaughter. But should we continue to provide such leeway if we truly aim to place the proper value on animal welfare? This historical dialogue, considered together with the increasing volume of empirical evidence supporting recognition of the harm of slaughter without stunning, seems to provide a fairly compelling case against its continued practice; at least in the continuing absence of compelling scientific arguments in favour of the dated methodology. Though Grandin has always taken a diplomatic approach with regard to the religious context surrounding slaughter without stunning, she has nevertheless expressed concerns for animal welfare at every step in her ongoing analyses. Concerns that have not been properly addressed. She has indeed provided what we may consider to be due process to the enactors of ritual slaughter; opportunities for improvements, before ultimately suggesting the performance of stunning after seemingly exhausting other avenues to improve the process from the perspective of the animal. Whether or not she would say so herself, I think the full application of the Humane Methods of Livestock Slaughter Act to all American slaughter establishments is the only legislative course capable of addressing the concerns of both Temple Grandin and the scientific and veterinary communities during the act of slaughter. These are groups for which I do not claim to speak, but these are groups which generally do not enter politically charged discussion. The body of work of these groups, however, speaks for itself. We would risk the blatant ignorance of suffering not to acknowledge the consensus.

Ritual slaughter advocates

But before any well-supported consensus can be recognized, the arguments made in support of the ritual practice in question must be considered. Just as it would be difficult to discuss ritual slaughter without mentioning Temple Grandin’s position, so too, would it be narrow-minded not to address the arguments from its vocal proponents. Not the religious arguments, but the animal welfare-related rationale of the religious advocates. This is a key distinction, as it would not be productive for me to make arguments attempting to discredit religious beliefs. Even when arguments regarding the basis for slaughtering without stunning do not seem to practically make much sense, no religious beliefs behind the desire to ritually slaughter should be subject to my scrutiny. They are for the individual to believe or disbelieve. Even practicing Muslims are not supposed to question the basis for their halal slaughter, or why it is superior (Regenstein et al. 2003). So what would give me the right to do so? Instead, the focus here is the arguments within the realm of animal care, and it is finally time to address the points of contention. I hope to do so in a way that does not bring about either insult to the authors or failure to consider an argument in its entirety. Though it is difficult to say I have staked any brave claims thus far, it is always a possibility that the implications of what I have experienced can be reframed in recognizing other
perspectives. Since other perspectives are well-established on record in this debate, the prominent arguments made in defense of slaughter without stunning are readily accessible. And I would like to start with a source that is made even more accessible due to its place in USDA outreach material. My introduction to the following source was not an accident. When I was concerned about what I was seeing during inspection and began exploring the information supplied by an agency outreach professional regarding ritual slaughter, I found that this source was provided both to USDA personnel and any concerned third parties (commonly the conventional slaughter plants). Being front and centre in our educational material, my hope was that its arguments would be compelling. That it would impart confidence that the animal’s experience is accounted for; perhaps highlight some studies to support the ritual methods while acknowledging fairly the entirety of all available data. It is highly difficult to convince myself that is what I encountered in this 2011 work entitled Government Regulations of Shechita (Jewish Religious Slaughter) in the Twenty-First Century: Are They Ethical?, which, again, were the arguments laid out in our agency’s outreach material.

This work simultaneously (1) scrutinizes one among the large number of available studies so as to suggest that stunning does not afford significantly better outcomes for the slaughtered animals, and then (2) abandons the animal welfare argument entirely to suggest welfare is ultimately irrelevant because access for all religious groups to meet renders the discussion of humane handling efforts null and void. If I may address my concerns with both of these approaches, I’ll start with the first. In response to one of the 2009 studies by Gibson et al. (mentioned previously), and while acknowledging that ‘they showed that slicing a cow’s neck yields an electroencephalogram (EEG) power spectrum that they claim is consistent with a painful stimulus,’ the author of the essay in question had this to say; ‘The Gibson study has zero relevance to shechita because the conditions he used did not mimic shechita in terms of the knife’s size, sharpness, and smoothness … which makes one wonder why they would do this sort of experiment,’ (Zivotofsky 2012). Now, I understand that the author of this question was voicing a concern for a potential source of confounding (given the rest of his works, he also strongly seems to be suggesting there is anti-Semitism inherent in the opposing view; also understandable to some extent, given historical context). However, I wonder if it may be considered patently fallacious to assume the researchers in question would dedicate their time and efforts for no reason. Or perhaps for some nefarious reason other to advance our understanding of quantitative pain parameters with animal welfare in mind. Perhaps a more generous view of the team would be afforded if a full consideration of the rigorous process of designing a funded study was made. Or if more context of the work performed by these academic researchers was considered. For example, in 2015, Gibson published another study evaluating two different neck cut locations. His team concludes that ‘the adoption of a [high neck cut] could reduce the welfare compromise associated with the delayed time to loss of consciousness during slaughter without stunning,’ (Gibson et al. 2015). Surely, this represents yet another example of researchers trying to improve ritual slaughter methods on behalf of the groups performing them. Perhaps, too, it can be evidence that Gibson’s efforts have not been made for any other sake than to improve slaughter conditions in practice. That there should be confidence among those suggesting there are motives for these researchers other than improving animal welfare, that there do not seem to be. No bigoted ends were sought. If ritual slaughter practices will persist in the face of mounting evidence of suffering, professionals like Gibson seemingly wish to reduce the apparent welfare compromise as possible by informing the process (i.e. high neck cut). I dare say, other scientists have carried out ‘this sort of experiment’ because those performing ritual slaughter first demand proof that they are causing pain to the animals they’re cutting or otherwise claim religious freedom outweighs the welfare costs. Consider the absurdity of that statement. For those unfamiliar with the scientific process, let us establish an important foundational understanding. In the strictest sense, we may consider that the scientific process does not prove hypotheses. A study will either support or disprove hypothesis. But it does not claim to prove any theory beyond a shadow of a doubt. This is why, for example, the concept of evolution, despite having volumes of supporting data, is considered a theory. There may likely never be absolute, irrefutable proof that these traumas are not hurting these animals in their final minutes of life. One cannot experience the consciousness of another animal. Instead of demanding more and more support that these applied fatal injuries are doing just that, perhaps one would be better served on moral grounds to search for convincing support that they are not causing suffering rather than scrutinizing evidence to the contrary.

But since the argument levied against the legitimacy of this study holds that the materials and methods are invalid solely due to insufficiently sharp smooth, and long knives, let us again take a look at what procedures were used. Gibson et al, as reported in the contended study, standardized their process by effecting a single incision to the ventral aspect of the neck using a ‘sharp, flat-edged knife 245 mm long by 28 mm wide. The knife was used exclusively for the neck incision and was re-sharpened after each use, using a Tru Hone sharpener,’ (Gibson et al. 2009b). Now, I’ll reiterate that I have never seen a ritual slaughter event during which the knife used was sharpened between each and every animal. I have also never witnessed a ritual slaughter during which every animal was effectively slaughtered using a single incision. It, again, is very common to see multiple cuts made prior to the severance of the deep arteries of the neck. I actually think it’s relatively safe to say the conditions enacted during the study were, if anything, much more controlled than the average ritual slaughter. Regardless of the accuracy of that supposition, I cannot see how the claim could be made that the knives used here were so inappropriate so as to reduce the entire study to a state of ‘zero relevance’ in reflecting shechita. If we are not to believe the contents of the materials and methods section of a collaborative study published in a reputable, national veterinary journal, then we are indeed in a precarious state with all medical research utilized today to improve global health. It may be time to stop visiting one’s medical doctor – the studies which have informed their educations are not to be trusted. Again, if the knife sharpness in these studies is the
source of contention for proponents of slaughter without stunning, I will have relative confidence in relaying that, by all indications to me in practice, the reported conditions of these studies tend to be much more compatible with minimizing pain than the average (and really any) ritual slaughter event I have witnessed. More often than not, I see multiple cuts performed on each animal and I do not see blade sharpening between each. I see cuts that I would not describe as precise, and I see short blades occasionally used, whether or not the absolute or relative length of the blades actually matter. These are the conditions which are legally permissible due to the religious exemption from humane handling regulations, and so these are the conditions which result in practice. That is a claim I can stake with honesty. And the bottom line is, no matter how sharp the knife may be, the likelihood of rendering any mammal instantaneously and painlessly insensible with a knife is effectively zero. That is a task uniquely suited for modern stunning methodology. And that seems to be because consciousness is a state afforded by a functioning brain which you cannot directly affect via incising an animal’s neck.

Regardless of the validity of his initial scrutiny, Zivotofsky extends this line of reasoning to suggest that shechita may only be minimally painful to the animal; or perhaps not painful at all. In his mind, this assertion is based upon a premise that shechita is ‘carried out using a special knife (chalaf) that is perfectly smooth with no nicks or serrations, such that the incision is as painless as possible,’ (Zivotofsky 2012). He is far from the first representative of the religious group to say that cuts from extremely sharp knives do not present a painful stimulus for the animals, specifically due to the sharpness and length of the blade (Rosen 2004; Regenstein 2012). This claim has very little support, the entirety of which can be summarized by the following 2 subjective observations; that cattle often do not always visibly react while restrained in a chute when the initial cut is made under ideal conditions (in reference to the Grandin report), and that, anecdotally, humans do not always experience immediate pain in response to cuts (the example of paper cuts is given, where the recognized pain is not always immediate but sometimes delayed and dull). If this does not seem to you to be strong support for a stance that animals do not experience pain when cut through the neck, you would not be alone. It may have been precisely for the prominence of these claims and the lack of corresponding support that many of the studies described earlier were conducted.

I understand the use of the term ‘perfectly smooth’ in describing the blades which are supposed to be used during ritual slaughter. It is the same ‘perfect’ which is used to describe a deity, or perhaps a holy process which is believed to have been ordained by said deity. The term ‘perfect’ is, in this case, a religious term. And I certainly do not take issue with someone of a particular faith describing their process of worship as ‘perfect’. I would likely do the same, had I happened to have been a member of Judaism or Islam. The issue with its use in the realm of empiricism is that the blades used in ritual slaughter are obviously not, in fact, perfectly sharp. I am sure there are some slaughter establishments that are diligent about sharpening the knives between each cut, but that does not make a blade perfectly smooth or sharp. Very sharp? Sure. But exquisite, albeit not perfect, sharpness also just happens not to be reflective of what I’ve observed. There is somewhat of an axiom within the USDA that most plants perform to the level of inspection. When inspectors have higher standards, plants often perform to meet (not exceed) them. The exemption from the slaughter-related humane handling regulations removes all expectations on behalf of the inspectors, so whatever happens is left to the discretion of butchers who are financially benefitted by moving more animals through the process quickly. Generally, violations of animal welfare seem to be a result of impatience rather than ill intent. So, as I suspect that the conditions executed during these studies were likely more compatible with animal welfare than the average ritual slaughter conditions, this practical experience is the basis. And if the Gibson study didn’t reflect the sharpness of knives used in the ideal ritual slaughter, just know that it likely did at least reflect ritual slaughter operations in practice. That is what the religious exemption from stunning regulations allows.

As I noted above, perhaps too repetitively already, perfectly sharp knives are not used in practice. I have the experience to be able to tell you that these hypothetical conditions are not met in practice. I have seen short knives used. I have seen relatively dull knives used. Other auditors, too, have found that knife sharpness and length varies in halal slaughter, and occasionally dull knives are used (Gregory et al. 2012). I have commonly seen the slaftere make multiple cuts to reach the deep blood vessels as necessary. I have seen a sawing motion used (about the only thing I have not seen is prayer recitation during the sacred process, as I had been told to expect). Had I not noted that above, you would still be able to have full confidence that perfectly sharp knives are not used in ritual slaughter, as perfectly sharp knives only exist conceptually. No audience needs me to tell them that the blades are not perfect. Just like the process clearly does not seem to be perfect in minimizing pain and stress. And it is precisely because of this absolutist terminology that it is difficult to rationally weigh the limited information available to us. Any research on this topic which suggests increased distress is associated with halal or kosher slaughter, which does not involve animals that can verbalize in clear language their pain, may be met by these practicing groups with denial and accusations of religious discrimination (as the Zivotofsky paper seems to do). To doubt the perfection of a religious practice is to blaspheme. As is communicated by the Institute of Food Technologists’ explanation of halal and kosher food requirements associated with slaughter, ‘[a] Muslim is not supposed to question exactly why or how something is unclean or harmful in what Allah has prohibited,’ (Regenstein et al. 2003). Because fatally stunned animals are unclean, the only appropriate method of slaughter must be without flaw. And so criticism of the ordained process must be unwarranted. In light of the religious disposition, the reactive opposition to any research-derived information is understandable. This context is also, I think, what makes many reluctant to question the ritual slaughter exemption in place. Again, religious
freedom is a precious thing. And as history has taught us, we
must be highly careful to recognize and refrain from discrimi-
nation against any group; religious or otherwise. But surely
no practice, religious or otherwise, should be exempt from
demands for animal welfare. Nor from our societal under-
standing that if you’re likely causing others to suffer
unnecessarily, there is hardly any acceptable excuse. Surely
this can still be true.

Because of this same notion of a perfect slaughter
process, Zivotofsky continues his analysis of the 2009
study (utilized here to represent all similar studies) by
casting doubt regarding the nature of conscious perception
of injury. He writes,

It is possible that cutting a cow’s neck with a short, blunt, non-
smooth knife is indeed painful, while a shechita cut may be signif-
ically less so or even totally devoid of pain. Does the animal feel
pain? Might it even be a pleasurable feeling, e.g., are endorphins
released? I don’t know. But many people who have gotten a
paper cut or who have been cut by a scalpel can attest to the fact
that while the cut is taking place it is essentially not sensed and it
is only later that the pain kicks in. (Zivotofsky 2012)

Again, the obvious basis of this contention is that, sometimes,
when we humans are cut by something very sharp, the corre-
spanding pain does not register immediately. If an anecdotal
comparison to some of the cuts we experience is to be our jus-
tification for slaughter without stunning, then we might also
anecdotally recognize that if our necks were cut past the skin,
through the trachea and esophagus and nerves of the neck,
and we were then left to bleed out for a variable period of
time, we would certainly experience distress and, yes, pain.
Even if the initial cut was not immediately accompanied by
the pain of having metal saw through you (albeit ‘smooth’
metal), the cascades of neurologic input from peripheral
nerves to the brain would surely not take more than a minute
… more than ten seconds, even. All of this may be supposed
in the same way that proponents of halal and kosher slaughter
suppose that a cut from a sharp knife may not be painful to
the animal. Regardless of these convenient assumptions,
I think the larger point is that the burden of proof should not be
upon the scientific community to prove beyond doubt that
nonverbal animals are experiencing pain upon being incised
while conscious. There currently exists, not proof, but suffi-
cient support for the intuitive likelihood of pain perception both in
study and in reasonable assumption. Instead, the burden of
proof might be expected to rest on the individuals choosing
to cut conscious animals during an era in which modern stun-
ning methodology allows for an instantaneous onset of loss of
consciousness. The practicing groups have been welcome to
perform studies which we can then scrutinize in determining if
ritual slaughter is morally acceptable. To present the data result-
ing from their perfect methods for peer review. There may likely
be a reason the scientific publications presented thus far seem to
be in relative agreement. But too often are these important dis-
cussions prohibited from the public stage of scrutiny via immedi-
ate claims of religious discrimination. Such is the necessity of
limiting our scope to animal welfare; animal welfare is not a reli-
gious pursuit. It is proudly a human pursuit which has far reach-
ing implications for the entirety of our society.

I’ll make a brief aside here, because I know Mr. Zivotofsky
objects to my last point supporting the utility of modern stunning
methods. The basis for this objection has been that, as he
identifies, the American Meat Institute apparently permits
failure rates up to 5%. These would be instances where a hand-
held captive bolt is discharged and may or may not contact the
animal, but does not induce immediate unconsciousness. And
stunning failures happen. Zivotofsky is not wrong to point out
that failed stun attempts do happen. But they certainly do not
seem to change the understanding that modern stunning
methods represent drastic improvements to humane euthanas-
ia. Now, I am not familiar with the 5% figure, nor am I inti-
amately familiar with the American Meat Institute. I dare say I
do not need to be; that is not a regulatory authority. The
group responsible for overseeing slaughter operations in
America tends to be the USDA. In some instances, a particular
state’s department of agriculture will inspect plants, and gener-
ally their standards are expected to meet USDA regulations, as
well. For these agencies there is no 5% rule. Every time a failed
stun attempt occurs and there appears to be a distressed or
conscious animal, a regulatory control action is taken to stop
slaughter operations. While some noted surveys have
suggested that it is possible to reach a 100% stunning success rate with modern captive bolt devices, it is true that
we are not currently there (Gregory and Shaw 2000). We do,
however, have the regulatory tools to encourage efforts in the
right direction, and to hold accountable establishments
that fail to perform at 100%. To lend some perspective, out of
the thousands of animals I have seen slaughtered with a
captive bolt device, I witnessed two failed stun attempts;
occasions where the bolt device or firearm was discharged,
contacted the animal’s head, and did not render it immediately
unconscious until an immediate follow-up attempt was made.
On both occasions, and on any occasions where one of my
inspectors reported such findings to me, the result was
always the same. A regulatory tag was placed in the facilities
and further slaughtering by the plant was disallowed until com-
unication with the district office had occurred. In my cases, a
publicly-accessible noncompliance report was then issued, and
a plant-proposed measure to aim at recurrence prevention was
expected. Had these slaughter establishments not enacted an
immediate, second, successful stun attempt in response to
the first, failed attempt (plants are generally expected to have
backup stun devices in the immediate area) the result would
have been an imposed suspension of operations. In my case,
though, the immediate second stun was indeed performed
within seconds of the initial attempt. In short, the regulatory
bodies which oversee American slaughter operations take
failed stunning attempts, similar to all animal welfare concerns,
very seriously. In training, in studying directives, in meetings,
and in practice, I do not ever recall encountering any 5% rule.
Any lack of effective stunning is impermissible; a problem to
be addressed. Rather, I should say it is impermissible unless,
of course, it is shechita or halal slaughter being performed. In
those establishments, there exists what would amount to a
100% failure allowance rule at any non-exempt plant. And
since failed stun attempts must be met with immediate correc-
tive actions (an immediate, successful second stun attempt), I
might suppose that the post-slaughter experience of a mis-
stunned animal may not be significantly different in either duration or character of the conscious experience than a successfully, ritually slaughtered animal (‘mis-stunned’ used here to denote a failed attempt which contacts the animal, not to be confused with a missed stun attempt, or ‘miss-stun’, which does not). Here, I have been prompted to make another supposition, but I would again argue it is based on some well-supported, reasonable assumptions which any audience can capably evaluate. Regardless, the expectation for first-attempt stunning effectiveness is 100%, not 95%, and there is immense pressure on conventional slaughter establishment to take this pursuit seriously. All failed stun attempts observed by inspectors are documented. They do happen, but they are not overlooked and they are a very common reason for establishment operations being suspended. This is in stark contrast to mishaps which occur during ritual slaughter, which are not infrequent and are considered part of the religious ritual which is not to be scrutinized by USDA inspectors on site.

To return to the argument Zivotofsky lays out, I want to address the possibility of ‘pleasurable experience’ due to endorphins, as it may be the most compelling of all arguments I have seen made in favour of ritual slaughter. This is the point where I must recognize that which I do not know and cannot assume with absolute confidence. I cannot, for one, definitively say that no animal experiences pleasure following the cut; especially as the intact brain slowly shuts down. As electrical signaling begins to end and the especially as the intact brain slowly shuts down. As electrical signaling begins to end and the final releases of neurotransmitters mark what seems to be the end of a conscious life. This brings to my mind the reported experience of people who have drowned and been resuscitated; reporting that after the panic came a peaceful, cathartic end to consciousness. As an awareness of self and surroundings ultimately ends as an enormous quantity of neurons experience hypoxia, perhaps there is a euphoria beyond what we have all recognized after fainting or experiencing a ‘head rush’. Truthfully, I do not know if a captive bolt disrupting brain material would rob an animal of such an ending by physically disrupting brain matter. But just as I recognize this uncertainty, I must simultaneously hold that we can be confident that it would spare the animal of the panic and pain leading up to that end moment. Elevated stress hormones, EEG values of magnitudes elsewhere only consistent with painful stimuli, pain behaviours including vocalization and agonal gasping – these are not indicators of pleasure. While I cannot be certain that pleasure does not follow the immediate agony, the available parameters for pain and stress to be experienced by a conscious animal are present during and following ritual slaughter and avoided during conventional slaughter. Ultimately, the use of ‘I don’t know’ as evidence for why such an endorphin-derived phenomenon may be dominating the experience at slaughter despite overwhelmingly strong pain signals from sensory nerves is obviously not sufficient. Can you hypothesize it? Absolutely. But again, once done, the onus of supporting that claim must be on you. There is well-established precedent for justifying religious beliefs with relatively baseless suppositions. Proponents of religion tend to be comfortable with this arrangement and cite faith as an instrument to fill gaps of knowledge currently available to us. That is not a concern in this discussion; religious beliefs are personal. But religious rituals, and specifically those whose externalities directly impact the wellbeing of others, clearly have great potential to cause harm. For these, we must require more empirically grounded justification. The stakes are too high in a nation that values animal welfare, and ‘I don’t know … endorphins?’ as an argument does a disservice to all sentient beings here.

So, yes; always of importance is recognition of what we do not know. But what we do know here is that (a) current researchers, experts in academia, overwhelmingly believe that while our understanding of the parameters of EEG has much room for advancement and uncertainty is always present, signature EEG changes in temporal proximity to established painful stimuli are likely indicators of pain perception in these animals. Indicators which have been shown to reflect cognitive perceptions of pain in humans, and which have been shown to be consistently associated with painful treatments in multiple mammalian species (Gibson et al. 2009b; Sabow et al. 2016). They are supported by analyses of EEG changes in response to painful stimuli in both humans and non-human animals in procedures which did not result in ultimate death. Accompanying these EEG changes are the systemic blood concentrations of endocrine compounds known to be associated with stress. We also know that (b) there is no apparent reason why these EEG changes would not be consistent with pain perception and result in conscious and emotional pain recognition; the ritually-slaughtered animal is not made unconscious by anesthesia or stunning. It is conscious post-slaughter. To these points, Zivotofsky likened the utilization of EEG to measure electrical brain activity as an indicator of potential pain perception to ‘using surgical equipment to cut paper for a kindergarten project,’ (Zivotofsky 2012). To be inclusive, Zivotofsky is not alone in finding fault with the utilization of EEG when studying slaughter. Another vocal proponent of ritual slaughter, Dr. S.D. Rosen, after acknowledging that scientific methods for measuring pain have improved, adds the objection that anesthetized patients do not have a flat EEG and yet are hopefully not perceiving pain (Rosen 2004). Rosen, too, in response to studies which had monitored for the ultimate cessation of EEG waves as an indication of when consciousness may be ending after slaughter without stunning, voices concern that changes in EEG frequency following captive bolt stunning in cattle might also take at least 25 s, citing a 1981 source, suggesting EEG frequency changes are not a consistent indicator of insensibility. My obvious critique of this viewpoint, one that I certainly hope will be corrected if I am misinterpreting, is that the signature changes of the several EEG parameters mentioned in the studies above (including median frequency, total EEG power and root mean square for each waveform) seem to be necessary conditional precursors to pain perception in a conscious animal. This is a key distinction. Anesthetized animals will variably show this same electrical activity in the brain in response to surgical stimuli (like a scalpel incision) which, in a conscious animal, would be painful. But the reason they can be present in anesthetized patients without the animal perceiving pain is that the anesthetized animal is anesthetized. It is being administered centrally acting drugs for sedation, dissociation and analgesia. In captive bolt device-stunned cattle, the subject is not conscious (due to both concussive force to the skull and physical disruption of
brain tissue) upon the discharge of the equipment. In cattle slaughtered without first being stunned, there is no intervention. So the electrical basis for pain perception is not mitigated by any lack of awareness. The conscious mind is uninhibited in processing the pain and stress. Similar to his recognition of EEG activity following captive bolt stunning, Rosen, too, mentions sympathetic discharge which may indicate a stress response. Perhaps he could explain why a sympathetic discharge would be of any significance if its physiologic effects would not be centrally recognized because the animal is not conscious (and also tends to be, by all indications, dead at that point). He does seem to recognize the general acceptance that a 'conscious brain is necessary for the perception of pain,' (Rosen 2004). Though successfully stunning an animal often results in immediate (and I do mean immediate) death, it always results in immediate unconsciousness at the very least when applied correctly… and this matters. Now, to be fair, recognition of this sympathetic discharge post stunning seems to have arisen in discussions about meat quality, as it apparently occurs in all forms of slaughter and can apparently affect resulting meat quality. Other studies from 2004 and 2006 seem to have shown that there are no significant differences in bleed out, packed cell volume or meat quality parameters between conventional slaughter and slaughter without stunning (Agbe- niga 2011). And admittedly, concerns of meat quality are not of interest to me here. Yet this adrenaline release following a captive bolt application is presented as evidence against the utility of stunning. These assertions seem to be rife with bias and assumptions, and yet this material is presented as outreach material in describing ritual slaughter and is considered first and foremost in legislative debate; a disservice the burden of which is only assumed by the animals being slaughtered. Regardless, the point here seems to be that EEG reflections of electrical brain activity argument are a reasonable proxy for nociception because we know these patterns of electrical activity are the basis and prerequisite conditions for the recognition of pain in aware animals. And S.D. Rosen would not be blamed for scrutinizing these parameters. Zivotofsky, too, would be justified in his analysis. But what strikes me is that I have not heard any party equate EEG signature changes with pain perception. Only stimulus. What we have is, in complete disagreement with any argument claiming ritual slaughter cuts are painless, data strongly supporting that it is just that. And we have this data, coupled with animals we know to be conscious during and after the cuts are made. This is the context which makes relevant the tools utilized by the researchers; which makes valid their concerns.

I still have some concerns about how the actual moment of death contrasts in animals with structurally intact central nervous systems (that haven’t been physically disrupted by a projectile or bolt) versus those that die from insufficient oxygen to the brain. But regardless of the exact moment of death, we have a degree of confidence that the period of time leading up to death is both painful and stressful for animals ritually slaughtered, whereas the animals experience neither after stunning. And I think our experience inclines us to believe this even if the scientific literature did not provide support. There’s a reason that neither human nor companion animal euthanasia is ever performed via neck incision. If those who suggested the experience may likely be ‘pleasurable’ for ritually-slaughtered animals are confident in that supposition, perhaps they would like to pledge to end their own lives in such a manner in the event that terminal illness ever establishes a time limit on their conscious existence. Since the primary animal welfare-based support proffered by those arguing in favour of ritual slaughter amounts to anecdotal comparisons to human experiences with paper cuts, I too will call upon a supposition of human experience with the following question. An obvious question that surely many readers have already considered. Were I to be killed, would I prefer to be instantaneously made unconscious by a blast to the head? Or would I, instead, prefer having my neck cut, typically in a sawing motion, past the skin, past my airway, through the musculature in my neck, through my esophagus, through nerves and through my major blood vessels as I am restrained before being left to bleed out? This is not a dramatization, and sometimes the obvious answer is something behind which to stand; even if it is unpopular to disagree with religious practices. But again, it isn’t the religious component that I am scrutinizing. It is the effect on animal wellbeing which has implications for many thousands of animals every year.

And what must we also believe if we are to adopt the alternative perspective on this subject? Indeed, given the extensive similarity in structure and function between human central nervous systems and those of all other mammals, we would be doing a disservice to all humans who die by any means other than a deep neck incision or similar procedures (I happen to know that surgical scalpels tend to be significantly sharper than the blades which tend to be used during slaughter, and yet scalpels are essentially never used in human medicine without either local or general anesthesia). Analgesic and anesthetic drugs would be entirely without use in such a reality. Anesthesiologists would be without work. What a different world that would be for medical professionals. Let it be no wonder the veterinary community, by and large, seems to be very opposed to slaughter without stunning. To make the assumption of the experience of pleasure in a nonverbal mammal in response to a noxious stimulus would necessitate many simultaneous assumptions which contradict modern medicine. It also represents a disturbingly reckless optimism; a willingness to radically gamble with the wellbeing of sentient beings.

Finally, we arrive at the second component of Zivotofsky’s argument, an argument levied by most sources on his side of the discussion of the justification of any legal restrictions on ritual slaughter. To address this next argument fully, let us take a look directly at the source, as follows:

Were one to examine the ethical risks in not banning shechita (kosher slaughter), they would find that the only risk is that a very small percentage of animals will be slaughtered by what some veterinary societies have claimed is not their preferred method, but rather by another method whereby the animals may experience several seconds of additional pain. On the other hand, passing such legislation, while guaranteeing that no animal is “subjected” to shechita, also ensures that the Jews of the jurisdiction will be deprived of meat and of their religious freedom. Those are the only two options: some animals will be killed via shechita and Jews can have meat or no animal will be slaughtered by shechita and Jews will not have meat. (Zivotofsky 2012)
Now let us dissect this passage, claim by claim. Initially, one may be inclined to take issue with the use of volumetric relativism intended to minimize what is at stake here. When this author was discussing the American Meat Institute’s alleged permissible 5% stun failure rate, he directly claimed that 5% of all livestock slaughtered represented a ‘huge’ and ‘problematic’ number of individual animals. While I suggested that such a proportion of mis-stuns does not match the mis-stun rate I observed in practice, I made no argument that any number of mis-stunned animals would be insignificant. Failed stunning attempts are taken quite seriously even if they do not subjectively seem to elicit pain or agonal behaviours. The irony, then, is that when discussing the percentage of animals slaughtered under ritual custom, we are to believe the ethical risk involving these animals is not significant specifically because it is a ‘very small percentage.’ Yes, the absolute number of animals ritually slaughtered in America is a very large number. And no, the absolute number of animals affected is not central to the thesis of this essay, relevant to the data collected experimentally, or adequate in addressing the concerns of animal welfare. Under the guise of this logic, murder would be acceptable, provided it didn’t progress to serial murder, victimizing whatever percentage of the population is deemed to be ethically insignificant. If unintentionally failing to stun a certain percentage of animals on the first stun attempt makes all stunning efforts morally ambiguous, what are the moral implications of intentionally failing to stun every ritually slaughtered animal? Remember, stunning is performed solely to minimize stress and pain associated with slaughter. I will acknowledge that most slaughter plants in America are not operating under religious exemption. The point still remains, there would be no moral ambiguity about intentionally causing undue suffering to even one animal in its final moments of life. Modern justice systems do not tend to be subject to that degree of moral calculus.

Regarding the next claim of several seconds of additional pain, we can find similar issues. Even if the amount of time between the neck incisions and the animal’s subsequent loss of consciousness was consistently limited to several seconds, which it objectively is not, we are still repeatedly causing undue suffering in the last moments of the lives of our animals. And the use of ‘additional’ in implying pain associated with alternative methodology (stunning) is, at this point, an undeserved premise to establish. Current consensus does not suggest that captive bolt stunning is painful to any degree, as it results in instantaneous unconsciousness (and generally too, instantaneous death coinciding with the disruption of the physiologic basis for cognition). So no, what is at stake here continues to be generally more than several seconds and up to minutes of pain. Not additional pain. No, just pain, simply put, and multiplied by the hundreds of animals ritually slaughtered every day in the U.S.

And finally, we reach the main point of contention. The apparent stimulus for opposition. In the absence of the exemption to the legislation in question, would we be depriving Jewish and Muslim Americans of meat? As must be apparent, I have sought to firmly plant myself in the animal welfare realm of this discussion. I could point out that suppliers are not denying any group access to their product. There is plenty of available meat in America; thanks to many hardworking people, this was even true throughout the uncertain early times of the COVID-19 pandemic. I could note that if Jewish people object to the way in which certain meat was prepared, as clearly some do, they are also free not to consume it. This would not equate with depriving anyone of meat any more than cannibals are deprived of meat because, again, murder is illegal (this is definitely not a comparison of any modern groups to cannibals, only a comparison of hypothetically similar, if extreme, conditions). Anyone can choose not to eat meat derived from conditions which are compatible with animal welfare pursuits. That is a choice, and it actually seems to be a fairly ethically responsible choice in many respects, as argued by the many proponents of veganism. But these are not points of veterinary science. These are not points related to animal welfare. These are sensitive topics with which I am no more suited to grapple than any other individual. So when Zivotofsky summarizes the theistic argument for slaughter without stunning, he takes the ball out of my court, so to speak. He asks, ‘would the rights of Jews to have access to meat outweigh the rights of animals to have a slightly more humane way of being slaughtered?’ (Zivotofsky 2012). This author then proceeds to suggest that even if animal welfare is better honoured by stunning before slaughter, the possibility of Jewish people finding stunning unacceptable would make the change ethically problematic. While I question the assertion that stunning methods, at best, only make slaughter ‘slightly more humane,’ I would stake the claim that even if we could confidently recognize this difference in slaughter methods to indeed be slight, the question posed still has somewhat of an obvious answer. There is no constitutional right to have access to meat, but eliminating the HMSA’s exemption for ritual slaughter would not bar anyone from meat. It would only reframe the choices that many individuals will face; do they want meat produced in conditions where all reasonable measures were taken to limit animal suffering, or would they prefer to steer clear of red meat (though poultry slaughter seems to be a comparable discussion)? I do not take it lightly that this conversation has implications for religious customs, but never have I encountered a question intended to be leading and substantial, but which I suspect most of us would so confidently answer differently than the author posing it. Were the question to be generously extended to pose the choice broadly between animal welfare versus religious freedom, I think that is a question that has already been answered. These sources ask whether an animal’s right to be treated humanely supersedes the rights of Jewish people to have access to meat … I think absolutely, yes. I have no authority to tell a person of Jewish faith that their prescriptive texts were written before stunning equipment existed. Before there were superior alternatives to bleeding an animal to death. Nor do I presume to. But as animal welfare efforts have increased in this country over time, surely we can reasonably demand improvement from all parties, secular and otherwise. Our constantly improving treatment of animals is in many ways one of our most impressive accomplishments. It speaks volumes about the empathy of our nation. The recognition of ultimate value in all sentience. The responsibility we take for the animals we have domesticated.
If a lesser volume of domestic meat being available to some portion of these groups due to personal choice is all that is at stake here, I can carry the burden on my conscience. I will gladly cease to eat meat myself in recognition of the negative externalities such modification to existing legislation would impose. This is something many Americans already do in the name of moral accountability. I would still gladly see ritual slaughter recognized as illegal, just as any intentional animal abuse is. But an informed society is capable of deciding for itself how to weigh the value of an exercise considered to be a religious freedom with the wellbeing of animals, specifically our domestic mammals. That is a task for all of us, collectively.

Taking a step back here, I am not using absolute terminology to say ritual slaughter under religious pretenses is inherently immoral or even undeniably inhumane. I believe both sides of this argument have much to offer, and I am not, by nature, a confrontational person. What I am saying is that if slaughter without stunning is allowed to continue in spite of our animal welfare laws, we must demand substantial evidence to support the unsubstantiated claims. Namely, the claims of those who stake that loss of consciousness is instantaneous, that the experience is somehow pleasurable for the animal because of endorphin release, and that modern stunning methods are worse, somehow. I do not think it is a hate crime to demand from religious groups convincing empirical evidence to support the notion that ritual slaughter minimizes pain and distress as much as can be reasonably achieved, keeping in mind that multiple modern stunning methods are inexpensive, readily executed, and consistently produce immediate unconsciousness prior to slaughter. In the absence of such evidence, I think we do our animals a disservice by holding slaughter plants accountable for how food animals are treated in their final moments.

So how much consideration should be given to the faults this author finds with the established studies when he offers no evidence of his own? When his side of this discussion has operated with such little support? When there is no corresponding wealth of studies? No alternative collection of tangible efforts made to consider animal welfare during slaughter? Efforts such as there are backing the methodology of the majority of slaughter plants in this country; plants which satisfy all components of the Humane Methods of Livestock Slaughter Act? There is always a place in the field of science for skepticism, but when unscientific groups reflexively scrutinize any detail of the studies in place while contributing no substantial evidence of their own and the practice in question has significant impacts on other humans or other sentient species, I wonder if our society can demand more. Notions more compelling than ‘maybe an infinitely sharp knife would only feel like a papercut’ or ‘I do not know, endorphins?’

And in the midst of this all, recurring allusions to Nazi Germany, to anti-Semitism and to intolerance of religious freedoms are made. I imagine the vast majority of religious freedoms are protected for good reason – it is really not for me alone to say – but their protection is conducive with the maintenance of a free country in which anyone can legally explore different beliefs systems without facing discrimination. It seems to be for this reason that Dr. Grandin, in the midst of recognizing the increasing volume of studies on the subject, continually made disclaimers to temper the establishment of any strong conclusions against the religious customs. She, for example, ended her acknowledgment of the 2016 Sabow et al findings by asking for this data ‘to be looked at in the perspective of the entire process’ of slaughter and notes that abusive practices prior to slaughter can also cause suffering. The way she ended her update is not relevant to discussions of stunning; the topic of the study. To this point, it should also be noted that USDA inspectors can intervene with any abusive handling instances at any point in the process outside of the stunning area. But the disclaimers she made after acknowledging the importance of the recent studies seem to have been made for a very specific reason. I am definitely not suggesting that she is looking to protect the practice of slaughter without stunning for a reason that is far more political than scientific, and far less objective than she claims to be. Rather, I am suggesting the specter of any potential infringement on religious freedoms is highly influential in a realm in which it should have no bearing. What I am referring to here is an unscientific consideration of religious rights. And, again, it is completely reasonable to be very reluctant to make any determinations which may restrict the religious practices of any community. Perhaps commendable, even. But let it not detract from the demands of science; especially when animal suffering is at stake. ‘Given the importance of religious slaughter to people of these two major faiths, it is important that scientists must be absolutely objective when evaluating these practices from an animal welfare standpoint,’ (Grandin and Regenstein 1994).

This is what Grandin wrote in 1994. On the contrary, I think that it is important that scientists be absolutely objective when evaluating these practices because that objectivity is always demanded by the scientific process. The religious implications should not have any say over how the data are considered. I hope there can be agreement on that.

I do not think most of us require evidence that the academic researchers in this field are operating under professional and objective dispositions. In frequently stark contrast to other parties here, scientists tend to be very clear about any potential conflicts of interest (generally there are none apparent), about potential sources of confounding, and about the limitations of the data at hand. In reading through any of the studies I have listed above, you will not find traces of bigotry; you will find careful discussions of measurable parameters encountered in repeatable, standardized conditions and the likely implications of these parameters. Again, these are the demands of science. The rules by which the scientific community operates, but with which other communities only intermittently engage. Consider how one of the authors of a study I cited above responded to an email of my questions. I will paraphrase here, and leave out the author’s name as well, as this reference to correspondence is only being provided to show the deliberate, considerate, and decidedly unbiased perspective offered thus far by the scientific community:

- You seemed to provide a wealth of support for why the EEG data you collected was suggestive of noxious stimulus, which would be recognized centrally in a conscious animal
as pain. Some proponents of ritual slaughter have suggested that, due to endorphin release, the experience might actually be pleasurable for the slaughtered animals. Could the EEG data you gathered only be consistent with pain, or is it possible that the increase in waveforms could result from euphoria or the process of the brain dying?

- Out of curiosity, do you feel slaughter without stunning is morally supportable?
- Author: ‘It is well documented that EEG may be useful in monitoring pain in ruminants (Bergamasco et al. 2011). There is a 2005 study which showed that non-painful warm and cold stimuli applied to humans were able to cause increased circulating levels of cortisol and, subsequently, elicit EEG reaction in humans. Thus we cannot rule out definitively the possibility of non-painful stimuli involved in the increased EEG activity in the goats.’

I think we may agree this response gives no indications of ‘may’ before suggesting an animal’s experience during this religious process may not be characteristic of experiences we consider pleasant, there are justifiable reasons for this. Far be it from me to claim exactly where anti-Semitism and islamophobia do not exist. The historical narratives alone would give one pause in doing so, and my personal sensitivity for detection is likely not great. I would only ask that we first consider the explicit arguments in place here prior to attributing any malice on behalf of any given side; especially when the accused side is the world’s scientific community and academic institutions speaking very cautiously and deliberately.

Again, I would side with any claim that the individual should be free to pursue any religious or secular pursuits within the realm of legality. But I also imagine the vast majority of religious practices do not come with the externality of the direct suffering of living beings. But ritual slaughter unequivocally does. It, subjectively, hurts to watch; it is foreseeable even less pleasant to be the subject. In the absence of an animal welfare-based rationale for the practice of ritual slaughter, I cannot imagine religious freedom is an adequate justification in modern America. If a cult was torturing wildlife in our city parks, religious expression would not exempt the individuals involved from facing prosecution. To say that we are well within reason in demanding better arguments is, in my mind, an understatement. Even in discussions involving constitutional rights. This is the reason I felt I had to weigh in, like so many animal advocates have already done.

Further, there is something about accusing the opposing side of an argument of operating under the pretense of confirmation bias which seems disingenuous or unfair to me. Though I do not know how else to view these arguments presented, I will refrain from speculating that they only seem to make sense if you’re someone who is only seeking to use the data available to support the religious based viewpoints already in place. I do not think that is a productive discussion to have. And if anecdotal evidence (e.g. paper cuts) are the justifications here, I might bring up anecdotally that a prey animal (cattle) restrained in a chute and head catch might be expected not to react outwardly to a throat incision, even if it is painful. Thus, one could discuss in similar fashion the Grandin paper consistently referenced by Zivotofsky in claiming ritual slaughter is painless. After all, when a cheetah chases down a gazelle and clamps down on its neck, the gazelle generally stops resisting at that point though still alive and conscious. I would not take that to mean being bitten in the neck is not painful, and a cheetah’s dentition certainly does not meet any standard of ‘perfectly’ smooth or sharp enough so as to not cause pain when tearing through flesh. A bird might be limp in the mouth of a cat before flying away if given the chance. A child might submit to abuse from a bully. Potential comparisons to make here are plenty. But I am confident that some degree of suffering is present in all of these instances where animals do not visibly display efforts to resist or flee. There are, in fact, many instances in which pain is immobilizing. Those who have received injections from large gauge needles (or even routine intravenous needles) know that the instinctive response to the discomfort is not to move while the needle is
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The electrocardiogram (ECG), fusion and the patient rapidly loses consciousness in cardiac output immediately leads to a failure of brain perfusion which he tells was 'timed very precisely by following the electrocardiogram (ECG),' (Rosen 2004). He then pivots to use this supposed time frame (actually he shaves off a few seconds to claim a window of 'approximately two seconds') in describing the loss of consciousness following shechita. Although heart failure is not the cause of fatality during ritual slaughter, he stakes that blood flow to the brain following the cut would very quickly cease, as if ventricular dysfunction had, in fact, occurred. This, despite the fact the ritually-slaughtered animal's heart continues beating for minutes following the cut. To support this claim, he cites two studies; a 1976 study in which dye injected into the heart ventricles of the subjects immediately before ritual slaughter cuts, and a 1986 study which does the same (Levinger 1976; Blackman et al. 1986). We are told the 1976 study found little appreciable dye had made it to the brain tissue, and Rosen takes the indication without providing concrete parameters that the volume of blood represented by the dye surely would effectively have been too little to support central nervous functioning. The 1986 study did not identify passage of the dye in the exposed cerebrum of sheep following the cut, but the calves the study included perfused the dye through cerebral vessels for over 100 s.

Rosen's reason for citing these studies is to support the idea that blood perfusion to the brain is not sufficiently supplied by vertebral arteries alone; that incising the carotid arteries and jugular veins should sufficiently and immediately cease central nervous metabolic function. The recognition of blood flow to the brain through vertebral vessels had been proposed by some as a potential reason cattle may experience sustained consciousness following a ritual slaughter cut. In bringing this up, the intention was surely to suggest that a kosher slaughter will not result in a delayed onset of loss of consciousness because, once blood flow from the carotid arteries is lost, vertebral arteries do not supply enough blood to keep the brain functioning for a significant amount of time. Rosen's claim is that when you cut the carotids, consciousness will be immediately lost (in about two seconds, he presumes). But the data collected from the calves is only supportive of the antithesis. Rosen displays honesty in including this study in its entirety, but he subsequently writes off the results in one brief sentence following its introduction into his work by noting that these 1986 slaughters were not shechita. Bilateral, instantaneous severance of the common carotids in a controlled environment? Yes. But not technically shechita, and so the results must not be relevant.

This approach seems to be a well-established one. As published studies have continued to describe average periods of time before loss of brain responsiveness in excess of 15 s following ritual slaughter conditions (a 1986 study from Wotton and Gregory can be added to the list of studies already mentioned), voices including Dr. Rosen's have offered passing critiques similar to that described in the previous paragraph; some may likely be warranted, others seem prematurely dismissive. As an example of what we might agree could be a potentially valid concern, Rosen has expressed concern for the release of restraint in Blackmore's (1984) study (as this study, too, found evidence of prolonged consciousness following ritual slaughter). Foreseeably, if the head was not held back following the cut and the incised edges to the neck were allowed to regain contact, bleeding may not be ideally facilitated. But if the mere release of restraint was sufficient in occluding the severed carotids, I am not sure anyone would ever bleed out. Even after applying firm pressure on severed arteries, you can only confidently expect bleeding to cease when those major vessels are either ligated, cauterized or otherwise surgically occluded. The pressure from an animal's cranial neck segment passively (it is passive because the muscles responsible for ventral flexion of the neck are severed by the cut) contacting the caudal neck segment would certainly not be buried. If you throw your back out, you immediately freeze and tense up so as not to destabilize the situation, even though the immediate discomfort can be substantial. The difference between the previously mentioned author assuming that the slaughter cuts are painless because occasionally the cuts we experience are not immediately painful and me recognizing the instances immediately preceding this sentence is that neither myself nor any other party aiming to be objective in considering ritual slaughter would ever use any of these anecdotes as sole support to stake a claim. I am not a bully arguing that my victims are not suffering because, once restrained, they tend to stop resisting the abuse. And while I am not necessarily accusing those who perform and advocate for ritual slaughter of being bullies, the reason I am not may only be because I am not staking my claims on anecdotal evidence alone.

I do not mean to be obtuse here; I understand the argument that has been made; that an animal in pain can likely be expected to react in an effort to get away from the source of the pain. But rarely have I seen a report with more potential for both bias and confounding; perhaps the two biggest challenges in the scientific community, than with this kosher slaughter study Zivotofsky references. Bias being the explicit religious consideration the researcher expresses in the report, the results they may have been expecting to see; even hoping to see to support the practice in which so many already believed. And the confounding to include all factors which may have caused the bovines not to react, such as being restrained into a small chute with a head catch; even if, in theory, there was room for them to move far enough for visual detection in response to the cuts. It is because of this bias and confounding that studies with objective measures are performed, only to be disregarded thus far by ritual slaughter advocates including Zivotofsky.

The above arguments are not the only arguments put forth, and so we must return once more to source material. To further consider opposing perspectives, there may be value in further recognizing the work of the previously mentioned S.D. Rosen. His arguments run parallel to this essay's first advocate's, but in his 2004 account he sought to provide a physiologic basis for what was hoped to be accurately descriptive of ritual slaughter. Again, we find two main theses in Rosen's approach to the documented welfare concerns. The first thesis holds that consciousness is lost very quickly following the cut. The second supposes that ritual slaughter is not painful to the animal. Rosen lays the foundation for his argument by describing that after humans experience sudden heart failure, 'the collapse in cardiac output immediately leads to a failure of brain perfusion and the patient rapidly loses consciousness'. His time frame for this loss of consciousness is 'less than 5 seconds', a figure which he tells was 'timed very precisely by following the electrocardiogram (ECG),' (Rosen 2004). He then pivots to use this supposed time frame (actually he shaves off a few seconds to claim a window of 'approximately two seconds') in describing the loss of consciousness following shechita. Although heart failure is not the cause of fatality during ritual slaughter, he stakes that blood flow to the brain following the cut would very quickly cease, as if ventricular dysfunction had, in fact, occurred. This, despite the fact the ritually-slaughtered animal's heart continues beating for minutes following the cut. To support this claim, he cites two studies; a 1976 study in which dye injected into the heart ventricles of the subjects immediately before ritual slaughter cuts, and a 1986 study which does the same (Levinger 1976; Blackman et al. 1986). We are told the 1976 study found little appreciable dye had made it to the brain tissue, and Rosen takes the indication without providing concrete parameters that the volume of blood represented by the dye surely would effectively have been too little to support central nervous functioning. The 1986 study did not identify passage of the dye in the exposed cerebrum of sheep following the cut, but the calves the study included perfused the dye through cerebral vessels for over 100 s. Rosen's reason for citing these studies is to support the idea that blood perfusion to the brain is not sufficiently supplied by vertebral arteries alone; that incising the carotid arteries and jugular veins should sufficiently and immediately cease central nervous metabolic function. The recognition of blood flow to the brain through vertebral vessels had been proposed by some as a potential reason cattle may experience sustained consciousness following a ritual slaughter cut. In bringing this up, the intention was surely to suggest that a kosher slaughter will not result in a delayed onset of loss of consciousness because, once blood flow from the carotid arteries is lost, vertebral arteries do not supply enough blood to keep the brain functioning for a significant amount of time. Rosen's claim is that when you cut the carotids, consciousness will be immediately lost (in about two seconds, he presumes). But the data collected from the calves is only supportive of the antithesis. Rosen displays honesty in including this study in its entirety, but he subsequently writes off the results in one brief sentence following its introduction into his work by noting that these 1986 slaughters were not shechita. Bilateral, instantaneous severance of the common carotids in a controlled environment? Yes. But not technically shechita, and so the results must not be relevant.

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expected to achieve any significant degree of hemostasis. False aneurisms have been described following some ritual cuts as impedances to blood loss, and perhaps the incidence would be increased without continued restraint, but if shechita is so effective in instantaneous depleting blood perfusion pressure, then would the degree of incidental contact following the release of restraint following the cut be expected to prevent the severed carotids from emptying? If we assume that, though unsubstantiated, the release of restraint can significantly prolong consciousness following the cut by impeding exsanguination, we must also assume certain conditions are in place. For one, if animals supposedly lose consciousness in about 2 s here, we must assume that, once the carotids are severed, 1. the cut is finished within 2–3 s (a condition commonly not met in practice), 2. the restraint is released within those same 2–3 s (a condition never met when mechanical restraint is used, but is intermittently met during manual restraint of small ruminants), and 3. the blood lost prior to the release of restraint is not of the sufficient magnitude to meet Rosen’s supposed conditions for establishing unconsciousness (a reasonable claim to make, but one I am sure Rosen would be reluctant to concede). In short, I can recognize no support for the notion that restraint methodology can be expected to account for prolonged consciousness following the incisions. If the contrary can ever be supported to any convincing extent, then ritual slaughter operations would still need to drastically refine these variables of operation.

Regarding the less-valid objections, a tendency to disregard the findings of any studies which disagree with one’s hypotheses relating to ritual slaughter on the mere basis that it wasn’t presided over by religious authorities, or perhaps by the right religious authorities, may be considered highly dismissive. We cannot address shechita or halal slaughter without making the intangible conditions tangible; without describing exactly which factors are of benefit to animal welfare. I realize this is a difficult task; I have heard a religious butcher consider his invocation of the name of Allah to be the only pain control required in addressing the animal’s experience during slaughter. This is obviously a faith-based stance, and a scientific counter would surely fail to advance the discussion in any productive way. While we may question if that line of reasoning satisfies our moral expectations elsewhere in this society, the disrespect of any group’s religious beliefs is not the aim here, nor do I think the analysis of religious beliefs is even necessary in discussing objective parameters relating to animal welfare during slaughter. But unlike Rosen’s objection to the restraint in place in the Blackmore study, most objections do not seem to specify what exactly researchers have failed to do that religious ritual slaughter tangibly accomplishes. The equivalent of the ‘perfectly sharp’ knives have been reproduced experimentally. Ritual restraint has been mimicked. Knife position has been reproduced. I would not be one to demean any group’s culture by noting the simplicity of any holy process, but it is worth noting that academia tends to be meticulous in establishing reproducible conditions—a necessary prerequisite to proposing a research project. Yes, the past two decades have added numerous significant studies to this conversation; conversations that Rosen could not have acknowledged in 2004. But these categorical scientific studies have been disputed for many more years prior to this decade. Saying, as Rosen does, that any studies documenting the potential for suffering, often prolonged suffering, following slaughter are ‘not strictly comparable (Shechita v a non-Shechita cut)’ surely should be met with demands for elaboration. Otherwise, the simultaneous severance of the major vessels of the neck by a sharp instrument should be considered synonymous with halal and shechita. Because that, again, is both reflective of the religious texts cited and the legislative language which provides for humane animal handling exemptions at these slaughter plants, and that is what many inspectors observe in practice. When these groups continue to cite that the US Congress has deemed ritual slaughter to be humane, that is the same process we are endorsing.

Carrying on with his analysis of blood perfusion parameters, Rosen also references a 1958 study which highlights the significant rate at which blood is lost following ritual slaughter; apparently, an animal will lose 50% of its total blood volume in one minute (Dukes 1958). While other sources have found a rate of loss of 1–2% total blood volume lost per minute, and bleeding for up to 6–7 min, we can still recognize that blood is lost relatively quickly when you sever the carotids. This point was never in contention, but it serves Rosen’s subsequent claim that blood flow to the brain ‘was zero after Shechita,’ (Rosen 2004). In short, he rests his case on the rapid loss of blood volume in suggesting a mechanism for why consciousness would likely be lost within a few seconds following ritual slaughter. Again, this reflects a reasonable effort to make considerations on behalf of the subjects of slaughter. And, in this case, it reflects an informative physiologic lecture from someone who is clearly well-versed; clearly more experienced in cardiovascular medicine than myself. But just because I enjoyed the analysis does not mean I can overlook points of potential incongruence with the topic at hand.

A minor point of contention with Rosen’s analysis would be to point out that the referenced Dukes study reported that blood pressure in the brachial and vertebral artery dropped to 45–50 mmHg/sec for the first three seconds in the subjects studied (Agbeniga 2011). So, if you can expect a 45–50 mmHg/sec decrease during the first three seconds, and the mean arterial pressure of a bovine may be about 175 mmHg (though it can be over 225 mmHg under normal circumstances), then after three seconds the mean arterial pressure may still be about 40 (to 90 mmHg) and ongoing perfusion would still be occurring (Doyle et al. 1960). That is strictly based on the prerequisite conditions the authors assert are governing perfusion post-cut. So how could Rosen claim that ‘blood flow was zero after Shechita’ if the very sources he is using to stake this claim would suggest some degree of perfusion pressure exists following those 3 s? That source supposed it is unlikely that blood could reach the brain following the cut, but he did not claim that blood pressure was immediately zero, nor do we see him claim that consciousness would immediately be lost specifically due to this drastic decrease in blood pressure. If that claim is made elsewhere and properly supported, we may give higher consideration to it, despite its readily-apparent disagreement with practical findings of ritually slaughtered livestock continuing to demonstrate multiple indications of consciousness much more than 3 s post-
cut. If we need a reason why a ‘perfectly’ efficient exsanguination may not render an animal unconscious as rapidly as human heart attack victims, we might recognize that the mechanisms driving blood flow in the brain are not entirely understood at this time. That, while the brain is very sensitive to changes in blood pressure and oxygen concentrations, there is increasing evidence that the capillaries supplying the brain function in storing reserve oxygen as well as facilitating the migration of surplus oxygen to brain tissue as needed. The Washington University School of Medicine described this buffer allowing the exchange of excess oxygen in response to instances of high brain oxygen demand and suggested that, contrary to previous beliefs, the brain is not solely and initially dependent on increased blood supply to meet all immediate metabolic needs (though it is important to note this was based upon a study of human physiology) (Mintun et al. 2001). Personally, I wonder if it is more reflective of reality to recognize that ventral neck incision simply poses an inherently different challenge to bodily function than sudden heart failure. If low blood pressure, rather than cerebral hypoxia, is ultimately the cause of lost consciousness during shechita and heart failure, I would ask for evidence that the parameters of those two conditions consistently align. Ultimately, the 2–3 s timeframe is not established by practice, and the theory behind it must be subjected to scrutiny. As a sort of footnote, it may also be considered that Levinger, the author of Rosen’s citation, had also asserted that exsanguination was more effective following ritual slaughter, and therefore meat quality was supposedly improved relative to the product of conventional slaughter methods; those claims were readily debunked in later studies (Kallweit et al. 1989; Pleiter 2010). Certainly, no one should be scrutinized for hypothesizing, but there seems to be a history in this particular ongoing debate of putting the cart before the horse and allowing the benefit of the doubt to justify oversight of important slaughter conditions.

Again, livestock consistently demonstrate signs of consciousness following ritual slaughter, shechita or otherwise. This is well-documented, and essentially always greatly exceeds the 2 s timeframe one may expect based on Rosen’s experience with peracute heart failure. At this point, I hesitate to continue introducing more source material regarding these timeframes; there already seems to be consistent bordering on redundant agreement with what I have seen at ritual slaughterhouses in practice. However, since Temple Grandin is a trusted source to Rosen, as evidenced later in his work as he attempts to justify shechita, let us note that yet another publication of hers, updated in 2014, examined 5 shechita slaughter operations (Grandin 2014). She had hoped to observe 90% of cattle initially indicate a loss of consciousness (‘eyes rolling back’) and ‘start to collapse’ within 30 s of the completion of the incision (the incision often takes a few seconds). This hope was not warranted, as only one of the 5 plants achieved her 90% rule. Again, I do not know what is significant about 90%, nor do I know the welfare-related difference between 29 s of consciousness following the injury and 31 s. But what we can take away, is that 30 s is a subjectively long time to be agonal when the alternative seems to be 0 s after stunning. Additionally, we may recognize that 30 s is in excess of the timeframe asserted by Rosen by an entire order of magnitude – a factor of 10. Multiple cattle Grandin witnessed in this project took 120 s to display initial signs of lost consciousness, and the only bovine which began to collapse within 10 s did so in 8 s. And these data were not collected in extraordinary ritual slaughter operations. Grandin told that the most successful plant was ‘doing everything right’ (though they displayed some instances of using a sawing motion with the blade during the cut). And despite Grandin continuing to make recommendations for improving welfare at these plants, she had good things to say about every plant visited in this particular project except one; using phrases like ‘excellent Shochet,’ ‘good upright box,’ ‘excellent box operator,’ and ‘plant was doing everything right’ (Grandin 2014). Again, these are not scientific statements, but Grandin is an expert here and if these are among the best ritual slaughter plants she visits, then we can know that ‘ideal’ and average ritual operations, alike, simply do not achieve these 2–3 s timeframes supposed to describe the un-stunned, cut animal’s experience.

Oddly enough, one of Grandin’s suggestions in this very same 2014 publication was to immediately release the restraint including the head holder ‘immediately after the animal was cut to promote bleeding’. Her rationale was that pinning the animal’s chest against the front of the chute restricts blood flow (a phenomenon to which I can attest, having seen a cut steer not begin to show arterial bleeding following the incisions for perhaps 40 s until the restraint mechanism applying pressure in the area of the thoracic inlet was released). However, one cannot help but remember Rosen specifically arguing that an animal’s restraint must not be immediately released from the head catch so bleeding will not be impeded. Here we see two parties, both suggesting that ritual slaughter can be performed humanely, who are reporting the slaughters they have witness are not humane strictly because bleeding was impeded by the very conditions the other party wishes to see made ubiquitous. This interaction is exactly why we must insist the ‘perfect conditions’ of ritual slaughter are made concrete, because, to date, I have yet to hear about any conditions in shechita or halal slaughter which actually address these welfare concerns. Regarding exsanguination, some operations release restraint immediately and some do not. Neither categorical operation achieves the satisfactory outcome of the immediate delivery of unconsciousness due to exsanguination.

Despite this apparent conflict, the incongruence with practical timeframes for lost consciousness following ritual slaughter is the larger point. The conclusions drawn from cardiovascular parameters enrich the discussion, but the likelihood of their reflecting reality is tempered by the continuing support from every measured parameter indicating the consciousness that animals display following the cut lasts much longer than his proposed timeframe. If we recall, Rosen claimed his initial timeframe to lost consciousness following a collapse in cardiac output was ‘timed very precisely by following the electrocardiogram (ECG)’. I wonder what he would say in response to the abundance of studies that have reported prolonged consciousness following slaughter without stunning as indicated by EEG, as well as biomarkers in circulating blood and conscious behaviours. Although Rosen could not have known about all the EEG studies we can now consider, current data collected by
EEG, as discussed above, has suggested to the international agricultural science community that prolonged activity indicative of pain very reliably follows ritual slaughter cuts. Further, there were EEG studies as early as 1983 which found indications of insensitivity only as early as 28–168 s and cerebrocortical activity up to 5 min after the neck cut (Blackmore et al. 1983). Again, the concern here is prolonged periods of time spent in conjunction with a painful stimulus in the absence of concussive forces, brain tissue disruption, anesthetic agents, or any other intervention applied to address the conscious perception of pain and stress. Such time frames would surely meet those criteria.

My reason for seeking to discuss time frames was not to scrutinize anyone’s work, nor was it to argue what exact amount of time represents too much time for avoidable suffering. Instead, it was a desire to explain to myself in a satisfying way why the experience of the ritually slaughtered animals I have seen walking around the slaughter floors (post-cut) or seemingly agonizing on the floor might not be as it seemed. I wanted reassuring scientific explanations for the eye tracking, the gasping. We do not have to consider the palpebral or corneal reflexes, which often take entire minutes to subside, to be indicators of consciousness. They are concerning, but reflexes are not dependent upon consciousness. However, as far as one can deduce without inhabiting the nervous system of the slaughtered animal, every other indication outside of vocalization (again the larynx is detached from the trachea) tends to be present for much more than two to three seconds following slaughter. Every characteristic of conscious behaviour. Foreseeably, I could have been convinced, in the absence of any other evidence, that some animals may indeed lose consciousness within five seconds. And I do not encounter anybody contesting Rosen’s quantifiable claim that a large amount of blood volume is lost in 30 s to one minute. But there is simply no way around the lack of consistency in delivering the results proposed by those who have supported ritual slaughter. Despite the simultaneous severance of the carotid arteries in just about every animal ritually slaughtered, consciousness, by all indications, does not seem to be lost in most animals, let alone all animals, in this window of ‘approximately two seconds’. I cannot say that I have ever once seen early indications of lost consciousness that quickly, though I cannot be certain. If the prolonged consciousness following ritual slaughter was the only welfare concern here, you may find you have trouble convincing yourself of Rosen’s second thesis (the lack of pain). But even if we can bring ourselves to share in his first perspective here, that would still mean sentient mammals are experiencing an initial painful stimulus followed by an agonal final 2 s of their lives. So with these concerns unresolved, let us continue to this second major thesis of Rosen’s.

When acknowledging this author’s second thesis, we are immediately met with further evidence of the impact of Temple Grandin’s 1994 research. Rosen uses that very report and names the ‘lack of flinching’ before, during, and after slaughter as the sole basis for concluding that the incision is not painful (Rosen 2004). We know that, in fact, flinching was reported by Grandin upon first contact with the blade. We must also consider that this author published this work prior to the completion of many of the more recent scientific studies of pain parameters during slaughter, namely the most recent EEG studies. Keeping this in mind, the utilization of only one marginally objective parameter for confidently ruling out pain resulting from an incision cannot be considered appropriate. In keeping with the descriptions we have heard of the ritual, Rosen then vouches for the ‘exquisite’ sharpness of the blade used before claiming.

There is minimal stimulation of the incised edges, typically below a level adequate to activate the pain pathways. The latter is analogous to the frequent experience of surgeons who have cut themselves in the course of an operation and only noticed it well after the event. (Rosen)

An immediate response to this passage is to question very strongly how the claim that thresholds for peripheral neurons to send pain signals are not reached by the stimulus in question. There is no source material provided with that claim, and I suspect there is a reason for that.

So too, would I question the claim, already disputed by historical record, that incised edges are not stimulated. Perhaps the ‘perfect’ ritual slaughter only minimally stimulates incised edges, but evidence of sanctified shechita slaughter has shown that kosher slaughter often includes manually exteriorizing the cervical respiratory and digestive tracts after the cut to facilitate bleeding; something that we can surely agree would maximally stimulate incised tissue edges and in all likelihood can be expected to present severe pain involving these ‘incised edges’. Despite the difficulty of attaining footage in these facilities, this ‘throat tearing’ exteriorizing procedure was captured on video in 2004 at the U.S.’s largest glatt kosher slaughter house by an undercover animal rights group. The released video showed conscious steers, true to the customs of the rite, having their throats slit by a religious slaughterer prior to another worker immediately tearing open each steer’s incised neck with a hook and pulling out the trachea and esophagus. The steers were then dumped on the floor while continuing to consistently display signs of consciousness awareness. These animals would attempt to rise, sometimes successfully, after being dumped and process their state with ‘dangling windpipes’ for up to 3 min (McNeil Jr, The New York Times 2004). As you may expect, this prompted disgust from the public, and many slaughterhouse experts reported it was the worst cruelty they have ever seen. The slaughter plant’s supervising rabbi, though, said the captured video was ‘testimony that this is being done right.’ The leading organization overseeing kosher products agreed that Jewish slaughter laws were not violated. And finally, a Jewish authority (a Rabbi of high standing) was called to visit this operation after the video’s release and corresponding public outcry, and found that the procedures in place met all standards of shechita slaughter ‘to the highest degree,’ that ‘the shochtim (rabbinic slaughterers) were all highly proficient, skilled and knowledgeable,’ (Gurtman 2005). If that language looks familiar, highly skilled ritual slaughterers are precisely what Temple Grandin has called for over the years in improving...
welfare at these exempted operations. The consensus from all parties, religious and secular, alike, has not been that this case represents ritual slaughter performed in ways other than intended. And yet, the video shows cattle very clearly seeming to display distressed animals in conditions that would, in all likelihood, induce significant suffering as they retain consciousness for as long as 3 min. Three agonal minutes, as incised edges are obviously and invasively stimulated. And in response to all of this, the undercover animal rights advocacy group which released the footage was accused of anti-Semitism and likened to fascists in perpetuating ‘Nazi libel’. Imagine voicing concerns for the well-being of animals and being called a Nazi by authorities of one of the world’s most established religions.

Even in less-egregious ritual environments, the animal’s head is often released immediately after the cut, thereby allowing incise edges to freely reestablish contact. The horrible situations brought to light by undercover organizations in ritual slaughter establishments are not the exceptions to an otherwise flawless process. Instead, they are an inevitability when religious exemption from animal welfare laws prevents regulatory agencies from holding many establishments accountable for cruel neglect of a sentient product. In my mind, it does not matter if some members of a religion scoff at fellow followers of the faith for not carrying out the ritual as one party feels it ideally would be. On trial here is not what ritual slaughter, either halal or kosher, is supposed to be – this particular methodology has been utilized for thousands of years and is unlikely to change. In the most ideal of circumstances, I think ritual slaughter is very likely to be considerably more distressing and painful than the experience of immediate unconsciousness delivered by appropriate stunning methods. But regardless of the most ideal religious conditions, I would suggest the argument is really about what this religious exemption from animal welfare regulations allows. Because the conditions which are allowed are the same conditions which manifest in practice. Regardless, it would be a mistake to so easily grant Dr. Rosen’s premise; the grounds for which he deduces painlessness during ritual slaughter.

I will, however, grant Rosen the benefit of the doubt here and assume that this example of surgeons cutting themselves without realizing is indeed a frequent experience of surgeons. In the hundreds of surgeries I have witnessed, I have never seen nor heard of surgeons incising themselves and failing to sense it. Nor have my colleagues, to my knowledge. But, there are vast communities of people with far more experience than I will ever have in the surgery suite, and I do not imagine Rosen is fabricating a supposedly frequent phenomenon. At the same time, I can fully assure anyone who does not already know otherwise, that you can expect a cut, even from a blade as sharp as a scalpel, to be painful. There is a reason a surgeon will consistently communicate with his/her anesthetist at the moment of the first incision; the painful stimulus of even the first cut generally needs to be considered as a significant anesthetic event which can warrant increased anesthetic agent administration pending the patient’s response. I simply do not believe the stimulus of the neck incision during slaughter consistently fails to reach a minimum threshold stimulus. I am not even confident it ever fails to reach that stimulus, though I remain open to the possibility. As this has been studied, I will relay the message that a lack of immediate pain recognition is more commonly experienced in humans when the cut is limited to the skin (Von Helleben et al. 2010). According to this source, with deep stab injuries, about 72% of subjects have experienced immediate pain, and pain was always experienced at least soon after. Even with superficial skin lacerations, though, only about half of those reported to have any small window of painlessness prior to onset of noception; a period which I would not expect to last until the animal is unconscious (Von Helleben et al. 2010). Additionally, it has been established that nerves severed during the cut can continue to send intense injury discharges for up to 4 s (Gregory 2008). Considering the volume of richly-innervated tissues in the neck and the average number of cuts required, it may be of little surprise von Helleben et al. concluded as follows; ‘It can be stated with the utmost probability that animals feel pain during the throat cut without prior stunning. […] This applies as well for a smooth cut performed by a skilled operator,’ (Von Helleben et al. 2010). For Rosen to make this claim of painlessness without any reference material outside of hearsay in the surgical community seems to me to meet the parameters of recklessness. I do not fault this author for his reasoning, and he has demonstrated consideration of the painful stimulus, to some extent. But, again, why should we accept any lack of support on behalf of our domestic animals, even if it did not happen to be in seeming disagreement with the findings of our studies? How can we accept anecdotal evidence that we know does not carry water. Scalpel blades are relatively inexpensive; let us all cut ourselves and report back regarding the painlessness of the experience. After that experiment fails, let us act on the empirical evidence. I respect Rosen’s work here; in it, there is considerably more thought for the physiologic basis of the animal’s experience than many other similar sources have offered. I had only hoped its arguments put either practical observations or study results into a new perspective, which I cannot say they did. If there exist some factors I haven’t properly considered, I hope I will soon be corrected; I also cannot say I expect to be.

On that note, and as we work to fully consider the arguments made in favour of ritual slaughter, I would request that its supporters do the same on our behalf. As Rosen concludes his narrative, he writes,

> It is likely that one reason for the clamour for stunning in certain quarters is confusion of an aesthetic nature. Characterisation of Shechita as ‘cutting an animal’s throat’, with descriptions of blood spurting from the neck or of the late muscular spasms, are unattractive, to say the least. However, to the uninitiated, coronary artery bypass surgery is also visually unappealing! In dealing with an issue as important as the potential suffering of animals, it is unacceptable that superficial aesthetic considerations should be allowed to cloud the argument. (Rosen 2004)

To this passage, I must say that I have yet to see a single author raise concerns over the presence of blood in ritual slaughter. There is blood in any slaughter; it is safely considered a non-issue here. And when we see continued comparisons to surgery procedures, we may understand the rhetorical utility. Ritual slaughter does not look like a surgical procedure to me, but if an observer wishes to view it as such, I would not object. The
obvious problem in doing so, though, is the implication that
the same considerations are made on behalf of the patient. In
other words, anesthesia. And again, if ritual slaughterers were
to anesthetize their animals prior to their surgical procedure,
I would gladly scrap this entire essay. As it stands, let us be
very clear that no argument put forth has been made for aes-
thetic reasons relating to unsightliness, and none of the
parties involved here are ‘uninitiated’. I firmly assert that both
sides of this argument should be obligated to be fair to the per-
spective of the other if any productive dialogue is to occur. So,
again, it is unfair to suggest that any concerned individual who
scrutinizes the moral implications of ritual slaughter is simply
off-put by the spectacle of blood, or some other similarly
absurd facet of the process. Such individuals are not inherently
squeamish, nor anti-Semitic, islamophobic, nor intolerant of
harmless religious practices. I think it amounts to logical
fallacy to dismiss the arguments of scientists and animal
welfare professionals by suggesting as much. I imagine that is
not what the proponents of ritual slaughter have intended to
do, but it is absolutely what their tendency has been. In
truth, I am proud to say we live in a country that values
animal welfare. I hope those concerned about any husbandry
practices from any culture continue to speak up, despite the
repercussive personal insults.

Again, my aim here has not been to hold accountable those
who have weighed in on this topic over the years. Rather, it is to
hold accountable the dismissive claims made in favour of a
refusal to utilize distress-sparring technology when slaughtering
animals. I have not avoided what I have seen to be the most
compelling arguments, and I have directly quoted prominent
sources as much as possible in an attempt to capture the
most substantial components of said arguments. There is no
question that much has also been left out of this essay. For
example, there are contexts both historical and international
that have not been given much due here. Poland is currently
in the process of banning ritual slaughter. Flanders banned it.
Slaughter without stunning has already been made illegal in
countries like Switzerland, Norway, and Sweden. Elsewhere,
apolitical organizations overseeing livestock welfare have
taken strong, science based stances supporting stunning
before all slaughter (ex. UK Farm Animal Welfare Council,
Meat and Livestock Australia, Compassion in World Farming).
And in the midst of these settings, we seem to find the same
arguments. On one side of the aisle, high-standing religious
authorities from the religions in question, have consistently
expressed concerns of underlying bigotry and religious intoler-
ance. A high standing clergyman, Rabbi Schuchman, recently
conveyed the following perspective:

An attack on shechita is no more than a thinly veiled challenge
against our right to exist. The real aim of those who purport to
champion the cause of humane treatment to animals, he asserted,
is either to starve the Jews and force them to leave the country,
or to eat non-kosher and thereby assimilate. (Schuchman 2012)

In response, the veterinary community voices concerns with
various degrees of assertiveness that our animals are being
made to suffer unnecessarily; sometimes being exasperated
even enough to go as far as asserting ‘this is a major incision into
the animal and to say that it does not suffer is quite ridiculous,’
(Dr. Clark, FAWC). Perpetually, the two sides of this debate’s
aisle seem to fail to connect. While accusations of bigotry rep-
resent a straw-man attack, there is an undeniable world history
of intolerance towards Jewish people. Simultaneously, we
might agree that the indications of pain and prolonged,
agonal consciousness as proposed by reason and further illus-
trated by the scientific community’s efforts have not been
properly acknowledged by those who believe their practice
to be ordained by god. These are the political and religious con-
texts about which I have claimed a lack of capacity to speak. I
cannot competitively analyse positions when history has been
so charged by religious persecution. And so, obviously, the
arguments I have acknowledged here have been explicitly
secular. If the performance of ritual slaughter was limited to a
group of nondescript, nonaffiliated citizens gathering in the
park down the street from me every other Thursday to incise
conscious mammals, the veterinary oath would similarly
compel me to call for some prompt regulatory intervention.

What may be less obvious, but has hopefully been assumed,
is that valid criticisms of foundational assumptions regarding
ritual slaughter can be made without the existence of anti-
Semitism or islamophobia. Those attitudes have been absent
from this essay, absent from the scientific studies as far as I
can gather (not that I am uniquely sensitive in detecting its
possible presence), and I believe, absent too in the minds of
those like Dr. Grandin who have repeatedly voiced their con-
cerns over the decades. I do not think this needs to be said,
but I have respect for religious freedom and the perspec-
tives of any group that has compelled immense numbers of fol-
lowers to live conscientiously over thousands of years. I
highly suspect the particular tradition of ritual slaughter is
the only problematic practice I will ever identify as such regard-
ing the Jewish or Muslim faiths. I would stake this entire discus-
sion is solely aimed at the betterment of animal welfare in light
of current empirical data. One can enter this discussion without
desiring to point out any logical flaws in religious approaches.
Or any likely misunderstandings about the process of dying
which all animals experience. Or the fact that exsanguination
happens regardless of stunning. Or the fact that severing the
major arteries of a conscious animal does not result in complete
removal of blood from an animal, anyway. This paper does not
even fixate upon asking whether a desire to consume animal
tissue without the blood which accompanies it would justify
causing avoidable suffering to the animals we slaughter. And
by virtue only of where I was born, I do not happen to be a
member of either the Jewish or Muslim faith, so I am not
equipped to provide a fair argument on behalf of the practice
of cutting conscious animals without any form of local or
anesthesia. I do not want to stake the claim that there is nothing holy about cutting an animal’s neck open. I
do not want to stake the claim that, in every likelihood, the
ancestors of these religious groups would have utilized
firearms or captive bolt devices during their slaughter rituals,
had the technology been available when these practices
were established. When Jewish texts tell that animals must
be cut, the alternative to cutting at the time essentially
boiled down to manually-driven blunt trauma. But since the
religious forerunners did not stun animals, modern followers
of these religions refuse to consider alternatives to the
methodology which was likely the most appropriate available hundreds of years ago. These are all claims upon which I have devoted no time analysing. Claims upon which I will not fixate because they are within the realm of religious belief. I understand that I am in no position of authority to scrutinize anyone’s religious beliefs. Luckily, they are claims I do not have to go about supporting; I am tasked with operating in a secular consideration of the information at hand, both observational and scientific. This, in my mind, was sufficient in composing a compelling plea to lift the religious exemption to the HMSA. You, of course, are tasked with coming to your own conclusion.

Final thoughts

There are many topics I have no authority to confront. What I can do is comfortably claim that the animals we have domesticated for many generations and selectively breed into existence for our own purposes, should be animals for which we assume the highest degree of responsibility regarding well-being. We commandeer their reproduction, artificially inseminating females to constantly be pregnant and lactating. We select for those who put on weight the fastest (ex. Angus cattle). Or those who have the highest fat content (Wagyu) or produce the most milk (Holstein/Jerseys). We apply every economic pressure to these animals in exchange for our protecting, vaccinating, and caring for them. Though that care is sometimes lacking, its pursuit is imperative as long as we call into existence each individual. This care includes the promise of a humane death. When we domesticated animals, they became an extension of our communities; our moral responsibility. We owe it to them to take every reasonable measure in limiting their suffering. I would stake we should call into question whether non-human sentient beings may be protected by our constitution’s promise to uphold freedom from religion. The other side’s focus of this argument has historically been on protecting the freedom of religion. Should sentient animals not have access to freedom from religion? This is a line we have already willingly drawn to limit religious practices; we do not let people stone others for stealing. Human sacrifices are not a tolerated modern day phenomenon. We have certainly been willing to acknowledge that some religious practices from many cultures have come with prohibitively harmful externalities to others. I also happen to believe this would be a good legal precedent to set; that prior to practicing activities which may likely harm sentient beings, the burden of proof to ensure no significant negative externalities to others should be on those wishing to practice. If such a precedent were more fervently established, perhaps compounds such as glyphosate, which has been widely used environmentally prior to complete documentation of safety, would not be near ubiquitous in the US by the time the American Cancer Society recognizes it as a probable carcinogen. Those old enough to remember the environmental effects of DDT will relay the consequences it had before being banned. Luckily, no supplying groups claimed a religious connection to its use. Just as we eventually demand robust safety data for any secular practices, I would simply like to see some convincing evidence that the loss of consciousness during slaughter without stunning is actually immediate. Or that the animal is not consistently subjected to substantial pain. That either a loss of the 3 definitive signs we use to confirm unconsciousness or some other indication results very quickly, or that pain and stress is immediately mitigated with some supportable strategy. I do not expect that evidence can be found.

If, by now, you are not tired of reading the phrase ‘pain and stress’, then I appreciate your patience. The utility in returning to this terminology is in the establishment of the actual concerns at hand. Namely, animals that are sensible to pain and conscious to internalize its perception and experience corresponding distress. If it has not been clear, this has been absolutely necessary due to the common response exhibited by Rabbi Schuchman and so many others in his corner of the historic debate platform. The response of accusations of bigotry on behalf of animal welfare advocates and ordinary citizens alike. I am frustrated by this response. I am. Not because it is not a valid concern to raise, but because of what it insinuates about so many in the scientific community. How it detracts from a discussion of science and animal welfare. I cannot hope to understand what it means to be Jewish. To be tasked with understanding the world while internalizing the historical, and to some extent ongoing, persecution of my people on the grounds of my faith or ethnicity. I imagine that anti-Semitism and anti-Islam sentiment can be encountered in any sector of American society. But I also believe that this discussion is not a veiled attack on any group. Rather, it is a questioning of a legal exemption which prevents regulatory authorities from intervening to prevent practices which strongly seem to be incompatible with animal welfare.

We are all Americans here, whether Jewish, Christian, Muslim, Atheist, or other. As such, I think it is high time we fully take responsibility for all slaughters performed in America by all Americans. By saying that slaughter without stunning is against our laws … except under the premise of religious practice, are we not shirking that responsibility? Do we not believe in our laws enough to apply them to all citizens? If we, as a country, can agree that performing modern stunning methods prior to cutting animals at slaughter is such an improvement over other slaughter methods that it should be mandated; that slaughtering without stunning is not up to our standards for legally permissible behaviour, then why should pretenses (religious or otherwise) which are not related to animal welfare allow for exemption? Indeed, one of the most important characteristics of our laws is that they can be applied to every applicable party. Illegal activity is illegal activity.

Our species is obviously not uniquely capable of being harmed by the practices of others. Of perceiving conditions where direct, consistent, predictable, and avoidable suffering befalls the individual. Conditions which would be considered illegal in this country if not for the premise of religious custom. And I am not the only party to believe this does not constitute a mere attack on a protected group. Not the only party to believe both that our country is one that proudly values animal welfare, and that ritual slaughter practices occur comfortably sheltered from that value in the company of other, far less harmful religious freedoms. Upon conversing with a number of butchers and agricultural workers, there
does seem to be a palpable consensus of resentment, bordering on disgust, for ritual slaughter. In fact, I questioned just about everyone I worked with during my tenure as a public health veterinarian looking for satisfactory answers. Instead of answers I generally encountered frustrated shrugs. It is true, as some reasoned, that non-domestic animals often become moribund in conditions expected to cause much more suffering than an ideal ritual cut would likely impart. The impartiality of nature to suffering animals is a fact of life. But for the people I met who spend their waking days caring for domestic animals, whose livelihood involves ensuring a painless euthanasia, and who are also legally expected to avoid intentionally causing suffering in conscious animals; for these people the experience of ritual slaughter is not welcomed. But despite this resentment in the face of a religious practice, and being as objective as I can, I do not believe that either islamophobia or anti-Semitism is behind this resentment. Anyone who sees as much death as those who work with agricultural animals is likely to resent any group, secular or religious, that freely chooses to inflict unmitigated pain on these species. Even so, it is not any practicing individual who is under scrutiny here. If the insistence is to view this discussion as an attack, it can only be viewed as an attack on the practice itself. In fact, it is obvious that religious tolerance is the only reason ritual slaughter has been acceptable. Not bigotry. Membership of the practicing individuals in their protected groups is the sole basis for the exemption. And yet again, defending the religious practices of all Americans is rightly a high priority. But religious freedom does not excuse the violation of the vast majority of our country’s laws. With a few notable exceptions, most of our laws rightly apply to every applicable American citizen/entity. Why should the animal welfare law not be as widely enforceable? And why, in an advanced democratic republic, can we not ban practices of which the vast majority of Americans would surely disapprove?

Regardless, there is certainly much (especially in the realm of social studies) which I do not have the perspective or interest to discuss here. In my mind, anchoring this discussion in animal welfare is the only way to achieve a satisfactory outcome on behalf of most citizens; and hopefully at least an acceptable outcome for all parties. If I have failed to capture the bulk of either side’s narrative, then perhaps I may yet be satisfied by some consideration for animal welfare which has not yet surfaced. If I have properly considered the limitations in all perspectives here, then I feel comfortable advancing as follows.

Summarizing plainly here, the bulk of the most common and compelling welfare-related arguments made by those arguing in support of religious ritual slaughter is two-fold; one, that what has been seen and studied does not reflect the ideal, intended ritual slaughter conditions; that when performed properly, ritual slaughter is not much worse (or perhaps not any worse) from an animal welfare perspective than slaughters that utilize stunning methods. The cut might be painless and consciousness should be lost quickly. And two, that the cost of ritual prohibition to the religious freedom of religious groups outweighs the negative externalities of likely suffering in those animals slaughtered. I have referenced source material, using direct quotations as often as reasonable, hoping to capture conflicting arguments fairly and in their entirety. Because of the arguments presented historically, I have felt compelled to draw attention to the fact that perfect ritual conditions are not met in practice, that ideal ritual conditions do not address the fact that a conscious animal is exposed to a highly painful stimulus for which no intervention is in place to prevent central perception of pain and stress, and therefore the consensus that, by all available indications, ‘not much worse’ still means significantly worse when contrasting slaughter with and without stunning. As to the second argument regarding the god-given right to sacrifice livestock, I’ll leave it to a capable audience to weigh the relative importance of those values, having made my position clear. I would wager the vast majority of Americans are not comfortable compromising the wellbeing of any sentient animal to meet the demands of any group. Therefore, while continuing to respect all aspects of any group’s religious expression which do not directly harm other living beings, I wonder if we can agree on the reasonable removal of this one legislative disclaimer accompanying the Humane Methods of Livestock Slaughter Act. Because, rather predictably, what is allowed by the legal exemption from animal welfare expectations at the time of slaughter is exactly what happens. Insufficient consideration given to the sentient beings being killed.

I have no illusions that my opinion on the matter is final or beyond question. There are many individuals with more experience with ritual slaughter than I, and Temple Grandin has spent more time discussing food animal welfare. This is just my honest account. A product of the dissatisfaction I have felt encountering the current arguments for the humanity of this custom. None of the facts stated here are particularly refutable; they are what I have repeatedly witnessed. More importantly, they are what peer-reviewed scientific studies have consistently repeated. And I do not believe any of the questions I have raised are either invalid or impertinent to this conversation. They are simply questions of moral concern which I genuinely do not believe have been properly addressed. And knowing that this is a country which cares deeply about domestic animals, I believe that if I had ended up occupying another societal role; another line of work or even another religious affiliation, I would still want to be aware of what exactly this legal exemption for ritual slaughter allows. Ours is not a country which tolerates the annual trapping and slaughter of dolphins by hand. We do not accommodate a market for domestic dog meat. You cannot freely purchase ‘jungle meat’ procured with disregard to the welfare of intelligent non-human primates. We do not excuse animal cruelty by these mechanisms nor countless others, as many other countries currently do. Ours is proudly a country operating with the luxury of ubiquitous free thought, and therefore free capacity to consider all sentient beings. And such thought can only result in appropriate legislative decisions if we are all aware of the practices which are carried out in these facilities typically only seen by plant employees and a small handful of USDA employees – employees who are limited in bringing their concerns raised while carrying out official duties into the landscape of political discussion.

When the proponents of this practice are not realistic about how it is actually carried out. When they are quick to make convenient assumptions to justify the continuation of an anointed
religious practice, and even quicker to dismiss the results of relevant scientific studies, then we blindly propagate the suffering of our animals, to whatever extent, as supportably better methods are ignored. In other words, I am not absolutely ruling out the remote possibility that halal or kosher slaughter methods are superior, even from an animal welfare perspective, to methods which include stunning. I find it astronomically unlikely, but even as I feel confident I would prefer being shot in the head to being stabbed to death, I cannot beyond any doubt say that I know what each slaughtered animal experiences. I suspect we will not know the best way to shut down a functioning, sentient brain until the field of neuroscience advances significantly in connecting the relationship of multitudes of firing action potentials along neurons to the character of thoughts. There may, one day, be paradigm-shift ing evidence that a dying consciousness is best served via death from blood loss from the neck. That the process of ritual slaughter is not just a process which is convenient for those performing the ritual, but one that actually eases the process of dying. Though I find it highly unlikely, it is necessary in scientific advancement to keep an open mind to all possibilities. But my arguments here are not based upon my suspicions, nor my assumptions. I believe they instead utilize the best available evidence. When dealing with how we treat the nonverbal, sentient animals we are killing, I think it is highly reckless to base justifications upon assumptions. Despite the ever-present potential for introduction of contradictory evidence, ritual slaughter by all current indications seems to be entirely unsupportable from my perspective as a veterinarian, as a former regulatory authority, and as a citizen of a country with a commendable tendency to care deeply for animals. Until better, animal welfare-based support for ritual slaughter is provided, I believe the religious exemption from humane handling regulations should be removed from policy to allow USDA inspectors to enforce the expectation of proper treatment for all animals in America. And if you happen to agree with me, it may be worth notifying our legislative officials to request a change be made. And thank you for taking the time to read this account. It’s something I could not bring myself to ignore.

As a final exercise, I’d ask that anyone interested in this topic consider what is actually at stake. What is the ultimate outcome of an elimination of the ritual slaughter exemption, thereby allowing the mandating that any domestic animals euthanized for food purposes in America be rendered unconscious prior to being cut and bled? For those of us who value sentient consciousness as the highest unit of value in our universe, this means a deserved consideration of just that. For those who value love above all else, this would mark the HMSA as an act of unrestricted compassion toward animals. For those who most value religious freedom, let this not be viewed as a hindrance of that. As far as I know, no religious practice requires the consumption of meat. The closest such approximation I have seen presented is the Deuteronomy quote: ‘thou shall kill of thy herd and of thy flocks,’ – certainly not a highly specific command regarding dietary choices. The Old Testament more emphatically seems to promote the ownership of slaves than it does the consumption of ritually slaughtered animals – a reality which thankfully did not prevent the abolition of slavery in America. And in no legislative outcome proposed by any party here would any Americans be denied the freedom to pursue every conceivable religious practice which does not call for the sacrifice of conscious animals. And as sophomoric as this sounds, no religion is barred from updating its practice to reflect societal advances in animal husbandry; a truth that the modern animal caregivers of these religions have already embraced by utilizing modern medicines and information garnered from the study of genetics. Whichever category you might pursue, there is room for advancements in modern methodology which, with the evidence currently at hand, and in the agreement of informed, empathetic intuition, better cater to our efforts to properly care for our domestic animals. The only unacceptable route would be allowing ourselves to be persuaded by what strongly seem to be bad arguments.

If we can agree that slaughter without stunning clearly and consistently seems to cause otherwise avoidable pain to its subjects, then we can formally weigh our relative valuations of animal welfare and the freedom of religion. Posed another way, in the face of negative externalities associated with religious practices, can our constitutional freedom from religion be provided for all sentient beings? Humans are not exclusively capable of suffering, nor do we seem to be exclusively capable of experiencing wellbeing. We are, though, exclusively able to domesticate other species, breeding new individuals into existence and controlling every component of their lives to produce food. Because of this reality, we owe our livestock every reasonable accommodation. And I would not be alone in asserting that stunning is a reasonable accommodation. A small, final effort of consideration with extensive implications for the animal.

Disclosure statement
This work was not done in collaboration or association with any other groups or individuals. The author did not contribute to this work while currently employed with the USDA, and has not been affiliated with any relevant interest groups since said employment. My views here should not be interpreted as the official views of the USDA. The USDA is a non-biased organization which seeks to provide safe, wholesome, and unadulterated food for all Americans. To this end, it seeks to verify adherence to all regulations in place. Therefore, my position in questioning the ethical basis of the legal foundation set by this exemption within the HMSA is a position I have not ever, in my official capacities, carried out. It is only since I have concluded my work as a USDA veterinarian that I am pursuing this topic of concern. With this disclaimer, I would also like to say that I hold the work of the USDA in high regard. Working alongside USDA inspectors and administrators, I found a group of high-integrity people prepared to face any adversity to protect the American consumer. It was an honour to work with the USDA, and much of the agency’s work is good work, in my personal view. This essay is not to be interpreted as a complaint of it. I only wish to see the agency enforce its animal welfare standards uniformly. An end which now requires legislative change. Along these lines, it may also be of note that, insofar as I can tell, I have no apparent conflicts of interest. I do not foreseeably stand to gain anything from entering this discussion, and it pertains to a career field in which I am no longer active. My motivations for expressing the above judgements have been made clear, and I believe them to be, if you’ll pardon the expression, in good faith.

Below I will provide all reference material sourced here. My intention was not to slight any parties discussed; only to provide direct access to the other perspectives for those interested. It is all too easy to unfairly
References

Agbenia B. 2011. Influence of conventional and kosher slaughter techniques in cattle on carcass and meat quality. B. Inst. Agrar. (Hons). Food Production and Processing. University of Pretoria.

Aghwan ZA, Regenstein JM. 2019. Slaughter practices of different faiths in different countries. J Anim Sci Technol. 61(3):111–121.

Barrasso R, Bonera E, Ceci E, Roma R, Alò A, Mottola A, Marchetti P, Celano GV, Bozzo G. 2020. Evaluation of the animal welfare during religious slaughtering. Ital J Food Saf. 9(1):8387. doi:10.4081/ifs.2020.8387.

Blackman NL, Cheetham K, Blackmore DK. 1986. Differences in blood supply to the cerebral cortex between sheep and calves during slaughter. Res Vet Sci. 40:252–254.

Blackmore DK. 1984. Differences in behaviour between sheep and cattle during slaughter. Res Vet Sci. 37:223–226.

Blackmore DK, Newhook JC, Grandin T. 1983. Time of onset of insensibility in four- to six-week-old calves during slaughter. Meat Sci. 9(2):145–149.

Bergamasco L, Coetzez JF, Gehring R, Murray L, Song T, Mosher RA. 2011. Effect of intravenous sodium salicylate administration prior to castration on plasma cortisol and electroencephalography parameters in calves. J Vet Pharmacol Therapeutic. 34(6):565–576.

Bozzo G, Barrasso R, Marchetti P, Roma R, Samolis G, Tallintio G, Ceci E. 2018. Analysis of stress indicators for evaluation of animal welfare and meat quality in traditional and Jewish slaughtering. Animals. 8(4):43. doi:10.3390/ani8040043.

Campbell WW. 2008. Evaluation and management of peripheral nerve injury. Clin Neurophysiology. 119(9):1951–1965.

Ceci E, Marchetti P, Samolis G, Sportelli S, Roma R, Barrasso R, Tallintio G, Bozzo G. 2017. Determination of plasmatic cortisol for evaluation of animal welfare during slaughter. Ital J Food Saf. 6(3):6912. doi:10.4081/ifs.2017.6912.

Claudon L, Marsot J. 2006. Effect of knife sharpness on upper limb biomechanical stresses—a laboratory study. Inter J Indust Erg.

Doyle AE, Fraser JRE, Smith PK. 1960. Effects of bontylin tosylate on blood pressure, cardiac output, and renal function in hypertension. Br Med J. 2(5196):422–425.

Dukes HH. 1958. A study of blood pressure and blood flow in the vertebral arteries of ruminants. Report to the Humane Slaughter Advisory Committee, US Department of Agriculture. Ithaca, Ithaca University.

Farm Animal Welfare Council (FAWC). 2003. FAWC report on the welfare of animals at slaughter of killing. Department for Environment, Food and Rural Affairs.

Gibson TJ, Dadios N, Gregory NG. 2015. Components of electroencephalographic responses to slaughter in halothane-anaesthetised calves: effects of cutting neck tissues compared to major vessels. N Z Vet J. 57:84–89.

Gibson TJ, Johnson CB, Murrell JC, Chambers JP, Stafford KJ, Mellor DJ. 2009a. Components of electroencephalographic responses to slaughter in halothane-anaesthetised calves: effects of cutting neck tissues compared to major vessels. N Z Vet J. 57:84–89.

Gibson TJ, Johnson CB, Murrell JC, Hulls CM, Mitchinson SL, Stafford KJ, Johnstone AC, Mellor DJ. 2009b. Electroencephalographic responses of halothane-anaesthetised calves to slaughter by ventral-neck incision without prior stunning. N Z Vet J. 57:77–83.

Grandin T. 1998. The feasibility of using vocalization scoring as an indicator of poor welfare during slaughter. Appl Anim Behav Sci. 56:121–128.

Grandin T. 2012. Cattle should be cut in the cervical (C1) position to improve welfare during Kosher and Halal slaughter without stunning. Grandin.com.

Grandin T. 2014. Kosher box operations, design, and cutting technique will affect the time required for cattle to lose consciousness. Grandin.com.

Grandin T. 2017. Discussion of research that shows that Kosher or Halal Slaughter without stunning causes pain. Grandin.com.

Grandin T. 2018. Evaluating methods of restraint for holding animals during kosher and halal slaughter. Preparation and processing of religious and cultural foods. Woodhead Publishing Series in Food Science, Technology and Nutrition, 349–358.

Grandin T. 2019. Maintaining acceptable animal welfare during Kosher of Halal slaughter. Grandin.com.

Grandin T, Regenstein J. 1994. Religious slaughter and animal welfare: a discussion for meat scientists. Meat Focus International, 115–123.

Gregory N, Shaw F. 2000. Penetrating captive bolt stunning and exsanguination of cattle in abattoirs. J Appl Anim Welfare Sci. 3(3):215–230.

Gregory NG. 2008. Physiology and behaviour of animal suffering. Germany: John Wiley and Sons.

Gregory NG, Fielding HR, von Wenzlawicz M, Von Holleben K. 2010. Time to collapse following slaughter without stunning in cattle. Meat Sci. 85(1):66–69.

Gregory NG, von Wenzlawicz M, Alam RM, Anil HM, Yezlidere T, Silva-Fletcher A. 2008. False aneurysms in carotid arteries of cattle and water buffalo during shechita and halal slaughter. Meat Sci. 79(2):285–288.

Gregory NG, Von Wenzlawicz M, Von Holleben K, Fielding HR, Gibson TJ, Mirabitio L, Kolesar R. 2012. Complications during shechita and halal slaughter without stunning in cattle. Anim Welf. 21(Suppl 2):81–86.

Gurtman R. 2005. Shehita: Jewish Ritual Slaughter. Office of Scholarly Communication, Harvard Library.

Johnson CB, Mellor DJ, Hemsworth PH, Fisher AD. 2015. A scientific comment on the welfare of domesticated ruminants slaughtered without stunning. New Zealand veterinary journal. 63(1):58–65.

Kallweit E, Ellendorf F, Daly C, Smidt D. 1989. Physiologic reactions during the slaughter of cattle and sheep with and without stunning. Dtsch Tierarztl Wochenschr. 96(3):89–92.

Killour R. 1978. The humane handling of stock for slaughter with particular reference to procedures in New Zealand.

Klein C. 1927. Sind geschachtete tieren sofort nach dem schachtsschnitt bewusstlos? Verlag Berliner Tierschutzverein, pg16.

Lambooy E. 1982. Some aspects of the effectiveness of stunning in sheep by the captive bolt. Meat Sci. 7(1):51–57.

Levinger IM. 1976. Medical aspects of shechita. In: E. Munk, M. L. Munk, editors. Shechita. Religious, historical and scientific aspects. Jerusalem: Gur Aroyh Publications; p. 147–149.

McNeil DG Jr. 2004. Videotapes show grisly scenes at Kosher Slaughterhouse. The New York Times.

Mellor DJ, Gibson TJ, Johnson CB. 2009. A re-evaluation of the need to stun calves prior to slaughter by ventral-neck incision: an introductory review. N Z Vet J. 57(2):74–76.

Mintun MA, Lundstrom BN, Snyder AZ, Vlassenko AG, Shulman GL, Raichle ME. 2001. Blood flow and oxygen delivery to human brain during functional activity: theoretical modeling and experimental data. Proc Natl Acad Sci USA. 98(12):6859–6864.

Murrell JC, Johnson CB. 2006. Neurophysiological techniques to assess pain in animals. J Vet Pharmacol Ther. 29(5):325–335.

Newhook JC, Blackmore DK. 1982. Electroencephalographic studies of stunning and slaughter of sheep and calves: part 1—the onset of permanent insensitivity in sheep during slaughter. Meat Sci. 6(3):221–233.

OIE. 2007. Guidelines for the slaughter of animals. Paris: Terrestrial Animal Health code World Organization for Animal Health.

Pett DB, Hattingh J, Ganhaof M, Bezuidendhout L. 1994. Factors which affect blood variables of slaughtered cattle. J S Afr Vet Assoc. 65(2):41–45.

Pleiter H. 2010. Review of stunning and halal slaughter. North Sydney: Meat and Livestock Australia.

Regenstein JM. 2012. The politics of religious slaughter—how science can be misused. Proceedings of the 65th Annual Reciprocal Meat Conference at North Dakota State University.

Regenstein JM, Chaudry MM, Regenstein CE. 2003. The Kosher and Halal meat laws. Comprehensive reviews in food science and food safety. Institute of Food Technologists.

Rosen SD. 2004. Physiological insights into shechita. Vet Rec. 154(24):759–765.

Sabow AB, Goh YM, Zulkifili I, Saziil AQ, Kaka U, Ab Kadi MZA, Ebrahimi M, Nakynisige A, Adeyemi KD. 2016. Blood parameters and electroencephalographic responses of goats to slaughter without stunning. Meat Sci. 121:148–155.

Schuchman M. 2012. A cut above: Shechita in the crosshairs, again. Fall Kashrus Kurrents Meat. STAR-K.
United States Department of Agriculture. 2020. FSIS Directive 6900.2 Revision 3. Humane handling and slaughter of livestock.

United States Department of Agriculture, Food Safety and Inspection Service. 2019. Humane handling verification for livestock and good commercial practices for poultry. Inspection Methods Training. https://pregunteleakaren.gov/wps/portal/fsis/topics/inspection/workforce-training.

Van der Wal PG. 1978. Chemical and physiological aspects of pig stunning in relation to meat quality—a review. Meat Sci. 2(1):19–30.

Von Holleben KV, Von Wenzlawowicz M, Gregory N, Anil H, Velarde A, Rodriguez P, Cenci Goga B, Catanese B, Lambooij B, Lambooij B. 2010. Report on good and adverse practices—Animal welfare concerns in relation to slaughter practices from the viewpoint of veterinary sciences. Dialrel Deliverable, 1.

Warrington R. 1974. Electrical stunning: a review of the literature. Veterinary Bulletin.

Wotton SB, Gregory NG. 1986. Pig slaughtering procedures: time to loss of brain responsiveness after exsanguination or cardiac arrest. Res Vet Sci. 40(2):148–151.

Zivotofsky AZ. 2012. Government regulations of Shechita (Jewish religious slaughter) in the twenty-first century: are they ethical? J Agric Environ Ethics. 25:747–763.

Zivotofsky AZ, Strous RD. 2012. A perspective on the electrical stunning of animals: are there lessons to be learned from human electro-convulsive therapy (ECT)? Meat Sci. 90(4):956–961.

Zulkifi I, Goh YM, Norbaiyah B, Sazili AQ, Lotfi M, Soleimani AF, Small AH. 2013. Changes in blood parameters and electroencephalogram of cattle as affected by different stunning and slaughter methods in cattle. Anim Prod Sci. 54(2):187–193.