

THE SERIOUS WELFARE PROBLEMS OF ELECTRICAL STUNNING FOR POULTRY AND THE CASE FOR GAS KILLING AS A MEANS FOR MORE HUMANE SLAUGHTER

By Cem Akin

The practice of electrically stunning poultry, which is standard in slaughterhouses across North America [1](#), results in both poor welfare and carcass degradation. In terms of welfare, the many variables and frequent process failures associated with electrical stunning methods make it difficult to ensure adequate stunning and result in pain and suffering for birds who experience prestun shocks, have their necks sliced open, and are dipped in scalding hot water, often while still fully conscious. Furthermore, the uncrating, shackling, and conveying of live birds, which always precedes electrical stunning, has been shown to cause severe stress and leads to a decrease in meat quality. On the other hand, the gas killing of poultry using a mixture of 90 percent argon in air with less than [2](#) percent residual oxygen, while not perfect, helps to significantly alleviate many of these animal welfare and carcass-quality issues and should be adopted by producers.

Animal Welfare Concerns of Electrical Stunning

Serious animal welfare problems that arise with electrical stunning of poultry are painfully evident before stunning even takes place. In order to facilitate the process, birds must first endure a stressful procedure called “shackling,” in which they are hung upside-down by the legs on a line of shackles moving so fast that it is impossible to handle the birds humanely. Leg deformities and other injuries typical of large broilers may exacerbate the pain as their sensitive periosteal areas are pinched by the metal shackles. In one survey, researchers examined broilers and found that [3](#) percent had broken bones and 4.5 percent had dislocations when examined after shackling. Another study looked at hens before and after shackling and found that there was a 44 percent increase in newly broken bones immediately following shackling. Recent analyses published in *Animal Welfare* and *World’s Poultry Science Journal* concluded that shackling can be both a physiologically and psychologically painful experience. [4](#) It is only after enduring these stresses that the birds are electrically stunned.

“Humane slaughter,” as defined by law for most species in many developed countries, requires that animals be rendered unconscious, thus insensible to pain, prior to slaughter. For any

claims of humane slaughter to be made, it is critical that this be accomplished without exception and with minimal stress afforded to the animals involved. With electrical stunning for poultry, however, this is almost impossible because of the great variation among individuals that determines the effectiveness of the electrical settings. In other words, each bird will have a different weight, fat content, age, number of feathers, level of cleanliness, brain resistance, and leg size (which determines shackle-to-leg contact)—all of which influence the effectiveness of an electrical stun and thus make it nearly impossible to ensure proper stunning unless the settings are changed to accommodate each bird. “The high occurrence of improper stuns is testimony to the difficulty of controlling all these variables” and as a result, “under many commercial conditions in poultry slaughterhouses, we have little reason to believe that proper electrical stunning is achievable consistently.” ⁵ This was confirmed in a Farm Animal Welfare Council report to the British minister of agriculture, which surveyed facilities in the United Kingdom and found that one-third of chickens were improperly stunned and not rendered insensible to pain during electrical stunning. ⁶

Although it has been argued that settings in excess of 120mA may induce unconsciousness ⁷ in chickens if applied properly, others have called this theory into question. The most profound indication of insensibility to pain is an isoelectric (flat) EEG pattern. Electrical stunning, however, does not immediately produce such a pattern. It has been hypothesized that the epileptiform brain activity that it does induce is akin to a human grand mal epileptic seizure wherein the subject is unconscious. And while this argument may be appropriate for sheep and pigs, who display the high-frequency polyspike activity found in grand mal seizures after being electrically stunned, it is markedly different for chickens. In fact, in 90 percent of chickens, electrical stunning produces low-frequency polyspike activity that is “associated with petit mal epilepsy in humans and is not necessarily associated with unconsciousness.” Higher voltage settings do not remedy the problem by causing higher frequency polyspike activity, implying that regardless of the electrical settings, chickens may not be rendered unconscious as a result of the stunning. ⁸

Furthermore, research presented at a recent symposium on the humane slaughter of farm animals suggests that birds may still be able to experience pain after electrical stunning but are not able to display a pain reflex because of temporary paralysis. ⁹ A study authored by four British poultry slaughter supervisors concluded that electrical stunning is fraught with problems and acknowledged that “electrical paralysis may occur under certain conditions in man

and other animals, during which pain can be perceived but reaction to it is impossible.” 10 And several researchers have presented evidence that even the shock, which is supposed to render the animal immediately and painlessly unconscious, is, in fact, intensely painful. 11

In addition to the efficacy problems of electrical stunning in general, the system is also prone to frequent failure. Prestun shocks are both painful and common, occurring, for example, when a bird’s wing comes in contact with the stun bath 12 before the head. Testimony from the recent “McLibel” lawsuit revealed that, according to Dr. Neville Gregory, up to 13.5 percent of broilers at one particular slaughterhouse were being shocked before fully entering the stun bath. Chief Justice Bell, who presided over the case, concluded that the pre-stun shocks were indeed cruel. 13 Other birds are able to avoid the stun bath altogether by lifting their heads and thus having their throats slit by a mechanical blade while fully conscious. Some are even able to avoid this blade, again by lifting their heads or via guide rail failure. Recent research examining the use of electrical stunning for poultry verifies that “birds dodge the knives, some completely, some partially, because they are not fully stunned.” 14 Another leading poultry scientist wrote that “problems associated with inefficient neck cutting [are] only too common in poultry processing plants.” 15 The “McLibel” lawsuit highlighted the numerous occasions where broilers were still fully conscious during neck-cutting. 16 For example, Chief Justice Bell estimated that, based on the evidence presented during the trial, more than two birds per minute in the U.S. were fully conscious as their throats were cut. 17 Dr. Gomez Gonzales, a meat-management technician for the McDonald’s Corporation, also testified that between 1 and 2 percent of chickens miss the stun bath in their U.S. slaughterhouses. 18 Applied to U.S. Department of Agriculture statistics for 2000, this means that up to 165 million broilers miss the stun bath altogether and have their throats cut while still fully conscious every year. 19

Despite the manual killer positioned between the mechanical blade and the scalding tank, with such fast-moving lines, often two rows deep, it is impossible to ensure that every bird is dead, let alone unconscious, before entering the scalding tank. Additionally, the more time that elapses after the point of the initial stun (for those who did not avoid the stun bath), the closer the birds are to full recovery. Thus, those who avoid the mechanical blade have an increased probability of being conscious when they reach the manual killer or, in the event that they are missed by the manual killer as well, as they enter the scalding tank. The previously mentioned study, whose authors were veterinary surgeons with

experience supervising poultry slaughter, determined that sentient birds are indeed sometimes scalded. [20](#) Another survey looking at various chicken processing plants in Australia also concluded that some birds are “not killed before they reach the scald tank.” [21](#) And two additional studies concluded that “red-skin chicken carcasses,” a common occurrence during electrical stunning, is due to a physiological response to heat when live birds enter a scalding tank. [22](#)

The tendency for improper electrical stunning is even more pronounced in the United States, where, despite an abundance of evidence to the contrary, [23](#) most producers believe that high electrical settings lead to carcass downgrading [24](#) and, as a result, keep settings too low (significantly lower than the 120mA used in many facilities in the United Kingdom) to achieve anything more than temporary paralysis. [25](#) And since U.S. laws inexplicably do not provide humane slaughter for poultry and thus do not require that birds be rendered insensible to pain prior to slaughter, [26](#) producers often compromise animal welfare for supposed gains in carcass quality. A metastudy of electrical stunning methods verifies that in North America, “the development and application of [electrical] poultry stunning had more to do with facilitating processing than with humane slaughter.” This is confirmed through documentation indicating that typical North American settings may be as low as 12.5 mA. [27](#) Such low electrical settings have particularly dangerous consequences for birds who are paralyzed yet still sensible after passing through the stun bath or who miss the mechanical blade and fully recover by the time they are manually cut or scalded.

Gas Killing Offers a More Humane Alternative to Electrical Stunning

Clearly, electrical stunning methods result in severe welfare problems for billions of birds each year in the U.S. alone. Gas killing, using a mixture of 90 percent argon in air with less than 2 percent residual oxygen, has proved to be far more humane and less likely to cause carcass degradation—two convincing reasons why producers should immediately adopt such systems. The welfare improvements from making such a switch would be vast, including the elimination of uncrating, live shackling, prestun shocks, and being cut or scalded while still conscious because of improper stunning. A recent study examining gas killing states that “there is no doubt that [the gassing] of poultry would eliminate some of the welfare concerns associated with the slaughter of poultry.” [28](#) Such methods allow for the stunning of birds while still in their transport

crates, greatly reducing the stress of unloading. It would also “eliminate the preslaughter handling stress associated with uncrating and shackling the live birds before they are stunned electrically.” [29](#) Under the gas killing model, birds are taken directly from the transport vehicles in their containers and gassed before being shackled.

In fact, after visiting a poultry slaughterhouse that employed a gas killing system, a leading poultry-welfare scientist was compelled to write: “In my opinion, this is the most stress-free, humane method of killing poultry ever developed. The birds are quiet throughout the operation. They remain in the transport crate until dead and the killing procedure itself is fast, painless, and efficient. There is no risk of recovery from unconsciousness.” [30](#) Other leaders in animal welfare who endorse gas stunning include the late Ruth Harrison of the Farm Animal Welfare Council; Professor John Webster, dean of veterinary medicine at Bristol University; James Phillips, chief veterinary officer of the Royal Society for the Prevention of Cruelty to Animals (RSPCA); and Dr. Martin Potter, head of the Farm Animals Department of the RSPCA. [31](#)

The Most Humane Mixture Is 90 Percent Argon in Air With Less Than 2 Percent Residual Oxygen

Research has shown that the use of 90 percent argon in air with less than 2 percent residual oxygen is the most humane and least aversive gas mixture for killing poultry. A study comparing different types of mixtures found that the argon mixture is “acceptable on humanitarian grounds” and that “chickens can ideally be killed in batches by inducing anoxia ... with 90 percent argon ... in air. [32](#) While carbon dioxide has been shown to be highly aversive to humans [33](#) and birds when inhaled, argon is an inert gas and is not readily detected, thus can be used to create a non-aversive atmosphere where birds die painlessly. In one study, researchers observed that 100 percent of hens tested entered a feeding chamber filled with 90 percent argon voluntarily and were killed by the gas, while fewer than half even set foot into a chamber containing carbon dioxide. [34](#) Other research looking into poultry gassing, particularly for turkeys, found that “because argon is an inert gas with no taste or odour, most of the turkeys did not detect its presence, and they didn’t show any signs of respiratory discomfort before they lost consciousness,” whereas others displayed discomfort via head shaking and gasping with a mixture containing carbon dioxide. [35](#)

Clearly, the use of an anoxia-inducing mixture of 90 percent argon in air with less than 2 percent residual oxygen results in great welfare improvements over other methods of killing or stunning poultry, including reduced stress during unloading, shackling and stunning, and a reduced risk of prestun shocks and being conscious during neck-cutting and scalding. The residual oxygen level, however, must be carefully maintained at less than 2 percent to ensure rapid brain function loss, as several researchers have found that trapped air between birds or crates can raise the residual oxygen to levels that can prevent proper stunning. Also, in order to ensure that recovery to consciousness does not occur, it is crucial that the birds be killed by the gas before being shackled. Studies examining the batch stunning of chickens using various gas concentrations found that many birds rapidly regained consciousness, suggesting that gas stunning may be unsuitable on welfare grounds. Researchers have recommended that “birds should be killed rather than stunned by the stunning gases” and that this “will not only obviate the recovery of consciousness, but subsequent operations such as uncrating and shackling of the birds and neck cutting would be performed more easily on the dead and hence relaxed carcasses.” ³⁶ In order to improve upon the deficiencies of electrical stunning, the use of gas methods must kill the birds, rather than merely stun, thus reducing the likelihood of regaining consciousness during slaughter.

Carcass-Quality Improvements From the Gas Killing of Poultry

In addition to the welfare benefits, gas killing provides producers with improved carcass quality when compared to electrical stunning; the latter of which is “frequently criticised on both bird welfare and meat quality grounds.” ³⁷ Researchers at the University of Bristol looked at carcasses of gas-stunned vs. electrically stunned broilers and concluded that incidence of broken bones and breast muscle hemorrhaging would be “substantially reduced by gas killing of broilers.” ³⁸ In addition, the study found that gassing also results in a more rapid pH fall after the killing than with electrical stunning, thus enabling early filleting. A study published in the *Veterinary Record* also compared carcasses from the two stunning methods and stated that “the advantages of gaseous stunning include improved meat quality, fewer broken bones and less muscle haemorrhaging.” ³⁹ The authors also looked into the concern that gas-stunned birds do not have as good a bleed-out rate than electrically stunned birds and found that after one minute, the differences were “not sufficient to impede the bleeding efficiency of broilers.” ⁴⁰ Another study at the University of Bristol in the U.K.

found that “gaseous stunning of broilers produced relatively better quality carcasses and meat than electrical stunning and therefore may have commercial advantages.” ⁴¹ More specifically, gas-stunned broilers showed lower incidence of broken bones and breast and leg muscle bruising. The authors suggested that the increased leg bruising from electrical stunning was a direct result of shackling live birds.

Yet another reason that gas killing improves carcass quality results from the tendency of a chicken to inhale water during the initial spasm from being electrically shocked. A recent study examined this by including a radioisotope in the stun bath and then looking at carcasses to determine whether or not internal radioactivity was detected. The results clearly showed that “chickens can and do inhale water during electrical stunning in a waterbath and that no remedy is available at the moment.” ⁴² The authors suggest that the respiratory tract could thus be contaminated with bacteria from the stun bath and leak onto the edible portions of the carcass during evisceration.

Conclusion

It is all too clear that electrical stunning methods do not result in humane deaths for chickens. During this process, chickens endure the stresses of uncrating, are painfully hung upside down on shackles, and often receive painful prestun shocks. Many have their necks cut while still fully conscious, and some are even scalded alive. Gas killing methods, using a mixture of 90 percent argon in air with less than 2 percent residual oxygen, significantly help alleviate these welfare problems while, at the same time, improving carcass quality for the producer. There are several such systems currently available for commercial use and a number of large-scale systems have already been implemented in the United Kingdom with great success.

Please direct any questions or comments regarding this report to Cem Akin at 757-622-7382, or email CemA@peta-online.org.
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