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Pre-Slaughter Stunning: Why it is important for poultry

Certified Animal Welfare Approved by A Greener World (AGW) has the most rigorous standards for farm animal welfare currently in use by any organization in North America. Its standards have been developed in collaboration with scientists, veterinarians, researchers and farmers across the globe to maximize practicable, high-welfare farm management.

The aim of the Certified Animal Welfare Approved by AGW slaughter standards is to ensure that poultry are killed quickly, painlessly, and without any suffering. Many on-farm processors still slaughter poultry by cutting the neck in the false assumption that this method is quick and painless. After considering the available research, however, this paper argues that stunning before neck cutting is by far the best option for bird welfare in the slaughter process.

Minimizing pain and stress at slaughter

A number of factors can contribute towards minimizing the pain and stress experienced by poultry at slaughter. The bird must be caught, loaded and transported to the place of slaughter with the minimum stress. The facilities at the slaughterhouse must be designed to avoid potential injury or distress—for example, if birds cannot be slaughtered immediately there must be somewhere they can be held that avoids extremes of temperature. The individuals carrying out the slaughter must be properly trained and skilled, while the method of slaughter must be appropriate to the species being killed—and be effective at the first attempt.

In order to make death (defined as the cessation of the vital functions) as stress-free and painless as possible, the slaughter process must ensure that death is achieved either instantaneously or after the bird has first been rendered unconscious by another means, such as stunning. If the method of slaughter used means loss of consciousness is not immediate—for example, when using gas stunning—then the induction of

unconsciousness should be non-aversive (in other words it should not be unpleasant) and should not cause anxiety, pain, distress or suffering in conscious birds.

Evaluation of the effectiveness or otherwise of different stunning, slaughter or killing methods can be assessed by a range of different indicators—for example, the time taken to induce unconsciousness, the duration of unconsciousness, and the time to death.

Pain from the bleed cut

Many on-farm processors currently slaughter poultry by cutting the neck of the bird so that blood loss leads to death. This is commonly promoted as being “quick and painless”, but how does this actually affect the bird?

All birds have pain systems that have evolved to protect them from harm. Research shows that cutting the neck of a bird to bleed it without stunning it first can result in considerable pain. When a very large cut is made across the neck a number of vital tissues are severed, including skin, muscle, trachea, esophagus, carotid arteries, jugular veins, major nerves plus numerous minor nerves. A bird that is conscious when this cut is carried out will receive a barrage of sensory information to the brain. While wounds which involve the tearing of tissue—or multiple cuts—will affect a higher number of pain receptors than a clean cut, a long cut across the throat or a deep cut to sever blood vessels will still provide an input to pain centers in the brain is made—no matter how sharp the knife. This kind of massive injury will result in very significant pain and distress in the period before sufficient blood loss occurs for the bird to become insensible.

The lack of struggle and apparent “calmness” of the bird are often cited as reasons why throat cutting without pre-stunning is a welfare friendly or pain free method of slaughter. However, research shows that cutting the throat of a bird without prior stunning will significantly affect its ability to show some of the key physical responses which are used to evaluate the extent of pain. For example, difficulty in movement may occur because of the effect of blood loss on muscles and blood pressure or because the bird is shackled or held in a cone. The actual shock of the cut being made will also affect the bird’s responses. Likewise, the assumption that just because the bird doesn’t squawk means that it didn’t feel pain is incorrect, as the bird may be physically unable to squawk because the cut might have gone through the trachea. In summary, it is clear that observations of low levels of behavioral response following throat cutting do not mean that the bird did not feel any pain.

Time to loss of consciousness

After the blood vessels in the throat are cut, the resulting blood loss will lead to a lack of nutrients and oxygen going to the brain, causing the gradual loss of consciousness. Further blood loss will eventually damage the brain to the point that vital functions cease and death occurs. However, we know that during the period when the bird is still conscious after the throat cutting, serious welfare problems are highly likely to occur as the bird can still feel anxiety, pain, distress, and other suffering. The duration of this period depends on how the bird is restrained during the cut and the subsequent blood loss, as well as how extensive the cut was.

Certified Animal Welfare Approved by AGW standards require that the duration of unconsciousness induced by any stunning method must be longer than the total time between the end of the stun and the making of the bleed cut *plus* the time it takes for blood loss to cause death. In order to assess this we need to know how long it takes for blood loss to cause death. This evidence will also inform us as to how long it takes for a bird which is not stunned to lose consciousness after its throat is cut.

Several studies have examined how long a chicken will remain conscious if it is not stunned and its neck is cut. For example, Barnett *et al* (2007) showed that birds lost consciousness on average between 12 and 15 seconds after the throat cut, while one bird remained conscious for up to 26 seconds. This corresponds to research by the European Food Safety Authority (2004), which concluded from the available scientific literature that a minimum of 25 seconds bleed-out time will be necessary to avoid return of consciousness. Other work from Gregory (2004) showed that birds generally lost consciousness within 15 seconds from having their necks cut, but some birds remained conscious for up to 30 seconds. McNeal (2003) showed that decapitation rather than neck cut still showed brain activity for around 15 seconds.

From the evidence above, it is clear that the period of unconsciousness induced by the stun must last for at least 30 seconds to avoid any risk of the stunned bird regaining consciousness during bleeding. If a bird is *not* stunned, however, the research cited above indicates that it might not lose consciousness—and could still have brain activity—for anywhere from 12 to 30 seconds. This is a long time for a bird to be suffering the distress of having had its throat cut.

What happens when a bird is stunned?

The aim of stunning is to obliterate the waking or aware state. In this unconscious state the bird cannot experience pain. Effective stunning will disrupt the neurotransmitters in the brain, causing a state that renders animals unconscious and insensible in less than a second from when the stun is applied, thereby removing the risk that the bird will experience pain and distress during slaughter and subsequent bleeding. When loss of unconsciousness is not immediate—as in gas stunning—the mix of gases used must ensure that the induction of unconsciousness is non-aversive and will not cause anxiety, pain, distress or suffering in conscious birds. So what are the most common stunning methods?

Electrical stunning

Electrical stunning causes insensibility by disrupting the generation and transmission of electrical impulses in nerve cells. As long as the stunner is correctly placed, and the correct current is applied, the stunning electrodes will induce an electrical current of sufficient intensity to disrupt the neurotransmitters in the brain. This disruption renders the bird unconscious.

While some might think that electrically stunning the bird will in itself cause pain and distress, the reality is that effective stunning takes less than a second—typically as little as 0.2 seconds—before the bird is insensible. This is insufficient time for the bird to register any pain from the stun. If the stunning current is maintained for a given time the nerve cells become unable to respond to any stimulus. The bird will then remain insensible after the current is removed until normal brain activity resumes. Scientific literature shows that the period from stun to the start of the return of any brain activity is *at least* 30 seconds, although it takes longer for “normal” brain activity to resume. As established earlier in the paper, as long as the bird has its neck cut immediately after electrical stunning it will have lost enough blood for it to be dead before any return to consciousness.

Several types of electrical stunning are available. Large plants generally use electric water bath stunning, where birds are shackled with their heads entering a bath of water through which an electric current is passed. For smaller plants, however, handheld stunners are commonly used. In the U.S., the most common handheld electric stunner is the stun knife. Here, stunning is achieved through the use of an electrical current delivered by the blade of the stun knife when pressed against the bird’s neck. The electrical circuit passes through the whole body of the bird, which must be grounded—for example, by hanging the bird from a shackle. Once the bird is stunned the knife is

used to make the bleed cut. In other countries a head-only electric stunner is frequently used. This has electrodes that are placed either side of the bird's head so the electric current goes directly through the brain.

When the bird is stunned its body stiffens as the muscles contract; if it is held in a cone you will see the legs rigidly extend. The eyes will be wide open but there will be no blink reflex and the bird will not be breathing. The bird is not dead at this point, only unconscious, so it is important to carry out the bleed cut as soon as possible after stunning so that it does not regain consciousness.

In summary, correctly performed electrical stunning is a humane method of rendering an animal instantaneously unconscious and, with timely and effective bleeding, unconsciousness and insensibility will last until death from blood loss occurs.

Mechanical stunning and killing

Non-penetrative and penetrative captive bolt devices are also frequently used to stun and kill chicken and turkeys. Here, the bolt head is fired with high velocity onto the head of the chicken or turkey, causing severe structural damage to the skull and brain and immediate death—provided the right diameter of bolt is placed and fired correctly. Birds are restrained in cones, shackles, or by hand and captive bolts must be fired perpendicular (at right angles) to the frontal bone. Bolt diameters should be a minimum of six millimeters and a length between 10–25 millimeters to be effective in chicken. Although loss of consciousness is immediate, severe wing flapping will often occur. This flapping is not a sign that the bird feels pain—it actually demonstrates that the bird's brain has been damaged to the point that it has no control over the movements of its wings and body.

Adequate application of the captive bolt is indicated by:

- Completely destroyed skull and brain
- Immediate onset of apnoea (the bird stops breathing)
- Dilated pupils
- Absence of corneal reflex
- Severe uncontrolled wing flapping
- Bleeding through the wound.

Gas stunning

Stunning with gas is different to both electrical and mechanical stunning, in that it is *not* instantaneous. The design of any gas stunning system must take into account the advice of a qualified expert who will also be able to advise on the type of gas used and flow rate at which it is delivered. A significant level of information is now available on the use of non-aversive gas mixture, which may include argon and nitrogen. Birds do not have receptors that recognize argon or nitrogen, so even though induction of unconsciousness may take several minutes, the bird will not experience any pain or distress during this time.

Many people believe that gas stunning can only be used by large modern poultry processing plants. However, some farmers are now using small-scale gas “stun to kill” apparatus for on-farm euthanasia, if not for routine slaughter. This method involves the use of an airtight chamber into which the bird can be placed and gas introduced. A regulator to control the flow of gas and a means of measuring the concentration of gas in the chamber are essential. Gases such as argon or nitrogen are readily available from suppliers, such as welding supply companies, but farmers must get professional advice before adopting this method to kill birds.

Neck dislocation

Neck dislocation is commonly used for on-farm euthanasia and culling. In an emergency, it may be the quickest option on farm where proper slaughter equipment is not readily available. However, neck dislocation is *not* an appropriate method for planned slaughter, particularly for larger birds (those over 6.5 lbs in weight).

Research shows that neck dislocation (either by stretching or crushing) does not cause immediate loss of consciousness for many birds. Neck dislocation by crushing was also shown to be considerably less effective than neck dislocation by stretching.

When the neck is stretched and then dislocates, at the point of dislocation the brain of the bird can sometimes retract rapidly into the skull, resulting in a concussion or stunning effect. However, it is not possible to guarantee that neck dislocation will definitely cause this concussive effect or that the concussion is great enough to act as a ‘stun’—even if the neck dislocation is carried out according to all guidelines. Published research shows that a concussive effect only occurred in 10 percent of neck dislocated birds. So there will always be a risk that brain activity continues after the neck dislocation—and this would be despite a complete severance of the spinal cord and no eye reflex.

It is also worth noting that the use of tools aimed at aiding the process of neck dislocation, such as “wringers” or poultry pliers, do not resolve the welfare problems noted above. This is why neck dislocation—however it is carried out—cannot be recommended as a routine slaughter method.

Summary

From the information above, it is clear that neck cutting without stunning is extremely detrimental to animal welfare. Instead of immediate insensibility, which occurs with electrical or captive bolt stunning, when the neck is cut the bird will pass through consciousness, to stupor, to semi-consciousness, unconsciousness and, finally, death from eventual blood loss. Pain, suffering and distress during the cut and bleeding process are highly likely. Rather than the milliseconds to unconsciousness that are a feature of an effective stun, it can take up to 30 seconds for the animal to reach unconsciousness where no stun is applied and the major blood vessels in the neck are cut.

Although stunning methods themselves require careful management through training and correct use of appropriate tools to avoid risks to bird welfare, scientific research clearly shows that stunning before neck cutting represents the lowest potential risk of compromising bird welfare in the slaughter process.

References and further information

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KEYWORDS

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