

Improving Welfare of Broiler Chickens at Slaughter

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Introduction

For a slaughter method to be humane, it must produce insensibility as rapidly and painlessly as possible (Vizzier-Thaxton *et al.*, 2010). Stunning broiler chickens prior to slaughter is practised to induce unconsciousness and insensibility and to immobilise them for the throat-cutting procedure (Shields & Raj, 2010). Currently, both electrical and controlled-atmosphere stunning (CAS) are used worldwide (Vizzier-Thaxton *et al.*, 2010). However, controlled-atmosphere killing (CAK) and low-pressure stunning have recently been proposed as more humane alternative methods.

Discussion

Globally, multiple-bird, electrical water-bath systems are the most common method of stunning birds prior to slaughter (Shields & Raj, 2010). However, this method is increasingly coming under scrutiny on welfare grounds, and Hindle *et al.* (2010) have identified several areas of concern.

There are numerous factors that may affect the efficacy of the stun and, consequently, some birds may either fail to lose consciousness, or regain consciousness when their necks are cut (Shields & Raj, 2010). These factors include variations in resistance to the electrical current, arising from the presence of several birds in the bath, individual bird resistivity and shackle condition (Hindle *et al.*, 2010). Birds may also struggle and lift their heads, or may be too short to reach the water (Shields & Raj, 2010).

The current that each individual bird receives is important for an effective stun (Hindle *et al.*, 2010). However, the European Union-recommended minimum current for broilers of 120 mA increases quality defects such as haemorrhages and broken bones (Lambooij *et al.*, 1999), resulting in a conflict between effective stunning and commercial interests in carcass quality. It is also well documented that painful pre-stun electric shocks can occur before the head enters the water if a wing inadvertently touches the water (Sparrey & Kettlewell, 1994).

The process of shackling is also criticized for causing excessive pain to birds. Lambooij *et al.* (1999) noted that bruising of the leg and thigh muscle, and nociceptive properties of the skin over the legs of the birds provide evidence that shackling is painful (Gentle & Tilston, 2000).

Additionally, hanging upside down is a physiologically abnormal posture for chickens (Shields & Raj, 2010). Indeed, in a study by Vizzier-Thaxton *et al.* (2010), corticosterone concentrations were significantly greater in electrically stunned birds than in birds stunned by low atmospheric pressure (LAP). Vizzier-Thaxton *et al.* (2010) attributed this, at least in part, to the inversion and shackling of live birds in electrical stunning.

Controlled-atmosphere stunning works by displacing O₂, using CO₂, N₂ and Ar, or a mixture of these gases, to incapacitate hens and broilers prior to shackling and exsanguination (Shields & Raj, 2010). This has been suggested as a more humane alternative, as it avoids the problems associated with electric shock and live shackling. However, Shields & Raj (2010) have recently argued that to obtain the full welfare benefits of the system, it is imperative that the birds are actually killed, rather than stunned, by the gas. Birds can rapidly recover from exposure to these gas mixtures and achieving uniform gas concentrations in the atmosphere surrounding the birds may be difficult (Purswell *et al.*, 2007). This may lead to problems similar to those of ineffective electrical stunning, where some birds may either fail to lose consciousness, or regain consciousness when their necks are cut. Additionally, CAK can be done in transport crates, entirely eliminating the need to handle birds at the slaughterhouse (Shields & Raj, 2010).

Arguably, CAS and CAK are preferable to electrical stunning on humane grounds. However, behavioural evidence suggests that CO₂ may be unpleasant and distressing to inhale, as it is an acidic and pungent gas (Shields & Raj, 2010). Birds have intrapulmonary chemoreceptors that detect CO₂ but are insensitive to the effects of hypoxia induced with argon and nitrogen (Shields & Raj, 2010). However, inert gases may not be practical because they are not readily available in large quantities and are more expensive than CO₂ (Shields & Raj, 2010).

The use of low atmospheric pressure has recently been proposed by Vizzier-Thaxton *et al.*, (2010) as another option for humanely stunning and killing broiler chickens. LAP stunning and killing involves mechanical removal of O₂ by reducing air pressure (Purswell *et al.*, 2007). Euthanasia using decompression is not a new idea, and the EU allows the use of a vacuum chamber for slaughtering farmed game species (Vizzier-Thaxton *et al.*, 2010). However, because the American Veterinary Medical Association has ruled it an unacceptable method of euthanasia, decompression is not considered in the US (Vizzier-Thaxton *et al.*, 2010).

Primary objections against using decompression include the rapid expansion of gases trapped in body cavities and prolonged discomfort in immature animals. However, Vizzier-Thaxton *et al.* (2010) argue that because of the unique structure of the avian respiratory system, it is unlikely that significant amounts of air would be trapped. Previous studies have shown that, when subjected to decreasing O₂ concentration, adult birds slowly became unconscious, without showing any signs of distress, until respiratory failure supervened (Woolley & Gentle, 1988).

Vizzier-Thaxton *et al.* (2010) also used behavioural evaluation as well as corticosterone concentrations and histopathology to demonstrate that controlled atmospheric pressure reduction could be an effective and humane process. They argue that discomfort associated with decompression is resolved when the speed of the O₂ removal is decreased, and precisely controlled. Purswell *et al.* (2007) found that the speed of pressure reduction was critical to reducing discomfort reactions from the birds, and no haemorrhagic lesions were found in any tissue submitted from the LAP system, in contrast to reports of haemorrhagic lesions found in lungs, brains and hearts of animals undergoing rapid decompression (Vizzier-Thaxton *et al.*, 2010).

Conclusion

Humane slaughter of production animals is a complex issue, but improvements have the potential to affect the welfare of large numbers of animals. Current slaughter methods of broiler chickens are widely criticized, and several alternatives have been investigated. While initial data suggest decompression may be a viable alternative, further independent testing into LAP to replicate results and substantiate conclusions is needed.

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