An exploration of Animal Welfare Improvements that may be gained for Farmed Chickens by Adopting Alternative Slaughter technologies

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Introduction

Where the process is mechanised, chicken slaughter at commercial plants involves handling, shackling, inversion, electrical stunning and exsanguination (Lines *et al.*, 2011; Shields & Raj, 2010). These methods are known to cause physical injury, mental distress and painful pre-stun shocks if the chicken's wings contact the electrified water-bath before the head (Lines *et al.*, 2011). Furthermore, water-based electrical stunning is not always "consistent, immediate or effective", so the chicken may be conscious or regain consciousness before the throat is cut (Shields & Raj, 2010). In response to these concerns, alternative technologies, including improved shackle lines and controlled atmosphere stunning (CAS), have been developed.

Discussion

A modification to traditional shackle lines may eliminate the need for birds to be inverted (Lines *et al.*, 2011). This method, where a conveyor belt supports the weight of the chicken as it rests on its breast with its legs in shackles behind, was evaluated over a two-day period using extensively reared, organic broiler chickens at a modified small commercial processing plant (n=2857) (Lines *et al.*, 2011). Direct observations were made of every 25th bird from shackling up to the point of entry into the water-bath, monitoring vocalisation and movement, including wing-flapping (Lines *et al.*, 2011). In addition, the behaviour of every chicken was evaluated on entry into the water-bath and post mortem assessments of leg and wing damage were performed on every 5th bird (Lines *et al.*, 2011). The system modifications were then removed and the original slaughter technique was evaluated using the same methods (n=2491).

This study indicates that significantly fewer birds struggle immediately after shackling and for shorter bouts using the modified system (Lines *et al.*, 2011). The quality of entry into the electrified water-bath is better and time required on the shackling line is shorter (Lines *et al.*, 2011). Post mortem examination indicates that the modified system results in fewer wing haemorrhages and bruises (Lines *et al.*, 2011; Shields & Raj, 2010). Further, despite the fact that birds tend to struggle more just prior to entry into the water-bath, fewer pre-stun shocks occur with the modified system (Lines *et al.*, 2011).

However, humane slaughter methods must "produce insensibility as rapidly and painlessly as possible" (Vizzier-Thaxton *et al.*, 2010). So, while improved shackle lines may advance animal welfare for chickens up to the point of stunning, the inconsistencies associated with water-bath electrical stunning may undermine these gains. As a consequence, Hindle *et al.* (2010) assessed the animal-welfare implications of water-bath stunning.

The efficacy of electrical water-baths is influenced by the size of the bath, number of birds immersed at any one time, duration of immersion and the conductive resistance caused by the shackles (Hindle *et al.*, 2010). The combined effect of these factors can result in a failure to induce unconsciousness or premature recovery from stunning (Hindle *et al.*, 2010). In a study conducted by Hindle *et al.* (2010), electroencephalogram and electrocardiogram measurements were used to determine the outcome of various settings on 185 chickens using a purpose-built stunner (Hindle *et al.*, 2010). The results obtained indicate that the stunner-settings required to produce effective stuns vary among birds (Hindle *et al.*, 2010). Further, higher-than-recommended frequencies are commonly used in stunning procedures at many slaughterhouses and these frequencies require concomitant increases in current to produce effective stuns (Hindle *et al.*, 2010). However, these higher currents are often not provided as they increase the incidence of blood splashing, which is undesirable for meat producers. Arguably, the conflict between animal welfare and meat quality cannot be resolved

using multi-bird, constant voltage, electrical water-bath stunning systems (Shields & Raj, 2010). Available alternative technologies such as CAS may provide more acceptable welfare outcomes.

Several toxic gas mixtures have been proposed for the purposes of CAS. Many of these involve carbon dioxide (CO_2) mixtures with CO_2 concentrations above 45% by volume of air (Sparks *et al.*, 2010; Alphin *et al.*, 2010). Shields and Raj (2010) report that based on physiological and behavioural evidence, CO_2 at these concentrations may cause irritation and distress to chickens, as they possess intrapulmonary chemoreceptors that detect CO_2. Further research should be conducted into the use of low atmospheric pressure stunning (LAPS) systems as a means of inducing unconsciousness in chickens (Vizzier-Thaxton *et al.*, 2010).

The use of LAPS is controversial due to the risks associated with rapid decompression and the tolerance that young animals demonstrate for hypoxia (Vizzier-Thaxton *et al.*, 2010). However, Vizzier-Thaxton *et al.* (2010) contend that LAPS can be a humane stunning method for chickens if applied slowly. A large-scale decompression unit, capable of holding two commercial broiler transport cages, was created to assess LAPS in a commercial setting over a six-month period (Vizzier-Thaxton *et al.*, 2010). During this study, in which more than 10,000 chickens were processed, bird welfare was monitored by cameras mounted inside the unit, corticosterone assays collected immediately after stunning, post mortem examination and histopathology. The results indicated that only 6% of chickens stunned using the LAPS system flapped their wings during exposure, corticosterone concentrations were lower when compared to electrically stunned birds and no haemorrhagic lesions were observed on histopathology (Vizzier-Thaxton *et al.*, 2010). As such, this method may be preferable to electrical stunning as it improves the welfare of chickens in slaughterhouses by removing the requirement for them to be handled, shackled and inverted while conscious. It also produces effective and consistent stunning and can be tailored to ensure that all birds are adequately stunned. However, the practical application of this method in commercial operations may be limited by the need for skilled personnel to operate and maintain the LAPS (Vizzier-Thaxton *et al.*, 2010).

Conclusion

The greatest animal welfare gains for chickens during slaughter require a holistic approach to improving slaughterhouse practices. Improvements such as those described above may reduce physical injury, mental distress and pain imposed upon chickens prior to and during slaughter. As consumers are becoming more welfare-conscious, it is hoped that meat producers will improve welfare standards for chickens by adopting these alternative technologies.

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