Recent Welfare Developments in Pre-slaughter Stunning Techniques for Broiler Chickens

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Introduction

The humane slaughter of production animals is a recurring issue for animal welfare (Shields & Raj, 2010). In today's poultry industry, broiler chickens are shackled while conscious and electrically stunned in a water-bath prior to slaughter in order to induce unconsciousness and immobilise them for exsanguination (Hindle *et al.*, 2010). However, research shows that some chickens are still conscious when they are slaughtered due to an ineffective stun (Hindle *et al.*, 2010; Shields & Raj, 2010). This essay will examine developments in current stunning techniques as well as discussing an alternative method aimed at improving the welfare of broiler chickens.

Discussion

Broiler chickens display struggling behaviour immediately after they are inverted and suspended by shackles, suggesting that they become distressed as a result of this process (Lines *et al.*, 2011). Bedanova *et al.* (2007) presented further physiological evidence to support this idea by positively correlating corticosterone concentrations with duration of shackling.

In response to this welfare concern, a breast support conveyor system (BSCS) was designed as a practical and economical addition to conventional shackle lines (Lines *et al.*, 2011). This system was trialled in a small poultry-processing plant over two days with 150 broiler chickens from six farms. The chickens were positioned on a horizontal conveyor with their breastbones supporting their weight and their shackled legs extended behind them. They were supported in this way until entry into the water-bath. Chicken behaviour and post mortem examinations were used to assess the efficacy of this system.

The results showed that chickens in the BSCS struggled less at the time of shackling, had less wing damage and their entry into the water-bath was facilitated, with fewer pre-stun shocks, compared to traditional systems (Lines *et al*., 2011). However, Lines *et al.* (2011) also identified significant problems with the BSCS: chickens became poorly positioned if the shackle line turned sharp corners; chickens showed more struggling behaviours at these points than they did without the BSCS.

The BSCS is a viable alternative for improving conditions for broiler chickens in plants with straight shackle lines, as it can be implemented with relatively few modifications to existing systems. It can also decrease the time between shackling and stunning. Traditional systems had to allow time for chickens to calm down and wing-flapping to cease before proceeding to the water-bath (Lines *et al.*, 2011). With the BSCS, fewer chickens display wing-flapping immediately after shackling, so less time is spent shackled.

Although improvements to the process of conveying broiler chickens to the electrical water-bath can be made with the BSCS, various authors have questioned the efficacy of the stunning procedure itself (Raj *et al.*, 2006; Hindle *et al.* 2010). Hindle *et al.* (2010) collected information on present electrical-stunning practices from 10 poultry plants in Holland. Their study showed variations in the conditions under which broilers were stunned. They tested the effectiveness of stunning using the average technical settings of the plants with a single-chicken water-bath. Although Hindle *et al*. (2010) collected data on broilers, hens and ducks, only the information on broilers will be commented on in this essay.

Present European recommendations for stunning require a current of 100mA and a frequency of 50Hz (Hindle *et al.*, 2010). To ensure an effective stun, higher frequencies require higher

levels of current (Raj *et al.*, 2006). The data collected from the Dutch poultry plants showed that higher frequencies (400 and 1,000Hz) were being used (Hindle *et al*., 2010). Furthermore, they found that in many cases, the current received by each chicken varied significantly and was insufficient to produce an effective stun (Hindle *et al*., 2010). Different numbers of chickens (4-27) in the water-bath at one time and variance in individual broiler impedance contributed to the different current levels (Hindle *et al.*, 2010). However, increasing voltage settings to ensure higher currents will increase the incidence of blood splashing (Hindle *et al.*, 2010). Moderation of the current helps to ensure product quality at the expense of an effective stun. Hindle *et al.* (2010) highlight the importance for governments to recognise the relationship between frequency and currents that is required to produce effective stunning, while at the same time protecting animal welfare.

Standardisation of technical settings at poultry plants and the addition of BSCS are changes that can benefit the welfare of broilers in plants using multi-chicken, electrical water-bath stun systems, but some larger plants have replaced these conventional methods with controlled atmosphere stunning (CAS) systems (Lines *et al.*, 2011). They have done this to address welfare issues associated with the conventional stunning methods and shackling of sentient broiler chickens (Lines *et al.*, 2011). However, the use of toxic gas mixtures in some CAS systems has also raised questions about whether this method is actually more humane than electrical stunning (Vizzier-Thaxton *et al.*, 2010).

A low atmospheric pressure (LAP) system that reduces oxygen tension for controlled atmosphere stunning (CAS) has recently been developed and tested (Vizzier-Thaxton *et al.*, 2010). This system does not use noxious gas mixtures; instead broiler chickens lose consciousness by way of slow decompression of the atmosphere (Vizzier-Thaxton *et al.*, 2010). Vizzier-Thaxton *et al.* (2010) developed a commercial unit to ascertain the correct operating settings aimed at providing a humane method of stunning chickens. At the end of the six-month trial period, they found that corticosterone concentrations were greater in electrically stunned chickens than in LAP-stunned chickens (Vizzier-Thaxton *et al.*, 2010). It is likely that decreased corticosterone concentrations resulted from the absence of handling, inverting and shackling by allowing chickens to remain in their transport crates during stunning. Thus the LAP system eliminates live shackling and inconsistencies associated with electrical stunning, making stunning cleaner, easier and more humane.

Conclusion

While the BSCS initiative improves the welfare of broiler chickens in multi-chicken electrical water-bath systems, this technique is merely improving an inherently flawed system. Thus, traditional stunning methods should be phased out in preference of a system such as LAP stunning, which ensures an effective stun for each chicken and eliminates live shackling.

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