The effect of pre-stun shocks in electrical water-bath stunners on carcase and meat quality in broilers

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Abstract

The objective of this study was to identify the extent of pre-stun shocks in a commercial broiler processing plant and to collect any evidence of their effect on broiler carcase and meat quality. The results showed that the degree of bird movement on entry to the water-bath was related to the incidence of pre-stun shocks, with heavier male birds showing less movement and correspondingly lower levels of pre-stun shocks. In a separate trial, 500 birds identified as receiving a pre-stun shock were compared with 500 control birds (no pre-stun shock). They were assessed for carcase downgrading conditions, red wing tips, wing haemorrhages, shoulder haemorrhages, breast muscle haemorrhages, the incidence of broken pectoral bones and also for meat quality defects. All downgrading conditions were subjectively assessed using photographic standards. The results of this study have shown that the incidence of pre-stun shocks has a significant effect both on carcase downgrading conditions and on meat quality. Pre-stun shocks are preventable and the poultry processing industry can improve both bird welfare and carcase and meat quality by ensuring that they do not occur.

Keywords: animal welfare, carcase quality, electrical stunning, miss-stun, pre-stun shocks, water-bath stunner

Introduction

The Council Regulation on the protection of animals at the time of killing (1099/2009) specifies in Annex I, no 3 that for the water-bath stunning of poultry, a key parameter is the prevention of electrical shocks before stunning. If a bird’s leading wing or any other part of the bird makes contact with the live water before the head, the bird will receive a potentially painful pre-stun shock (PSS). Therefore, bird welfare will be compromised and it is likely that there will be an effect on carcase and meat quality through repeated electrical stimulation of the live bird in the water-bath. Terlouw et al. (2008) reported that PSS are painful to the bird and could also stimulate birds to fly the water-bath and as a result they would not be stunned. Miss-stun can occur particularly with small birds, when they arch their neck or lift up when stimulated by a pre-stun shock and fly the full length of the water-bath stunner without being stunned. The Farm Animal Welfare Council (FAWC 2009) also reported that PSS must be painful. The occurrence of PSS in electrical water-bath stunners has been reported for many years (Wotton & Gregory 1991; Raj & Tserveni-Gousi 2000; Wotton & Wilkins 2004; HSA 2006). This welfare problem has not been prioritised by the poultry industry and it is proposed that if a link can be demonstrated between PSS and the incidence of downgrading conditions then financial pressure can be added to the welfare leverage.

Pre-slaughter stunning means any intentionally induced process, which causes loss of consciousness and sensibility without pain, including any process resulting in instantaneous death (Council Regulation 1099/2009). The stunning method employed must produce immediate loss of consciousness that lasts until death (WASK 1995) so that the bird cannot feel any pain or distress associated with the slaughter process. The most widely employed stunning method for the commercial stunning of poultry is electrical water-bath stunning. Electrical water-bath stunning of poultry is designed to pass the head and upper part of the bird through an electrically live water-bath whilst the circuit is completed through an earthed shackle. However, because the electrical current passes through the whole body of the bird, it can also affect carcase and meat quality (Wilkins et al. 1998). Therefore, assessment of both the electrical stunning parameters and carcase and meat quality are essential requirements in order to maintain both bird welfare and profitability during the processing of poultry (Prinz 2009). Birds should be stunned through a single continuous immersion in the live water without receiving PSS (WASK 1995).

The construction of an electrically isolated entry ramp over the entrance to the water-bath will help project the head of the bird into the ‘live’ water quickly and reduce the incidence of PSS. The overflow of water from the water-