Assessing pig welfare at stunning in Swedish commercial abattoirs using CO₂ group-stun methods

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Abstract

While regular monitoring of stun quality in abattoirs is now required by EU law, guidelines specific to species and stun method have not been adequately developed. Carbon dioxide (CO₂) gas stunning of pigs in groups is widely used because of efficiency and reduced pre-slaughter stress. However, some pigs may recover from the stun process if it is not correctly managed. In light of these concerns, this study aimed to develop and implement a standardised assessment for stun quality for use in commercial pig abattoirs. Eight abattoirs and 9,520 slaughter pigs were assessed for stun group size, stick time and stun quality. The stun system, CO₂ concentrations and exposure times were also investigated. A stun-quality protocol (SQP) identified and risk-rated symptoms signifying recovery of consciousness. In abattoirs using paternoster stun-boxes, pigs consistently showed no stun-quality problems despite 65% with stick times between 70 and 100 s. Stun-quality problems were detected in 1.7 to 3.3% of pigs in abattoirs using dip-lift stun-boxes and 75% of stick times were below 60 s. In 36 of 38 cases of inadequately stunned pigs, a combination of symptoms from the SQP was seen. Regular gasping preceded other symptoms in 31 cases and was a valid indicator of inadequate stunning. In response to the stun-quality assessments, two abattoirs serviced the stun machines (increasing CO₂ concentrations and exposure times). All pigs were adequately stunned in follow-up studies. Implementation of stun-quality assessments, such as developed in this study, can assure monitoring of animal welfare at slaughter, beneficial not only to the industry and relevant authorities but also the concerned consumer.

Keywords: animal welfare, CO₂ stunning, commercial abattoirs, pig welfare, stun-quality assessment, stun-quality protocol

Introduction

The purpose of stunning animals at slaughter is to ensure they are rendered insensible to bleeding (sticking) and post-slaughter procedures, and it is a statutory requirement of the EU (EC 2009). All major abattoirs in Sweden use group-wise carbon dioxide (CO₂) stun systems where approximately 2.8 million pigs are slaughtered annually (Official Statistics of Sweden 2011). CO₂ stunning is now favoured over electrical or captive-bolt methods due to greater benefits for animal welfare (Stoier et al 2000; Barton Gade & Christensen 2002; Terlouw et al 2008) and meat quality (Velarde et al 2000a; Channon et al 2003). The main animal welfare advantage is that pigs can be handled and stunned in groups rather than individually restrained and stunned as with alternative methods. CO₂ systems can also be operated with mechanical push gates that separate pigs into small groups and push them into the stun-box, abolishing the use of electric prodders. When these systems are properly operated, pre-slaughter stress can be reduced (Christensen & Barton-Gade 1997). The depth of unconsciousness (stun quality) from CO₂ gas stunning depends on CO₂ concentration, exposure time and the animal. Due to individual biological variation, some pigs may regain consciousness while others not, even if stunned in the same group (Forslid 1987; Holst 2001). To ensure good animal welfare the stun should ensure unconsciousness is induced for a sufficient duration to include not only the stun-to-stick interval but also the time taken for brain death to occur due to sticking. Anil and McKinstry (1993) found that sticking does not always result in rapid and profuse blood loss in pigs, and the time taken for permanent loss of brain responsiveness varies in commercial practice. Problems with slow bleeding (and consequential delay of death) can occur if the size of the sticking wound is too small (Gregory 1999; Anil et al 2000). It is therefore imperative for animal welfare that unconsciousness is closely monitored, and pigs re-stunned when necessary; especially as pigs are hoisted upside down and conveyed to a scalding tank for de-hairing within five minutes after sticking in some abattoirs.