Licensing poultry CO$_2$ gas-stunning systems with regard to animal welfare: investigations under practical conditions

K von Holleben*, M von Wenzlawowicz and E Eser

Bsi Schwarzenbek, Postbox 1469, 21487 Schwarzenbek, Germany
* Contact for correspondence and requests for reprints: info@bsi-schwarzenbek.de

Abstract

Carbon dioxide stunning of broilers is not permitted in Germany. However, the competent authority can license a system for testing, during which scientific evaluation with regard to animal welfare is required. Between 2004 and 2011 several aspects of three systems have been evaluated in Germany and Italy under practical conditions including: (i) supply to the stunning system; (ii) induction conditions; (iii) stunning effectiveness; and (iv) process control. The systems were: (i) LINCO progressive gas-stunning system in which broilers in their transport crates are lowered stepwise into a pit filled with CO$_2$ and exposed to slowly increasing concentrations of CO$_2$ in air up to between 50 and 65% with total dwell times between 275 and 440 s depending on birds’ weight; (ii) Stork PMT two-phase gas-stunning system (40% CO$_2$/30% O$_2$/30%N$_2$ for 1 min/ 80% CO$_2$ for 2 min) in which broilers are tipped onto a belt, on which they pass through the gas atmospheres; and (iii) Anglia Autoflow two-phase CO$_2$-stunning system, in which the birds are exposed to the atmosphere in their crates. Results on the third system are pending as the investigation is still ongoing. In systems (i) and (ii) analysis of behaviour showed that birds were only exposed to high CO$_2$ concentration (> 40%) after becoming unconscious. Stunning effectiveness was very high but, nevertheless, occasionally birds (0.027% LINCO system and 0.003% Stork PMT system) were able to regain consciousness. Examples of evaluation of behaviour during induction are presented in this paper and animal welfare aspects are compared. Controlled-atmosphere stunning systems for broilers using less than 40% CO$_2$ until animals are unconscious, show obvious advantages compared to electrical water-bath stunning, for example, the avoidance of shackling and achieving high stunning effectiveness.

Keywords: animal welfare, broiler, CO$_2$ stunning, CAS, key parameters, monitoring points

Introduction

Scientific results concerning welfare during gas stunning of poultry need to be transferred into slaughterhouse conditions. Even if a stunning method is scientifically approved, the system developed for putting this method into practice has to be evaluated with regard to animal welfare. Hence, the evaluation of welfare of a gas-stunning system under practical conditions involves the following issues: (i) good welfare during pre-stunning handling and supply to the system to avoid injuries, reduce excitement and for a gentle induction of the stunning process; (ii) scientifically based induction conditions and corresponding clinical appearance, which can be verified under practical conditions; broilers must have lost consciousness before they enter high CO$_2$ concentration (> 40%), see Regulation [EC] No 1099/2009 Annex I, Chapter I. As loss of consciousness is not instantaneous, the induction phase must be gentle and must not include aversive effects; (iii) sufficient depth of stunning to assure that, in combination with a given stun-stick interval and quality of neck-cutting, no animal regains consciousness before dying; and (iv) suitable process control and monitoring of relevant welfare parameters including definitions of key parameters and monitoring points to enable easy checks by the plant staff and competent authority.

The authors have been involved in providing scientific expertise to German competent authorities and to European manufacturers/industry, to assist with the decision whether, and under what conditions, systems for gas stunning of poultry could be installed according to the German Animal Welfare legislation. In Germany, currently, CO$_2$ stunning is permitted for turkeys, whereas for broilers, until EC regulation 1099/2009 comes into force, only a temporary permission for testing is possible.

The controlled-atmosphere stunning (CAS) systems for poultry described in this paper according to Council Regulation (EC) No 1099/2009 of 24 September 2009 on the protection of animals at the time of killing (Annex I, Chapter 1, Methods, Table 3, Gas methods) can be subsumed under Line 2: “Carbon dioxide in two phases”, which is described as “Successive exposure of conscious animals to a gas mixture containing up to 40% of carbon...