

HUMANE SLAUGHTER FOR BROILERS

SUMMARY OF METHODS, WELFARE CONSIDERATIONS, AND POLICY RECOMMENDATIONS

INTRODUCTION

Slaughter practices in global food supply chains have gained significant attention recently, both within food businesses and among consumers and the media. This document provides information on the humane slaughter of broiler chickens, including an overview of the main methods of slaughter commercially used in the United States, and recommendations for corporate animal welfare policies.



MAIN METHODS OF SLAUGHTER FOR BROILER CHICKENS

1. ELECTRICAL

Electrical water bath stunning:

Electrical waterbath stunning is the main method used in the United States for the slaughter of poultry. In this process, broilers are manually removed from transport crates, then hung upside down on a moving line using metal shackles. Once shackled, the birds pass through an electrified waterbath. Electricity flows through the body and up the metal shackle, ideally producing cardiac arrest and unconsciousness, and resulting in an irreversible stun.¹ In principle, electrical waterbath stunning can be humane, however, these systems also present serious welfare concerns, which justify the need to transition to systems that provide better outcomes from a welfare perspective, such as controlled atmosphere processing.

Welfare concerns:

- The electrical parameters that result in an effective stun (low frequency, high current) can also cause blood spots in the muscle, bruising and broken bones, all of which reduce the value of the carcass. These meat quality issues are a result of the electrical current causing strong and simultaneous muscle contraction. For this reason, higher frequencies and lower currents are typically used, resulting in fewer meat quality issues but a greater number of birds being ineffectively stunned. Ineffectively stunned birds are often conscious during subsequent stages of processing, including bleeding and scalding.²
- There are also issues with the consistency of the stun each bird receives, as there are several birds in the waterbath stunner at any one time, and individual birds will have different levels of electrical resistance.³ If the electrical parameters delivered to each bird are not sufficient, there is a risk birds will recover consciousness during bleeding, or that birds are paralyzed but still conscious.
- Painful pre-stun shocks can occur if wings come into contact with the waterbath before the head.
- Research confirms that the handling, inversion, and shackling of the birds required for electrical waterbath stunning causes serious pain and stress.⁴

1. Berg, Charlotte, and Mohan Raj. 2015. "A Review of Different Stunning Methods for Poultry—Animal Welfare Aspects (Stunning Methods for Poultry)." *Animals* 5 (4): 1207–19.

<https://doi.org/10.3390/ani5040407>

2. Hindle VA, Lambooij E, Reimert HGM, Workel LD, Gerritzen MA. 2010. Animal welfare concerns during the use of the waterbath for stunning broilers, hens, and ducks. *Poultry Science* 89(3): 401–412.

3. *Ibid.*

4. Gentle MJ, Tilston VL (2000). Nociceptors in the legs of poultry: implications for potential pain in pre-slaughter shackling. *Animal Welfare* 9: 227–236.

2. CONTROLLED ATMOSPHERE

Controlled atmosphere (gas) systems, which expose birds to a controlled mixture of gases inside of a closed chamber, are considered stun-kill systems; in other words, when adequately used, there is no risk of the birds recovering consciousness prior to or during bleeding. Another significant advantage is that the birds remain in their transport crates throughout the process, avoiding the need for additional live handling—including the highly stressful processes of dumping, inversion, and shackling.

Carbon dioxide:

Carbon dioxide acts directly on the nervous system to stop breathing in addition to blocking availability of oxygen. Carbon dioxide is used in the majority of controlled atmosphere systems, in two main ways: multi-phase systems involve successive exposure to a gas mixture containing up to 40% carbon dioxide to stun the birds, followed by exposure to a higher concentrations of carbon dioxide (>55%) which result in death; the alternative method is to use combinations of carbon dioxide (up to 30%) and other gases – inert gases and sometimes oxygen – which lessens the aversiveness of the gas to the birds.⁵ Single-phase carbon-dioxide systems (where birds are introduced to a static concentration of gas) are not recommended, as birds in these systems demonstrate more agitation and more severe convulsions (thereby increasing the potential for injury).^{6,7}

Inert gases:

These include argon and nitrogen. As the name suggests, these are non-toxic and non-aversive to the birds. The birds die through a lack of oxygen. To be reliable, the gas has to be maintained with a maximum of 2% oxygen and the method takes longer to kill than carbon dioxide systems. However, as the gases are not aversive this is considered less stressful than carbon dioxide methods.⁸ Despite being considered better for welfare, inert gas systems are used less commonly than carbon dioxide systems as the gases are more expensive and because the method results in a period of vigorous wing flapping after the birds lose consciousness, which can lead to increased rates of carcass damage.

Low Atmosphere Pressure Stunning (LAPS):

The method works by gradually removing air (and therefore also oxygen) from a chamber containing the birds. Studies to date suggest that in terms of welfare, LAPS may be comparable to other CAS methods. Nevertheless, further research is needed to determine whether birds experience significant pain or distress between the start of the LAPS process and the onset of unconsciousness.⁹ In the United States, a commercial scale LAPS system has been in use since 2011, with a capacity for processing 21,600 broilers an hour, for birds up to 4kg.¹⁰

Welfare concerns:

- Use of inadequate concentrations of carbon dioxide, or failure to use multi-phase systems can result in carbon dioxide aversiveness. Carbon dioxide is aversive in low concentrations, and highly aversive in high concentrations. Aversiveness to carbon dioxide increases in severity when the carbon dioxide level is 30% by volume or more.
- In LAPS, animals may display signs of distress (headshaking, panting, jumping) for an average of 20 seconds. Time to loss of posture is longer for LAPS than for CAS using carbon dioxide or inert gases.¹¹

5. Gerritzen MA, Reimert HGM, Hindle VA, Verhoeven MTW, Veerkamp WB (2013). Multistage carbon dioxide gas stunning of broilers. *Poultry Science* 92(1): 41-50.

6. Abeyesinghe SM, McKeegan DEF, McLeman MA, Lowe JC, Demmers TGM, White RP, Kranen RW, Bommel H van, Lankhaar JAC, Wathes CM (2007). Controlled atmosphere stunning of broiler chickens. I. Effects on behaviour, physiology and meat quality in a pilot scale system at a processing plant. *British Poultry Science* 48(4): 406-423.

7. McKeegan DEF, Abeyesinghe SM, McLeman MA, Lowe JC, Demmers TGM, White RP, Kranen RW, Bommel H van, Lankhaar JAC, Wathes CM (2007). Controlled atmosphere stunning of broiler chickens. II. Effects on behaviour, physiology and meat quality in a commercial processing plant. *British Poultry Science* 48(4): 430-442.

8. Gerritzen MA, Lambooy E, Hillebrand SJ, Lankhaar JA, Pieterse C (2000). Behavioral responses of broilers to different gaseous atmospheres. *Poultry Science* 79(6): 928-933.

9. Mackie N, McKeegan DEF (2016). Behavioural responses of broiler chickens during low atmospheric pressure stunning. *Applied Animal Behaviour Science* 174: 90-98.

10. EFSA Panel on Animal Health and Welfare (AHAW), Simon More, Dominique Bicot, Anette Bøtner, Andrew Butterworth, Paolo Calistri, Klaus Depner, et al. 2017. "Low Atmospheric Pressure System for Stunning Broiler Chickens." *EFSA Journal* 15 (12): n/a-n/a. <https://doi.org/10.2903/j.efsa.2017.5056>.

11. *Ibid.*

RECOMMENDATIONS FOR CORPORATE POLICIES ON HUMANE SLAUGHTER OF BROILER CHICKENS

- 1 All animals killed for meat should be slaughtered humanely. For broiler chickens, the use of stun-kill controlled atmosphere methods using carbon dioxide or inert gases are recommended above other methods where possible. The use of electrical waterbath systems for broiler chickens should be phased out.
- 2 The killing of animals by bleeding without the use of pre-slaughter stunning is not considered a humane method of slaughter. Corporate animal welfare policies should stipulate that all meat in the supply chain comes from animals that have been subject to pre-slaughter stunning.
- 3 All systems for killing animals should be effectively managed and monitored. This includes:
 - The development and use of Standard Operating Procedures (SOPs) for all live animal operations.
 - Effective training of all staff involved in live animal operations.
 - Designating a member of staff responsible for animal welfare in the slaughterhouse, an “Animal Welfare Officer”, whose role it is to monitor operations to ensure SOPs are followed and to require remedial action be taken if non-compliance or other issues are found.
 - Use of CCTV in all live animal handling areas, with effective monitoring of the footage.
 - Effective measurement and proactive management of welfare outcomes at slaughter.
- 4 For controlled atmosphere systems:
 - A stun-kill method should be used to remove the risk of the animal recovering consciousness.
 - If carbon dioxide systems are used, a multi-phase system is recommended whereby the birds are initially subjected to concentrations up to a maximum of 40% carbon dioxide to stun the birds and thereafter subjected to higher concentrations to kill.
 - Controlled atmosphere systems should be designed so that the birds can remain in the transport modules, without the need for any additional live handling at the slaughterhouse.
 - Controlled atmosphere systems should be designed such that an operator can visually monitor the birds inside the chamber, in order to check for possible adverse reactions.

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