

BVA and PVS response to Animal Welfare Committee (AWC) evidence review on the welfare impacts of high concentration CO₂ gas stunning and of alternative stunning methods for pigs.

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Introduction

1. The British Veterinary Association (BVA) is the national representative body for the veterinary profession in the United Kingdom. With more than 19,000 members, our primary aim is to represent, support and champion the interests of the United Kingdom's veterinary profession. We therefore take a keen interest in all issues affecting the profession, including animal health and welfare, public health, regulatory issues and employment matters.
2. Pig Veterinary Society (PVS) is a specialist division of the British Veterinary Association. The Society was founded in 1963 and includes members from around the World and from all areas of the pig industry; membership is open to veterinary surgeons and scientists working in the pig sector. The Pig Veterinary Society exists to assist its members to care for pigs, through dissemination of knowledge about health, disease, the pig's welfare and management.
3. We welcome the opportunity to contribute to the Animal Welfare Committee's review of evidence on the welfare impacts of high concentration carbon dioxide (CO₂) gas stunning and of alternative stunning methods for pigs.

Q1. What are the welfare benefits and adverse welfare effects of preslaughter handling and restraint for high concentration CO₂ stunning and alternative stunning methods for pigs (e.g. inert gases, CO₂ and inert gas mixtures, automated or manual electrical stunning, mechanical methods)?

4. Animal health and welfare must be protected throughout the slaughter process (from preparation on-farm, to transport, handling and killing operations at the abattoir) so that animals receive the most humane death possible.
5. Slaughter processes should be designed to minimise avoidable pain, distress, fear, and suffering. Current legislation provides a good framework to achieve these outcomes. Species-specific needs should be considered at all stages of the slaughter process, and all animals should be effectively stunned before slaughter.
6. Gas stunning systems for pigs can offer several welfare benefits in terms of pre-slaughter handling, including ensuring animals remain in social groups and that the delivery of the stun is consistently effective at high throughputs. Additionally, the risk of human error, which can occur in the head-only electrical simple stunning of pigs with incorrect placement of electrodes, is reduced.
7. We support FAWC's (now known as AWC) general principles for gas stunning and killing operations in pigs under current UK legislation, which considers that the following should apply in all gas stunning and killing operations:

- Pigs should be maintained in a stable social group with a minimum of restraint.
 - Pre-slaughter handling facilities should be designed to minimise stress.
 - The gas used to induce unconsciousness should not be aversive.
 - All pigs should be rendered rapidly unconscious in the gas. It is a legal requirement that this point is reached within a maximum of 30 seconds of the pig entering the highest concentration gas in the controlled atmosphere unit.
 - An irreversible state of unconsciousness (death) must be reached in all pigs prior to sticking, which typically involves a deep cut to the chest of the pig cutting major blood vessels near to the heart.
 - There should be adequate monitoring of the system and the ability to provide efficient evacuation of livestock in the event of any system failure.¹
8. It is important to note that industry was advised to shift to gas stunning to improve welfare. There will need to be strong evidence of improved welfare outcomes if a shift away to alternative systems is advocated.

Q2. What are the welfare benefits and adverse welfare effects of high concentration CO₂ stunning of pigs and the potential alternatives?

9. As per our response to question 1, we support AWC's general principles for gas stunning and killing operations in pigs under current UK legislation, which stipulates that pigs must be exposed to gas methods for long enough to ensure death. We believe that there is a welfare benefit to the pig in terms of slaughter and pre-handling. As The European Food Safety Authority states that: "Gas stunning has a high potential for humane stunning or stun/killing if non-aversive gases or gas mixtures are used. It requires sophisticated technical equipment. The animals are exposed to a moderate handling stress only."
10. In terms of adverse welfare effects, there is evidence that shows that individual pigs can experience mild to severe aversive reactions and compromised welfare when pigs are stunned by exposure to a high concentration of CO₂. In 2003, in its opinion on the Welfare of Farmed Animals at Slaughter or Killing Part 1: Red Meat Animals, AWC supported further research into and development of alternatives to CO₂, such as mixtures including argon or nitrogen, which are less aversive. However, CO₂ causes faster central nervous system suppression than argon. With argon there is the increased possibility of recovery, and it takes longer to reach loss of posture and there is more kicking/paddling, which can result in more bruising and carcase damage. Ultimately, AWC concluded that the use of high concentrations of CO₂ to stun and kill pigs is not acceptable and it would wish to see the method phased out in five years. Research should therefore be undertaken quickly by government and industry to develop less aversive gas stunning methods with the aim of phasing out current aversive gas stunning methods for pigs.

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/325241/FAWC_report_on_the_welfare_of_farmed_animals_at_slaughter_or_killing_part_one_red_meat_animals.pdf

Q3. What back up methods of stunning are available?

Inert gas stunning methods

11. Existing evidence suggests that using inert gases such as argon (or nitrogen) to stun pigs should be explored. This evidence has demonstrated that pigs, chickens and turkeys showed greatly reduced aversion to inhalation of argon.
12. Inert gases allow for grouping pre-slaughter to be maintained and could be retrofitted into current CO₂ systems, albeit at significant cost. Exposure to argon for five minutes or less can result in rapid recovery, and UK legislation currently specifies that pigs must be exposed to the gas for long enough to ensure death. Pigs would therefore have to be exposed to the gas mixture for periods of seven minutes or more for death to be ensured.
13. Work carried out in Europe using argon found a failure rate of 0.5% and therefore a secondary method of stunning was required for these cases. At current abattoir throughputs, this would equate to at least one pig in every load requiring this secondary stun (likely to be electrical stunning). As well as being stressful for both staff and pigs, this would also create a significant time delay. It may be possible to eliminate these failures by significantly increasing dwell times. This would impact on throughput and therefore costs.
14. Argon is estimated to cost 1p more per kilogram of meat produced than CO₂. This is just the increased cost of the gas and does not factor in the cost of retrofitting an existing CO₂ system, or any potential reduced throughput if longer dwell times are needed. Concerns have also been raised about whether argon gas can be sourced sustainably, as its production often comes with a large carbon footprint.
15. Second to inert gas stunning, gas mixtures containing up to 30% CO₂ in argon (or nitrogen) are relatively less aversive than high concentrations (>70%) of CO₂.
16. Consideration should therefore be given to amending legislation to permit simple stunning (stunning that does not kill) by gas methods to encourage the use of less aversive gas methods and improve pig welfare at slaughter. If simple stunning were to be permitted, the time interval between end of exposure to alternative gas mixtures and sticking is critical.

According to the available evidence, examining exposure to 90% argon concentration, and a combined 30% CO₂ and 60% argon concentration, the interval times between exposure and sticking are reported to be²:

Exposure time in minutes	Maximum end of exposure to sticking interval in seconds
Three	25
Five	45
Seven	Not critical as pigs are killed

17. Any consideration of amending legislation to permit simple stunning by gas methods must therefore accurately determine the maximum end of exposure to

² <https://bvajournals.onlinelibrary.wiley.com/doi/10.1136/vr.144.7.165>

sticking interval to prevent the potential for recovery of consciousness before sticking, as well as assessing the logistical changes, and potential impact on animal welfare, that may be required to implement this in abattoirs.

High-Capacity Electrical Stunning

18. Electrical stunning is known to be very effective in a wide variety of animals, including pigs. The stunning itself is also known to be painless. This process will require pigs to be separated prior to stunning which may induce some stress. At present, the biggest barrier to using electrical stunning in commercial pork abattoirs is capacity. If an appropriate engineering solution could be found to mitigate this, it may well be an appropriate alternative to CO₂.

Low Atmospheric Pressure Stunning (LAPS)

19. Following positive results in the poultry sector, the use of hypobaric hypoxia to induce unconsciousness and death had been suggested as an early alternative to CO₂ stunning. This would allow pigs to be kept in groups prior to and during slaughter. A study jointly funded by DEFRA and the Humane Slaughter Association in 2018 assessed both the effectiveness of this technique as well as the aversiveness of pigs.
20. Whilst LAPS was found to be effective at inducing unconsciousness and death the researchers concluded that it triggered the same level of aversive behaviours in pigs as CO₂. It is possible that by slowing the speed at which oxygen concentration is reduced would reduce these aversive behaviours but would also significantly increase the time taken to carry out the procedure. This may render it non-viable in a commercial setting.

Captive-bolt stunning

21. Captive-bolt stunning is an alternative stunning method for pigs. The protracted violent convulsions produced in healthy pigs by the use of captive-bolt stunners precludes their use in commercial slaughter. They are generally only used in emergency slaughter of pigs. Where captive-bolt stunning is used on pigs for emergency slaughter, the heaviest cartridge for the stunner should be used, it should be delivered by an experienced individual, and the animal should be bled or pithed immediately to ensure a rapid death.