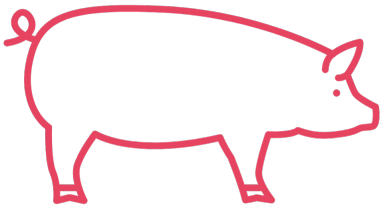
CO_2 Stunning in Australian Pork Processing: Evidence from PigStun Project

APL Project 2025/0166: Critical analysis of the PigStun project outcomes

Project participants: SunPork Group, The University of Melbourne - Animal Welfare Science Centre

The problem



Carbon dioxide (CO_2) stunning is the predominant stunning method used in Australian pork processing and globally. In recent years, concerns about animal welfare during CO_2 stunning, along with public and regulatory pressure in some jurisdictions, have driven international research into alternative stunning methods.

The EU-funded PigStun project investigated potential alternatives to high-concentration CO_2 stunning, including inert gas and improved electrical systems. However, it was unclear whether these alternatives could meet the animal welfare, meat quality, throughput and commercial viability requirements of the Australian pork industry.

The project

A comprehensive, independent review was undertaken by Australian Pork Limited, The University of Melbourne and SunPork to critically evaluate the PigStun project and assess its scientific robustness, practical outcomes and relevance to Australian commercial pork processing.

The review examined PigStun deliverables, supporting datasets, related projects and expert consultations to assess:

- Animal welfare outcomes
- Stunning effectiveness and reliability
- Meat quality impacts
- Economic and infrastructure implications
- Processing throughput and operational feasibility

Value for industry

This review provides clear, evidence-based guidance to support informed decision-making by Australian processors, regulators and stakeholders.

It enables the industry to respond confidently to scrutiny around pig stunning practices, avoid premature adoption of unproven or commercially unviable systems, and balance animal welfare objectives with product quality, efficiency and worker safety. The findings also reinforce Australia's commitment to science-led, welfare-responsible and market-fit processing systems.

Based on current scientific, welfare, operational and economic evidence, **CO_2 stunning remains the only method** that reliably meets the combined requirements of **animal welfare, processing efficiency, meat quality** and **commercial practicality** for the Australian and global pork industry.

Outcomes

The review found that:

- CO_2 stunning remains the most viable commercial method for Australian, and global, pork processing, consistently delivering reliable unconsciousness, high throughput, acceptable meat quality and proven scalability.
- Argon is the most promising alternative in terms of reduced aversive responses during induction; however, effective stunning requires oxygen levels below 2% and exposure times of up to seven minutes to prevent recovery of consciousness. These requirements substantially reduce throughput and would necessitate major facility redesign, additional stunners and/or significant increases in labour.
- Argon stunning also produced inconsistent meat quality outcomes, including higher drip loss, increased bloodspots and elevated risk of PSE (pale, soft, exudative) posing concerns for Australia's predominantly fresh pork market.
- Helium is not commercially viable, due to extremely high cost, limited global supply and reliance on large-scale gas recovery systems.
- Improved electrical stunning systems showed some welfare benefits from better raceway design and reduced use of high-voltage prodders; however, they still require single-file handling, carry risks of incorrect electrode placement, depend on short stun-to-stick intervals, and continue to deliver poorer meat quality outcomes compared with CO_2 stunning.

More information

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