Snapshot Report

Stealth Dual Purpose I.4.0 Knocking Box - Syndicated Development and Adoption PIP

Project code
2022-1066

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Date submitted
31/12/2025

Project description

Typical existing knocking boxes deployed in Australia are driven by pneumatics (or hydraulics) and by default are noisy during operation which can impact on each animal causing increased stress typically identified by increased vocalisations. This project supported 10 Australian beef processors to work with Jarvis to develop and trial and implementation of a Stealth dual purpose knocking box. The combination of the 10 processors and the locations nominated (i.e. some processors have multiple sites) enabled Jarvis (and AMPC) to further develop, install, evaluate and fine-tune the Stealth Dual purpose knocking box.

This project installed and validated one of the knocking boxes in a commercial beef processing facility. The core objectives of the project were to: reduce operational noise and animal vocalisation (improving animal welfare); enable advanced Industry 4.0 data capture (animal weight, RFID, and imaging at slaughter); facilitate electrical stunning to eliminate skull cracking, supporting religious slaughter requirements and expanding access to high-value export markets; and monitor and improve yield and quality, including tracking ecchymosis, bruising, and contamination.

Project content

The Stealth dual purpose knocking box is powered by an electric linear actuator with silent bushes for actuator connectors and pivots to reduce noise and associated stress levels of the animal during stunning. The knocking box is lined with nylon insulation, whilst the floor and entrance of the knocking box are lined with anti-slip, anti-conductive rubber to further reduce noise and slippage. The knocking box is fitted with both the Jarvis JASS-2 electric stunning unit and USSSC-1A pneumatic control cabinet for electric and pneumatic stunning respectively, with both units allowing greater control of stunning variables (air pressure, time, electric current etc) and the capture of all details through the in-built data loggers.

The knocking box was installed over Easter 2022, with modifications to facility layout and supporting infrastructure. Pneumatic stunning was used first, with operator training and SOPs developed for future electrical stunning. CSIRO collected data during the project to evaluate the knocking operation and noise and animal behaviour. A small-lot trial was conducted to validate electrical stunning effectiveness, animal welfare, and meat quality.

Early issues that occurred after installation included equipment pinch points, control panel ergonomics, and animal positioning, which were addressed through iterative modifications. Regular mechanical and electrical audits were conducted quarterly to address issues identified such as cylinder failures, seal wear, and control system reliability. Adjustments were made to the cradle, head restraint, chin lift, and automation improved animal positioning and operator workflow.

Project outcomes

The project was successful at installing the Stealth dual purpose knocking box and allowed the trailing of the electrical stunning options. The new knocking box was quieter and promoted better entrance into box by animals. The stealth box continues to be used by the processing facility, but use of electrical stunning was ceased during the trial due to the inability to meet operational production speeds. The requirement for a thoracic stick to occur to ensure the animal does not regain consciousness meant several processes had to be completed on the cradle before the animal was hoisted. As a result, the average process time was 72 seconds per animal was required, while the desired processing speed was 42 seconds per animal which was achievable with the pneumatic stunning.

Benefit for industry

Overall, the new Stealth dual purpose knocking box was quieter and promoted better entrance into box by animals. It worked effectively when employing pneumatic stunning but electrical stunning required many operations to be completed at the same station before the animal moves on and thus limited production speeds.