
Question to EURCAW-Pigs: Electrical stunning

19 June 2021

Question

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EURCAW-Pigs received questions from a welfare policy worker in one of the Member States, related to the loss of consciousness of animals after head-to-body electrical stunning (using a MIDAS stunner):

Context: At slaughter, the signs of consciousness chosen by the Food Business Operator (FBO) in his SOP after bleeding (horizontal knife bleeding on a table) were: absence of loss of posture, attempt to stand up, vocalization, eye tracking, eye reflex, 3 or more regular respiratory movements.

With these signs, the rate of consciousness observed after bleeding was between 8 and 10%, with large variations over time that are not explained yet. These 8 to 10% of animals declared conscious had respiratory movements as their only sign of consciousness (and one observed the day of the visit with vocalization): these are most often forced movements with significant rib pulling and jaw movements (sometimes 3-5 respiratory movements over the 20 seconds of the bleeding table). Accordingly, the questions are:

- *When do respiratory movements and gasps following electrical stunning, where appropriate, indicate a state of consciousness?*
- *Have you observed similar situations on other sites equipped with MIDAS as the electrical stunning system?*

Answers

Several EURCAW experts contributed to the response below. The EURCAW secretariat did the final editing, and may be contacted for queries: info.pigs@eurcaw.eu.

In short the answers are:

- Under certain circumstances, after electrical stunning and during bleeding, gasping may occur, characterized by a drawing of the lower jaw of the opened mouth towards the thorax. Gasping in the kind of these intermittent powerful inspiratory efforts are the result of ischemia or hypoxia. These breathing movements are not functional breathing and do not indicate consciousness.
- The observed respiratory movements are described for other sites where pigs are stunned by head-to-body electrical stunning (like in a MIDAS system). However, to our knowledge there is no information available on the number of occasions.

Background

Signs of (un)consciousness

The principal outcome of head-to-body electrical stunning of pigs is immediate loss of consciousness. Characteristic for effective electrical stunning are the immediate collapse in the hindquarters, stretched forelegs, and tonic rigidity of the entire body. The tonic phase will

change to a clonic phase without showing breathing activity, and eyeballs fixed or rotated into the socket. Thus, effective electrical stunning is characterized also by an immediate loss of breathing (i.e. no effective breathing activity, i.e. apnoea with or without some ineffective gasping) lasting throughout the bleeding phase until death of the animal (Berghaus and Troeger, 1998; EFSA, 2013; EFSA, 2020). Respiratory arrest is the result of an extension of the epileptiform seizure to subcortical regions (thalamus, brainstem) and cortical areas (Kaada & Jasper, 1952; Devinsky, 2004, cited by Terlouw et al., 2016). Involuntary muscle contractions, including those of the muscles involved in breathing, further intensify the effects of the generated epileptic seizure on breathing. Apnoea is accompanied by anoxia, which contributes to the state of unconsciousness (Terlouw et al., 2016).

The presence of breathing indicates an ineffective electrical stun whereas stunned animals recovering consciousness will start to breath in a pattern commonly referred to as rhythmic breathing which involves respiratory cycles of inspiration and expiration, and may begin as a kind of gagging or retching. Rhythmic breathing can be recognised from the regular movements of the chest, flank and/or mouth and nostrils. Under certain circumstances, after electrical stunning and during bleeding, gasping may occur, characterized by a drawing of the lower jaw of the opened mouth towards the thorax. Gasping in the kind of these intermittent powerful inspiratory efforts are the result of ischemia or hypoxia (see above; e.g. following anoxia due to apnoe). Unlike normal respiration, it is due to suppression of respiratory-modulated neuronal activities in the pons and recruitment of medullary activities (St. John, 2009). Gasping is not to be confused with functional breathing activity (Terlouw et al., 2016), especially since the chest is not active and the lungs are not filled as happens during normal rhythmic breathing. Nevertheless, gasping or regular breathing movements more than four times during the period later than 40 s after end of electrical stunning may indicate ineffective stunning, requiring re-stunning ((AG Tierschutz der Länderarbeitsgemeinschaft Verbraucherschutz (LAV), 2019); Gerritzen et al., 2021).

Prevalence

The observed gasping is described and observed for other sites where pigs are stunned by head-to-body electrical stunning (like in a MIDAS system). To our knowledge there is no information available on the number of occasions and the number of sites where this occurs.

Relevant references

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