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Are severely depressed suckling pigs resistant to gas euthanasia?

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Abstract

Severely depressed pigs exhibit differences in a number of important parameters that may affect gas euthanasia, including decreased respiration rate and tidal volume. Hence, the objectives of this study were to assess the efficacy and animal welfare implications of gas euthanasia of suckling pigs with varied disease severity (severely depressed [DP] vs other [OT]). A 2 × 2 factorial design was utilised with two gas types (carbon dioxide $[CO_2]$; argon [Ar]) and two flow rates (G = gradual, 35% box volume exchange per min [BVE min⁻¹]; P = prefill + 20% BVE min⁻¹). Sixty-two pigs were enrolled and tested as DP/OT pairs in each gas treatment combination. Pigs identified for euthanasia were assigned a subjective depression score (0 = normal to 3 = severely depressed). Pigs scored 3 and ≤ 1 were categorised as DP and OT, respectively. Significantly lower respiration, rectal temperature, pulse and weight were observed for the DP pigs relative to OT. Pigs were assessed for behavioural indicators of efficacy and welfare. No differences were observed between DP and OT when using P-CO₂ or G-CO₂. However in P-Ar, DP had greater latency to loss of consciousness relative to OT (212 [\pm 22] vs 77 [\pm 22] s), decreased latency to last limb movement (511 [\pm 72] vs 816 [\pm 72] s), greater duration of open-mouth breathing (151 [\pm 21] vs 69 [\pm 21] s), decreased duration ataxia (101 [\pm 42] vs 188 [\pm 42] s) and decreased righting response (27 [\pm 11] vs 63 [\pm 11] s). The G-Ar treatment was removed due to ethical concerns associated with prolonged induction. In conclusion, depression score did not affect pig responses to euthanasia with CO₂ gas, but did affect responses to Ar. Furthermore, Ar was associated with a prolonged euthanasia process, including frequencies and durations of distress behaviours.