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## **Effects of stocking rate on measures of efficacy and welfare during carbon dioxide gas euthanasia of young pigs**

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### **Abstract**

The objective of this study was to evaluate the effects of chamber stocking rate on facets of animal welfare and efficacy during gas euthanasia of young pigs (*Sus scrofa domestica*). Crossbred pigs (390 neonatal and 270 weaned) designated for euthanasia at production farms were randomly assigned to group sizes of one, two, four, or six pigs. Gas euthanasia of each piglet group was performed in a Euthanex<sup>®</sup> AgPro chamber. The chamber air was gradually displaced with CO<sub>2</sub> gas over 5 min to establish an in-chamber concentration of approximately 80% CO<sub>2</sub>. Pigs remained in that atmosphere for an additional dwell period of at least 5 min. Higher stocking rates were associated with higher CO<sub>2</sub> concentrations after gradual fill for both age groups. While there was no evidence of an effect of stocking rate on latencies to loss of posture or last movement in neonatal pigs, there was evidence of an effect on all measured efficacy variables in weaned pigs, with grouped pigs faster to succumb than solitary pigs. This finding is consistent with expected consequences of higher CO<sub>2</sub> concentration at increased stocking densities. Aversive states and behaviours of focal pigs in the chamber were scored from video. Weaned solitary pigs displayed a high incidence of pacing and may have experienced isolation distress. Escape attempts were absent in neonates and not linearly affected by stocking rate in weaned pigs. Although the risk of hazardous interactions was correlated with group size, this study provided no evidence that isolation during gas euthanasia would benefit animal welfare.

**Keywords:** animal welfare, behaviour, carbon dioxide, euthanasia, pigs, stocking rate