



Animal Welfare Institute

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José Arce, DVM, President
Panel on Animal Depopulation
American Veterinary Medical Association
1931 North Meacham Road, Suite 100
Schaumburg, IL 60173-4360

Reference: Classification of Ventilation Shutdown Methods in the AVMA Guidelines for the Depopulation of Animals

Dear Dr. Arce and Members of the Panel on Animal Depopulation:

We are writing regarding the classification of Ventilation Shutdown Plus (VSD+) in the AVMA *Guidelines on Depopulation of Animal*. This is a follow-up to previous correspondence from the Animal Welfare Institute with the Panel in October 2021 which urged the Panel to reclassify ventilation shutdown plus heat and/or humidity as “not recommended” and to address animal rearing practices that are both detrimental to animal welfare and increase the risk of future depopulations.¹

The October 2021 letter discusses a report published in the *Journal of the American Veterinary Medical Association (JAVMA)* entitled “A case study of ventilation shutdown with the addition of high temperature and humidity for depopulation of pigs.”² Subsequently, a November 2021 issue of *JAVMA* included two letters to the editor that offer criticism of the case study, as well as a response from the case study’s authors (see attached).³ In their response, the authors, in an effort to challenge the notion that VSD+TH causes significant harm to animal welfare, imply that the animals’ suffering is mitigated by impairment of the central nervous system (CNS) during heatstroke. They write:

“To date, there are no peer-reviewed studies on the physiologic response of swine to hyperthermia. However, extrapolating data from nonswine animal studies suggests that the onset of behavioral deviations and CNS impairment, as demonstrated by decreased auditory brain response amplitude, occurs when the core body temperature achieves \geq

¹ Liss, C. & Reyes-Illg, G. (2021, October). *Letter from the Animal Welfare Institute to the American Veterinary Medical Association*. <https://awionline.org/sites/default/files/uploads/documents/AWI-Letter-AVMA-Depopulation-Panel-Oct-2021.pdf>

² Baysinger, A., Senn, M., Gebhardt, J., Rademacher, C., & Pairis-Garcia, M. (2021). A case study of ventilation shutdown with the addition of high temperature and humidity for depopulation of pigs. *Journal of the American Veterinary Medical Association*, 259(4), 415–424. <https://doi.org/10.2460/javma.259.4.415>

³ Baysinger, A., Senn, M., Gebhardt, J., Rademacher, C., & Pairis-Garcia, M. (2021). Author’s response [Reply to Letters to the Editor]. *Journal of the American Veterinary Medical Association*, 259(10), 1103-1104. <https://doi.org/10.2460/javma.259.10.1102>. Full text available at: <https://www.vin.com/apputil/image/handler.ashx?docid=10673892>

43 °C.^{3,4,5} [sic] Given logistic constraints of this emergency on-farm event, core body temperature was not recorded for pigs, but the humidity was applied when the barn temperatures reached 54 °C and barns were maintained at a minimum of 49 °C for the duration of the procedure. Therefore, future research using VSD+TH must consider documenting core body temperature and behavior of pigs to quantify the temperature threshold that results in impaired cortical activity.”

The three studies the authors cite are attached here for review by the Panel.

The October 2021 letter to the Panel cites multiple other studies on the physiologic consequences of severe heat stress on pigs.⁴⁻⁵ Here, we would like to point out that information contained in the studies referenced by the case study’s authors in no way refutes the claim that mass killing via heatstroke causes severe harm to animal welfare. We discourage any further research on heatstroke as a method of mass killing, given that enough is known about the pathophysiology of heatstroke in terrestrial vertebrates to state unequivocally that it causes unacceptable levels suffering. Moreover, there are numerous alternatives available when depopulation is needed.

The first study cited by the authors of the VSD+TH case study, reference number 4, is “Heatstroke,” a 2019 review article in the *New England Journal of Medicine*.⁶ It notes that the pathophysiology of heatstroke involves direct cytotoxic effect and an inflammatory response similar to systemic inflammatory response syndrome (SIRS). While it reports CNS disturbances in humans, these heatstroke-induced changes to behavior and subjective experience are not benign; rather, they are very aversive:

“Early symptoms include behavioral changes, confusion, delirium, dizziness, weakness, agitation, combativeness, slurred speech, nausea, and vomiting. Seizures and sphincter incontinence may occur in severe cases, mainly in exertional heatstroke.”

While loss of consciousness does eventually occur, this is in the later stages, after significant suffering has been experienced.

The next study, reference number 5, is “Interstitial microwave hyperthermia in a canine brain model,” a study from 1986 published in the *International Journal of Radiation Oncology*.⁷ This study was carried out as part of an exploration into whether focal hyperthermia could be used for the treatment for brain tumors. Anesthetized dogs had their heads placed in stereotaxic frames and holes were drilled in their skulls to permit implantation of catheters,

⁴ Pearce, S. C., Mani, V., Boddicker, R. L., Johnson, J. S., Weber, T. E., Ross, J. W., Rhoads, R. P., Baumgard, L. H., & Gabler, N. K. (2013). Heat stress reduces intestinal barrier integrity and favors intestinal glucose transport in growing pigs. *PLoS one*, 8(8), e70215. <https://doi.org/10.1371/journal.pone.0070215>

⁵ Pearce, S. C., Sanz-Fernandez, M. V., Hollis, J. H., Baumgard, L. H., & Gabler, N. K. (2014). Short-term exposure to heat stress attenuates appetite and intestinal integrity in growing pigs. *Journal of Animal Science*, 92(12), 5444–5454. <https://doi.org/10.2527/jas.2014-8407>

⁶ Epstein, & Yanovich, R. (2019). Heatstroke. *The New England Journal of Medicine*, 380(25), 2449–2459. <https://doi.org/10.1056/NEJMr1810762>

⁷ Sneed, P. K., Matsumoto, K., Stauffer, P. R., Fike, J. R., Smith, V., & Gutin, P. H. (1986). Interstitial microwave hyperthermia in a canine brain model. *International journal of radiation oncology, biology, physics*, 12(10), 1887–1897. [https://doi.org/10.1016/0360-3016\(86\)90336-6](https://doi.org/10.1016/0360-3016(86)90336-6)

antennas, and thermometry probes. Heat treatments were applied to raise the temperature of focal areas in each dog's brain to 43-44°C.

Most of the dogs were euthanized prior to recovery from anesthesia. Five dogs were used for chronic survival studies and killed after days or weeks to permit examination of their brains. In these dogs, the only CNS abnormalities reported after recovery were mild to moderate hemiparesis (weakness on one side of the body), which resolved in most cases. In our opinion, this study is completely irrelevant to the question of how much suffering ventilation shutdown plus causes to pigs and other animals or how it should be classified by the AVMA.

The final study, reference number 6, is entitled "Effect of whole-body hyperthermia on auditory brainstem and somatosensory and visual-evoked potentials," and was published in a textbook called *Thermal Physiology* in 1984.⁸ In this study, 18 anesthetized, anemic cats had their blood removed from their bodies and passed through a cardiopulmonary bypass circuit with a heat exchanger. For between 87 and 209 minutes, their blood was heated to up to 45°C and returned to their bodies. Brain temperature was measured via thermocouple probes placed in various lobes of the brain. Evoked potentials, elicited by varying stimuli, were recorded at different blood temperatures.

For example, in six cats, brainstem auditory responses (BAERs) were generated by presenting clicks into one ear at a time. It was noted that the latencies and amplitudes diminished with increasing temperatures, especially at or above 40.2°C -42.2°C (104.4°F -108°F). Other experiments, in which brain waves were elicited with visual stimuli or shocks to the tibial nerve, found a "critical" temperature, when the waveform was irreparably altered, of between 41°C -42.5°C (105.8°F- 108.5°F). The authors attribute this variability to "variations in brain perfusion associated with using this cardiopulmonary bypass system."

Using this study to call into question the suffering of pigs killed via heatstroke is unconvincing for several reasons. First, the cats were already anesthetized, making it impossible to gather information about the subjective experience of having one's temperatures elevated to such a degree. The healthy pigs that have been killed via VSD+TH are fully conscious until they sustain severe thermal damage; they can be heard vocalizing for a prolonged period on audio covertly recorded during a depopulation using VSD+TH.⁹

Second, the use of a cardiopulmonary bypass machine to rapidly heat blood to a pre-determined narrow temperature range is not a comparable situation to subjecting conscious pigs to conditions in which the temperature is gradually raised to somewhere between 60.5°C and 75.7°C (140.9°F and 170.1°F). Prominent animal scientist Dr. Temple Grandin has pointed out that, in the *JAVMA* report on VSD+TH, the "large variation in the maximum temperatures ...

⁸ Britt RH, Lyons BE, Ryan T, Saxer E, Obana WG, Rossi G. (1984). Effect of whole body hyperthermia on auditory brainstem and somatosensory and visual-evoked potentials. In: Hales JRS, ed. *Thermal Physiology*. Raven, New York, p. 519–523.

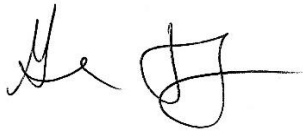
⁹ Direct Action Everywhere – DxE. Uncut, Unedited 2.5 Hour Audio of Pigs Being Roasted Alive Via "Ventilation Shutdown" [Video]. *YouTube*, 2020, June 24. Available at: <https://www.youtube.com/watch?v=ybBTWIUeC6c&feature=youtu.be>.

is likely [due to] difficulty controlling the process.”¹⁰ As mentioned in previous correspondence, Dr. Grandin has expressed her concern about the potential of VSD+ to cause animal suffering under field conditions and recommends against its use.¹¹

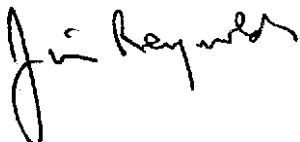
Third, veterinarians who treat feline patients in clinical practice will attest to the fact that cats with elevated body temperatures at or above 41.1°C (106°F), as is commonly seen with fever and with environmental- or opioid-induced hyperthermia, are typically conscious, responsive to stimuli of various types, and certainly capable for experiencing fear, pain, and distress. Thus, the findings of this research does not support the claim that pigs subjected to severe heatstroke will lose consciousness prior to experiencing significant suffering.

In conclusion, the research studies cited in defense of VSD+TH in no way substantiate a claim that killing animals via heatstroke causes less than egregious levels of suffering. Further research into using heatstroke as a means of depopulation is unethical and should not be recommended by the veterinary profession. We urge the Panel to reclassify any form of killing animals by heatstroke as “not recommended” as a depopulation method.

Sincerely,



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¹⁰ Grandin, T. (2021, October 9). *Email from Temple Grandin to Matt Johnson*. Available at: https://drive.google.com/file/d/1NL4wz2ecsF2FfHlqojNJ85yXMz_OP1RP/view?usp=sharing

¹¹ Animal Welfare Institute. (2021, October 27). *AVMA urged to revise guidelines to prevent mass killing of farm animals by heat stroke* [Press Release]. <https://awionline.org/press-releases/avma-urged-revise-guidelines-prevent-mass-killing-farm-animals-heat-stroke>