



Exposure to Ultrasonic Noise Alters Temperature and Adrenal

Gland Weights of *Rattus norvegicus* Dams and Pups

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Introduction

Ultrasonic noise (USN, >20 kHz) is a pervasive, often overlooked environmental stimulus perceived by animals (e.g., in laboratories, clinics, shelters, homes). Despite its potential to influence physiology and behaviour, and confound animal studies, the effects of developmental USN exposure remain poorly understood.

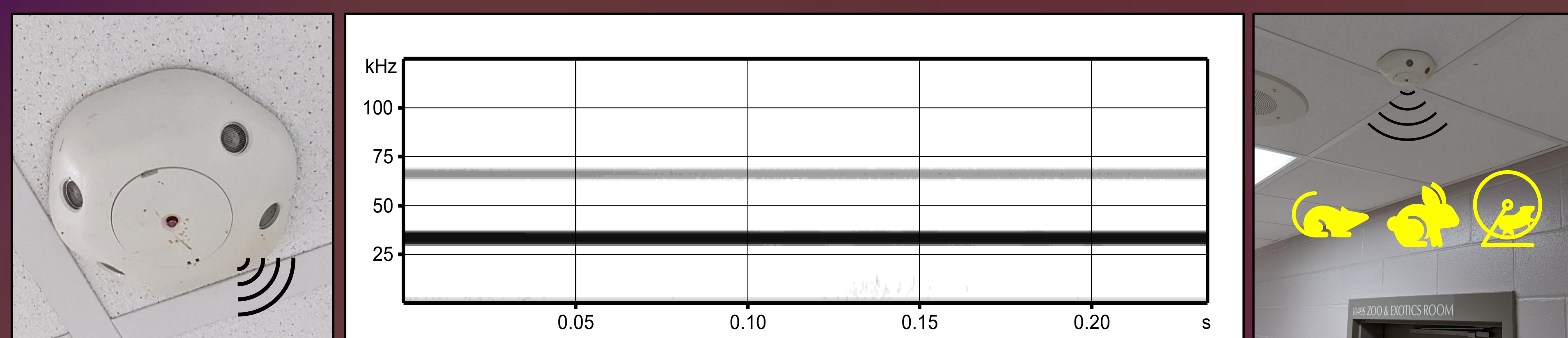


Figure 1. L-R: Ultrasonic occupancy sensor, 32 kHz >100 dB signal, location outside AVC exotics ward

Objectives

- 1) Assess effects of USN exposure on dam and pup thermoregulation.
- 2) Assess effects of USN exposure on adrenal gland weight.

Methods

Sprague Dawley dams ($n = 10$) were exposed to ultrasound (40 kHz, 70 dB SPL) ($n = 5$) or no noise ($n = 5$) beginning on E16 until weaning on postnatal day (PND) 21; pups were then maintained without noise until PND 42. Surface temperatures (eyes, ears, interscapular, tail) were assessed using infrared thermography. Adrenal gland weights of post-weaned dams (PND 25) and pups (PND 21/42) were determined.

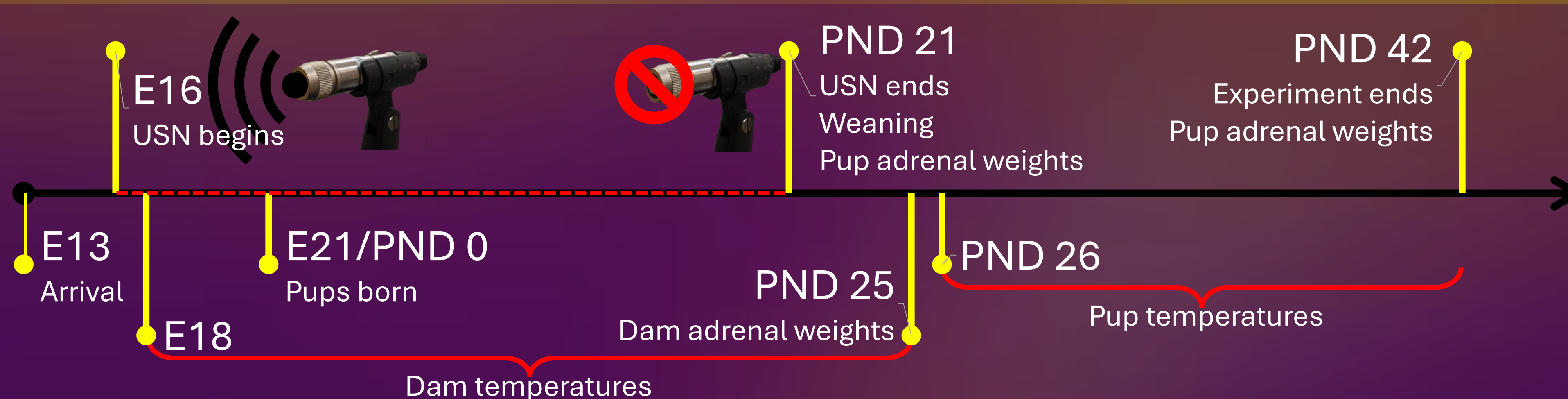


Figure 2. Timeline of events



Figure 3. L-R: Avisoft Bioacoustics 40 kHz signal generator, HIKMICRO B10S infrared thermography camera, representative image of rat temperature measurements

Results

USN-exposed dams exhibited increased prepartum eye temperature ($p = 0.0196$). No significant differences were measured in ear, body, or tail temperatures, or postpartum temperatures of dams or pups.

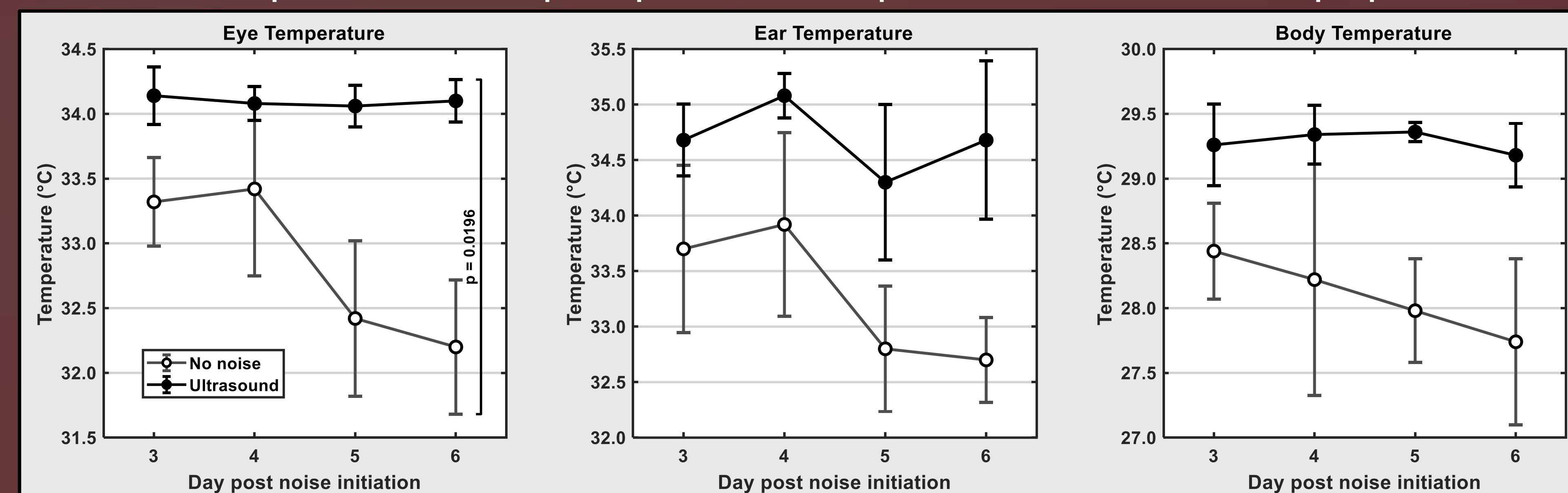


Figure 4. Prepartum dam temperatures, data presented as mean $\pm$ SE

USN-exposed pups had bilaterally increased adrenal weights ($p_L = 0.0021$, $p_R = 0.0025$) on PND 21. No significant differences were measured in relative or absolute adrenal weight for dams post-weaning, or PND 42 pups.

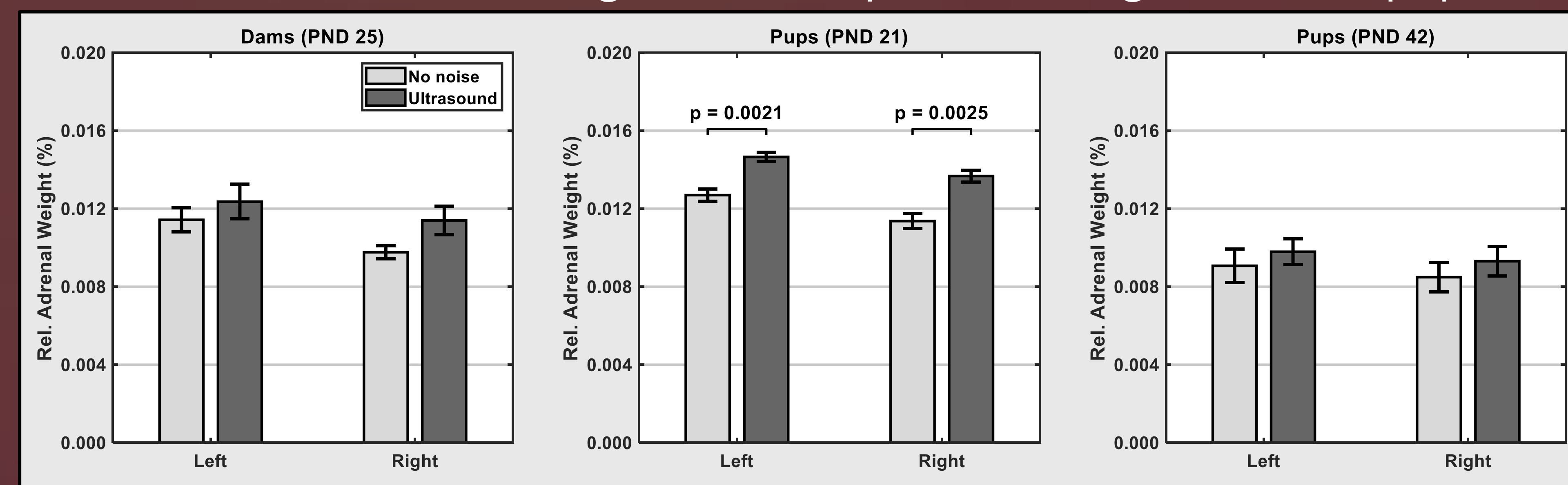


Figure 5. Relative adrenal gland weights as a % of body weight, data presented as mean $\pm$ SE

Conclusion

These findings indicate that ultrasound induces physiological markers of stress in both dams and developing pups, supporting the need for further research investigating the role of USN as an environmental stressor and experimental confound.

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