

# Preliminary evaluation of the effects of a 1:1 inspiratory-to-expiratory ratio in anesthetized and ventilated horses

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## Resumen

**Objective:** To describe some cardiorespiratory effects of an inspiratory-to-expiratory (IE) ratio of 1:1 compared with 1:3 in ventilated horses in dorsal recumbency. **Study design:** Randomized crossover experimental study. **Animals:** A total of eight anesthetized horses, with 444 (330–485) kg body weight [median (range)]. **Methods:** Horses were ventilated in dorsal recumbency with a tidal volume of 15 mL kg<sup>-1</sup> and a respiratory rate of 8 breaths minute<sup>-1</sup>, and IE ratios of 1:1 (IE1:1) and 1:3 (IE1:3) in random order, each for 25 minutes after applying a recruitment maneuver. Spirometry, arterial blood gases and dobutamine requirements were recorded in all horses during each treatment. Electrical impedance tomography (EIT) data were recorded in four horses and used to generate

functional EIT variables including regional ventilation delay index (RVD), a measure of speed of lung inflation, and end-expiratory lung impedance (EELI), an indicator of functional residual capacity (FRC). Results were assessed with linear and generalized linear mixed models. Results: Compared with treatment IE1:3, horses ventilated with treatment IE1:1 had higher mean airway pressures and respiratory system compliance ( $p < 0.014$ ), while peak, end-inspiratory and driving airway pressures were lower ( $p < 0.001$ ). No differences in arterial oxygenation or dobutamine requirements were observed. PaCO<sub>2</sub> was lower in treatment IE1:1 ( $p = 0.039$ ). Treatment IE1:1 resulted in lower RVD ( $p < 0.002$ ) and higher EELI ( $p = 0.023$ ) than treatment IE1:3. Conclusions and clinical relevance: These results suggest that IE1:1 improved respiratory system mechanics and alveolar ventilation compared with IE1:3, whereas oxygenation and dobutamine requirements were unchanged, although differences were small. In the four horses where EIT was evaluated, IE1:1 led to a faster inflation rate of the lung, possibly the result of increased FRC. The clinical relevance of these findings needs to be further investigated.

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