

INTRODUCING FLEX For Tafonius Junior

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Flow-Limited EXpiration (FLEX) is a novel ventilation strategy in which the expiratory phase is managed to maintain a **constant, linear gas flow** throughout expiration, rather than allowing rapidly passive, uncontrolled emptying of the lungs (see Figure below).

In conventional mechanical ventilation, expiration is usually **passive** — the expiratory valve opens and the lung empties until flow returns to zero. In FLEX, the ventilator **actively reduces the rate of lung emptying** by controlling the expiratory flow so that it remains steady (linear) until the end of the breath. This is achieved by adjusting the expiratory valve or flow settings so that the flow-time waveform is a straight, horizontal line during expiration (see Figure below).

In ventilator terminology, **flow-cycled ventilation** ends inspiration when a preset flow threshold is reached, switching to expiration. In FLEX, the expiratory phase itself is “flow-controlled” — the ventilator maintains a set expiratory flow rate until the breath ends, which can be time-cycled or flow-cycled depending on the mode.

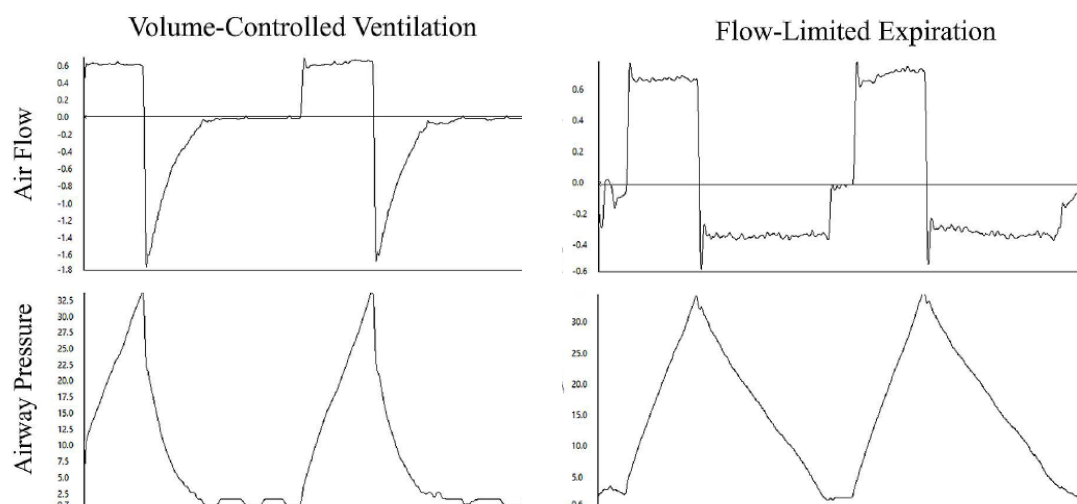


Figure: Flow and airway pressure patterns during conventional Volume-Controlled Ventilation and ventilation in the Flow-Limited EXpiration (FLEX) mode in a representative horse. During FLEX ventilation, the ventilator was set to let the tidal volume expire over 98% of the set expiratory time (Courtesy of Drs. B. Driessen and K. Hopster, University of Pennsylvania).

Potential benefits

- **Better gas exchange** by FLEX ventilation in anesthetized horses through enhanced regional ventilation/perfusion (V/Q) matching, likely due to prolonging expiratory aeration and reducing airway closure and hence alveolar collapse.
- **Lower peak and plateau pressures** with FLEX ventilation, potentially protecting against ventilator-induced lung injury (VILI).
- **Improved lung compliance** in anesthetized horses.
- **Lower positive end-expiratory pressure (PEEP)** is required to reach a comparable PaO₂/FiO₂ ratio with FLEX ventilation than without.
- May help in conditions with air trapping or prolonged expiration (e.g., COPD, bronchospasm).

In summary: Flow-limited expiration is a ventilator mode in which the expiratory phase is maintained at a constant linear flow, improving arterial oxygenation and lung mechanics in horses and other animal species, and potentially protecting against ventilator-induced lung injury (VILI).

For more detailed information please go to our library of supporting documents or review the supporting documentation on Flow-controlled expiration (FLEX) in the AVMA Journals.

You can also contact us at

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