SmartCow
an integrated infrastructure for increased research capability and innovation in the European cattle sector

Investigating components of cow breath with potential for rumen diagnostics

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Background and Methods

- Less intrusive techniques to study ruminant digestion and metabolism has been a distinctive feature of SmartCow
- This work screened cow breath for biomarkers

- Grazing dairy cows were held in a crush adjacent to a collecting yard on six separate sampling dates
- Breath samples (from immediately adjacent to the nostril) were pumped into tedlar bags for approximately 30 seconds.
- Samples were transported to the laboratory (within 3 hours) for analysis of breath components by Selected-Ion Flow Tube Mass Spectrometry

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Results and Discussion

- Significant negative relationships between concentrations of methane and ammonia represent mixtures of breath and ambient air
- Ammonia in ambient air (from the adjacent collecting yard) varied from 8 to 169 ppb - highest in late summer)
- Breath methane concentrations extrapolated as ranging from 530 to 1750 ppm on different occasions; this suggests an average 200-fold dilution of rumen gas in exhaled breath.
- After correction for dilution with ambient air, breath contained volatile fatty acids and sulphides linked to rumen activity, but at sub-ppm levels

- Sampling duration was too short to pick up eructations from all cows, with only one-third of samples containing rumen derived hydrogen sulphide; however all contained its derivative dimethyl sulphide which is found in alveolar breath
- Low concentrations may preclude use of these compounds as biomarkers