

### Reference 12

Jayasundara, S; Appuhamy, JADRN; Kebreab, E; Wagner-Riddle, C 2016 Methane and nitrous oxide emissions from Canadian dairy farms and mitigation options: An updated review CANADIAN JOURNAL OF ANIMAL SCIENCE 10.1139/cjas-2015-0111

### Background and objective

There is a need for a comprehensive review of recent Canadian relevant research evaluating options for mitigating GHG emissions from enteric fermentation and manure management. The objectives of this paper were to (1) review recent Canadian research on enteric methane (CH<sub>4</sub>) emissions, and CH<sub>4</sub> and nitrous oxide (N<sub>2</sub>O) emissions from stored manure related to dairy cattle, and (2) identify strategies for GHG mitigation that can currently be used in Canadian dairy farms and promising technologies that have potential to be used as mitigation strategies in the future.

### Search strategy and selection criteria

Not reported Although the primary focus is on Canadian research, applicable research from other cold climatic regions with similar dairy production systems was considered. The majority of studies evaluating GHG emissions from composting in Canada do not include reference manure storage for comparing change of emissions due to composting; therefore, only studies on dairy manure composting were considered.

### Data and analysis

Not reported

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
7	Dairy cattle	Complete emptying or cleaning of manure storage; Manure storage cover.	No mitigation strategy	Metric: 1) CH <sub>4</sub> emission; 2) N <sub>2</sub> O emission; Effect size: not reported	18.75

### Results

- One study observed about 50% lower total GHG emissions (CH<sub>4</sub> and N<sub>2</sub>O) from the completely emptied manure storage compared with emissions from the partially emptied storage. In another pilot level study, the presence of a small quantity of inoculum (~8%) could support the immediate production of appreciable amounts of CH<sub>4</sub> from manure within 10 d after refilling the storage with new manure, indicating that the storage should be emptied nearly completely to prevent old manure becoming an effective inoculum.
- Several recent experiments evaluating the effect of various cover types on CH<sub>4</sub> and N<sub>2</sub>O emissions from dairy manure have indicated appreciable reductions of these two gases combined (up to 26% reduction) compared with emissions from uncovered slurry.

### Factors influencing effect sizes

- No factors influencing effect sizes to report

### Conclusion

This review identify several promising strategies for mitigating GHG emissions from dairy manure, including AD, solid–liquid separation, composting, manure storage covers, and complete emptying of liquid manure storage at spring application. These results are uncertain due to the methodology used in this study (only systematic review, no quantitative analysis).