

Mitigation options for air quality impacts associated with dairy production: A Northeast US perspective

Jason Oliver, PhD
PRO-DAIRY Dairy Environmental Systems
LPELC Webinar 4/21/2023



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Outline

- Dairy production and air quality impacts
- Farmstead improvements
- Manure systems
 - Pits roofs and covers
 - Solid-liquid separation
 - Anaerobic digestion
 - Cover and flare
 - Biofilters

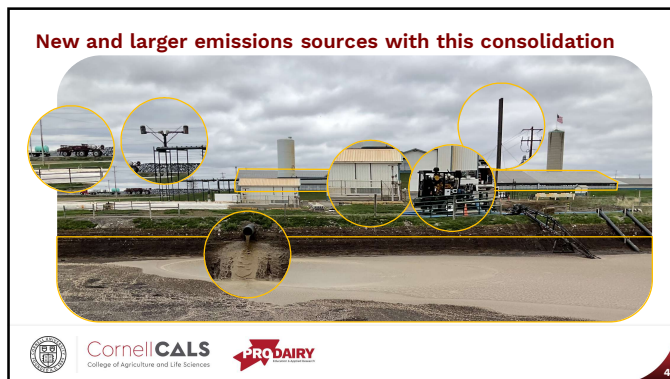


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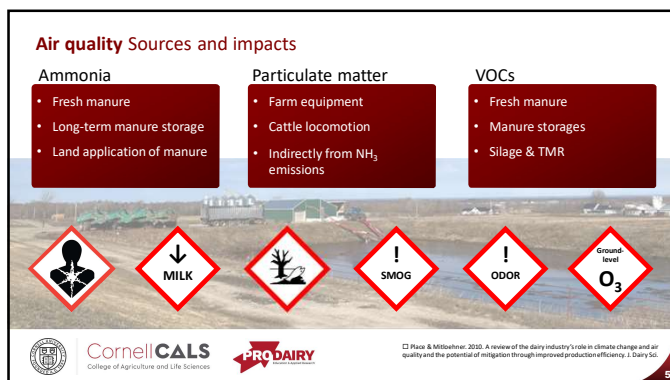
Agricultural production systems and landscapes are changing



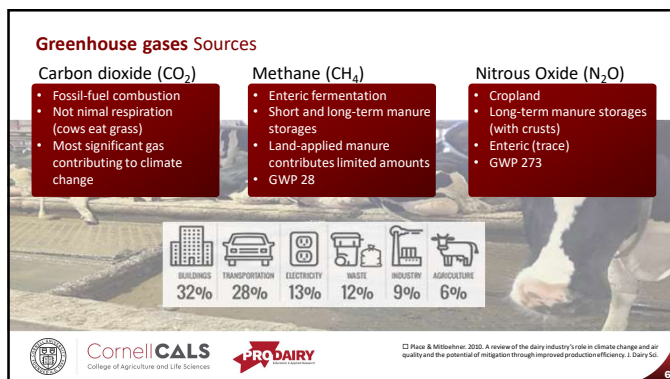
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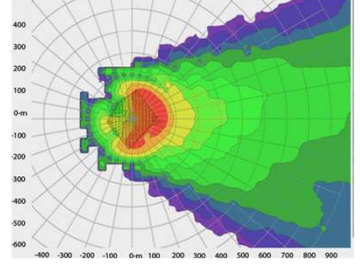
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Bioaerosols

- Elevated levels of pathogens, endotoxins and biological particulates
- Pathogens, including *S. rectivirgula* (farmer's lung)
- ARS found minimal impact bioaerosol 200m downwind of free-stall dairies
- Down wind transport from manure spreading



© Jahnke et al. 2015. Emission and dispersion of bioaerosols from dairy manure application sites. Human health risk assessment. ESI.
© Schaeffer et al. 2017. Size, composition and source profiles of inhalable bioaerosols from Colorado dairies. ESI.
© Larson et al. 2012. Characterization of bioaerosols from dairy farms: reconstructing the profile of occupational respiratory disease using molecular approaches. JEM.
© Dungen, Lyden & Blomberg. 2012. https://epic.org/assessment-of-bioaerosol-transport-at-a-large-dairy-operation

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Opportunities exist on our modern dairy facilities to contain and treat emissions



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Farmstead Hygiene – Pick up your poop



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Farmstead Hygiene - Your feedstuffs too



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Farmstead Paving and driving speed





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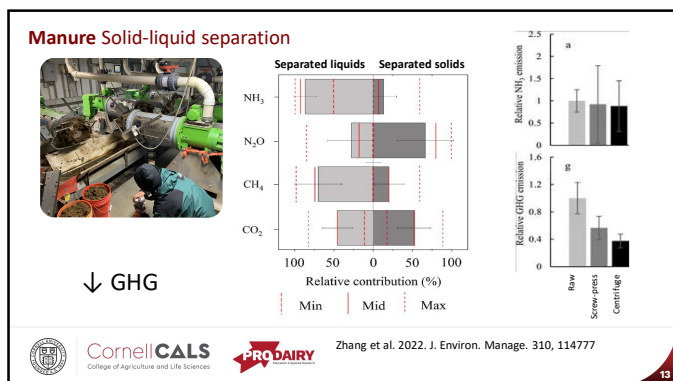
Manure Roofs and floating covers (crusts)



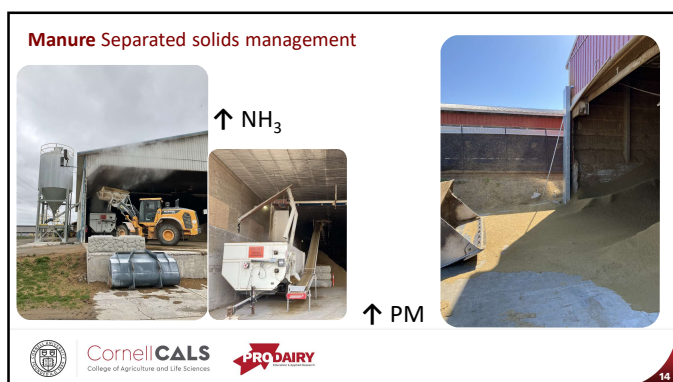
↓ NH₃
↗ N₂O
↕ CH₄

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College of Agriculture and Life Sciences  VanderZaag et al. 2008. Appl. Engineer. Agric. 24(5): 657-671
Kupper et al. 2020. Agric. Ecosys. Environ. 300, 106963

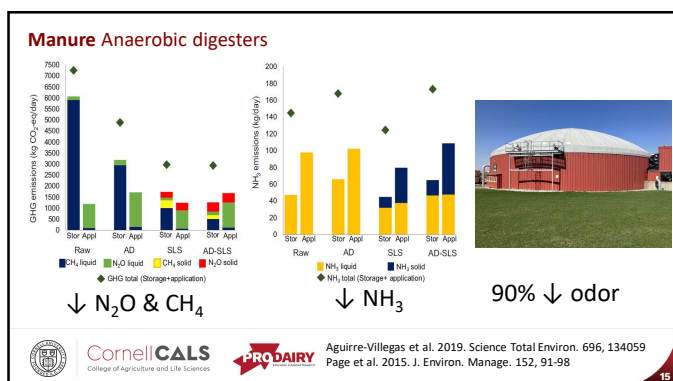
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Biofilters Manure & food waste storage pits



↓ Odor
↓ H₂S
↓ NH₃
↓ CH₄

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Biofilters Central pits and manure processing buildings



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Education & Applied Research

Jason P. Oliver, PhD
Sr. Extension Associate &
Dairy Environmental Systems Specialist
Department of Animal Science, PRO-DAIRY

Email: jpo53@cornell.edu
Phone: 607-793-8484
Web: prodairy.cals.cornell.edu/DES

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