Extension Service Tillamook County
Oregon State University, 4506 3rd St, Tillamook, Oregon 97141-2491
T 503-842-3433 | F 503-842-7741 | http://extension.oregonstate.edu/tillamook/

March 8, 2017

Dear Oregon Senate Committee on Environment and Natural Resources,

I am writing today to share my perspective with you on air emissions from Oregon dairies. I have had the privilege to work for Oregon State University's Animal and Rangeland Sciences Department for 27 years. During this time I have worked specifically with our states dairy industry providing educational programs and applied research. The past 20 years I have worked out of our Tillamook Extension office as a dairy specialist focusing primarily of nutrient management with our commercial dairy industry.

Nutrient management from a whole farm perspective includes the comprehensive look at nutrients cycling through our animals into waste storage and eventually being land applied agronomically as fertilizer on our croplands. These nutrients are then used by growing crops and recycled back through our animals as feedstuffs. How we manage these nutrients along the way influences where they ultimately end up. We have emission losses in the barn, during storage, during application and from our soils. We also can have other losses while handling feedstuffs before they actually get back into our livestock. These processes are naturally occurring with all organisms on the planet. The USEPA estimates livestock operations nationally account for 4.2% of our greenhouse gas emissions and dairies nationally accounting for 1.37%. While these numbers seem insignificant we all understand that to have clean air all industries need to take their contributions seriously.

The good news from my perspective is our Oregon dairy industry has been a leader in the nation in nutrient management and has worked successfully with Oregon Department of Agriculture/DEQ to create a program that has protected water quality and allowed our industry to be successful as well. An example of some of the success can be seen in Tillamook County. Over the past fifteen years we have had an aggressive water quality monitoring program lead by the Tillamook Estuary Partnerships with many volunteers. Data from this work has shown on our major rivers, that most have seen dramatic improvements to water quality with several actually being removed from the Oregon DEQs 303D for being impaired for bacteria.

In the last decade, I have been including educational programming to our dairy industry centered on managing air borne nutrients as well as efforts to address water. We often refer to this approach as a "Best Management Practice" (BMP) based approach to adopt technologies and management. In 2009, I co-authored an OSU Extension publication highlighting Ammonia control practices for our industry. We have seen considerable changes in the way manure is applied reducing emissions, protein in rations has been

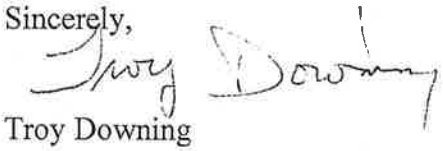
decreased reducing emissions, and improved understanding in feed management has reduced emissions. We have also seen a number of methane digesters installed including significant percentage of our industries cows in this process. This has helped reduce odor but has also significantly reduced the greenhouse gases methane and nitrous oxide from our operations.

Measuring air emissions are challenging, expensive and highly variable. However, over the past decade we have made serious progress nationally in our understanding of emissions from dairies and mitigation techniques. As part of this effort, a national livestock assessment and mitigation tool has been developed. This tool is free to all producers and helps them understand where emissions are occurring on their farm and offers BMP's to address the emission issue. The tool can be found at www.naqsat.tamu.edu. Concerns about dairy emissions and odors are not new. But we have a considerable amount of research today to give us improved understanding and management options. This BMP approach is a logical one in my mind to address these concerns and I am working to help our industries evolve. Our largest dairies are adopting almost all the possible BMPs researchers have developed and honestly are where the majority of new innovations are occurring.

Oregon's air is pristine and we all hope to keep it that way. I have concerns about asking Oregon's DEQ-EQC to develop regulations without identifying the problem or understanding how public investment can result in any improvements. If you look at the USEPA website for air quality in Oregon you will see our air quality is very high only having slight issues during the winter in towns like Eugene, Oakridge and Klamath Falls during inversions. Most air experts believe the issue is exaggerated by wood stove use in those communities. This site can be found at www.epa.gov/airnow/. Then select Oregon or search specific counties you want to see more information about.

In conclusion, Oregon State University faculty will continue to provide educational information to our livestock industry to help them understand and adopt the most relevant technologies. We will continue to conduct research and work with our local, state and national regulatory communities to help protect public health, the environment and the livestock industry. I am always available to work with you as well to understand why air chemistry is so complex and the things we are doing to help mitigate these challenges.

Sincerely,



Troy Downing
Professor, Extension Dairy Specialist

Sources of emission on a dairy	Expected pollutants for each source in order of importance	Suggested BMPs for emissions reduction <u>Tier 1</u>	Suggested BMPs for emissions reduction <u>Tier 2</u>	Suggested BMPs for emissions reduction <u>Tier 3</u>
Nutrition	NH_3, CH_4, H_2S, N_2O	Properly manage level of dietary protein (%CP) in diet to match, rather than exceed, an animal's needs (NH_3, N_2O, Odor) Properly manage and minimize overfeeding sulfur in the diet (H_2S, Odor)	Practice group and/or stage of lactation feeding (NH_3)	Increase the level or quality of starch in the diet (CH_4) Utilize feed additives to maximize efficiency (NH_3, H_2S, CH_4)
Feed Management	VOC, PM, Odor	Regularly remove spilled and unused feed from feeding area (VOC, Odor, PM) Manage or minimize the mixing of feed during windy times (PM)	Properly cover and manage ensiled feedstuffs (VOC, Odor)	Store feed in a sheltered storage structure (VOC, Odor, PM)
Milk Parlor	NH_3, VOC, Odor, H_2S	Use recycled parlor (clean) water used for flushing/cleaning parlor and holding area (NH_3, Odor) Ensure proper ventilation (NH_3, Odor, and PM)	Remove manure from parlor and holding area frequently (NH_3, VOC, Odor)	Treat recycled water used for flushing/cleaning holding area (NH_3, Odor)
Housing - Freestall Barns	NH_3, VOC, Odor, CH_4, H_2S	Remove manure from barns frequently (NH_3, VOC, Odor) Ensure proper ventilation of freestall barns (NH_3, Odor, and PM)	Bedding Selection and management (NH_3, H_2S, Odor) Manure removal technology and efficiency (NH_3, VOC, Odor)	Treat recycled lagoon water used for flushing (NH_3, Odor) Alleyway floor texture and type (NH_3, VOC, Odor) Manure removal technology and efficiency (NH_3, VOC, Odor)

Adopted from the Air quality management policy and BMPs for dairy operations report 2013, Yakima Regional Clean Air Agency

Sources of emission on a dairy	Expected pollutants for each source in order of importance	Suggested BMPs for emissions reduction Tier 1	Suggested BMPs for emissions reduction Tier 2	Suggested BMPs for emissions reduction Tier 3
Housing - Drylot Pens	NH_3, PM, Odor, H_2S, CH_4, VOC, N_2O	Spread (harrow) manure frequently (NH_3, PM) Surface moisture content management (NH_3, N_2O, VOC, Odor, CH_4, H_2S, PM)	Remove manure frequently (NH_3, PM) Incorporate wood chips in surface layer (NH_3, PM, Odor) Use straw bedding in drylot pens (NH_3, PM, Odor) Knockdown and remove fence line manure (VOC, Odor)	Urease inhibitors (NH_3, N_2O) Provide shade for cattle (NH_3, PM) Sitting of water trough within pen (NH_3, PM)
Grazing Management	NH_3, N_2O	Stock appropriate number of animals (NH_3, N_2O) Use rotational grazing (NH_3, N_2O)	Move water and feeding areas frequently (NH_3, N_2O)	Irrigate immediately after grazing (NH_3)
Manure Storage	Liquid: NH_3, H_2S, CH_4, Odor, VOC Solid: NH_3, H_2S, PM, CH_4,	Manure solids separation (NH_3, VOC, Odor, H_2S, CH_4) Properly manage the composting of solid manure (H_2S, Odor, PM, CH_4) Properly mange stockpiled manure (H_2S, Odor, PM)	Lagoon or storage covers (NH_3, H_2S, VOC, Odor, CH_4) Scrub Exhaust of enclosed waste containers (CH_4, Odor H_2S)	Installation of an anaerobic digester (CH_4) Surface aeration of lagoons (NH_3, H_2S, VOC) Reduce the pH of manure (NH_3, CH_4) Encourage purple sulfur bacterial formation in lagoons (H_2S, Odor)
Land Application	NH_3, PM, Odor, N_2O	Apply nutrients according to agronomic recommendations based on soil and manure test results (NH_3, N_2O) Inject or incorporate fertilizer into soil within 24 hours of application (NH_3, Odor) Do not over-irrigate (NH_3, N_2O) Apply during cool weather and on still rather than windy days ((NH_3, Odor, PM)	Utilize cover crops (NH_3, N_2O, PM Apply N fertilizer below no-till residue (NH_3, PM)	Installation of windbreaks or shelterbelts (Odor, PM)

Adopted from the Air quality management policy and BMPs for dairy operations report 2013, Yakima Regional Clean Air Agency