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Footprints in the Landscape: Sustainability through Plant and Soil Sciences

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Diel and Seasonal Dynamics of Ammonia Emissions From Cattle Feedyards.

Monday, November 2, 2009 | 3:45 PM
Convention Center, Room 326, Third Floor

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Ammonia emitted from cattle feedyards is a major loss of nitrogen, ranging from 30% to 70% of nitrogen fed to animals. Ammonia emissions follow patterns that operate at different time scales in response to environmental conditions, including temperature, precipitation, wind and atmospheric stability. Continuous measurement of atmospheric ammonia concentration using open path spectroscopy combined with an inverse dispersion model were used to estimate ammonia emissions from two southern High Plains beef cattle feedyards on time scales ranging from 15-min to mean seasonal emissions. Diel emissions showed a typical pattern of lowest rates during nighttime between midnight and sunrise and highest rates peaking near midday. Nighttime emission rates in winter averaged 0.18 kg NH₃/min, while spring, summer and autumn nighttime emission rates averaged 0.67, 0.56 and 0.53 kg/min, respectively. Peak mean ammonia emission rates ranged from 1.33 kg/min during winter to 2.28 kg/min during summer. Summer daily emissions were about twice those during winter. Spring and autumn emission rates were intermediate between summer and winter, and spring emissions tended to be greater than autumn emissions because of greater manure nitrogen present during spring. Temperature was a major factor determining the magnitude of emissions. Understanding the dynamics of ammonia emissions from cattle feedyards will help better quantify emission rates and emission factors, and yield insights to aid process modelling of ammonia emissions.

See more of: [Modeling Evapo-Transpiration and Energy Balances in Crops and Soils](#)

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