



Contribution ID: 36 Contribution code: 4-SEC

Type: **Oral presentation (9:10 AM - 4:10 PM)**

New insights into carbon footprints of dairy farming in pre-alpine regions of Germany: The role of emissions from drained peatlands in milk production

Tuesday 15 July 2025 15:25 (15 minutes)

Greenhouse gas (GHG) emissions from agriculture significantly contribute to climate change, with drained peatlands representing a substantial and often overlooked source, especially in Germany where 95% are drained for agriculture. Existing life cycle assessments (LCAs) of milk production often underestimate environmental impacts by neglecting these soil emissions. This study quantified the influence of peatland-derived emissions on the carbon footprint (CF) of milk production from three dairy farms located on drained peatlands in pre-alpine Bavaria, Germany.

We calculated CFs with and without peatland emissions, applying three methodological approaches: IPCC Tier 1, Tiemeyer et al. (2020) implied emission factors (EFs), and Tiemeyer et al. (2020) water table-dependent (WTD) response functions. A calculated near-natural peatland reference scenario was also established to contextualize these emissions. Our findings show that peatland emissions are a highly significant contributor, increasing milk CFs by over double on average, and becoming the dominant emission source. The chosen methodology notably influenced calculated CFs, with WTD-dependent approaches yielding higher estimates. Although subtracting baseline emissions from a near-natural scenario resulted in a minimal CF reduction (3.95% to 8.29%), the substantial impact of drained peatlands remained robust.

This study underscores the crucial importance of explicitly including peatland emissions in dairy LCAs for accurate environmental assessment. Results highlight the urgent need for targeted mitigation strategies, particularly water table management, to reduce the climate impact of agriculture on drained peatlands.

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Session Classification: Socioeconomy

Track Classification: Day 1: Science (English) / Tag 1: Wissenschaft (Englisch): Socioeconomy