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Exploring nitrogen losses from urine patches between upland and lowland grazing systems

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Urine patches in grassland ecosystems present unique environments where extreme nitrogen (N) loading occurs. This results in N losses into the atmosphere or leaching from soil. N losses vary due to climate conditions, soil conditions, and management practices. However, we do not fully understand how these factors influence N cycling and nitrous oxide (N₂O) emissions from urine patches. Much of the current literature on urine patch N cycling has focused on typical lowland agricultural systems. Very little work has explored other grazing systems, such as upland farming which is conducted across much of Wales. We have investigated this by using a catena sequence crossing both upland and lowland agricultural grazing systems. The range of soil types allowed us to explore how N₂O emissions and N losses vary under different conditions. Here we report on both a laboratory incubation and a mesocosm experiment examining these issues. This work should help to fill the knowledge gap around how emissions from urine patches could vary between UK uplands and lowlands. We hope to improve understanding of N losses and provide more realistic, regional, and accurate emission factors for upland farming systems.