Saskatchewan Prairie Conservation Action Plan

# Prairie's Got the Goods Week!

## Cattle grazing effects on water infiltration in grassland soils




Friday March 19th, 2021 at 12:00pm MT

Presenters: Dr. Timm Döbert, Postdoctoral Fellow, University of Alberta

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**Presentation Summary:**
The world's grasslands extend over more than 30% of the terrestrial surface. Those native grasslands spared from conversion to cropland are frequently used for grazing livestock. Domestic grazers act as ecosystem engineers, shaping the ecological processes underpinning grassland function. The maintenance of hydrologic function in grazing lands is a central management objective. Hydrologic processes are closely tied to numerous ecosystem goods and services including forage production and carbon sequestration. Grassland hydrology therefore plays an important role for ensuring food security and building resilience to a warming climate.

Soil water infiltration, an important component of the grassland hydrological cycle, is largely influenced by vegetation and soil properties, including plant litter, soil organic matter content, soil texture, and soil bulk density. In addition to these biophysical parameters, grazing patterns, as represented by variation in the timing, intensity, and frequency of livestock use, drive water infiltration processes.
As part of a larger interdisciplinary grazing management project under the umbrella of the Agricultural Greenhouse Gases Program (AGGP), we collected water infiltration measurements in grasslands on 52 ranches (set up as matched pairs). Our primary objective was to test whether adaptive multi-paddock grazing (AMP; a short-duration, high-intensity grazing system) and other select grazing practices alter water infiltration in western Canada's grasslands, relative to ranches employing more conventional grazing management (n-AMP).

Our study shows that AMP grazing, and specifically the use of higher rest-to-grazing ratios (i.e. extended rest periods to facilitate plant recovery) early in the growing season (prior to August 1), resulted in increased water infiltration in grassland soils. In contrast to rest periods, we found no evidence that herd effect, as regulated by animal stock density, leads to improved water infiltration. Finally, water infiltration was positively associated with increased litter mass under AMP grazing, whereas higher bulk density decreased infiltration rates throughout.

Overall, our study adds new scientific knowledge on environmental benefits of AMP grazing and specifically the potential of specialized rotational grazing systems using cattle to improve hydrological functioning in grazed grasslands.

**Biography**
Dr Timm Döbert is a global change ecologist with primary research interests in biodiversity and ecosystem function. He recently completed a postdoctoral fellowship under supervision of Prof Mark Boyce at the University of Alberta (UofA) working on a large-scale Agricultural Greenhouse Gases Program (AGGP) grazing management project (https://www.scientia.global/dr-mark-boyce-adapting-grassland-grazing-to-boost-carbon-sequestration/). In collaboration with an interdisciplinary team of researchers, he studies the influence of adaptive multi-paddock grazing (AMP), a type of rest-rotation grazing that references bison herd effects, on ecosystem processes and biodiversity in western Canada's grasslands. Research foci include the role of grazing on soil carbon sequestration, greenhouse gas fluxes, plant productivity, water infiltration, soil microbial function, enzyme activity, and socio-economic metrics. Dr Döbert was recently awarded a Mitacs Elevate Postdoctoral Fellowship to conduct scenario-based modelling in the context of carbon and hydrological models under supervision of Dr Monireh Faramarzi at UofA. He holds a PhD from the University of Western Australia for which he investigated the impacts of logging and oil palm expansion on native biodiversity in Borneo's lowland tropical rainforests (https://www.theguardian.com/money/2012/mar/23/research-scientists-rainforests-borneo).