



Experiment at Plantahof, Landquart. Photo credit: Florian Grandl

Mercator Research Program | Call 1

Greenhouse Gas Emissions from Dairy Production Systems based on Longevity or High-Yield Strategies

Background

A 'high-yield' strategy for dairy production systems, characterized by very high milk yields over just a few years, is the dominant approach used globally. Dairy cows thus have a very short productive life (often <3 years) and require a highly concentrated diet that uses large amounts of scarce resources and human-grade food. A 'longevity' approach that reduces the need for feed concentrates and extends the productive life of cows by several years might result in higher yields per day of life with lower environmental and economic costs. However, incomplete analysis of factors such as the impact of cattle age on greenhouse gas (GHG) emissions and yields, as well as of the environmental costs of rearing replacement cows, limits our ability to fully understand the potential of 'longevity' strategies.

Objective

The overall research objective is to produce a detailed comparison of 'longevity' and 'high-yield' strategies for dairy production systems that focuses on both environmental aspects and economic performance. Specifically, the research aims to close knowledge gaps about the relationship between GHG emissions and cattle age and to model the complete GHG budget of each strategy.

Research Approach

Biological experiments with respiratory chambers for measurement of feed intake, digestion, nutrient balance and methane emissions; GHG budget and economic modeling.

Relevance and Expected Outcomes

The project will (1) produce a unique dataset to analyze the environmental impact of both strategies based on a full GHG budget, effects of feeding strategies (with and without concentrate), and the influence of cattle age; and (2) assess sustainability of the 'longevity' strategy in terms of economic efficiency and GHG emissions. If shown to be more sustainable, a 'longevity' strategy could reduce the reliance of dairy production on human food and contribute to food security.

Food System Challenges Addressed

Sustainable livestock production, climate change and agroecosystems, economic sustainability

www.worldfoodsystem.ethz.ch/research/research-programs/MRP

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