

# Experimenting with the effects of climate change on mountain pastures

September 12 2012, by Jan Overney

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Researchers simulate an arid climate using greenhouse tunnels to study the effects of increased dryness on forage grown on mountain pastures. Credit: Agroscope Changins-Wädenswil

What will a warmer, drier climate do to the legendary quality of Swiss cheese? To address this and other questions, researchers from EPFL and Agroscope Changins-Wädenswil had small flocks of sheep graze below plastic greenhouse tunnels in western Switzerland, near Yverdon. The main focus of the experiment was to study the effects of droughts on mountain pastures and their forage production. On Wednesday, September 12th, the organizers are holding an open day to present the campaign to members of agricultural institutions, researchers and the public.

Mountain pastures are an important, yet often underestimated

ecosystem. They have been identified as havens for a diverse population of plants and microorganisms, which, through their activity, are an important driver of the [carbon chain](#). And pastures play a central role in Swiss agricultural policy, which stipulates forage autonomy as one of its tenets: farmers should be able to feed their livestock without having to rely on foreign forage.

## **Adapting to a changing climate**

Swiss mountain pastures have been blessed with abundant rain in the past, but this tide could soon turn. In 2003 and 2011, hot and dry summers led to poor forage yields; and [climate predictions](#) say that things are likely to get worse before they get better.

Changes in flora and micro-fauna, triggered by these changes in climate, could lead to less productive pastures, and ultimately, via the forage fed to livestock, less delicious dairy products. Beyond that, they may have repercussions on the carbon cycle and could influence drinking water quality in the groundwater below.

The first phase of the joint research project took place over the summer near the hamlet of La Frêtaz, in the Jura Mountains. By covering small plots of land with plastic greenhouse tunnels, the researchers simulated the effects of [aridity](#) expected as a result of [climate change](#) on mountain pastures. Sheep grazing on some of these plots provided additional insight into how grazing ties into this equation as compared to mowing the pastures for hay.

By the end of the artificially dry summer, the lush green of the pasture had given way to a dry brown. But in the process, the researchers were able to collect valuable data, soon to be evaluated, on the effects of droughts on vegetation, plant physiology, soil respiration and underground microorganisms.

## Developing a fodder report

In the coming years, the researchers will expand the size of the site under study to that of a farm, before moving on to studying an entire region of 100 square kilometers. Each of these ambitious projects is a mere stepping-stone towards their final goal: harnessing the power of remote monitoring for their applications.

In the future, farmers may well turn to satellites to help them lead their herds to the greenest pastures. New technologies use satellites to monitor the biological productivity of pastures over huge swaths of land at a time. As part of this project, the researchers will develop tools to extrapolate soil and forage analysis gathered locally over a wide area, providing an accurate, up-to-date picture of the pasture quality - a kind of fodder report.

For now the researchers are busy evaluating the outcome of this first experimental campaign, during which one thing has already become clear: the pastures do not do well during hot dry summers. The rain shelters had to be taken down 10 days before the open day, held yesterday, because visibly, the pastures had already suffered enough. But some good will come from this. By observing the recovery of the pastures, the researchers will be able to study their resilience in the event of droughts and learn how repeated dry summers could affect the ecosystem in the long run.

Provided by Ecole Polytechnique Federale de Lausanne

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