



**Targeted pasturing:
Plant energy content and
restoration success**

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Introduction

For **low-productivity ecosystems** many management methods have been discussed, e.g. mowing, **grazing**, burning and others.

Grazing has turned out to be an **effective tool** of nature **conservation, management** and **restoration**.

Often, due to **degeneration**, the area with its vegetation to be restored or managed has already a **reduced carrying capacity** for livestock.



Overall aim of the project

Development and test of a **methodological, integrated framework** combining **ecological restoration of alpine pastures** with agriculture (**pasturing** of sheep), allowing farmers an economically **viable development** thus helping to preserve and restore an important part of the alpine **cultural landscape**



Questions

- **Restoration of a high alpine pasture** from encroachment of dwarf shrubs (*Vaccinium* spp..)
- How does **vegetation respond** to targeted pasturing – (very) high intensity in a short period of time?
 - Development of dwarf shrubs
 - Development of herbs
- How changes the **energy content** of the pasture in the course of the trial/restoration effort?



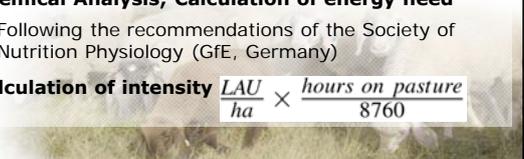
Restoration targets

- Reduction of **dwarf shrubs below 20%**
- Increase of **herbs above 60%**
- **No changes** in the amount of **open soil** (prevention of risk of erosion)
- **Energy content** above **8.2 MJ ME/kg DM**
(DM = dry matter; MJ = Megajoule;
ME = Metabolizable Energy)



Methods

- **Targeted pasturing or mob stocking with sheep**
Stocking method characterised by a high grazing pressure for a short time as a management strategy
- **Flock**
 - Between 738 (2008) and 950 sheep (2011); in 2010 the flock was divided
 - Period of occupation varied between 105 and 118 days (May to September)
- **Chemical Analysis; Calculation of energy need**
Following the recommendations of the Society of Nutrition Physiology (GfE, Germany)
- **Calculation of intensity** $\frac{LAU}{ha} \times \frac{hours\ on\ pasture}{8760}$



Methods - Study Area

Austria, Styria (Steiermark)

N 47,38801° E 13,78048°

Haus im Ennstal
ca. 110km SE of Salzburg

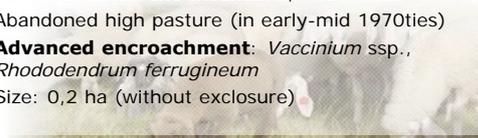


- **Pasturing area**

- 85 ha ski runs and sub-alpine heath (high pasture)
- Altitude: 1300 msm – 2150 msm

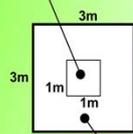
- **Trial Site**

- Saddle between two mountains, 1860 msm
- Abandoned high pasture (in early-mid 1970ties)
- **Advanced encroachment:** *Vaccinium* ssp., *Rhododendrum ferrugineum*
- Size: 0,2 ha (without enclosure)



Set up plan

Frame 1 x 1 m



Paddock (~ 68 x 35 x 68 x 25 m)

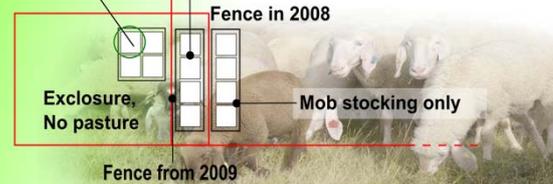
Mown in 2008, followed by mob stocking

Fence in 2008



Mob stocking only

Fence from 2009



Botanical Assessments

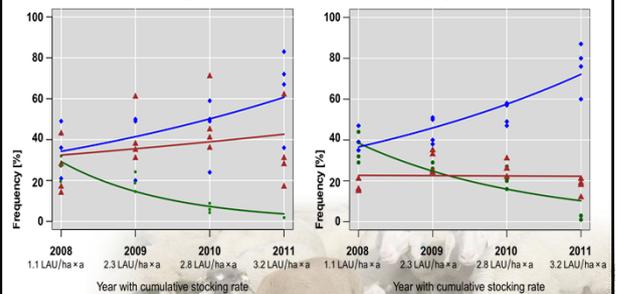
- **Factorial design** with 4 replicates
- Relevés of frequency (Raunkiaer 1934) with a quadrat
- 5 functional groups: Dwarf shrubs, herbs, lichens, mosses and open soil
- **Four levels:**
 - Enclosure - No pasturing
 - Mowing followed by mob stocking
 - Mob stocking
 - Low intensity/browsing



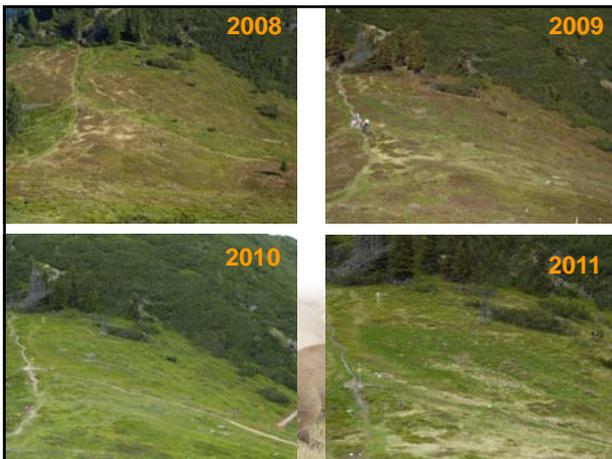
Results: Changes in Vegetation

Mown and pastured

Only pastured



GLM: $p > 0.001$ for both variants



Results: Energy content and coverage

Only pastured, first use

Year	Energy content [MJ ME]	Energy yield/ha [MJ ME]	LAU	LAU/ha*a	Need/d [MJ ME]	Coverage need [%] for one use
2008	7.95	7 039	68.4	1,1	6 858.8	21
2009	7.99	9 662	75.0	1,2	8 280.4	24
2010	8.11	20 614	36.5	0,5	5 179.8	81
2011	8.17	19 763	57.1	0,4	5 790.4	70

Pasture was used twice a year, with exception of 2011
Energy content relates only to first use

Summary & Discussion

- Reduction of **dwarf shrubs below 20%**
Reached, in both variants 😊
- Increase of **herbs above 60%**
Reached, in both variants 😊
- **No changes** in the amount of **open soil** 😊
With the variant „Mowing + Pasturing“ problems could arise: **Mowing**/removal of shrubs is **not necessary** and even increases the risk of erosion (...and saves money)
- **Energy content** above **8.2 MJ ME/kg DM** 😊
More or less (8.17 MJ ME/kg in 2011)

😊 **Overall: Success!**

Recommendations

- **Energy content as part of restoration targets - Energy need** could not be satisfied with yield possible on the trial area/paddock
 - → Monitoring of animals and restoration area is a must
 - → **Nutritional status vs. restoration success**
 - Good/high quality pastures around restoration areas are necessary to compensate shortage of energy for animals – Rotational stocking
 - Important for the acceptance of management measurements
 - Possible losses of income have to be compensated

