A simple model for the estimation of protein content of first-cut meadow forage

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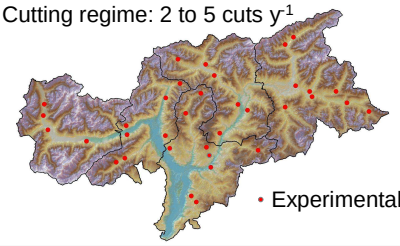
Introduction

- Forage quality of meadows declines over time with increasing developmental stage of plants; harvest timing is pivotal to the achievement of satisfactory forage quality
- 5-year data were collected in South Tyrol with the aim of developing an affordable and reliable tool for estimating forage quality as a function of harvest timing and other factors related to vegetation, geomorphology, soil properties and agronomic management
- Crude protein data (CP) have been chosen as a dependent variable for model development
- Focus of the present paper: replacing year effects, not useful for predictive purposes, with other factors related to the climatic features of the sites and to the weather conditions during vegetation growth

Material and methods

- 35 sampling sites, 5 years
- Weekly sequential sampling starting at pasture stage (15 cm growing height) – see poster 3.1.36 for details
- Statistical analysis: binary logistic regression
  - dependent dichotomous variable: CP<150 g kg^{-1} or CP≤150 g kg^{-1}
  - classification cut off 0.5

Altitude range: 667 - 1593 m a.s.l.
Cutting regime: 2 to 5 cuts y^{-1}



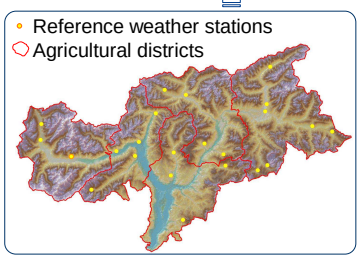
FACTORS GROUP A

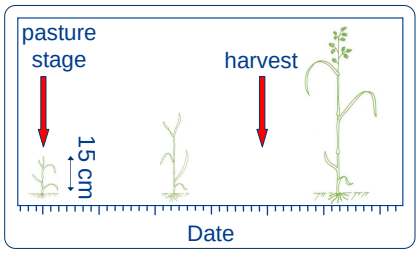
Harvest date	*Soil properties*	*Agronomic management*	*Botanical composition*	*Weather conditions*	*Geomorpho-logic traits*
• Days since pasture stage	• texture • organic matter • pH • P • K	• cut frequency • N-input • dung type • irrigation	• Functional groups dominance • Vegetation type	• Agricultural district • Year	• Altitude • Slope • Exposition

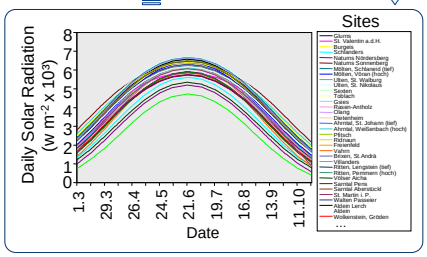
FACTORS GROUP B

Sum and mean of daily temperature departures from long-term average between 1 week before pasture stage and harvest date (reference weather stations of the respective agricultural district)

Solar radiation sum between 1 week before pasture stage and harvest date







Results

- Analysis 1 (factors group A): **10** significant factors, mean correct prediction **87.5%**
- Analysis 2 (replacement of year and time since pasture stage with factors group B): **15** significant factors, mean correct prediction **86.8%**

Conclusions

- Factors including cumulative and/or average values of the potential solar radiation, and of the temperature departure from the long-term average for the respective agricultural district, successfully replaced the year effect in the logistic regression and resulted in a satisfactory prediction accuracy

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