Grasslands used for forage production or as pastures compose a significant portion of Austrian territory (22% or 1.9 mil. ha) and play an important role in the landscape as well as part of the agriculture production system. However, grassland production does vary considerably among years and among individual cuts due to number of factors.

This is of major importance to dairy farmers since the whole farming system must account for the risk of unfavorable weather conditions. In case of Austrian grasslands, the seasonal yield deviations can reach up to 10% (in some cases 20%) and are common with even larger deviations between years of the individual cuts. Great deal of the yield variability is caused by the climatic factors and their interactions with the soil conditions, sward composition, and grassland management.

**AIMS**

- To derive a reliable statistical model for meadows under various management regimes;
- To evaluate performance of such statistical model during "dry" and "wet" years;
- To evaluate model capability to predict dry matter yield early in the season.

**EXPERIMENTAL DATA**

- Three Austrian experimental stations with yield, soil and weather records available for 32-40 seasons.
- Situated in different altitudes and soil conditions.
- Large number of fertilization and management variants.

**GENERAL MODEL DESIGN**

- CALM II TAUSON DATA SET: "avens" experimental seasons at Gumpenstein and Piber experimental sites (n = 353) were used for determination of the GRAM model parameters.
- VERIFINGR DATA SET: 2000 experimental seasons at Gumpenstein and Piber + independent data set from Admont (n = 305) were used for verification of the model.
- VERIFINGR DURING DRY YEARS: Ability of the model accuracy during dry years was tested on those years from the verification data set during which the average of the meteorological drought was proven.

**YIELD FORECASTING EARLY IN THE SEASON**

- Data base: Gumpenstein (G1)
- Each forecast consists of 9 runs expressed in terms of the probabilities forecast.

**METHOD PERFORMANCE DURING "DRY" YEARS**

- Performance of both GRAM modifications was tested during dry and wet seasons.
- Verification database was split into three subsets: "normal", "dry", and "wet.
- The thresholds were based on the Standard Precipitation Index (SPI).
- The analysis of residuals and observed vs. predicted yields was performed. The results showed that the model was able to accurately forecast the seasonal yield in general.

**CONCLUSIONS**

- The analysis of the GRAM model performance during dry years showed approximately the same results as over the whole dataset. No statistically significant differences were found in case of other GRAM modification compared to the whole dataset. However, in 3 cases, in which production was overestimated by more than 25% whilst in 13 cases the GRAM underestimated yield at least by the same error margin.
- All cases of GRAM failures that resulted in yield underestimation of more than 35% occurred during dry years at the Piber station. This site was found to be under occasional influence of underground water before that influenced the experiment yields.