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/*
        This SAS programme reads in the data and fits the two final models presented in
        Grange et al. 2022. 'Grassland legacy effects on yield of a follow-on crop in rotation
        strongly influenced by legume proportion and moderately by drought.' European
        Journal of Agronomy

        The response variables are DMY (Dry matter yield in the follow on crop phase, t ha^-1)
        and NY (nitrogen yield in the follow on crop phase, kg ha^-1).

        The fixed effects in the model are:
        -    The proportion of each species sown in the grassland ley phase (Lp, Pp, Tp, Tr,
             Ci, Pl)
        -    Drought coded 0 for rainfed conditions and 1 for experimental drought conditions
             implemented during the grassland ley phase.
        -    The variable XN distinguishes the high N fertiliser rate plots in the grassland ley
             phase (these plots were all monocultures of Lolium perenne).

        Additional notes:
        -    When XN = 1, Lp = 0.
        -    The intercept is omitted to avoid over parameterisation because the species
             proportions sum to 1.

        A random plot effect is included to account for the split-plot design in the grassland
        ley phase.
*/

/* Load the dataset into SAS and name it 'MixLegacy'  */

Filename mydata 'filelocation\LegacyEffect_Dataset.csv';

proc import datafile=mydata    DBMS=csv replace   out=MixLegacy;
        getnames=yes;
        datarow=2;
run;


/* Sort data by subject for modelling on repeated measures */
proc sort data=MixLegacy;
        by Plot Drought;
run;


/* Fit the model for estimating the dry matter yield of the follow-on
crop*/
proc mixed data= MixLegacy method=reml plots=all;
        class Plot;
        model DMY = Lp Pp Tp Tr Ci Pl XN Drought / noint solution ddfm=kr;
        random Plot;
run;


/* Fit the model for estimating the nitrogen yield of the follow-on crop*/
proc mixed data= MixLegacy method=reml plots=all;
        class Plot;
        model NY = Lp Pp Tp Tr Ci Pl XN Drought / noint solution ddfm=kr;
        random Plot;
run;
```