Assignment 1 – BLUPF90 family programs

This assignment involves the *blupf90* family of programs.

Create a directory. Download the zip file: blupf90_win.zip from the wiki page of the course and unzip it. Subdirectory bin will contain binaries and gnuplot package while subdirectory examples contains parameter files + data sets for some exercises.

Open an MS-DOS shell (e.g. "cmd" command) and move to the directory created before. Type:

setf90

This sets access to all programs in this MS-DOS shell.

Estimation of breeding values and reliabilities

1. Documentation for BLUPF90 program in the wiki: http://nce.ads.uga.edu/wiki/doku.php and also in blupf90.pdf file.

2. Run *blupf90* with examples specified in Appendices A-C from the BLUP manual. Examples are stored in the directory ***"examples"***. Parameter files start or end with letters ex.

3. Download from wiki page the file "ex_mat_mt.zip" and store and unzip under the folder created previously. The directory ***"ex_mat_mt"*** includes data/pedigree files for a 3 trait maternal model and a parameter file for one trait model. Run *blup90* for one trait with the following solving options:
   a) by default iteration (PCG),
   b) by Gauss-Seidel iteration and
   c) by FSPAK.

   For details how to change the solving options, see the wiki page for *blupf90*.

Variance components estimation

4. Read documentation for REMLF90 program in the wiki: http://nce.ads.uga.edu/wiki/doku.php and also in remlf90.pdf file.

5. Files for this exercises are in directory "***examples"*** . Files with *99 contain data files for up to 14 traits. Parameter file exmr99s1 uses these files for a single-trait model, exmr99s2 uses for a two-trait model, and exmr99s for a three-trait model.

6. Calculate estimates of variance components by *remlf90* and *airemlf90* using one and three trait models. Record the number of rounds and CPU time. Unix (including Linux) allows for measuring the CPU time by preceding command with time, e.g.,

   time remlf90

Attention: if computing takes too long, only obtain approximate time per round, or terminate. For Windows system obtain an approximate time of computation.

7. Read Wiki FAQ pages on Gibbs sampling and Post-Gibbs analysis.

8. For one-trait and 3 trait models, obtain 5,000 samples using *gibbs2f90*. Give burn-in of 1 and store every sample. Analyze samples with *postgibbf90*. Find a burn-in and estimate parameters. Re-estimate parameters with burn-in doubled. Are estimates very different?

9. Formulate conclusions. Are they similar to those in the paper "Reliable computing in estimation of variance components"?

OPTIONAL

10. Run *blupf90* using exmr99s parameter file so that it calculates accuracies for the animal effect. Accuracies for an animal in equation *i* in a single-trait situation is defined as:

    $ACC_i = 1 - PEV_i/VarA$

    Where:
    - PEV_i is the prediction error variance (S.E. = sqrt(PEV)) for equation *i,* which is the *i*-th diagonal of the inverse of the left hand side
    - VarA is the additive genetic variance

    Suggestion: Use "OPTION sol se" for *blupf90* - see *blupf90* documentation. This option calculates the sparse inverse of the left hand side.
    Warning: The formulas are correct only without unknown parent groups in the model.