Software packages in Animal Breeding

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Corrections and updates as of Aug 4, 1994

DFREML
Correction: Determinants are computed by sparse matrix factorization rather than by sparse matrix absorption.

MTDFREML
Now supports unknown parent groups and inbreeding

DMU
Official anonymous FTP site: rs580.foulum.min.dk (129.142.182.9).

Extensions by Esa Mäntysaari (esa@mttk9.mttk.fi).:
>   1. DMUEM - Accelerated EM REML algorithm for general models. In multiple traits it has been found more reliable and faster than any derivative-free REML program.
>   2. DMU4 - Support for accurate prediction error variance for up to approximately 200,000 equations.

JAA/MTC
Extension by Nicolas Gengler (gengler@fsagx.ac.be):
>   MTJAA20 and MTJAA21 - modifications of JAA to extended canonical transformation, or to models supported by MTC; compute breeding values and reliabilities for multitrait models without missing traits; available from anonymous FTP at misz.animal.uiuc.edu in contributed/gengler.

ABTK
Correction: The iteration is memory rather than disk based.

Practical comparison of derivative- and derivative-free REML

The table below shows convergence (rounds or function evaluations) and run time of several REML programs for one to three-trait repeatability models with 2 random effects, no missing traits, and 4898 equations. DFREML was selected as the most robust implementation of the DF algorithm. Timings are from Sun Sparcstation 2.

Number of traits	Measure	Program/Option			
		DFREML/Powell	DFREML/Simplex	DMUEM	MTC
1	rounds	26	47	24	85
	time [s]	42	76	175	405
2	rounds	238	639	33	84
	time [s]	1129	2997	920	672
3	rounds	583	2696	45	81
	time [s]	6380	28808	3679	898

Programs using the derivative optimization (DMUEM, MTC) converged in one cycle regardless of priors while the derivative-free program (DFREML) diverged when prior correlations between the traits were close to 0. When these correlations were .5, DFREML required several cycles of restarts.Timings in the table represent one cycle of

evaluation and do not include the restarts. Note: MTC does not support missing traits or different models/trait.