

MiX99 output files

MiX99 course on genomic prediction

COURSE DAY 2, March 10th, 2026



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- Files from running pre-processor
 - Log files
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 - OK files
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 - Standard output file
 - Solution files



Files in directory after a MiX99 run

```

584 Jun 18 2024 ARlog
1639 Jun 12 2024 CM_SCS_sire_HOL_SWE.clm
7239 Jun 18 2024 Conlog
171142966 Jun 12 2024 HOL_MastData_sire_gblup_SWE.dat
47653632 Jun 12 2024 HOL_sire_Ginv.dat
21480 Jun 12 2024 LG3_W004.cov
12947 Jun 18 2024 Memlog
22986 Jun 18 2024 MiX99.lst
3340 Jun 18 2024 MiX99_DIR.DIR
3334 Jun 13 2024 MiX99_IN.DIR
24 Jun 13 2024 MiX99_IN.OPT
13584 Jun 18 2024 Modlog
137 Jun 18 2024 Namlog
3336 Jun 18 2024 OK_mix99i
3622 Jun 18 2024 OK_mix99s
3055 Jun 18 2024 Parlog
7362567 Jun 18 2024 REMLlog
603 Jun 18 2024 Resid.List
456040 Jun 18 2024 Solani
1901156 Jun 18 2024 Solfix
1928576 Jun 18 2024 Solr01
16364032 Jun 18 2024 Solr02
1231 Jun 18 2024 Solreg
10473932 Jun 18 2024 Solvec
31715228 Jun 18 2024 Tm10.trco0
49 Jun 18 2024 Tm12.lsmn
6177652 Jun 18 2024 Tmp.cov0
12340220 Jun 18 2024 Tmp.ijcov0
271 Jun 18 2024 Tmp0.para
2285084 Jun 18 2024 Tmp1.code
56 Jun 18 2024 Tmp4.pedi0
53015300 Jun 18 2024 Tmp5.clas0
46156752 Jun 18 2024 Tmp6.diab0
15942628 Jun 18 2024 Tmp9.strc
29162 Jun 18 2024 TmpG.ids
29162 Jun 18 2024 TmpG.ids.sorted
291 Jun 18 2024 Tralog
1851 Jun 12 2024 VCdirfile_f.slv
26480340 Jun 18 2024 eHat.data0
119642896 Jun 12 2024 mix99i
121654456 Jun 12 2024 mix99s
2080 Jun 18 2024 original_blockcode.dat
12576 Jun 18 2024 parfile
12576 Jun 12 2024 parfile_ped

```

- **Input files** (data, pedigree, variance components, covariable tables, solver files)

- **MiX99** produces many types of files
- OK files
- Residual (co)variance patterns
- Block information file
- Iteration-on-data files (binary)
- Log files
- Solution files
- Instruction files for *mix99i* and *mix99s*

- If VC are estimated (**REML convergence file**)

Log files



MiX99.lst file

- Created by *mix99i*
- Contains the most important information about:
 - The input files used
 - Data used in the analysis
 - Pedigree used in the analysis
 - Covariance parameter file
 - Model used
 - Data description
 - Structure of MME
- Check carefully, whether the information shown agrees with the intended analysis

```

INPUT FILES
=====
DATA FILE:
Mrode.dat
File format      : formatted (ascii)
Integer input columns : 2
ID HTD
Integer input column types:
0 0
Real input columns : 6
phi0 phi1 phi2 phi3 phi4 Milk
Code for missing real values: -9999.000000
Integer input values less or equal to zero are considered missing.

PEDIGREE FILE:
Ped.dat
Integer input columns read:

APPLIED MODEL
=====
TR-GRP, WEIGHT  DEPENDENT VARIABLES:
-----
1 -            TR TR-NAME      N-OBS    MEAN      SD      MINIMUM    MAXIMUM
-----
1 -            1 Milk          42    16.210    4.4528    8.0000    24.000
-----
TR, TR-NAME
-----
1 Milk
Random no:
Number of Individuals..... 8
Number of Individuals with data records..... 5
Number of Data Records Processed ..... 42
Total Number of Accepted Observations ..... 42
Number of Trait Patterns ..... 1
Maximum Number of Trait Patterns ..... 1

METHOD AND IN
ANIMAL MODEL: COVARIABLES READ FROM DATA FILE:
-----
COVARIABLE      N      MEAN      SD      MINIMUM    MAXIMUM
-----
Trait group: 1
-----
1 phi0          42    0.70710    0.20224E-04    0.70710    0.70710
2 phi1          42   -0.14904    0.76021     -1.2247    1.2247
3 phi2          42    0.13661    0.85936     -0.76132    1.5811
4 phi3          42   -0.28420E-01  0.97047     -1.8704    1.8704
5 phi4          42    0.29346    1.0439     -0.77566    2.1213
-----
Number of residual (co)variance matrices ..... 1
    
```



mix99i > “standard output file” or log file

- Example:

```
mix99i > mix99i.log
```

- Contains more specific (detailed) information
- Includes error messages in the case the `mix99i` run **was not** successful
- Useful information when setting up a new evaluation run

Check version number

```

                                     M i X 9 9
release  XI/2025 version 25.1125 (Jan 20 2026 16:34 git 4db24e48) XSN
                                     P R E P R O C E S S O R
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http://www.luke.fi/mix99                   mix99@luke.fi

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large mixed model equations. Release XI/2025. Natural Resources
Institute Finland (Luke). Jokioinen, Finland.
URL: http://www.luke.fi/mix99

```

mix99i > “standard output file”

- CLIM commands
- Model information
- Variance components used
- Error messages

```

Reading MiX99 command file =rrmodel.clm
Producing MiX99 directive file=Mix99_DIR.DIR

=====
1 INTEGER ID HTD
2 REAL Reading RANDOM ...
3 DATAFIL -----
4 PEDFILE >> # RANDOM
5 PEDIGRE >> 1 1 1 2 2 2
6 PARFILE
7 RANDOM Reading PEDIGR (Inbreeding check!) ... 3 6
8 PRECON -----
9 MODEL >> # RELATIONSHIPS
10 Milk = >> # Standard pedigree based relationship matrix
11 WITHINB >> 3 1 1 1
=====

Reading REGRESS ...
>> # REGRESS
>> 12 1 2
Covariance Matrix for Random Effect Number 1 ID
Combining c -----
>> # COMBIN
>> n 1 2 3
n 2 -0.254000 3.17100
3 -1.10100 0.167000 2.45700
Method for -----
>> # PEDIGR
>> am 1 2 3
parents: si 1 3.29700
2 0.594000 0.921000
FILES: 3 -1.38100 -0.289000 1.00500
-----

Residual Co-Variance Matrix
-----
1
1 3.71000

```

```

ERROR: Checking equality of ID code in REGMATRIX and DATA cannot be done.

Please give PEDIGRECODE of DATA using DATASORT command,
OR
if no checking is wanted then do not give an ID code column in REGMATRIX
OR
use the REGINDEX approach in REGMATRIX.

```

```

-----
MiX99_INPUT: --- S T O P --- Time: 14:09:05.3 06.03.2026
-----


```

Luke

mix99s > “standard output file”

- Example

```
mix99s -s > mix99s.log
```

- Contains quite bit of information related to solver
- Check version 

```

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-----
                M i X 9 9 s
-----
release  XI/2025 version 25.1125 (Jan 20 2026 16:34 git 4db24e48) XSN

      M I X E D   M O D E L   E Q U A T I O N S   S O L V E R

      General Program for Large Mixed Model Problems with
      Preconditioned Conjugate Gradient Method

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large mixed model equations. Release XI/2025. Natural Resources
Institute Finland (Luke). Jokioinen, Finland.
URL: http://www.luke.fi/mix99
-----

```

mix99s > "standard output file"

- Parameters specific for solving
- Memory requirements
- Convergence criteria and statistics
- Model derivatives calculated

```
MiX99 preprocessing time&date: 14:19 06.03.2026
```

Preconditioner information:

```
XpX : f across block fixed  
WPW : b d within block effects  
WPWa: b across block random  
d=diagonal, b=block diagonal, f=full block
```

```
Number of traits in the model :      1  
Size of genetic (co)var matrix:     3
```

Parameters

```
Memory requirements           : high.  
Number of trait patterns      :      1  
Number of residual (co)variance matrices :      1  
Number of inv(R) matrices    :      1  
  
Number of CPU threads by MKL  :      1  
Number of CPU threads by OpenMP : No OpenMP compiled in  
Checking of release information in files : yes  
  
Maximum Number of PCG Iterations .....      54  
Minimum Number of PCG Iterations .....      1  
PCG Stopping Criterion ..... CR < 0.1000E-06  
  
Calculate residuals : No.  
  
Calculate DYDs  
File Soldyd format: text  
Model factors that are included in the DYD:  
1= included, otherwise 0.  
Order of factors is same as in REGRESS
```

mix99s > "standard output file"

- Convergence statistics
- Preview of solutions

```

-----
MiX99_SOLVE: Start of PCG Iteration                Time: 14:19:53.8  06.03.2026
-----

                Iteration Statistics
                -----
                Convergence Indicators
                -----
ROUND      CA      CR      CM      CD      MAX.CHA.
-----
Solution vector will be initialized to be zero
  rhs' * rhs =      34962.8876179330
 animal rhs' * rhs =  4466.86800920401
-----
  0      1.000      1.000      1.000      0.000      0.000
  1      0.1557      0.8952E-01      0.9727E-01      1.000      6.495
  2      0.7019E-01      0.4262E-01      0.3934E-01      0.1865      1.881
  3      0.3918E-01      0.2068E-01      0.1956E-01      0.7559E-01     -0.6396
  4      0.5653E-01      0.2699E-01      0.2392E-01      0.1288     -1.134
  5      0.5438E-01      0.2879E-01      0.2611E-01      0.1748     -1.737
  6      0.5718E-01      0.2414E-01      0.2097E-01      0.1740     -1.810
  7      0.2470E-01
  8      0.1656E-01
  9      0.1508E-01
 10      0.8965E-02
 11      0.8186E-02
 12      0.7535E-02
 13      0.6972E-02
-----
                First 20 Solutions for Random Effect:  1  ID
-----
Fact.Trt  Level  N-Obs  Eq-No  Solution  Factor
-----
  1  1      4      10     -0.648679  phi0(ID)
  2  1      4      10     -0.360049  phi1(ID)
  3  1      4      10     -1.47182   phi2(ID)
  1  1      5      10     -0.776117  phi0(ID)
  2  1      5      10     0.137014   phi1(ID)
  3  1      5      10     0.968836   phi2(ID)
  1  1      6      5      -1.99268   phi0(ID)
  2  1      6      5      0.985107   phi1(ID)
  3  1      6      5      -0.693156E-01 phi2(ID)
  1  1      7      7      3.51878    phi0(ID)
  2  1      7      7      -1.05099   phi1(ID)
  3  1      7      7      -0.404777  phi2(ID)
  1  1      8      10     -0.101305  phi0(ID)
  2  1      8      10     0.288919   phi1(ID)
  3  1      8      10     0.977081   phi2(ID)

```

Solutions for General Regressions

Trait	Reg-No	Eq-No	Solution	Covariable
1	1	35	11.4910	phi0
1	2	36	-0.625266	phi1
1	3	37	-0.134579	phi2
1	4	38	0.347894	phi3
1	5	39	-0.421769	phi4



Convergence statistics



Convergence criteria

- Iteratively solving MME requires a stopping rule or criteria
- Usually when solutions are “close enough” to true solutions
- Different criteria:
 - CA: relative difference between LHS and RHS of breeding value equations

$$ca_{(k)} = \sqrt{\frac{(\mathbf{r} - \mathbf{C}\hat{\mathbf{a}}^{(k)})'(\mathbf{r} - \mathbf{C}\hat{\mathbf{a}}^{(k)})}{(\mathbf{r}_a)'(\mathbf{r}_a)}}$$

- CR: relative difference between LHS and RHS

$$cr_{(k)} = \sqrt{\frac{(\mathbf{r} - \mathbf{C}\hat{\mathbf{s}}^{(k)})'(\mathbf{r} - \mathbf{C}\hat{\mathbf{s}}^{(k)})}{(\mathbf{r})'(\mathbf{r})}}$$

Convergence criteria (cont.)

- CM: same as CR but including preconditioner matrix

$$cm_{(k)} = \sqrt{\frac{(\mathbf{r} - \mathbf{C}\hat{\mathbf{s}}^{(k)})' \mathbf{M}^{-1} (\mathbf{r} - \mathbf{C}\hat{\mathbf{s}}^{(k)})}{(\mathbf{r})' (\mathbf{r})}}$$

- CD: relative difference between consecutive sets of solutions

$$cd_{(k)} = \sqrt{\frac{(\hat{\mathbf{s}}^{(k)} - \hat{\mathbf{s}}^{(k-1)})' (\hat{\mathbf{s}}^{(k)} - \hat{\mathbf{s}}^{(k-1)})}{(\hat{\mathbf{s}}^{(k)})' (\hat{\mathbf{s}}^{(k)})}}$$

- Default criterion in MiX99 is: $CD \leq 1.0e^{-5}$
- Criterion (CA, CR, CM, CD) can be specified in the instructions for `mix99s`

Example

```

-----
MiX99_SOLVE: Start of Iteration                               Time: 11:41:58.2  10.11.2023
-----

                                Iteration Statistics
                                -----

                                Convergence Indicators
                                -----
ROUND      CA          CR          CM          CD          MAX.CHA.
-----
Solution vector will be initialized to be zero
  rhs' * rhs =      4854312702.91901
animal rhs' * rhs =  437712074.408246
-----
  0      1.000      1.000      1.000      0.000      0.000
MiX99_SOLVE: Start inv(A22) computations                    Time: 11:41:58.2  10.11.2023
MiX99_SOLVE: External covariance work                       Time: 11:41:58.2  10.11.2023
MiX99_SOLVE: Done external covariance work                  Time: 11:41:58.2  10.11.2023
  1      1.103      0.5190      1.158      1.000      5866.
  2      0.5630      0.2585      0.8531      0.7279     -5898.
  3      0.4259      0.1571      0.3521      0.4292     -4502.
  4      0.1856      0.9473E-01  0.2595      0.7471E-01  766.4
  5      0.1544      0.7212E-01  0.2247      0.2920      3361.
  6      0.1150      0.5391E-01  0.1141      0.1294      1253.
  7      0.5480E-01  0.2865E-01  0.8911E-01  0.2468      2291.
  8      0.4283E-01  0.3076E-01  0.5621E-01  0.1223     -805.7
  9      0.2936E-01  0.1821E-01  0.3577E-01  0.1988      1924.
 10     0.2743E-01  0.1188E-01  0.2599E-01  0.1464     -1175.
 11     0.2062E-01  0.9937E-02  0.2236E-01  0.1481     -1520.
 12     0.1781E-01  0.8678E-02  0.1908E-01  0.1179     -1145.
 13     0.1521E-01  0.8560E-02  0.1663E-01  0.1153     -1115.
 14     0.1497E-01  0.6250E-02  0.1580E-01  0.1086     -1200.
 15     0.1373E-01  0.5490E-02  0.1435E-01  0.8249E-01  1298.
 16     0.1360E-01  0.5183E-02  0.1413E-01  0.8181E-01  1472.
 17     0.2464E-01  0.7901E-02  0.3048E-01  0.2581E-01  468.9
 18     0.1105E-01  0.4248E-02  0.1173E-01  0.4794E-01  954.9
 19     0.8762E-02  0.4446E-02  0.1036E-01  0.5865E-01  965.8
 20     0.1054E-01  0.4428E-02  0.2074E-01  0.2071E-01  235.6
 21     0.7852E-02  0.3278E-02  0.9001E-02  0.3982E-01  490.0
 22     0.1162E-01  0.3978E-02  0.1370E-01  0.3959E-01  -425.6
 23     0.6648E-02  0.2805E-02  0.7584E-02  0.1289E-01  137.3
 24     0.5564E-02  0.2158E-02  0.6283E-02  0.4528E-01  499.6
 25     0.4457E-02  0.1899E-02  0.4959E-02  0.3897E-01  467.3
 26     0.3665E-02  0.1667E-02  0.4094E-02  0.3471E-01  393.9
 27     0.3216E-02  0.1209E-02  0.3468E-02  0.3071E-01  -302.7
 28     0.2590E-02  0.1133E-02  0.2851E-02  0.2573E-01  -287.7

```

MiX99 course on genomic prediction, Tuusula, 9–11 March 2026



Solution files



Solution vector

- `mix99s` (or `mix99p`) will write solution files depending on the model
- The vector of solutions $\hat{\mathbf{s}}$ is written to a binary file (`Solvec`)
 - Used for re-starting the iterations
- Solutions for fixed effects stored in `Solfix` file
 - Also `Solfixnn` where `nn` is the effect number
- Solutions for regression effects are stored in `Solreg` file
- Solutions for random effects (other than additive) stored in `Solrnn`
- Solutions for additive genetic effects stored in `Solani`
- Also, if requested can get solutions for
 - Parent average (-PA)
 - Mendelian sampling (-MS)
 - DYD (in CLIM file)



Solfix

Fact.	Trt	Level	N-Obs	Solution	Factor Trait
1	1	61102022	68	72.978	YxT DV2
1	1	61132014	93	65.723	YxT DV2
1	1	61132015	93	62.113	YxT DV2
1	1	61152016	83	69.027	YxT DV2
1	1	61152017	83	70.840	YxT DV2
1	1	61162017	41	67.146	YxT DV2
1	1	61162018	41	68.537	YxT DV2
1	1	61162019	41	73.305	YxT DV2
1	1	61172018	90	67.870	YxT DV2
1	1	61172019	90	74.710	YxT DV2
1	1	61172020	90	70.888	YxT DV2
1	1	61182009	73	62.751	YxT DV2
1	1	61182010	72	62.345	YxT DV2
1	1	61182011	72	62.091	YxT DV2
1	1	61192010	72	63.129	YxT DV2
1	1	61192011	72	57.528	YxT DV2
1	1	61192012	72	66.850	YxT DV2
1	1	61192020	133	70.739	YxT DV2
1	1	61202011	76	62.884	YxT DV2
1	1	61202012	76	70.205	YxT DV2
1	1	61202013	76	69.256	YxT DV2
1	1	61212012	93	68.559	YxT DV2
1	1	61212013	93	68.122	YxT DV2
1	1	61212014	93	69.145	YxT DV2
1	1	61262008	33	59.242	YxT DV2
1	1	61262009	33	58.905	YxT DV2
1	1	61262017	100	67.852	YxT DV2
1	1	61262018	100	71.926	YxT DV2



Solr01

```
7      3 -0.87856E-01
8      3  0.17435
9      2  0.13006
18     3  0.59394E-01
19     3  0.13292E-01
20     2 -0.62751E-02
23     3  0.19603
24     3  0.14377
25     2 -0.25290E-01
28     3 -0.17569E-01
29     3  0.13365
30     2  0.18000
33     3  0.78728E-01
34     2  0.90698E-01
37     3  0.37459E-01
38     2  0.66166E-02
41     3 -0.43412E-01
42     3  0.15713
43     2  0.10468
46     3 -0.17118
47     3  0.23285
48     2  0.12124
53     3 -0.11032
54     3 -0.45434E-01
55     2  0.17981
64     3  0.10509
65     3  0.46660E-01
66     2  0.22553
69     3 -0.68395E-01
```



Solreg

Trt	Reg-No	Solution	Trait	Covariable
1	1	0.81472E-01	cm1	het
1	2	-0.15409	cm1	recl
1	3	0.17590	cm1	inbr
2	1	-0.54129E-01	cm2	het
2	2	0.82372E-01	cm2	recl
2	3	0.11904	cm2	inbr
3	1	-0.18721	scs	het
3	2	0.16532	scs	recl
3	3	-0.22924	scs	inbr
4	1	-0.21717E-01	cm1	het
4	2	-0.21135E-01	cm1	recl
4	3	-0.18864	cm1	inbr
5	1	0.65182E-01	cm2	het
5	2	-0.18658	cm2	recl
5	3	0.60386	cm2	inbr
6	1	0.53455E-01	scs	het
6	2	-0.13837	scs	recl
6	3	0.33919	scs	inbr
7	1	-0.24192E-01	cm1	het
7	2	-0.92449E-01	cm1	recl
7	3	-0.12313	cm1	inbr
8	1	-0.59407E-01	cm2	het
8	2	0.31341E-01	cm2	recl
8	3	0.39519	cm2	inbr
9	1	0.76489E-01	scs	het
9	2	-0.17273	scs	recl
9	3	0.89252E-01	scs	inbr



Solani (single- and multiple-trait)

1	1	27	-0.33520
2	2	17	-0.16359
3	3	14	0.22192
4	4	11	0.25396
5	5	18	0.17602
6	6	9	1.0875
7	7	12	0.34512
8	8	28	-0.21894
9	9	11	0.11986
10	10	9	0.47046
11	11	9	0.31121
12	12	0	0.24498
13	13	9	0.95656
14	14	19	0.51594
15	15	18	0.22643
16	16	11	0.32168
17	17	16	-0.22877
18	18	13	-0.56480
19	19	16	0.42511
20	20	19	0.98971
21	21	22	0.42041
22	22	9	0.60906
23	23	14	0.80307
24	24	9	-0.68750
25	25	5	0.15171
26	26	15	-0.42725
27	27	16	-0.60425
28	28	11	0.47550
29	29	25	-0.13069

1	1	27	71.273	195.85	57.031	-0.11651	-0.24330	-0.43263
2	2	17	-17.719	-107.72	-64.020	-0.33121	0.14348	-0.10620
3	3	14	-128.99	78.640	-16.263	0.78458	0.81575	0.41296
4	4	11	42.704	-237.61	-84.059	-0.84636	-0.30856	0.17791
5	5	18	51.049	-129.35	-125.85	-1.0576	0.48754E-01	0.26500
6	6	9	-160.45	-259.05	-91.337	-0.75621	1.2350	1.2493
7	7	12	114.18	-28.519	52.511	-0.86951	-0.28381	0.37740
8	8	28	117.28	143.00	-24.218	-0.70472	-0.13816	-0.33258
9	9	11	-95.709	-14.809	-32.643	0.61043	0.27430	0.11013
10	10	9	94.190	92.607	94.613	-1.2439	0.35662	0.43560
11	11	9	25.558	-167.17	82.176	-0.85363	0.76710E-01	0.38238
12	12	0	-25.694	-29.340	3.6038	-0.30033	0.34236	0.27763
13	13	9	213.51	-253.06	1.8394	-3.1769	-0.93903E-01	1.0324
14	14	19	-5.1630	22.684	-29.268	-0.19641	0.27521	0.40122
15	15	18	-21.929	-44.943	-3.7511	0.16547	0.32735E-02	0.25013
16	16	11	2.1538	-271.27	-93.930	-1.0108	0.41894E-01	0.41178
17	17	16	12.122	264.76	87.569	1.3205	-0.41279	-0.49160
18	18	13	-32.003	269.80	132.25	1.1859	-0.38152E-01	-0.60893
19	19	16	70.519	-77.768	33.654	-0.85409	-0.97929E-01	0.43488
20	20	19	37.995	-59.785	26.679	-1.0698	0.49186	1.0354
21	21	22	-67.412	42.231	75.236	-0.60426	0.97194	0.65468
22	22	9	-30.330	-152.31	-25.207	-1.2308	0.76003	0.77785
23	23	14	107.77	-188.52	140.42	-2.0887	0.24993	1.0451
24	24	9	104.20	100.10	24.596	-0.93976E-01	-0.83481	-0.83376
25	25	5	119.39	-25.662	118.56	-0.86175	-0.26093	0.18900
26	26	15	-138.05	66.369	-9.9283	1.0952	0.55631	-0.11855
27	27	16	98.626	346.93	184.59	0.62607	-0.24445	-0.65543
28	28	11	31.642	-99.952	-43.174	-1.1106	0.53038	0.86037
29	29	25	-94.553	20.722	-41.709	0.98350	0.84742E-01	-0.13007



Solani (multiple-trait RR)

1004617158	15	1012	0.14340E-01	0.24502E-01	0.16836	0.18818E-01	0.43114E-01	0.19499	0.32327E-01	0.54263E-01	0.20097	0.12319E-01
1014193157	54	47	-0.16352E-02	-0.60202E-02	-0.12050	-0.11648E-02	-0.19170E-01	-0.12990	-0.11709E-01	-0.30842E-01	-0.15192	-0.41856E-03
131006087	119	226	0.45895E-03	0.62561E-03	-0.73392E-01	-0.42498E-04	-0.20086E-02	-0.61148E-01	-0.21842E-04	-0.28329E-02	-0.58732E-01	-0.16145E-01
1318495441	136	299	-0.47375E-02	-0.70353E-02	-0.85651E-01	-0.12149E-01	-0.31196E-01	-0.15184	-0.13319E-01	-0.36921E-01	-0.17266	-0.47433E-01
237638	1	169	-0.47739E-02	-0.61246E-02	0.87339E-01	-0.10226E-01	-0.19492E-01	-0.71100E-01	-0.95398E-02	-0.21256E-01	-0.75536E-01	-0.45977E-01
239615	2	40	-0.27778E-02	0.37958E-02	0.62406E-01	-0.98204E-02	0.15099E-01	0.57272E-01	0.11244E-01	0.36305E-01	0.46803E-01	0.41384E-02
1000085707	3	98	0.11935E-01	0.79866E-02	-0.23381E-02	0.24219E-01	-0.35412E-03	-0.19822E-01	0.75686E-03	-0.26061E-01	0.24543E-02	-0.30987E-01
1000910340	4	57	0.79524E-02	0.12245E-01	0.13638	0.86156E-02	0.93795E-02	0.13193	0.12548E-01	0.91815E-02	0.15391	0.56681E-02
1004096625	12	95	0.46371E-02	0.60038E-02	0.85873E-01	0.11215E-01	0.23312E-01	0.12539	0.10151E-01	0.25506E-01	0.14018	0.22744E-01
1002065717	6	30	0.89853E-02	0.16445E-01	0.55108E-01	0.12804E-01	0.37059E-01	0.13367	0.24221E-01	0.48873E-01	0.13512	0.36173E-01
1001931348	5	193	0.44619E-02	0.11110E-01	0.19064E-01	0.13713E-02	0.15499E-01	0.56263E-01	0.15364E-01	0.26630E-01	0.40059E-01	0.38401E-01
1003381363	8	70	0.33863E-02	0.71408E-02	0.81356E-01	0.74200E-02	0.29417E-01	0.12971	0.14281E-01	0.39873E-01	0.13932	0.20321E-01
1004307129	13	1578	0.94285E-02	0.10097E-01	-0.46076E-01	0.14843E-01	0.47890E-02	-0.68618E-01	0.72209E-02	-0.60742E-02	-0.81655E-01	-0.26876E-01
1003426517	9	74	0.13196E-01	0.20913E-01	0.13112	0.15004E-01	0.21580E-01	0.12255	0.23029E-01	0.23811E-01	0.12746	0.11467E-01
1003769269	10	1882	-0.11097E-01	-0.18432E-01	-0.34157E-01	-0.11962E-01	-0.21255E-01	-0.11616	-0.21574E-01	-0.26422E-01	-0.10451	-0.56405E-01
1004520380	14	44	0.95819E-02	0.15299E-01	0.45779E-01	0.11390E-01	0.18513E-01	0.51179E-01	0.17670E-01	0.21342E-01	0.54001E-01	-0.39959E-02
1306960586	97	1599	0.20810E-02	-0.40638E-02	0.59661E-01	0.57847E-02	-0.24908E-01	-0.81829E-01	-0.13684E-01	-0.47428E-01	-0.70365E-01	-0.36088E-01
1007266066	24	817	0.57859E-02	0.80309E-02	-0.77758E-01	0.66471E-02	0.33633E-02	-0.59174E-01	0.69588E-02	0.33003E-03	-0.87385E-01	0.15745E-01
1008204563	27	71	0.45906E-02	0.44614E-02	0.12416	0.81641E-02	0.29484E-02	0.37956E-01	0.29160E-02	-0.34756E-02	0.53306E-01	-0.26359E-01
1308885223	110	256	0.12440E-01	0.13494E-01	-0.21752E-02	0.15175E-01	-0.10412E-01	-0.17204E-02	0.55323E-02	-0.28985E-01	-0.73468E-02	0.36105E-02
1307101559	101	933	0.12366E-01	0.13372E-01	-0.33216E-02	0.15120E-01	-0.10446E-01	-0.28836E-02	0.54173E-02	-0.29021E-01	-0.85575E-02	0.34231E-02
1011257787	37	2899	0.90247E-02	0.19008E-01	0.19031	0.13383E-01	0.53503E-01	0.30323	0.31960E-01	0.75104E-01	0.34506	0.58514E-01
1308994083	114	2088	0.65384E-02	0.35755E-02	-0.69002E-01	0.11752E-01	-0.10661E-01	-0.45498E-01	-0.33077E-02	-0.29151E-01	-0.41805E-01	-0.27451E-02
1011096874	36	55	0.38269E-02	0.48590E-02	0.31850E-01	0.36465E-02	-0.35717E-02	-0.18023E-03	0.25339E-02	-0.81148E-02	0.77410E-02	-0.43639E-01
1308547225	106	537	0.67950E-02	0.16572E-01	0.11311E-01	0.11595E-03	0.14566E-01	0.32913E-01	0.20902E-01	0.28989E-01	0.10419E-01	0.19358E-01
1013429201	48	347	-0.22383E-02	-0.10409E-01	-0.65526E-01	-0.76741E-03	-0.36185E-01	-0.11126	-0.21735E-01	-0.59898E-01	-0.11328	-0.32235E-01
1012945718	47	287	0.10498E-01	0.18752E-01	0.13075	0.12667E-01	0.32094E-01	0.15615	0.25097E-01	0.42478E-01	0.18291	-0.23246E-01
1307084707	99	173	0.12284E-01	0.19839E-01	0.29349E-01	0.17154E-01	0.34689E-01	0.10414	0.25568E-01	0.41404E-01	0.10214	0.32610E-01
1008858744	29	53	0.25784E-02	0.61938E-02	0.74233E-01	0.14869E-02	0.10248E-01	0.50237E-01	0.88638E-02	0.16454E-01	0.50458E-01	-0.13741E-02



SolMS and SolPA

SolMS

1	1	0	0.55175E-01
2	1	0	0.22565
3	1	1	0.14041
4	1	0	0.17047
5	1	0	-0.26826
6	1	0	-0.97793E-01
7	1	1	0.85236E-01
8	1	1	-0.18303
9	0	1	-0.51008
-1	4	0	-0.85236E-01
-2	6	0	0.85236E-01

SolPA

1	1	0	0.0000
2	1	0	0.0000
3	1	1	0.14041
4	1	0	0.0000
5	1	0	0.0000
6	1	0	0.0000
7	1	1	0.22565
8	1	1	-0.18303
9	0	1	-0.27588E-01
-1	4	0	0.0000
-2	6	0	0.0000



Convergence for REML files

Files from a REML run

- If variance components were estimated MiX99 also creates two additional files:
 - REMLlog file: parameter estimates at each REML iteration
 - parfile: file with estimated variance components
- *mix99s* > "standard output file" changes a bit when estimating variance components
 - Solving the MME
 - Solving pseudo-records
- More detailed information in VCE session

```

0 0 1.0000000 2.0000000
0 0 1.0000000 1.0000000
0 0 1.0000000 1.0000000
0 0 0.37605040E-03 0.55746505E-02
1 0.000 0.37302045E-03 0.55081830E-02
2 0.000 0.37324580E-03 0.54934104E-02
3 0.000 0.37415892E-03 0.54926070E-02
4 0.000 0.37176111E-03 0.54904549E-02
5 0.000 0.36898706E-03 0.54880370E-02
6 0.000 0.36663481E-03 0.54973961E-02
7 0.000 0.36532055E-03 0.54978808E-02
8 0.000 0.36346773E-03 0.55068634E-02
9 0.000 0.36228533E-03 0.55093562E-02
10 0.9445E-06 0.36196569E-03 0.55153115E-02
11 0.5377E-06 0.36105755E-03 0.55081209E-02
12 0.4050E-06 0.35897879E-03 0.55187010E-02
13 0.1770E-06 0.35856353E-03 0.55054538E-02
14 0.3725E-07 0.35770836E-03 0.54976639E-02
15 0.3613E-07 0.35811339E-03 0.54989843E-02
16 0.5185E-07 0.35767303E-03 0.55093501E-02
17 0.3511E-07 0.35532311E-03 0.55093582E-02
18 0.4003E-07 0.35428773E-03 0.55076514E-02
19 0.3676E-07 0.35362930E-03 0.55061361E-02
20 0.4675E-07 0.35403559E-03 0.55005427E-02
21 0.5752E-07 0.35428651E-03 0.54960521E-02
22 0.3455E-07 0.35623488E-03 0.55013182E-02
23 0.2079E-07 0.35740523E-03 0.55048345E-02
24 0.8858E-08 0.35542449E-03 0.55087432E-02
25 0.1550E-07 0.35450960E-03 0.54951238E-02

```



Output files

YD, DYD, Residuals, Predicted values



YD, IDD for single trait

YD	IDD
-1.513910	-1.487565
-0.4565169	-0.4374505
2.778435	2.793081
-1.052436	-1.039356
1.208954	1.223328
0.5956542	0.6141741
1.416995	1.442521
-0.9655000	-0.9301103
-1.905274	-1.857167
0.6842255	0.7479120
1.326037	1.352383
0.9349658	0.9540331
-2.650249	-2.635603
-2.472991	-2.459912
0.5751750	-0.5608023



Residuals

- eHat.data0 file

375.9618	78.27625	21.78931	-8192.000	0.9581818	-8192.000
-918.1262	251.4675	-14.69604	-8192.000	0.2272995	0.5507721
-279.6114	-59.84833	-270.9292	-8192.000	0.5029618	1.2589047E-02
163.8967	26.80728	482.3658	-8192.000	2.006240	-8192.000
-579.8066	811.3008	249.3358	3.758081	-8192.000	-8192.000
-212.8325	-284.7124	180.7123	-9.151011	-1.262391	0.6419176
-62.28945	142.6120	-25.55712	-8192.000	0.4319356	-0.6089533
-658.5862	344.6451	-199.1615	-0.3863287	-0.1636671	-0.3496098
-1009.002	642.7645	-275.3632	-0.9578662	-0.3282283	-0.4770048
-302.7321	197.2104	295.9206	-4.790569	0.3636586	0.2324517
-212.9362	-603.3013	80.01384	-8192.000	-8192.000	-8192.000
-37.71926	519.7742	-8192.000	-8192.000	-8192.000	-8192.000
8.823818	-516.5031	-4.893043	-8192.000	-8192.000	-8192.000
-570.4672	-134.9851	-136.8920	-8192.000	-8192.000	-8192.000
666.5819	296.3373	21.48295	-8192.000	-8192.000	-8192.000
-320.2286	-6.459901	-8192.000	-8192.000	-8192.000	-8192.000

Residuals corresponding missing values: -8192.000



Predicted values

- `yHat.data0`

```

7807.038    1823.724    2235.211    -8192.000    64.94182    -8192.000
6274.126    3389.532    1215.696    -8192.000    68.67270    72.64922
3704.611    2921.848    4905.929    -8192.000    68.49704    72.28741
9802.104    1885.193    3239.634    -8192.000    65.49376    -8192.000
7896.807    6663.699    2655.664    17.24192    -8192.000    -8192.000
3643.833    8132.712    3555.288    41.15101    71.66239    64.15809
7629.290    6122.388    1978.557    -8192.000    67.46806    66.60896
7937.586    5214.355    3893.162    4.386329    65.96367    67.64961
8799.002    3681.235    3469.363    2.957866    66.22823    70.27701
5726.732    3954.790    3868.079    10.79057    67.33634    70.76755
3771.936    2867.301    2601.986    -8192.000    -8192.000    -8192.000
6899.719    3558.226    -8192.000    -8192.000    -8192.000    -8192.000
10344.18    3762.503    1813.893    -8192.000    -8192.000    -8192.000
9092.467    4784.985    3031.892    -8192.000    -8192.000    -8192.000
10421.42    3827.663    1516.517    -8192.000    -8192.000    -8192.000
6088.229    2533.460    -8192.000    -8192.000    -8192.000    -8192.000

```



Summary

- MiX99 produces quite many output files
- Important to check
 - OK files (pre-processor, solver)
 - Ist files
- Solution files depend on model
 - Regression, fixed effects
 - Different random effects
- New options
 - Mendelian sampling
 - Parent average



Thank you!



luke.fi



MiX99 course on genomic prediction, Tuusula, 9–11 March 2026

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