Additional File C-26

The details of the MLR model is:

$$\mathbf{Y} = \mathbf{X}\boldsymbol{\beta} + \mathbf{Z}\boldsymbol{\gamma} + \boldsymbol{\epsilon}$$

The $\mathrm{n} \times 2$ matrix for **Y** is

$$\mathbf{Y} = \begin{pmatrix} Y_{11} & Y_{12} \\ \vdots & \vdots \\ Y_{n1} & Y_{n2} \end{pmatrix}$$

Y_{i1}: the standardized birth weight

Y_{i2}: the standardized weaning weight

The $\mathrm{n} \times (\mathrm{p}_1 + 1)$ matrix for **X** is

$$\mathbf{X} = \begin{pmatrix} 1 & X_{11} & X_{12} & X_{13} & X_{14} & X_{14} & X_{16} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 1 & X_{n1} & X_{n2} & X_{n3} & X_{n4} & X_{n5} & X_{n6} \end{pmatrix}$$

$X_{i1} = 1$ and $X_{i2} = 0$: sex is F

$X_{i1} = 0$ and $X_{i2} = 1$: sex is S

$X_{i1} = 0$ and $X_{i2} = 0$: sex is B

$X_{i3} = 1, X_{i4} = 0$ and $X_{i5} = 0$: birth season is autumn

$X_{i3} = 0, X_{i4} = 1$ and $X_{i5} = 0$: birth season is summer

$X_{i3} = 0, X_{i4} = 0$ and $X_{i5} = 1$: birth season is spring

$X_{i3} = 0, X_{i4} = 0$ and $X_{i5} = 0$: birth season is winter

X_{i6}: the standardized covariate weaning age

$\mathbf{Z}$ is an $\mathrm{n} \times \mathrm{p}_2$ matrix of genotypes measured on n individuals at p_2 SNP

$\boldsymbol{\beta}$ is the corresponding coefficient vector of sex, birth season and weaning age effects

$\boldsymbol{\gamma}$ is the corresponding coefficient vector of the SNP effects

$\boldsymbol{\epsilon}$ is the random error