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$y = Xb + Zu + e$ %

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$y =$.   %   %

$b =$.

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$u =$.

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1. Dumaraton

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= X

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$$E(y) = Xb$$

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$$V\begin{bmatrix} u \\ e \end{bmatrix} = \begin{bmatrix} A\sigma_a^2 & 0 \\ 0 & I\sigma^2 e \end{bmatrix}$$

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$$\begin{bmatrix} y_1 \\ y_2 \\ . \\ . \\ . \\ y_6 \end{bmatrix} = \begin{bmatrix} X_1 & 0 & 0 & ... & 0 \\ 0 & X_2 & & ..... & 0 \\ . & & 0 & ..... & 0 \\ . & & & . & . \\ . & & & . & . \\ 0 & 0 & & ... & X_6 \end{bmatrix} \begin{bmatrix} b_1 \\ . \\ . \\ . \\ . \\ b_{6.} \end{bmatrix} + \begin{bmatrix} Z_1 & 0 & 0 & ... & 0 \\ 0 & Z_2 & 0 & ... & 0 \\ . & & & & 0 \\ . & & & & \\ . & & & & \\ 0 & 0 & & & Z_6 \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \\ . \\ . \\ . \\ u_6 \end{bmatrix} + \begin{bmatrix} e_1 \\ e_2 \\ . \\ . \\ . \\ e_6 \end{bmatrix}$$

. (P< /)   (i =   …)   i   = y_i

i   = X_i

i   = b_i

(P< /)   i   = Z_i

(/)   ( )   i   = u_i

i   = e_i

( )   :

. (/) $E(y) = Xb$

$Var(y) = ZGZ' + R$

R   G

.(P< /)

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1. Covariate

( )			(kg)	(kg)
/ ^{e}± /	/ ^{c}± /	/ ^{c}±./	/ ^{c}± /	^{a}± /
/ ^{f}± /	/ ^{f}± /	/ ^{b}± ./	/ ^{b}± /	^{a}± /
/ ^{d}± /	/ ^{d}± /	/ ^{d}± ./	/ ^{d}± /	^{b}±
/ ^{c}± /	/ ^{c}± /	/ ^{b}± ./	/ ^{c}± /	^{c}± /
/ ^{b}± /	/ ^{b}± /	/ ^{a}± ./	/ ^{a}± /	^{c}± /
/ ^{a}± /	/ ^{a}± /	/ ^{b}± ./	/ ^{c}± /	^{c}± /

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1. Gene pool

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