Genetic aspects of Wood's lactation curve parameters in Jersey crossbred cattle using Bayesian approach

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SUPPLEMENTARY FILE

Supplemental Table S1. Mathematical descriptions of lactation curve traits estimated by Incomplete gamma function

Peak Milk Yield (Y_{max})	$a(b/c)^b e^{-b}$
Time of Peak Milk Yield (N_{max})	b/c
Persistency of milk yield (P)	$c^{-(b+1)}$

a =Initial milk yield after calving; b =Ascending slope up to peak yield; c =Descending slope after peak yield

Model used:

The following repeatability anima model was used:

$$y = Xb + Za + Wp + e$$

Where,

y = n ×1 vector of observations for each trait/parameter

b = Vectors of fixed effect

a = Vectors of direct additive genetic effect

c = Vectors of permanent environmental effect

e = Vectors of residual effect

X, Z and W= Incidence matrices of fixed effect, direct additive genetic effect and permanent environmental effect

The three random effects have the following distribution

$$Var\begin{pmatrix} a \\ p \\ e \end{pmatrix} = \begin{pmatrix} A\sigma_a^2 & 0 & 0 \\ 0 & I\sigma_{pe}^2 & 0 \\ 0 & 0 & I\sigma_e^2 \end{pmatrix} = \begin{pmatrix} G & 0 \\ 0 & R \end{pmatrix}, \qquad G = \begin{pmatrix} A\sigma_a^2 & 0 \\ 0 & I\sigma_{pe}^2 \end{pmatrix}$$

Where, A= Additive numerator relationship matrix

I= Identity matrix

σ^2_a= Direct additive genetic variance

σ^2_{pe} = Permanent environmental variance

σ^2_e = Residual variance

The total phenotypic variance (σ^2_P) is the sum of the three variance components.

$$\sigma^2_P = \sigma^2_a + \sigma^2_{pe} + \sigma^2_e$$

Estimation of genetic and phenotypic parameters

The heritability (h^2) of the studied traits were estimated as

$$h^2 = \frac{\sigma^2_a}{\sigma^2_a + \sigma^2_{pe} + \sigma^2_e}$$

The repeatability (r) of the studied traits were estimated as

$$r = \frac{\sigma^2_a + \sigma^2_{pe}}{\sigma^2_a + \sigma^2_{pe} + \sigma^2_e}$$

The genetic correlations (r_g) between the studied traits were estimated as

$$r_g = \frac{Cov(a_X, a_Y)}{\sigma_a(X) \times \sigma_a(Y)}$$

Where, $Cov(a_X, a_Y)$ = additive genetic covariance between trait X and Y

$\sigma_a(X)$ and $\sigma_a(Y)$ = additive genetic standard deviation of trait X and Y

respectively.

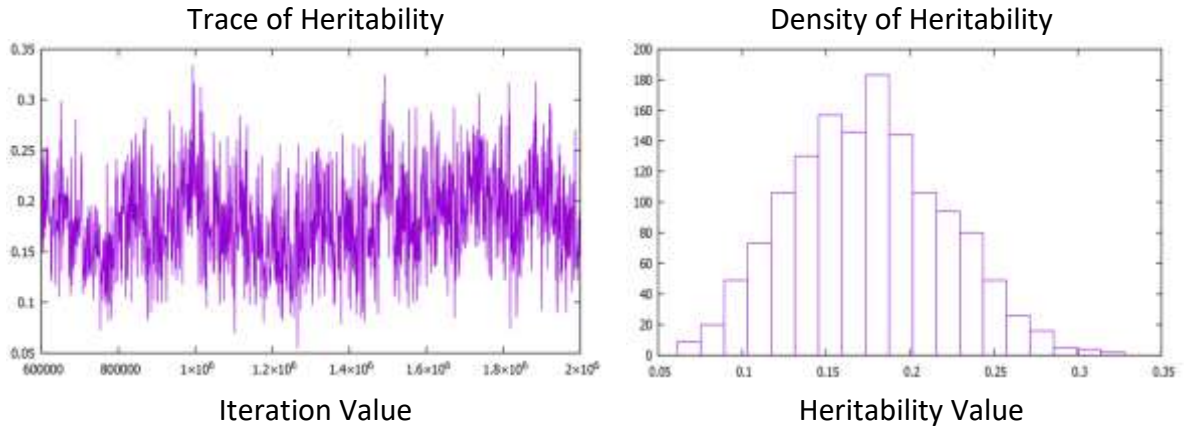The phenotypic correlations (r_p) between the studied traits were estimated as

$$r_p = \frac{Cov(P_X, P_Y)}{\sigma_P(X) \times \sigma_P(Y)}$$
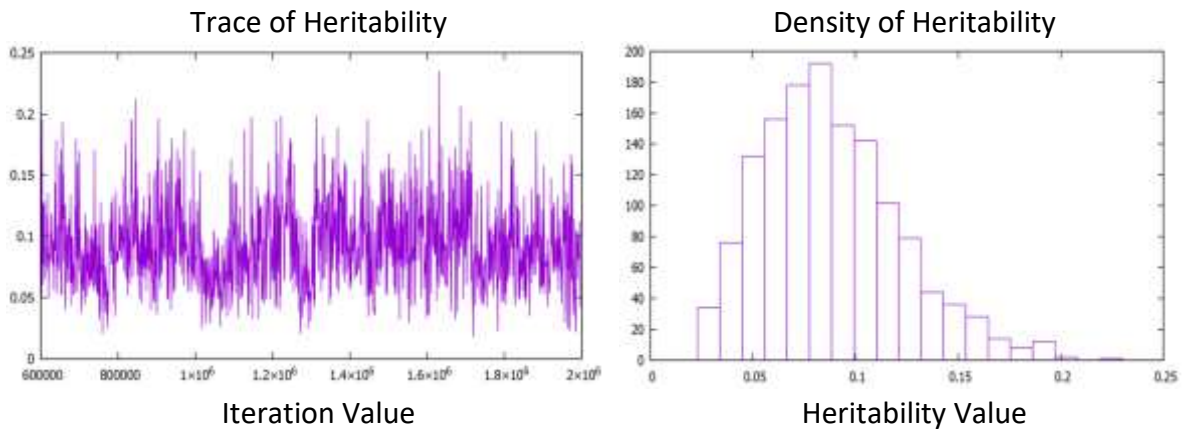
Where,

$Cov(P_X, P_Y)$ = Phenotypic covariance between trait X and Y

$\sigma_P(X)$ and $\sigma_P(Y)$ = Phenotypic standard deviation of trait X and Y respectively.
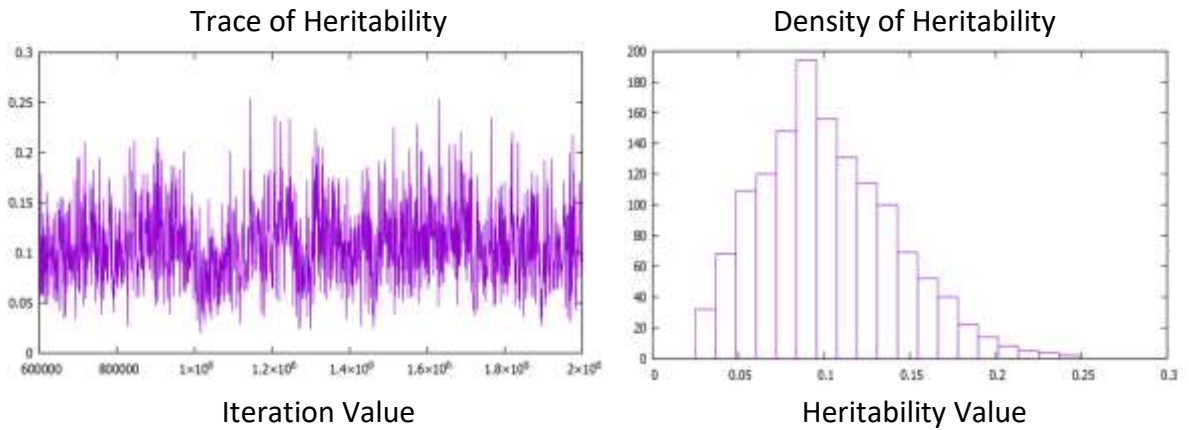
Figure S1 : Trace and density function of heritability of lactation curve parameters of Jersey crossbred cows estimated by Bayesian analysis.

Trace of Heritability | Density of Heritability

Iteration Value | Heritability Value

Initial milk yield after calving (a)

Trace of Heritability | Density of Heritability

Iteration Value | Heritability Value

Ascending slope up to peak yield (b)

Trace of Heritability | Density of Heritability

Iteration Value | Heritability Value

Declining slope after peak yield (c)

Figure S2 : Trace and density function of repeatabilty of lactation curve parameters of Jersey crossbred cows estimated using Bayesian analysis
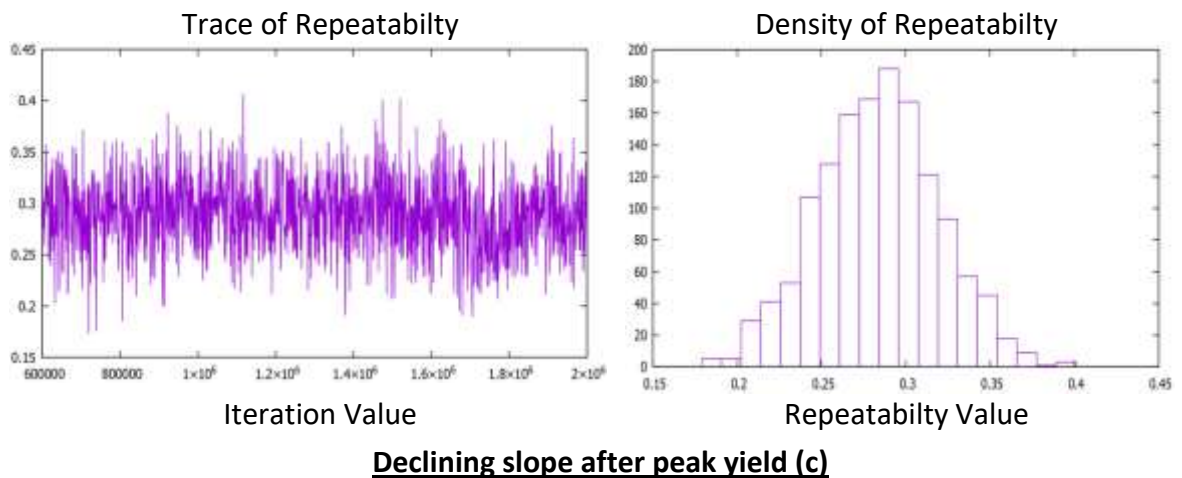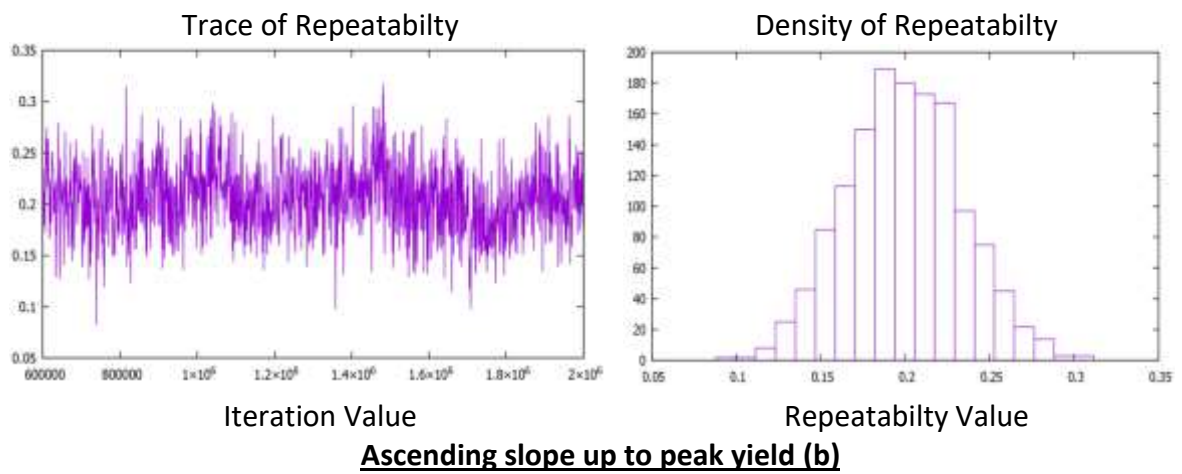
Trace of Repeatabilty   Density of Repeatabilty

Iteration Value   Repeatabilty Value

Initial milk yield after calving (a)

Trace of Repeatabilty   Density of Repeatabilty

Iteration Value   Repeatabilty Value

Ascending slope up to peak yield (b)

Trace of Repeatabilty   Density of Repeatabilty

Iteration Value   Repeatabilty Value

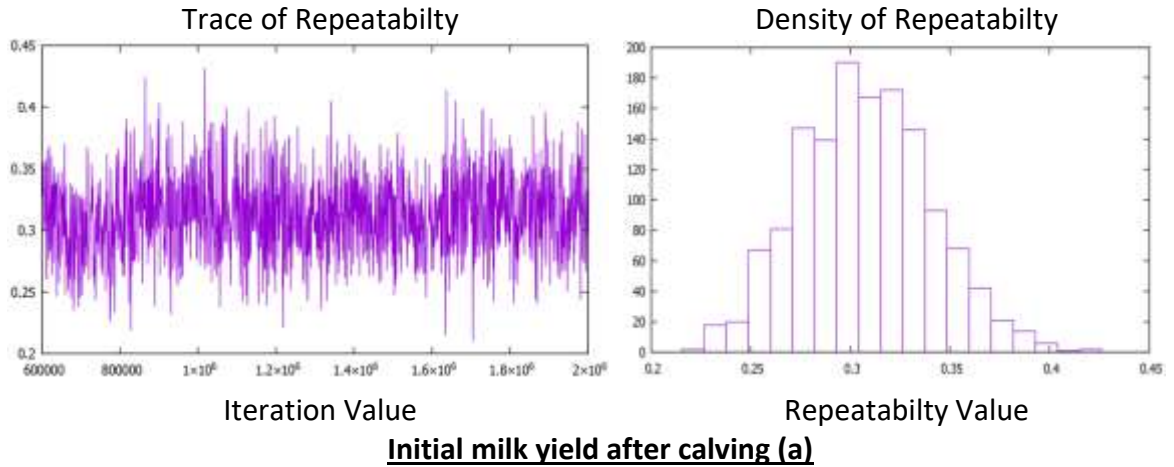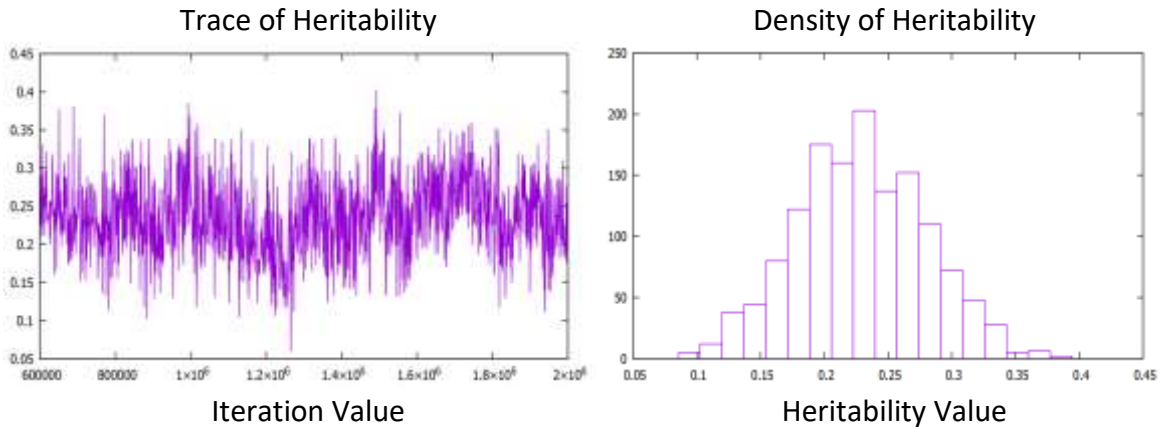**Declining slope after peak yield (c)**

Figure S3: Trace and density function of heritability of lactation curve traits of Jersey crossbred cows estimated using Bayesian analysis

Trace of Heritability   Density of Heritability

Iteration Value   Heritability Value

Peak milk yield(n_{max})

Trace of Heritability   Density of Heritability

Iteration Value   Heritability Value

Days to attain Peak Yield (t_{max})

Trace of Heritability   Density of Heritability

Iteration Value   Heritability Value

Persistency of milk yield (P)

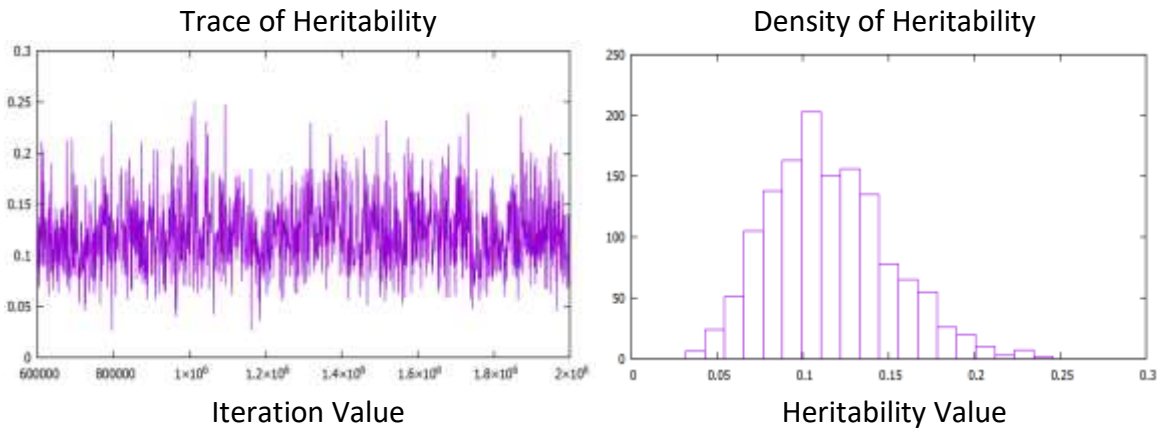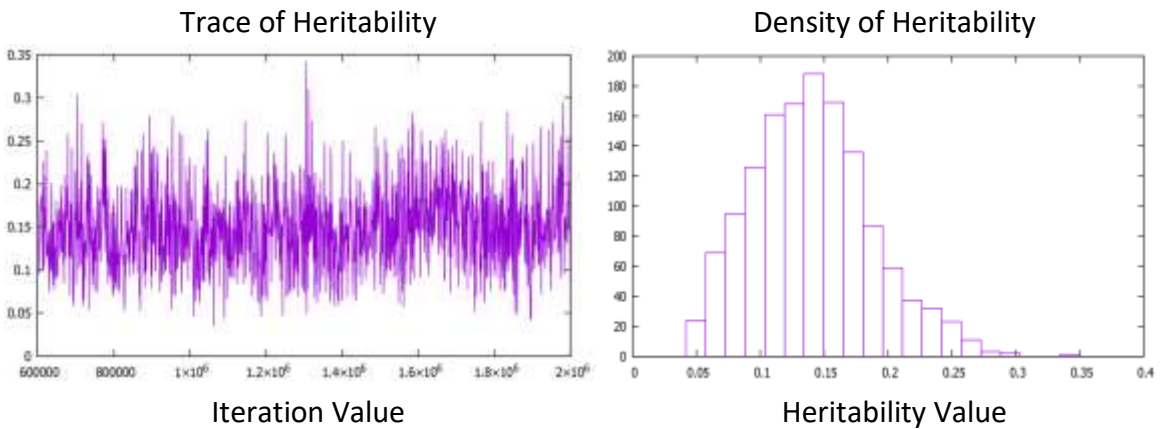**Figure S4: Trace and density function of repeatabilty of lactation curve traits of Jersey crossbred cows estimated using Bayesian analysis**

Trace of Repeatabilty — Iteration Value

Density of Repeatabilty — Repeatabilty Value

Peak milk yield(n_{max})

Trace of Repeatabilty — Iteration Value

Density of Repeatabilty — Repeatabilty Value

Days to attain Peak Yield (t_{max})

Trace of Repeatabilty — Iteration Value

Density of Heritability — Repeatabilty Value

Persistency of milk yield (P)