

# Bayesian estimation of response to selection on linear or ratio traits for feed efficiency in dairy cattle

M.S. Islam<sup>1</sup>, J. Jensen<sup>2</sup>, P. Karlskov-Mortensen<sup>1</sup>, P. Løvendahl<sup>2</sup>, M. Shirali<sup>2</sup>

<sup>1</sup> Division of Animal Genetics, Bioinformatics and Breeding; Department of Veterinary and Animal Sciences, University of Copenhagen, Frederiksberg, Denmark. <sup>2</sup> Center for Quantitative Genetics and Genomics, Department of Molecular Biology and Genetics, Aarhus University, 8830 Tjele, Denmark.

## Data

- Holstein cows from experimental farm, Foulum
- Cows were primiparous only
- Data from 1 to 44 weeks of lactation
- Traits were DMI, ECM, BW and BCS
- DMI (dry matter intake), ECM (energy corrected milk) and BW (body weight) were weekly means and BCS (body condition score) was recorded at 2 to 3 weeks interval

## Methods

- Multivariate repeatability model
- Derive genetic RFI using partial genetic regression coefficients
- Derive FCR dependent on means and (co)variances of its component traits (DMI and ECM)
- Bayesian estimation of genetic superiority of selected group

## Results

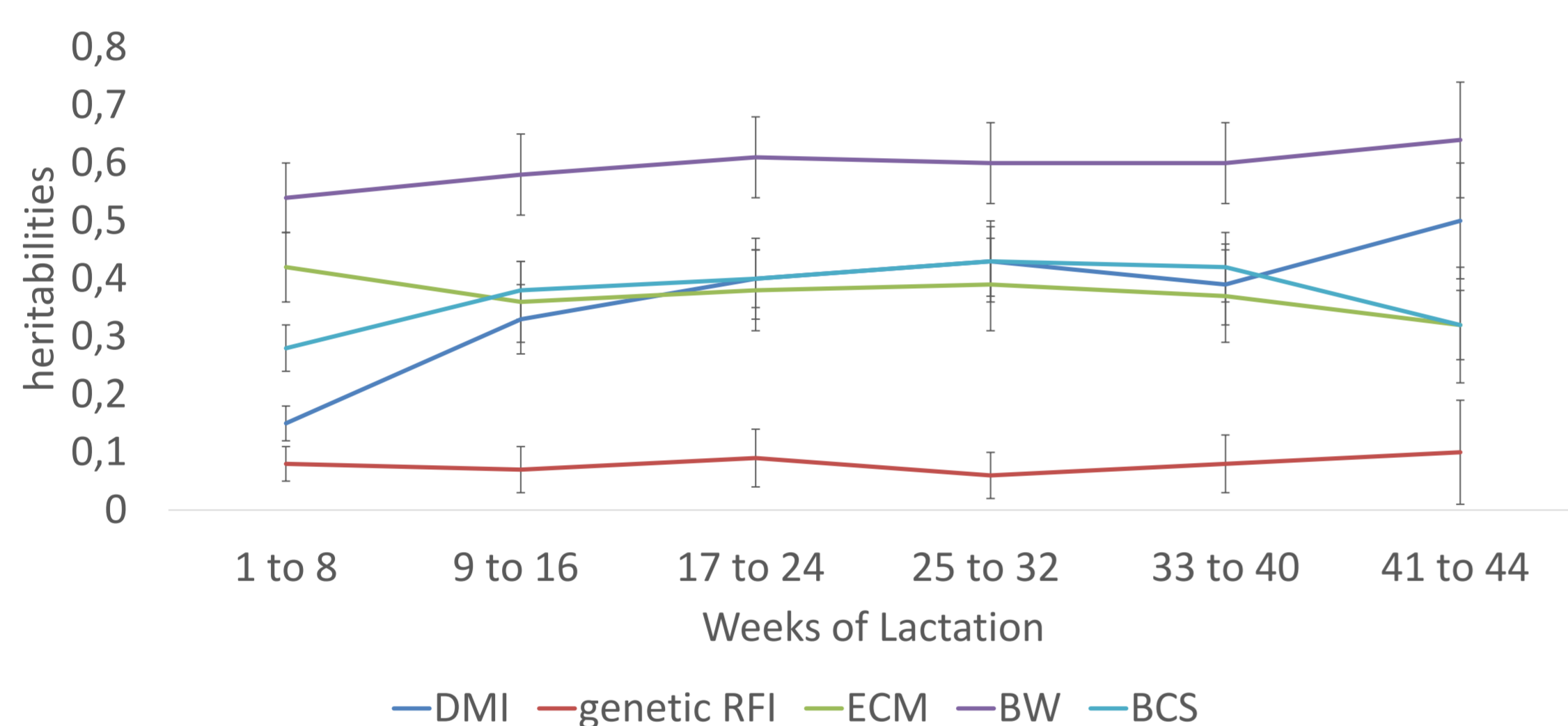


Figure 1. Posterior means of heritabilities of genetic RFI, DMI, ECM, BW and BCS across the lactation periods of Holstein cows

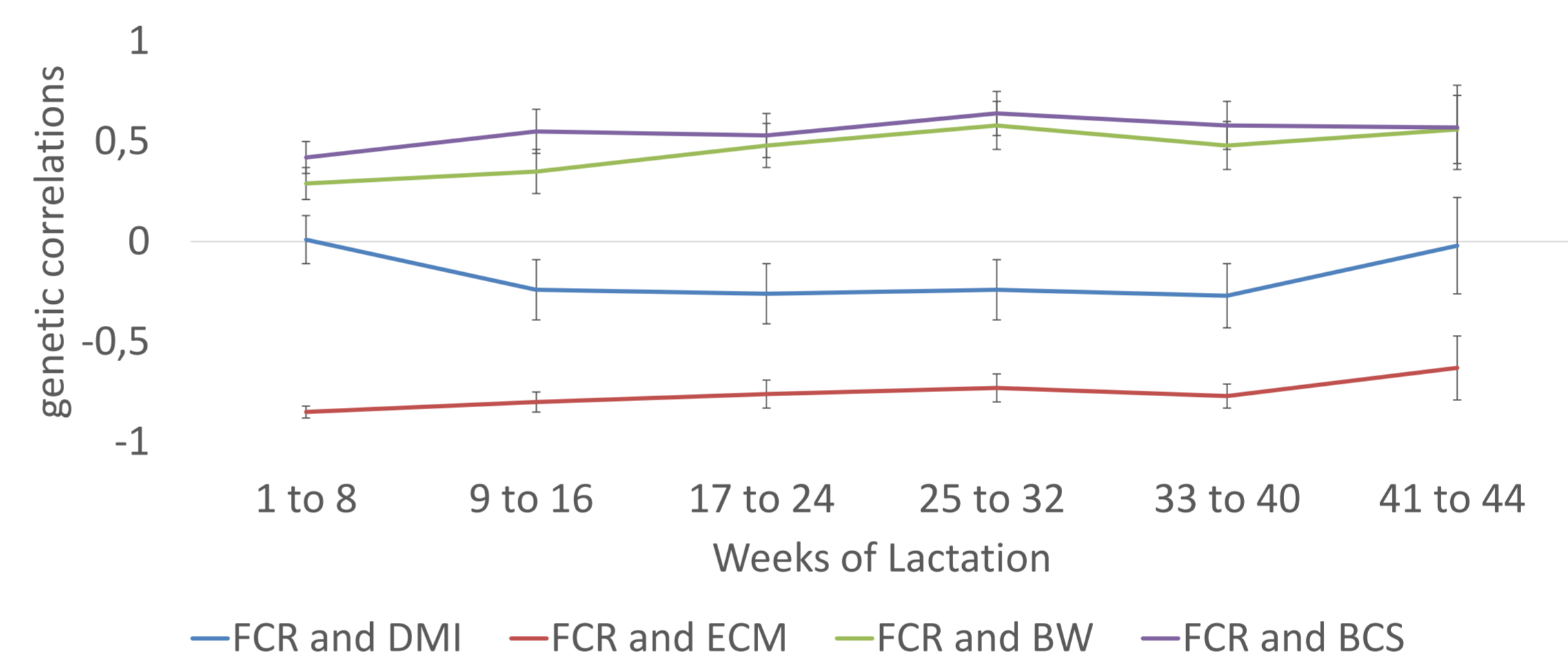


Figure 2. Posterior means of genetic correlations between FCR and production traits of Holstein cows along the lactation

Table 1: Posterior means of direct (bold) and correlated (non-bold figures) additive genetic superiorities of the selected group when the top 10% of the population is selected for single trait selection on feed efficiency traits across the lactation periods (by row)

Scenario	Genetic superiority of the selected group						
	RFI (kg/d)	FCR (kg/kg)	FCE (kg/kg)	DMI (kg/d)	ECM (kg/d)	BW (kg/d)	BCS
RFI, kg/d	<b>-1.344</b>	-0.004	0.155	-1.350	-0.100	-1.449	-0.004
	<b>-0.823</b>	-0.020	0.068	-0.757	0.125	0.019	-0.008
	<b>-0.831</b>	-0.020	0.061	-0.773	0.073	0.859	-0.001
	<b>-0.699</b>	-0.022	0.048	-0.697	-0.029	0.041	0.001
	<b>-0.845</b>	-0.030	0.059	-0.798	0.056	0.255	-0.004
	<b>-1.070</b>	-0.001	0.076	-1.045	0.031	-0.694	0.002

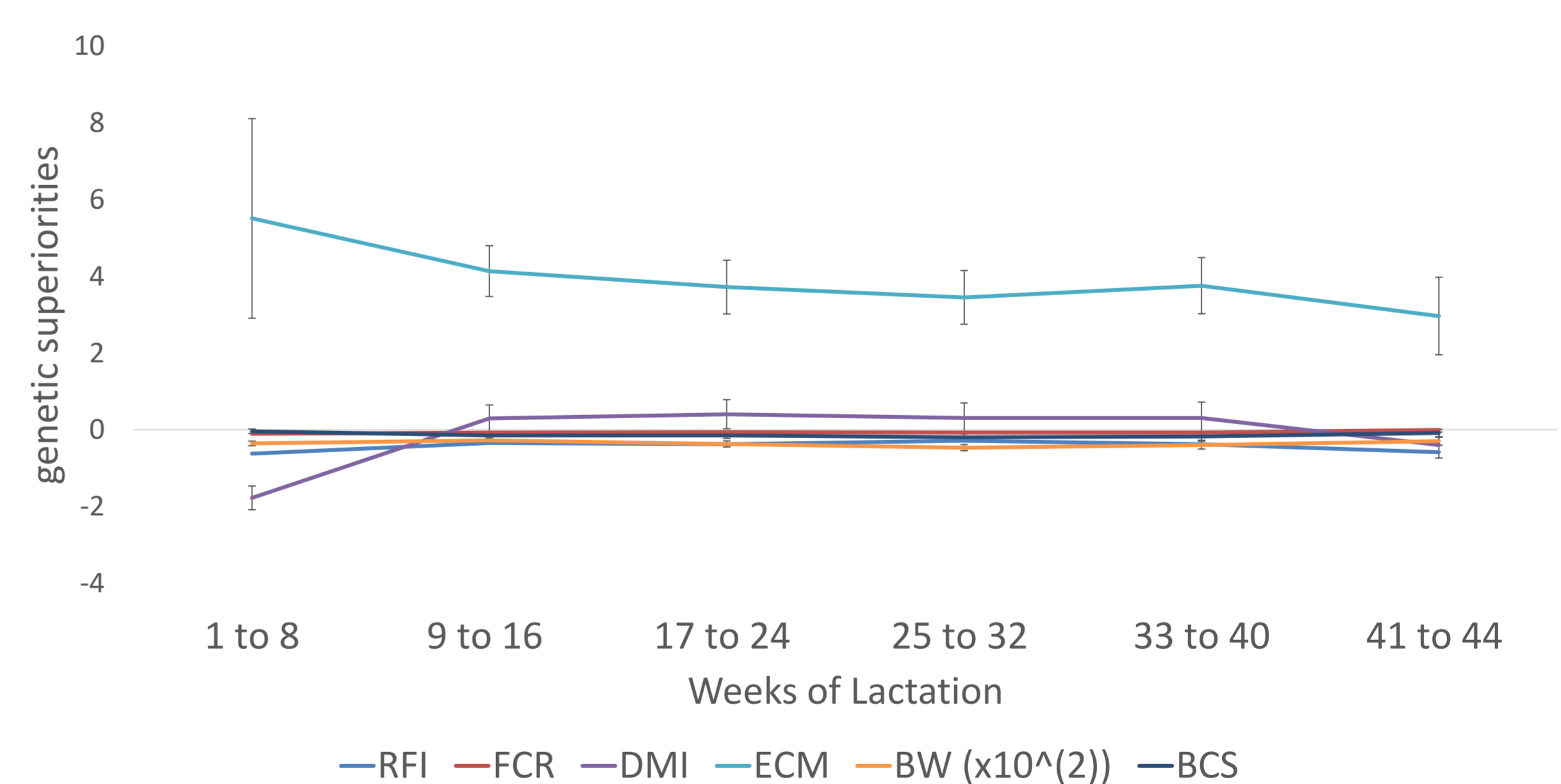


Figure 3. Posterior means of additive genetic superiorities of the selected group when 10% population is selected directly for FCR

- We can derive genetic RFI without separate multiple regression analysis
- No significant change in production traits due to direct selection for genetic RFI
- Unfavorable change in BW and BCS due to direct selection for FCR