Genetic parameters of pig birth weight variability

Y. Salimiyekta[1*], S. B Bendtsen[1], K. V Riddersholm[1], M. Aaskov[1] and J. Jensen[2]

[1]Danish Genetics, Lysholt Alle 10, 7100 Vejle, Denmark
[2]Center for Quantitative Genetics and Genomics, Aarhus University, 8000 Aarhus, Denmark

Introduction

- Piglets' survival is a major problem from an **economic** and **welfare** point of view

- Over the last decades, sows have been selected on **litter size** that led to increase in preweaning **mortality**

- Litter size in Danish sows increased by 0.6 piglets per year

11.7 live piglets/litter (2000) ⟶ 17.5 (2019)

Problem with large litter size

Introduction

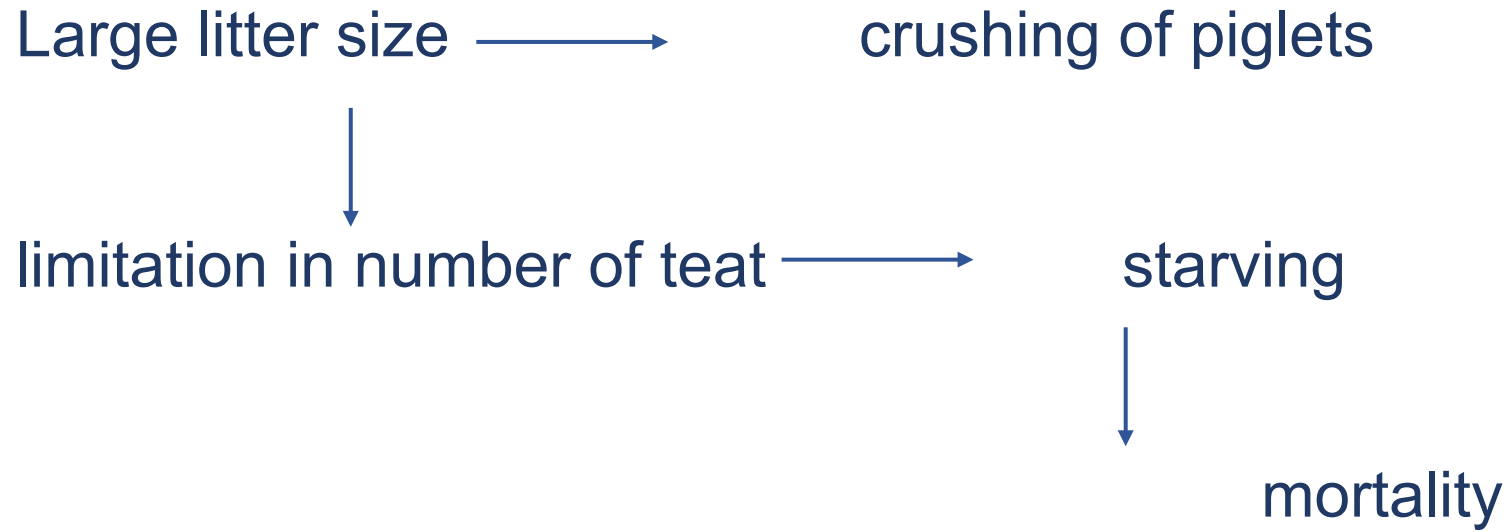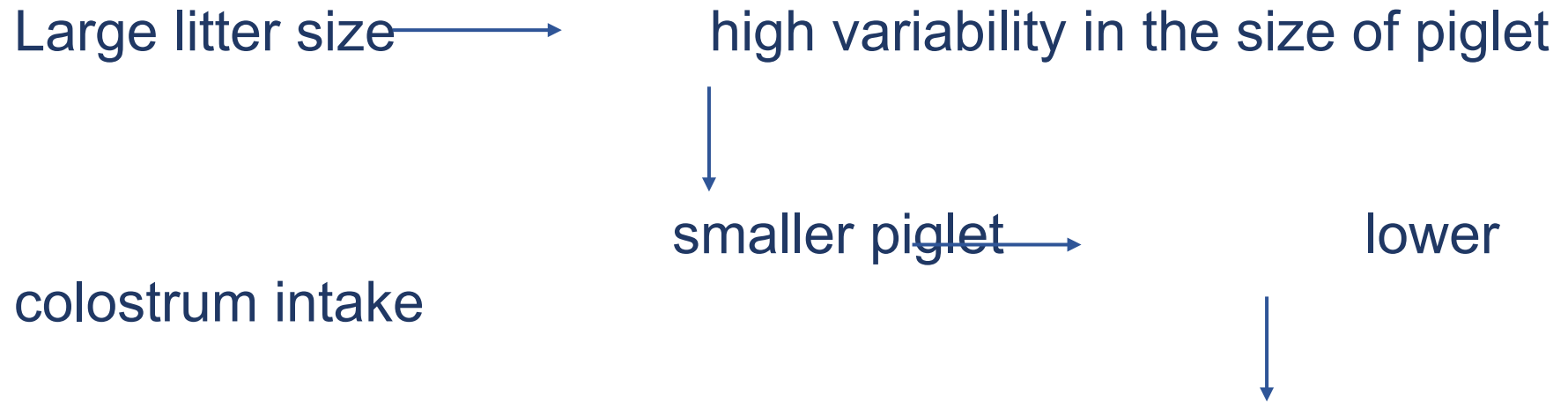Limitation in lactation feed intake (number of teat)

Decreasing birth weight

Higher risk of still born

(Quiniou et al. 2002; Damgaard et al. 2003, Tani et al. 20018, Schild et al. 2020)

Introduction

Large litter size   ⟶   crushing of piglets

limitation in number of teat   ⟶   starving

mortality

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Large litter size   ⟶   high variability in the size of piglet

smaller piglet   ⟶   lower

colostrum intake

less survival

4

Introduction

Genetic Correlation

	Litter size	N.parity	Growth during suckling	Pre weaning mortality
Birth weight variability	+	+	−	+

(Sell-Kubiak et al. 2015; ZHANG Tian et al. 2016 ; Quesnel et al. 2008)

Introduction

Benefits of birth weight uniformity

Less mortality (more survival)

Better growth during suckling

All-in-all-out strategy which is important for farmers mainly because of growing- finishing facilities

Objective

Estimation of genetic parameters of birth weight variability in Danish Landrace and Yorkshire in Danish Genetics pig populations

Data

Landrace

Sows: 1,686

Genotyped sow: 1,685

Farrowing: 2,127

Piglets: 31,266

Farrowed: 2019-2023

Animals in ped: 4,191

Yorkshire

Sows: 2,068

Genotyped sow: 2,068

Farrowing: 2,702

Piglets: 41,949

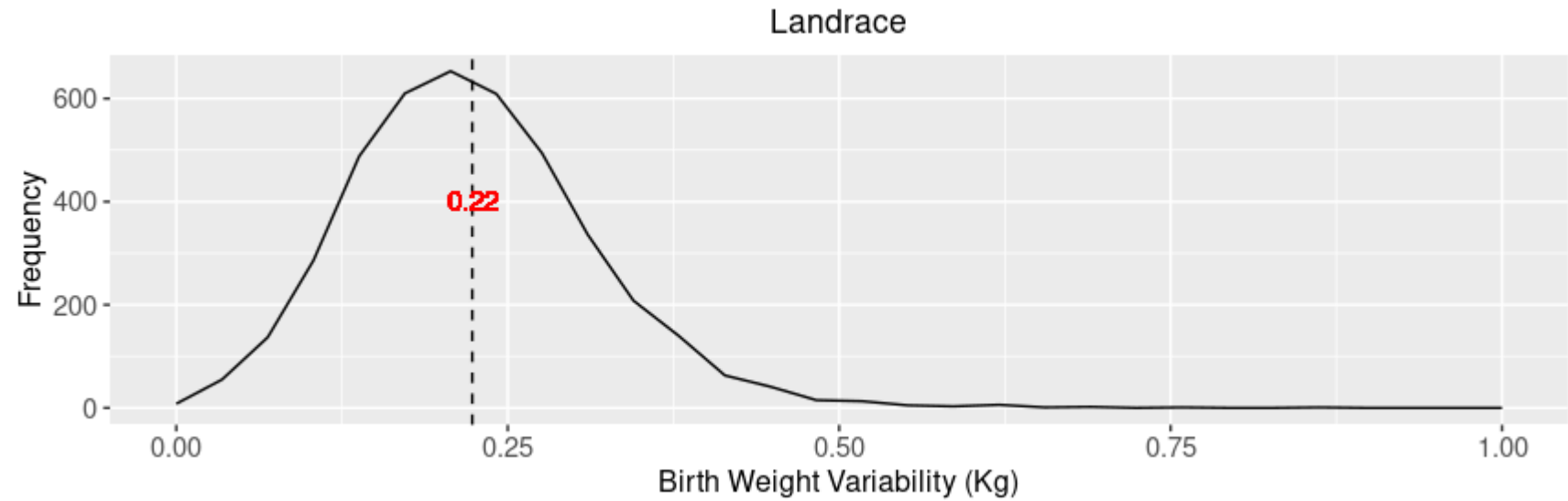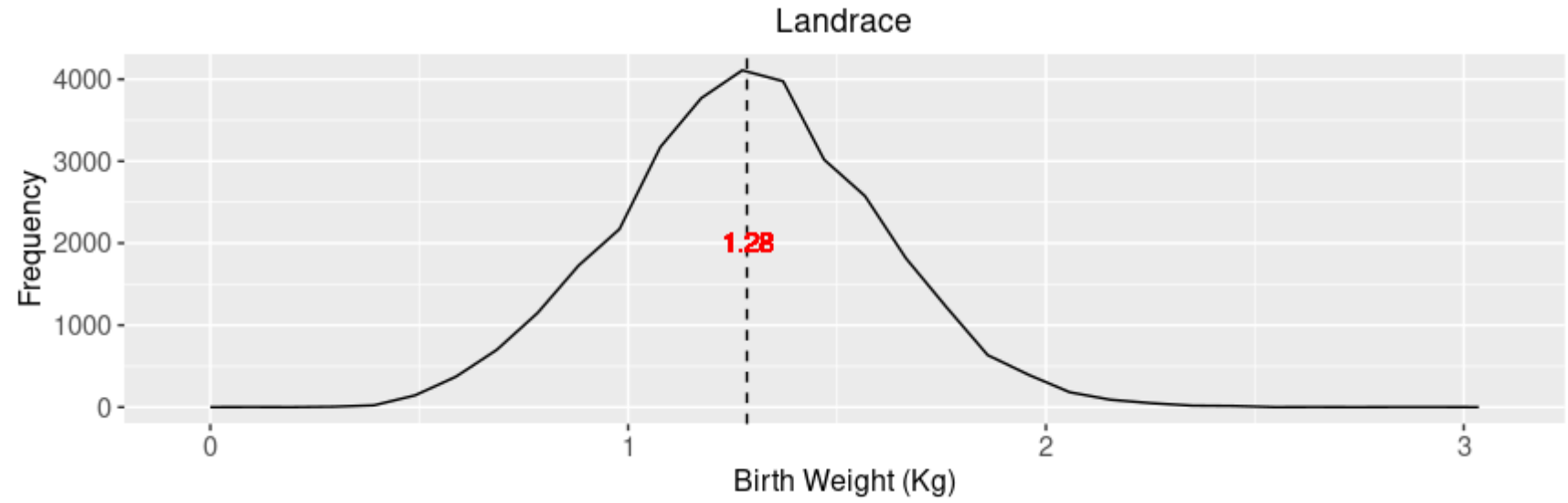Farrowed: 2019-2023
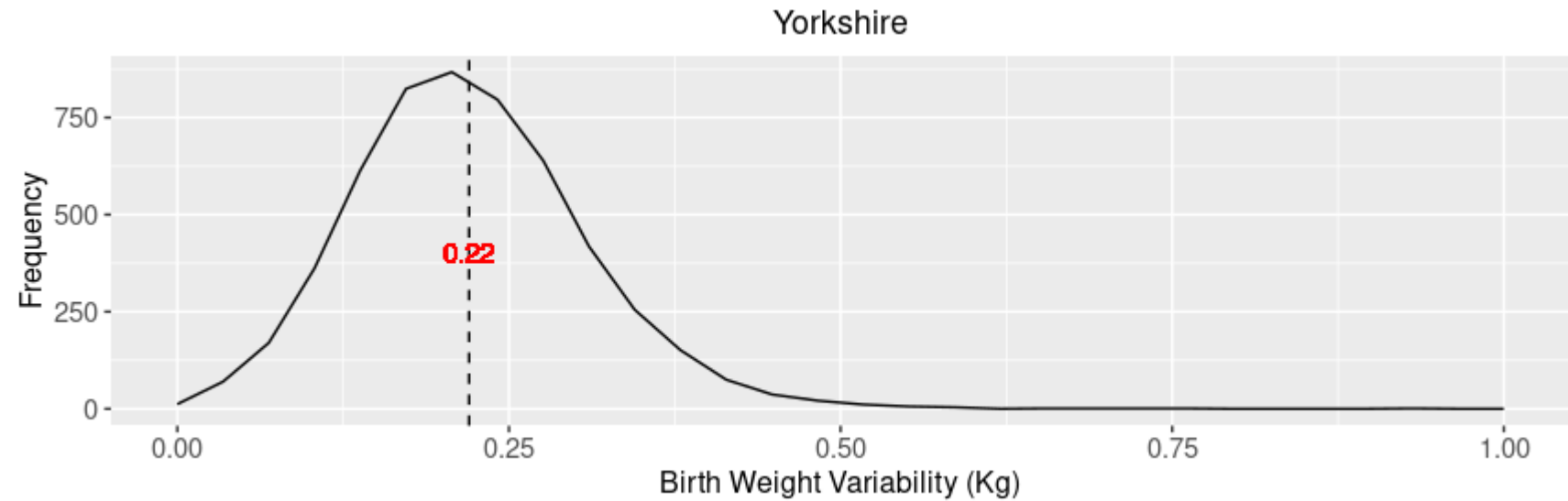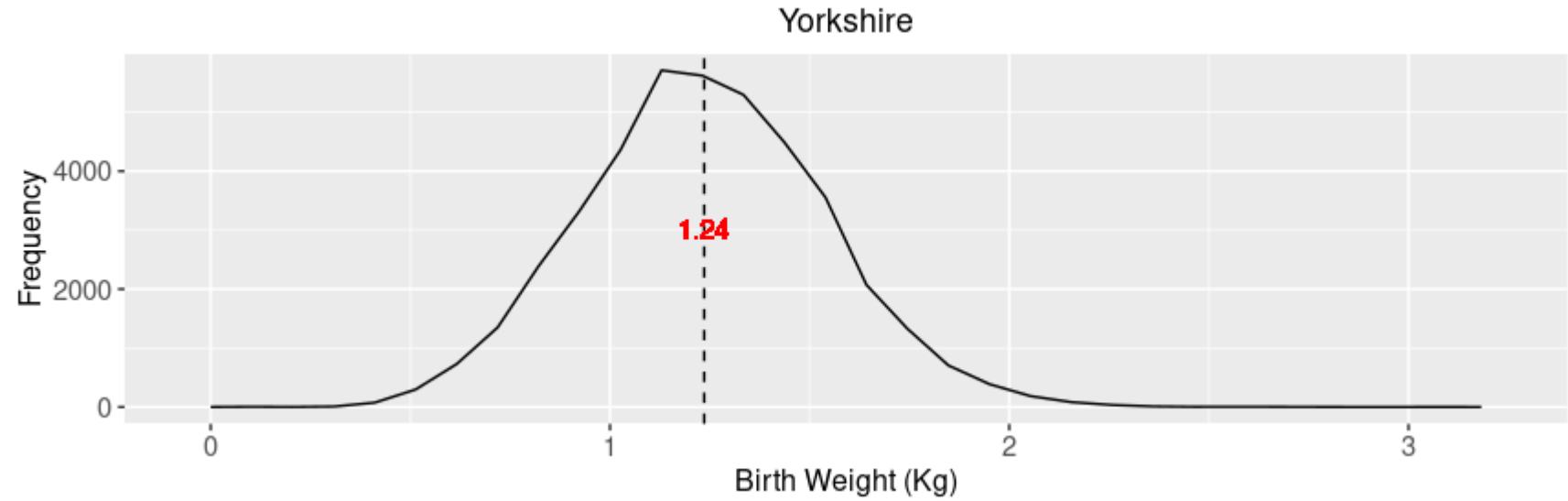
Animals in ped: 5,228

Descriptive statistics

Birth weight variability (Kg)	Min	Mean	Max	SD.
Landrace	0.034	0.223	0.743	0.091
Yorkshire	0.035	0.220	0.724	0.087

Distribution

Distribution

Yorkshire

1.24

Birth Weight (Kg)

Yorkshire

0.22

Birth Weight Variability (Kg)

Statistical Model

Birth weight variability

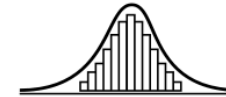N.parity   sex   live born   hys_f   mean_BW   animal   pe   residual

ssGBLUP
AI-REML

DMU
J.Jensen & P.Madsen 2013

Variance Components

	σ_a^2	σ_{Pe}^2	σ_e^2	h^2
Landrace	0.00062	0.00108	0.00598	0.08
Yorkshire	0.000705	0.00085	0.00560	0.10

Selection Response

	Landrace	Yorkshire
Selected females/ G.	1,192	1,497
Selected males/ G.	206	181
Mean of live born/ litter	15	16
σ_p^2	0.0076	0.0071
h^2	0.08	0.10
Economic weight	-1	-1
Selection response (g)	-21	-23

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SelAction program (Rutten & Bijma . 2001)

Selection Response

Landrace

Yorkshire
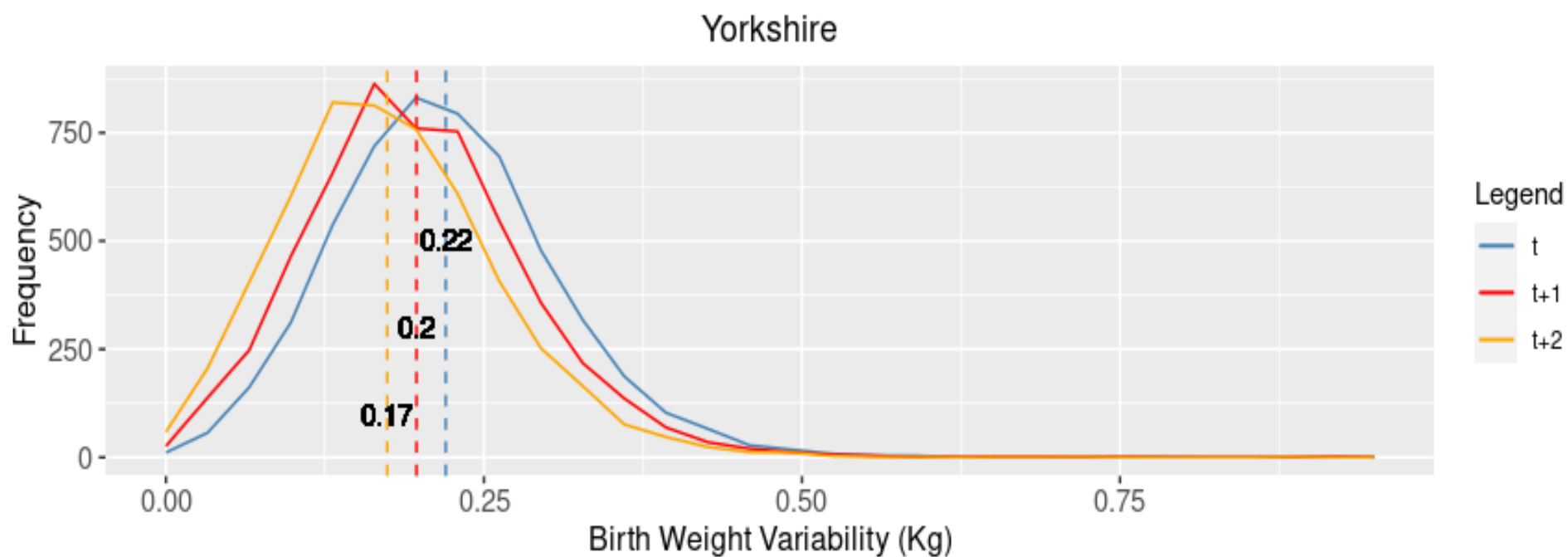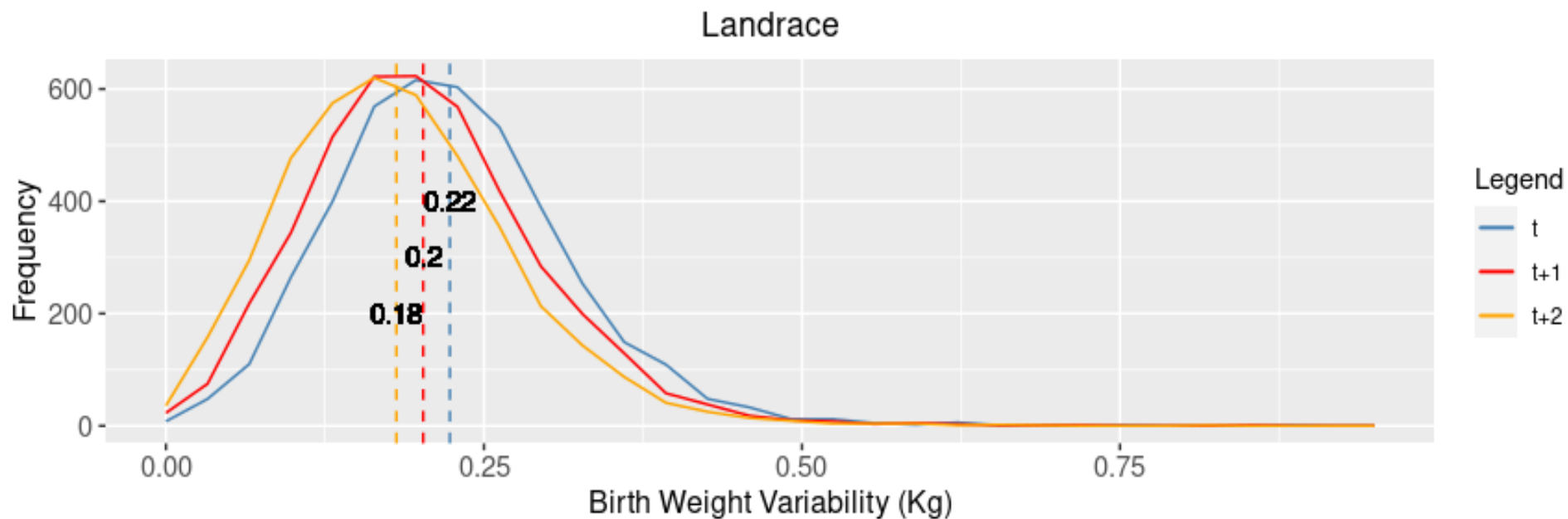
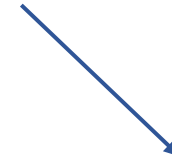## Conclusion

Birth weight variability is heritable

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Balance between mean and variability of birth weight

Lower variability in birth weight

Less preweaning mortality

Bether growth during suckling

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Next Steps

- Estimation of genetic correlation between birth weight variability and some traits in our index equation

- Computing selection response by considering all traits in the index equation and their economic weights

- Adding birth weight variability in our selection goals

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Thank you

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