



Relationships between immune traits found in the blood and milk of Holstein-Friesian dairy cows

SJ Denholm, TN McNeilly, G Banos, MP Coffey, GC Russell, A Bagnall, MC Mitchell and E Wall



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Introduction

- Health and welfare of animals is an **important issue**
- Maintaining healthy herd requires **early indication of issues**



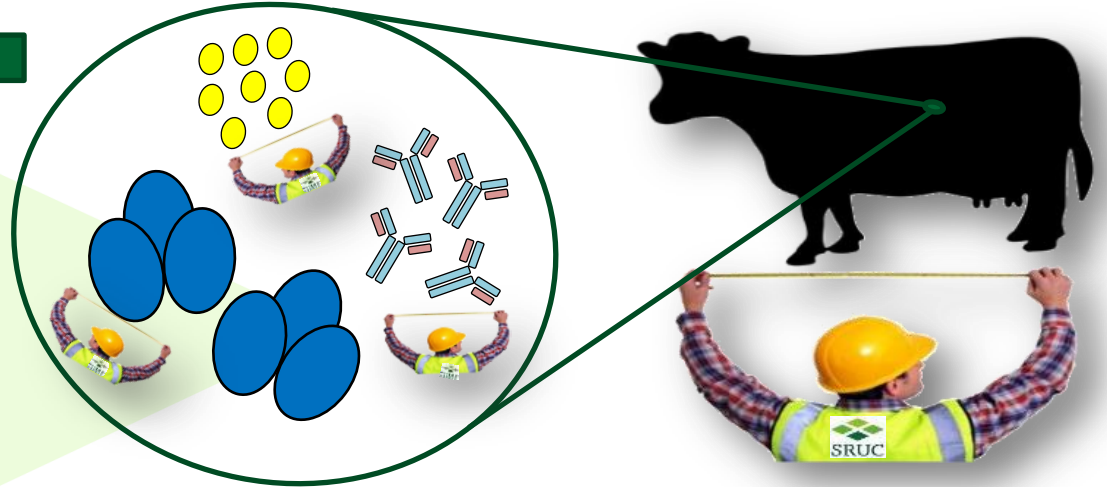
Introduction

- **Financial losses** from disease, culling and infertility within the herd
- Monitor and manage losses
- **Immune traits!**



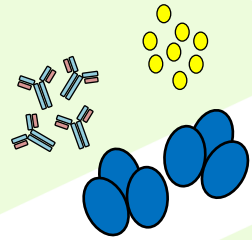
Introduction

Immune traits



measurable in blood!

Introduction



Immune traits

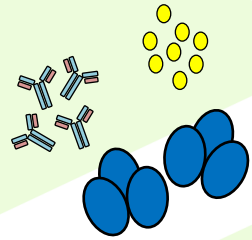


measurable in blood!

¹ Banos *et al.* (2013)



Introduction



Immune traits



measurable in blood!

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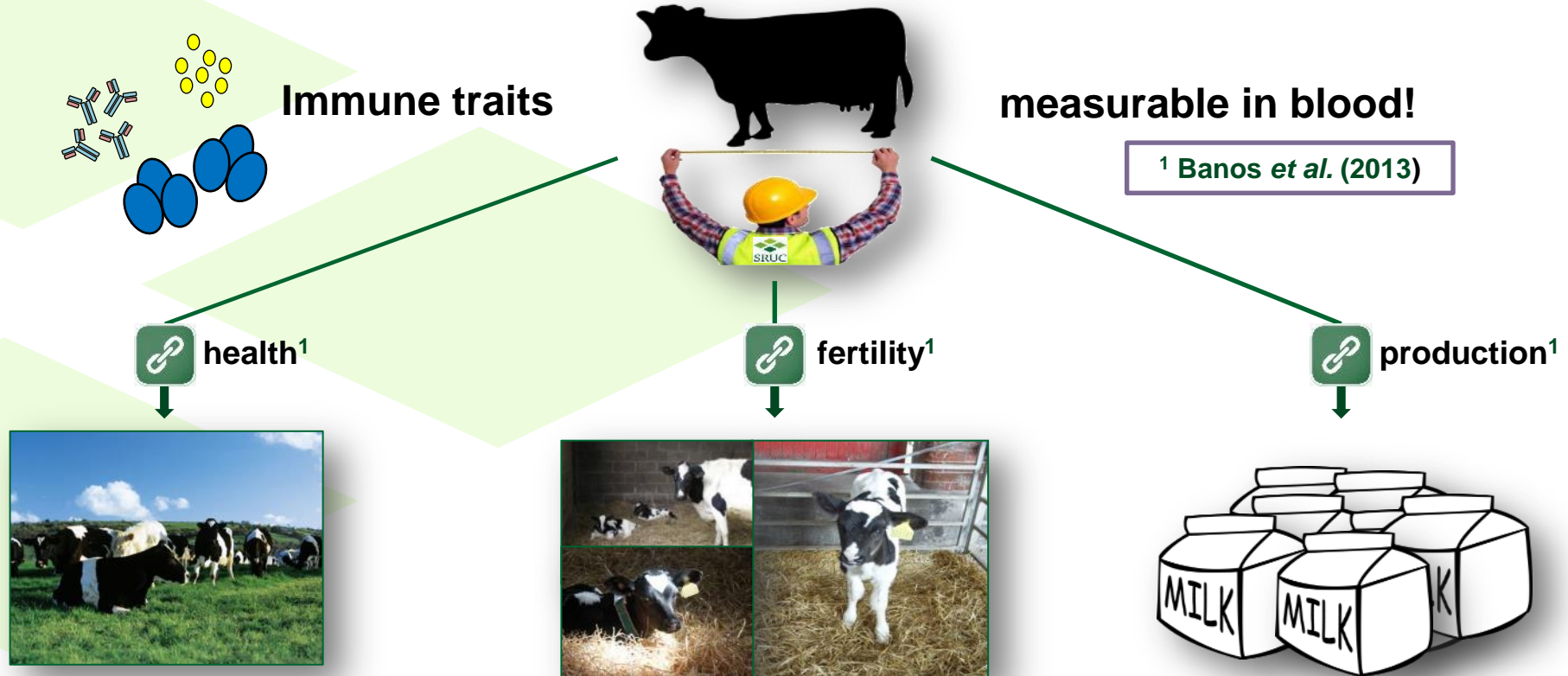
 health¹



 fertility¹



Introduction

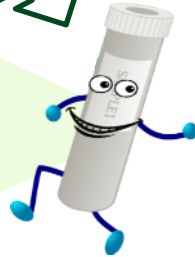


Introduction

- Milk is **routinely** collected



Routine milk
sample

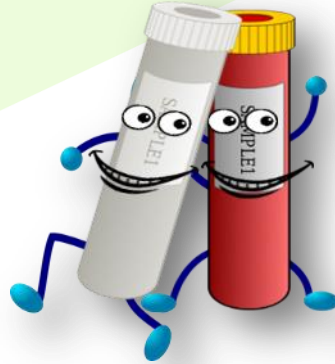


- **Less invasive** resource
- **Easily measurable**

Aim



Relationships between immune traits in blood and milk?



Materials and Methods

- 288 Holstein-Friesian dairy cows

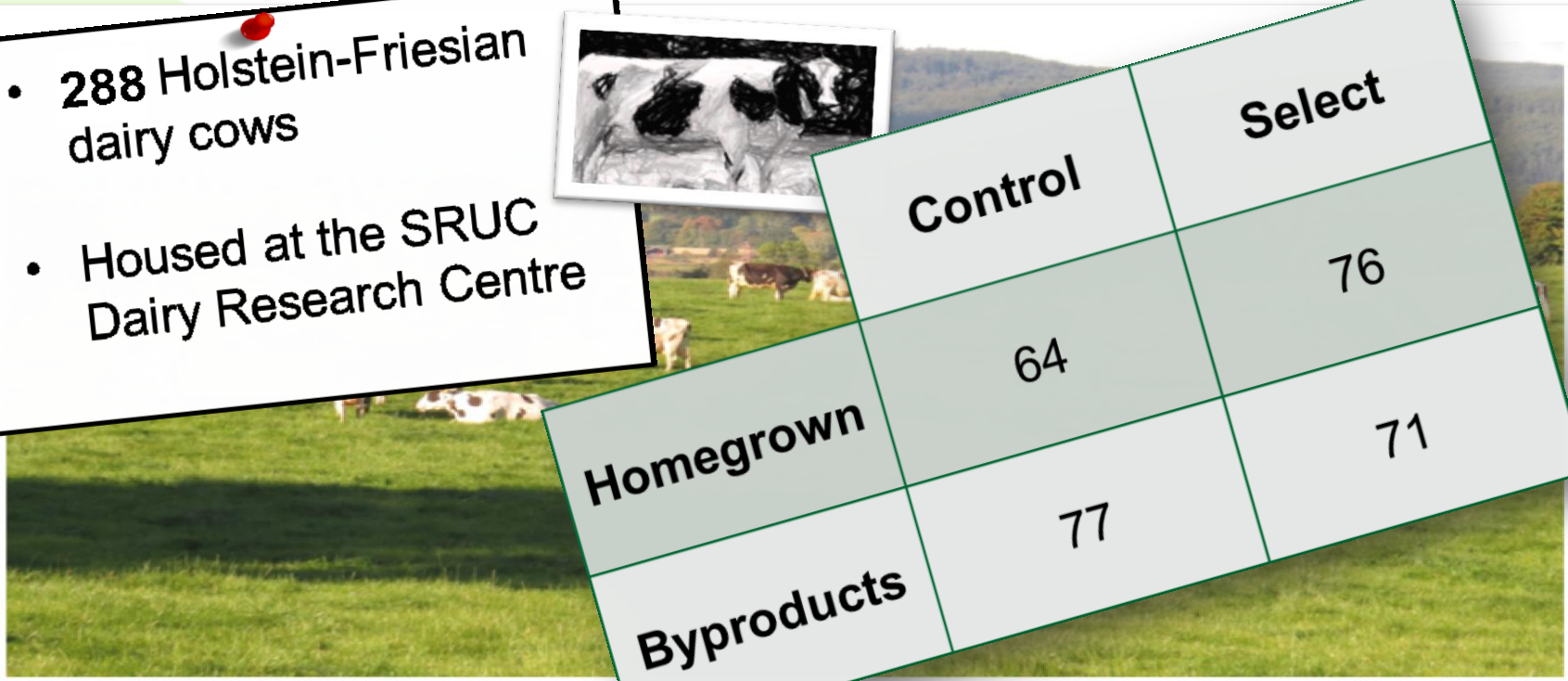
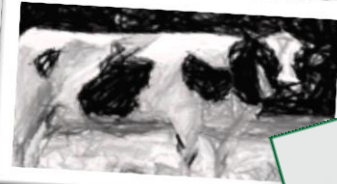
- Housed at the SRUC Dairy Research Centre



Materials and Methods

- 288 Holstein-Friesian dairy cows

- Housed at the SRUC Dairy Research Centre



| | Control | Select |
|------------|---------|--------|
| Homegrown | 64 | 76 |
| Byproducts | 77 | 71 |

Materials and Methods

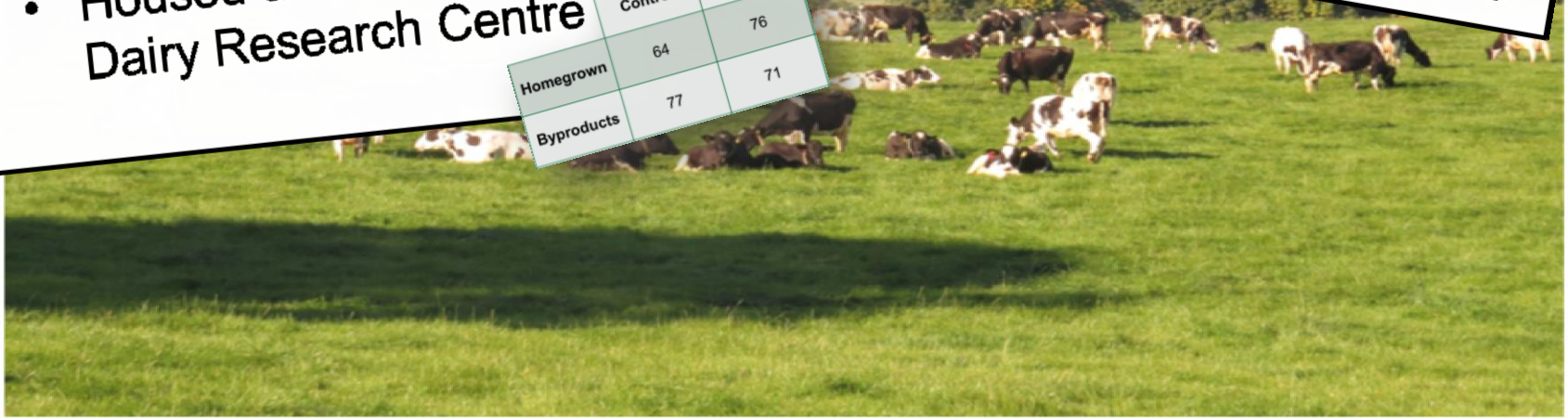
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- 11 milk and serum sampling points
- Apr 2013 – Jul 2014



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- Natural antibodies (NAb)
- Haptoglobin (Hp)
- Tumor necrosis factor (TNF- α)

Banos et al. 2013

- 251 Holstein-Friesian dairy cows
- From the same herd



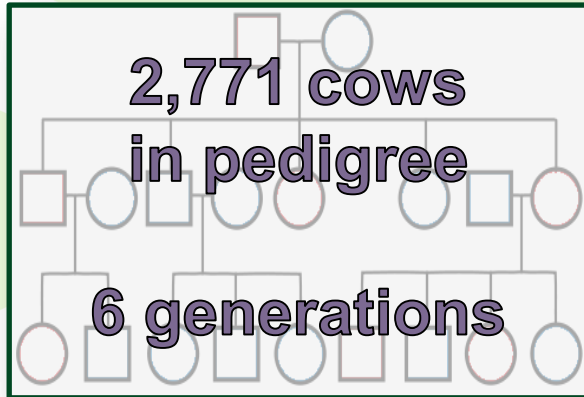
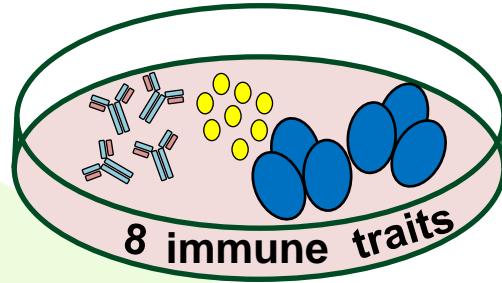
| | Control | Select |
|------------|---------|--------|
| Homegrown | 59 | 67 |
| Byproducts | 63 | 62 |

- 5 serum sampling points
- Jul 2010 – Mar 2011



- Serum samples assayed by ELISA

The Dataset



Statistical analyses

- Data were analysed using a mixed linear animal model

$$y_{ijklmnop} = \mu + F_i + G_j + W_k + A_l + H_m + C_n + S_o + a_p + p_p + e_{ijklmnop}$$

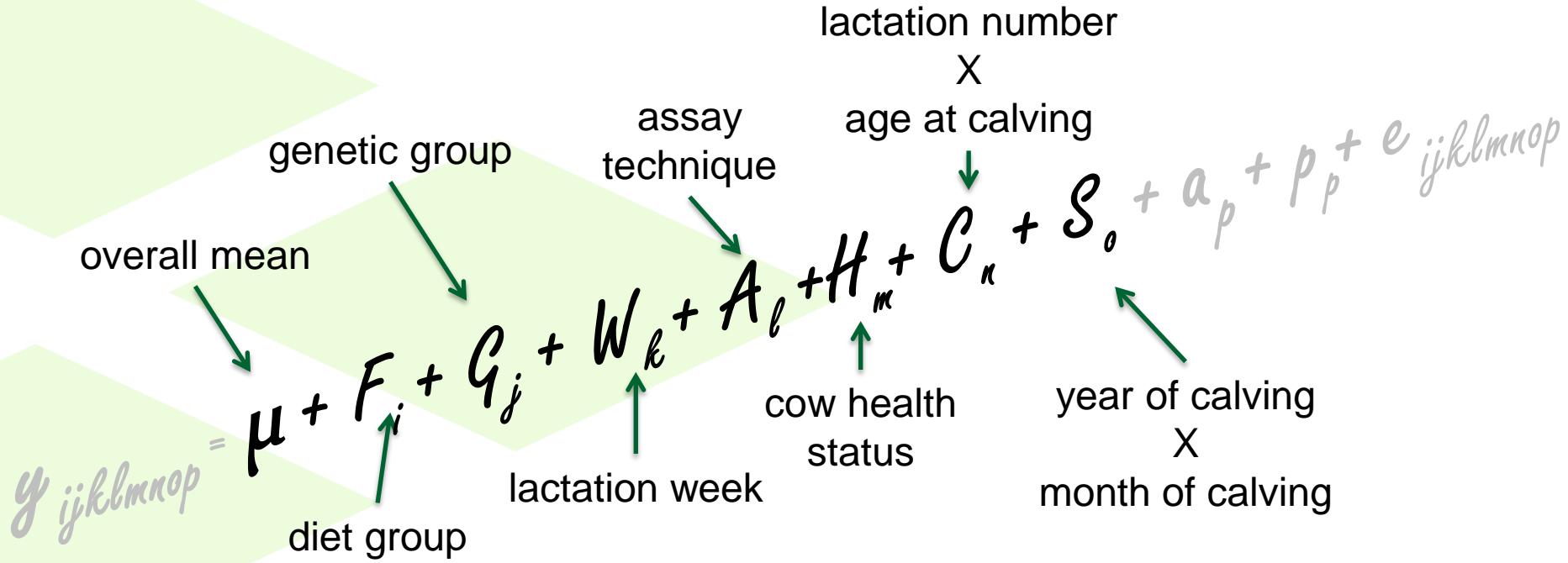


ASReml[®]

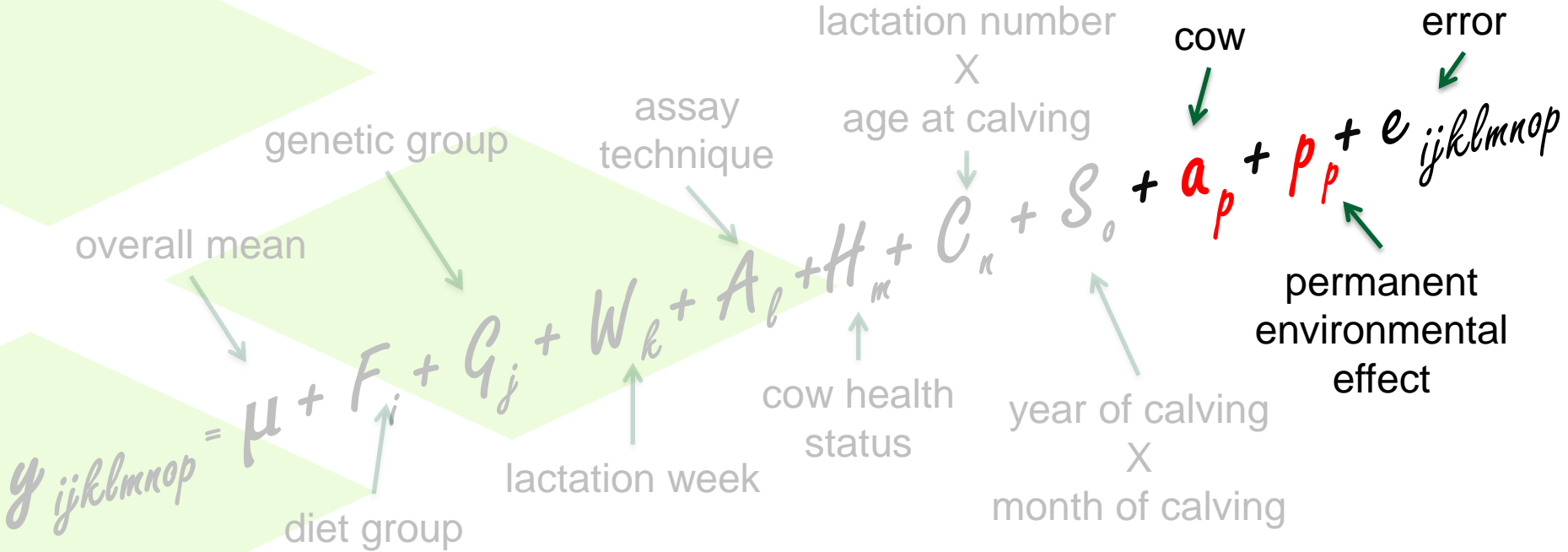
Version 3

(Gilmour et al., 2009)

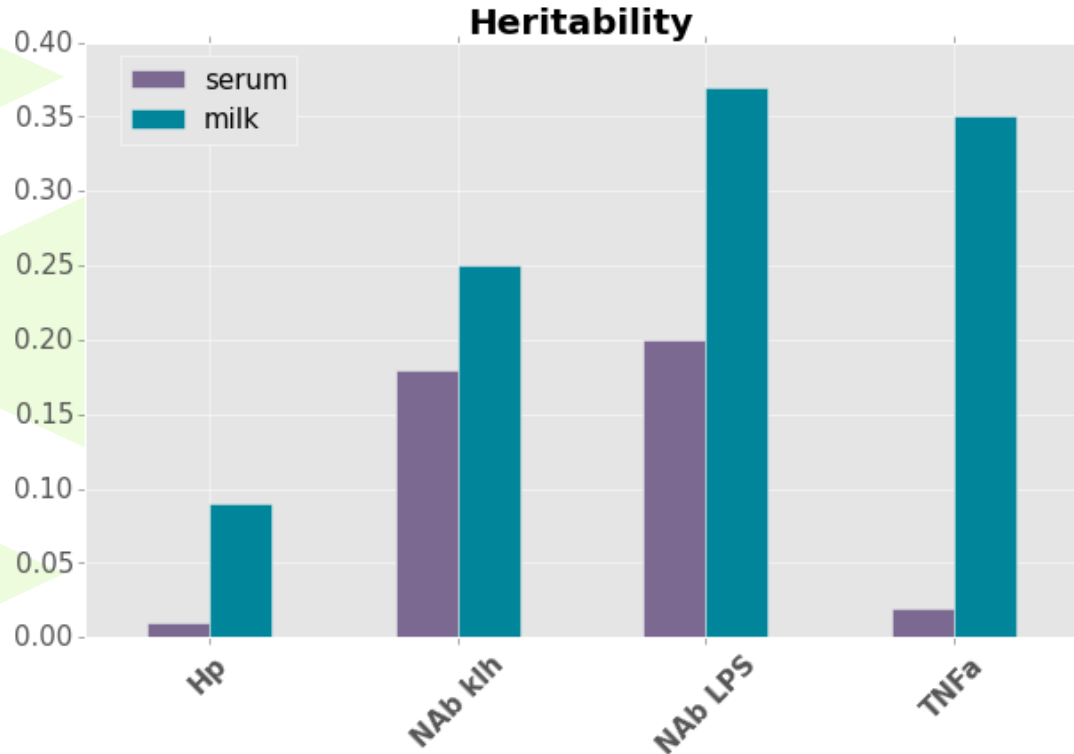
Statistical analyses



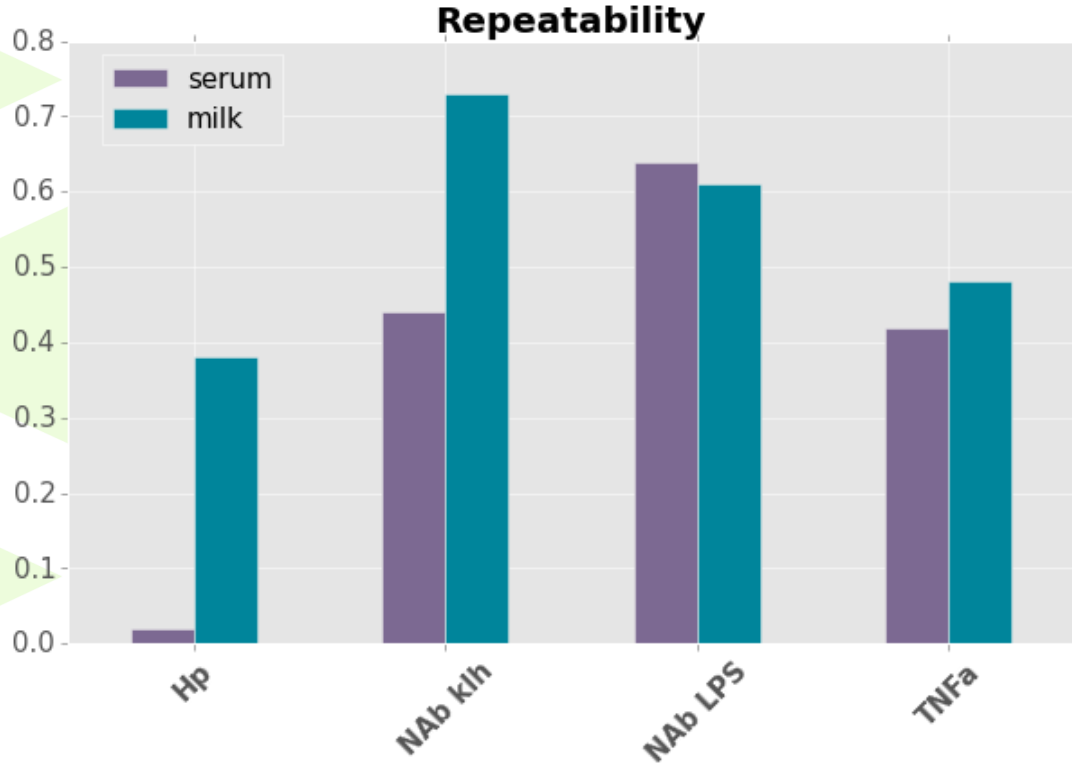
Statistical analyses



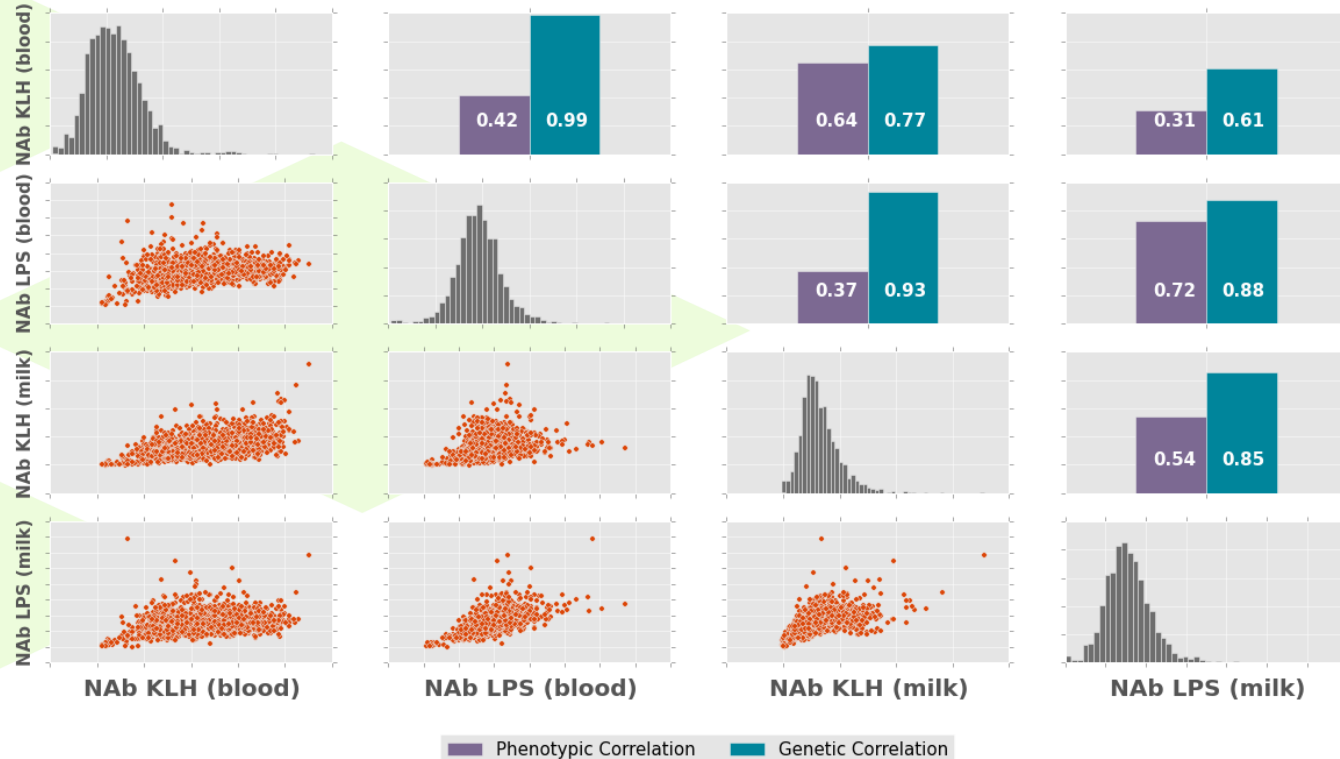
Genetic parameters



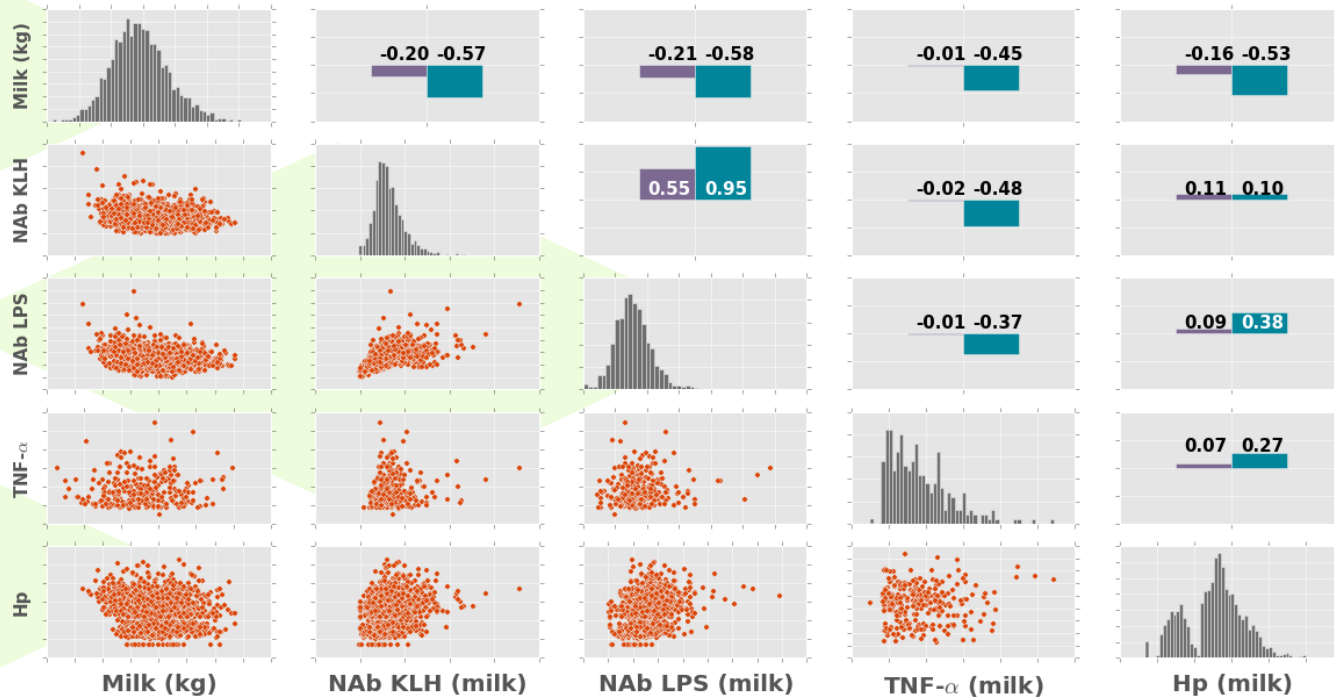
Genetic parameters



Blood vs. milk NAb



Immune vs. milk

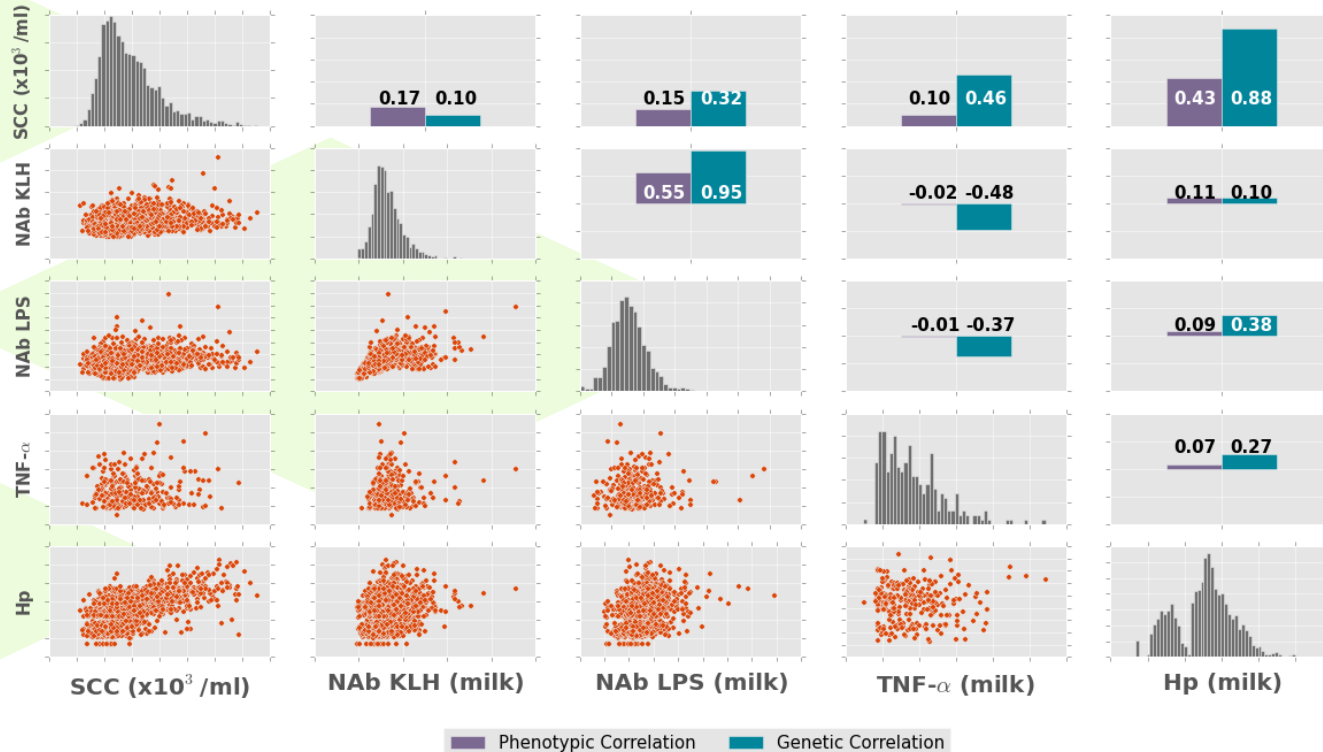


Phenotypic Correlation Genetic Correlation

Immune vs. milk



Immune vs. SCC



Immune vs. SCC



Conclusions



- Immune traits in blood and milk are heritable, repeatable and strongly correlated
- Highlights potential as a less invasive resource for predictive modelling of animal immune traits

Next Steps . . .



- Associations with health and welfare
- Immune time series

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Acknowledgements



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Thanks for listening



**For further information
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