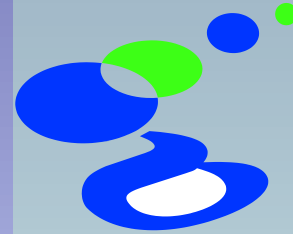


2008 ADSA-ASAS Joint Annual Meeting
Indianapolis, July 7-11



FNRS

Genetic Parameters of Saturated and Monounsaturated Fatty Acids Estimated by Test-Day Model in Walloon Dairy Cattle

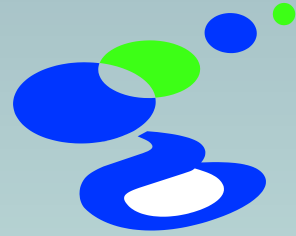
H. Soyeurt¹, C. Bastin¹, P. Dardenne², F. Dehareng²,
and N. Gengler^{1,3}

¹ Gembloux Agricultural University, Animal Science Unit, Belgium

² Walloon Agricultural Research Centre, Quality Department, Belgium

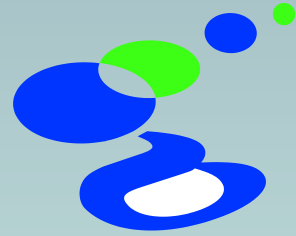
³ National Fund for Scientific Research, Belgium

Introduction



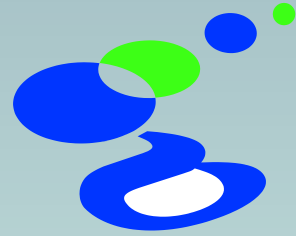
- Interest for human health
- Milk fatty acid composition:
 - Saturated (SAT): 70%
 - Monounsaturated (MONO): 25%
 - Polyunsaturated : 5%

Introduction



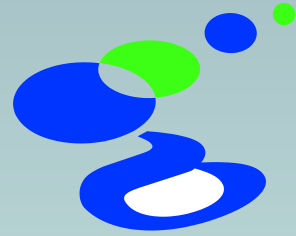
- Interest for human health
- Milk fatty acid composition:
 - Saturated (SAT): 70% (*vs. 30%*)
 - Monounsaturated (MONO): 25% (*vs. 60%*)
 - Polyunsaturated : 5% (*vs. 10%*)

Introduction



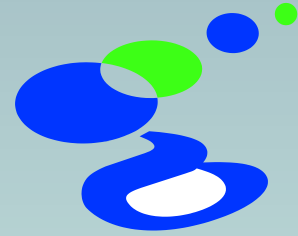
- Interest for human health
- Milk fatty acid composition:
 - Saturated (SAT): 70% (*vs. 30%*)
 - Monounsaturated (MONO): 25% (*vs. 60%*)
 - Polyunsaturated : 5% (*vs. 10%*)
- *Modifying the milk fatty acid profile*

General Objective



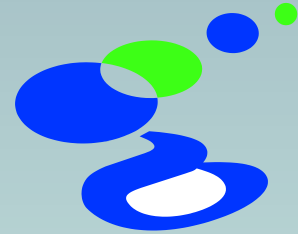
- Sources of variation:
 - Feeding
 - Genetic:
 - Previous studies: Moderate heritability estimates
 - Constant genetic parameters throughout the lactation?
- Aim of this study:
 - Estimate the genetic parameters for SAT and MONO in bovine milk using multi-trait random regression test-day models

Materials & Methods



- Data set:
 - $4 < \text{DIM} < 366$
 - 100,799 TD records (1991-2007)
 - Including 4,666 spectra (March 2005 – July 2007)
 - 11,626 primiparous Holstein cows
 - 18,573 animals in the pedigree

Materials & Methods

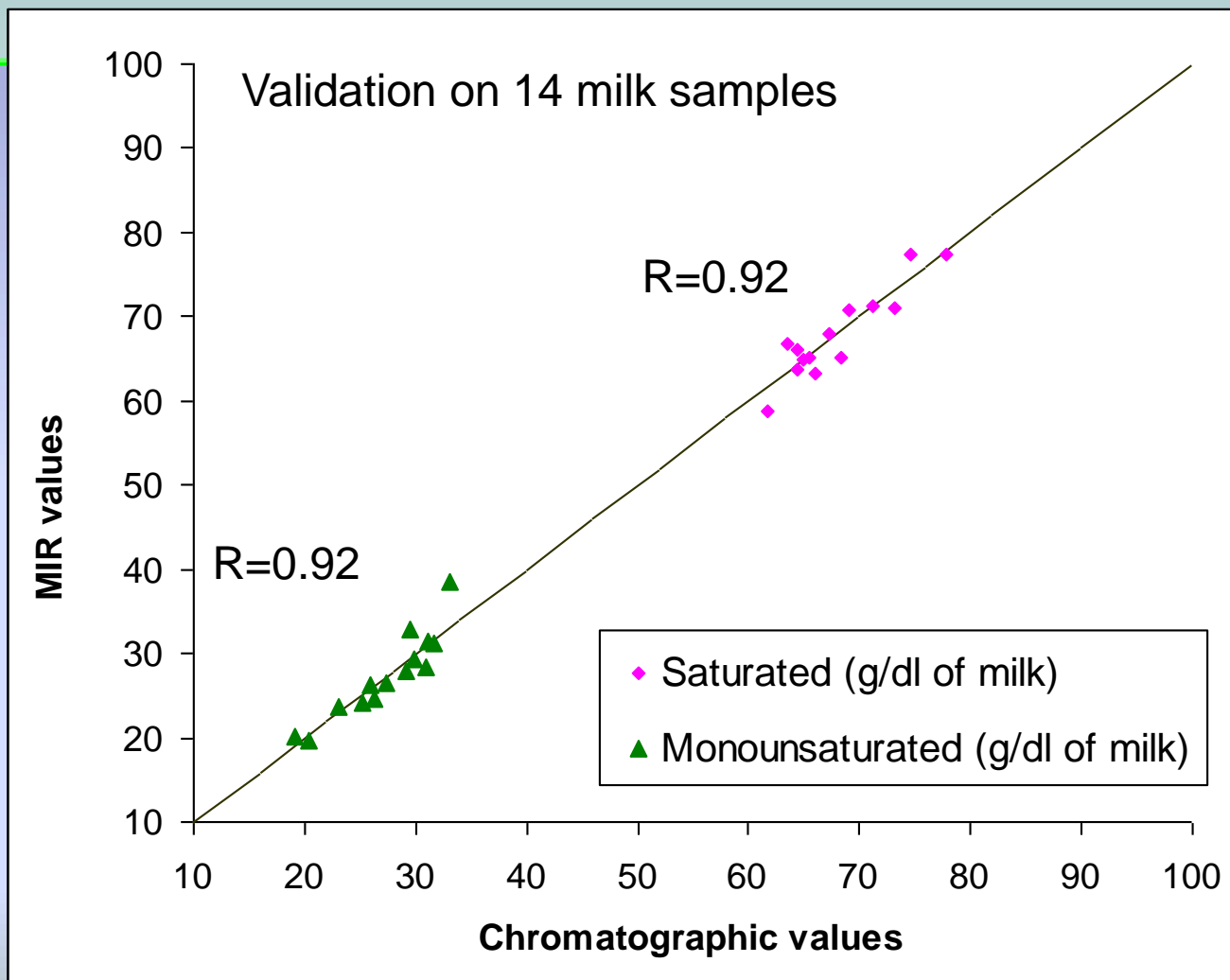
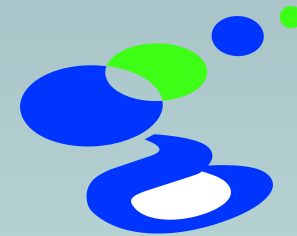


- Estimation of SAT and MONO contents
 - New PLS calibration equations
 - 114 milk samples in the calibration set

g/dL of milk	R ² cv	RPD
SAT	0.97	5.78
MONO	0.93	3.65

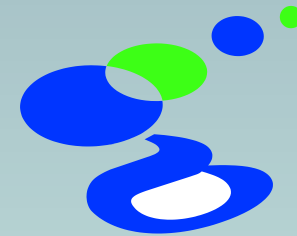
- Indicator of butter hardness = SAT:UNSAT

Studied traits



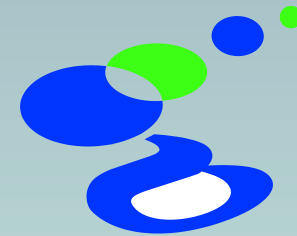
R= correlation between reference and MIR data

Studied traits



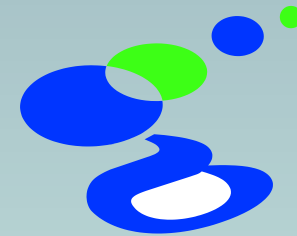
	N	Mean	SD
Milk (kg/day)	100,799	22.54	6.13
Fat (g/100g of milk)	100,799	4.05	0.68
Protein (g/100g of milk)	100,799	3.32	0.34
SAT (g/100g of milk)	4,666	2.63	0.54
MONO (g/100g of milk)	4,666	1.08	0.26
SAT (g/100g of fat)	4,666	66.26	6.15
MONO (g/100g of fat)	4,666	27.55	4.80
SAT:UNSAT	4,666	2.06	0.55

Studied traits



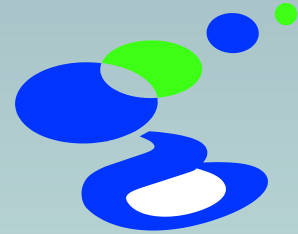
	N	Mean	SD
Milk (kg/day)	100,799	22.54	6.13
Fat (g/100g of milk)	100,799	4.05	0.68
Protein (g/100g of milk)	100,799	3.32	0.34
SAT (g/100g of milk)	4,666	2.63	0.54
MONO (g/100g of milk)	4,666	1.08	0.26
SAT (g/100g of fat)	4,666	66.26	6.15
MONO (g/100g of fat)	4,666	27.55	4.80
SAT:UNSAT	4,666	2.06	0.55

Studied traits



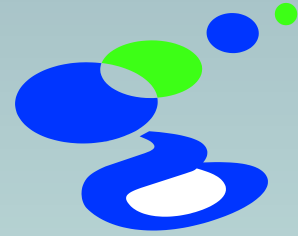
	N	Mean	SD
Milk (kg/day)	100,799	22.54	6.13
Fat (g/100g of milk)	100,799	4.05	0.68
Protein (g/100g of milk)	100,799	3.32	0.34
SAT (g/100g of milk)	4,666	2.63	0.54
MONO (g/100g of milk)	4,666	1.08	0.26
SAT (g/100g of fat)	4,666	66.26	6.15
MONO (g/100g of fat)	4,666	27.55	4.80
SAT:UNSAT	4,666	2.06	0.55

Materials & Methods



- Models:
 - Fixed effects:
 - Herd x date of test
 - Class of 15 days in milk
 - Class of age
 - Random effects:
 - Herd x year of calving
 - Permanent environment
 - Additive genetic effect
 - Residuals

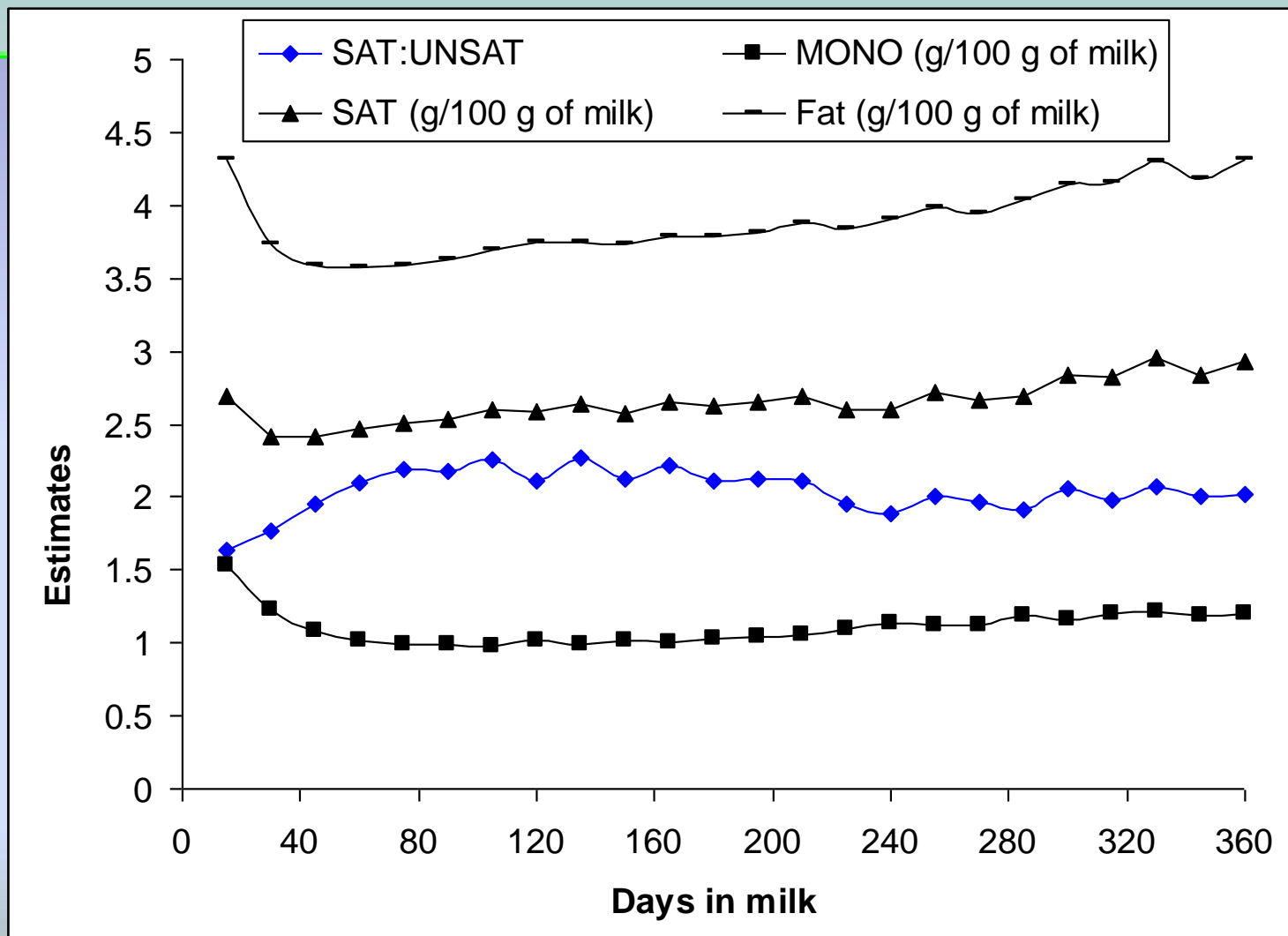
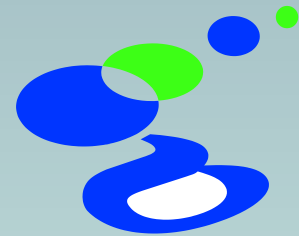
Materials & Methods



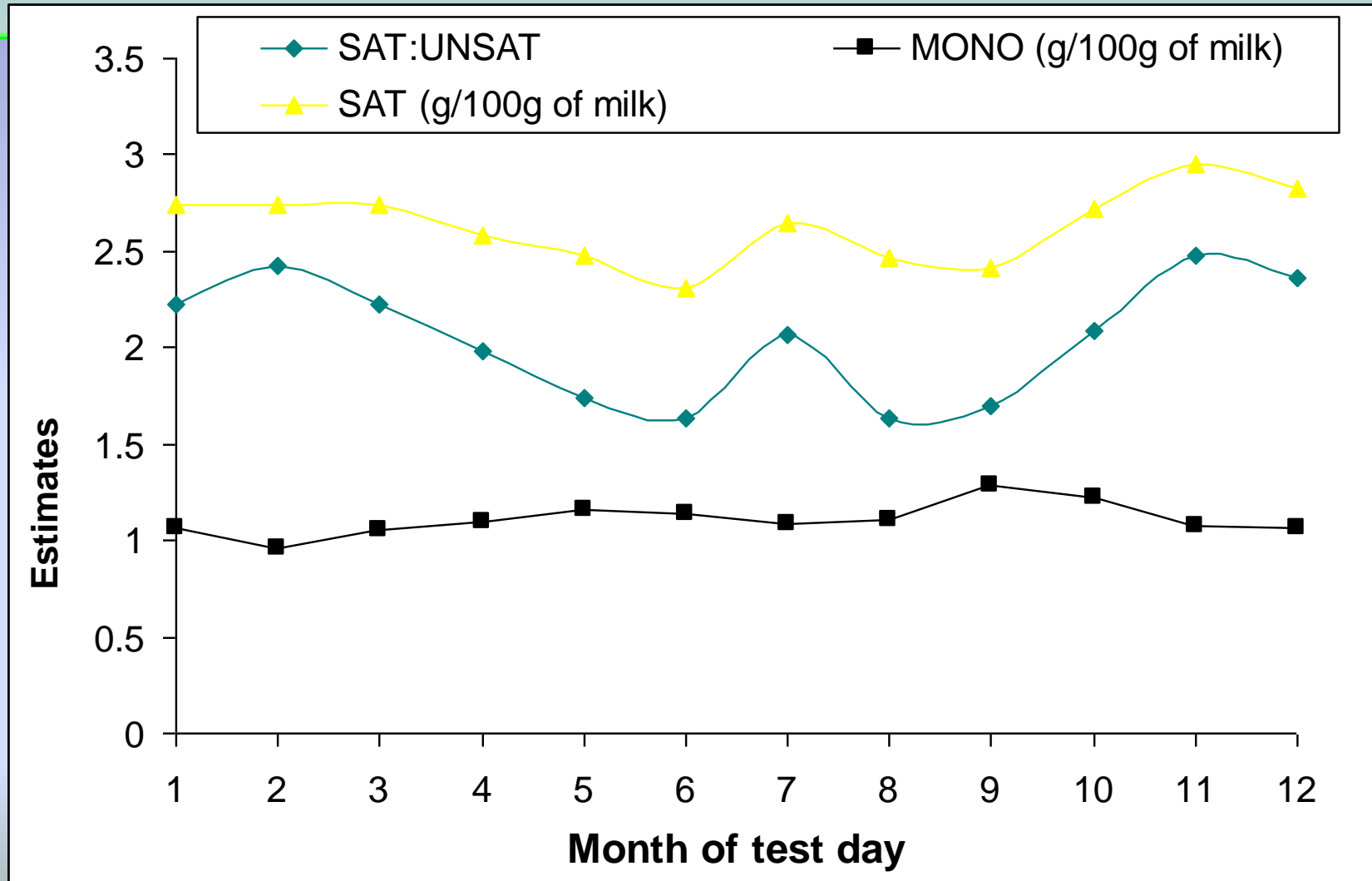
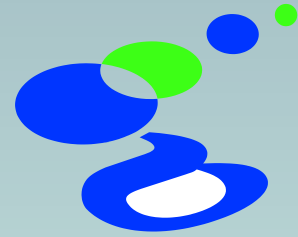
- Models:
 - Fixed effects:
 - Herd x date of test
 - Class of 15 days in milk
 - Class of age
 - Random effects:
 - Herd x year of calving
 - Permanent environment
 - Additive genetic effect
 - Residuals

Second order
Legendre Polynomials

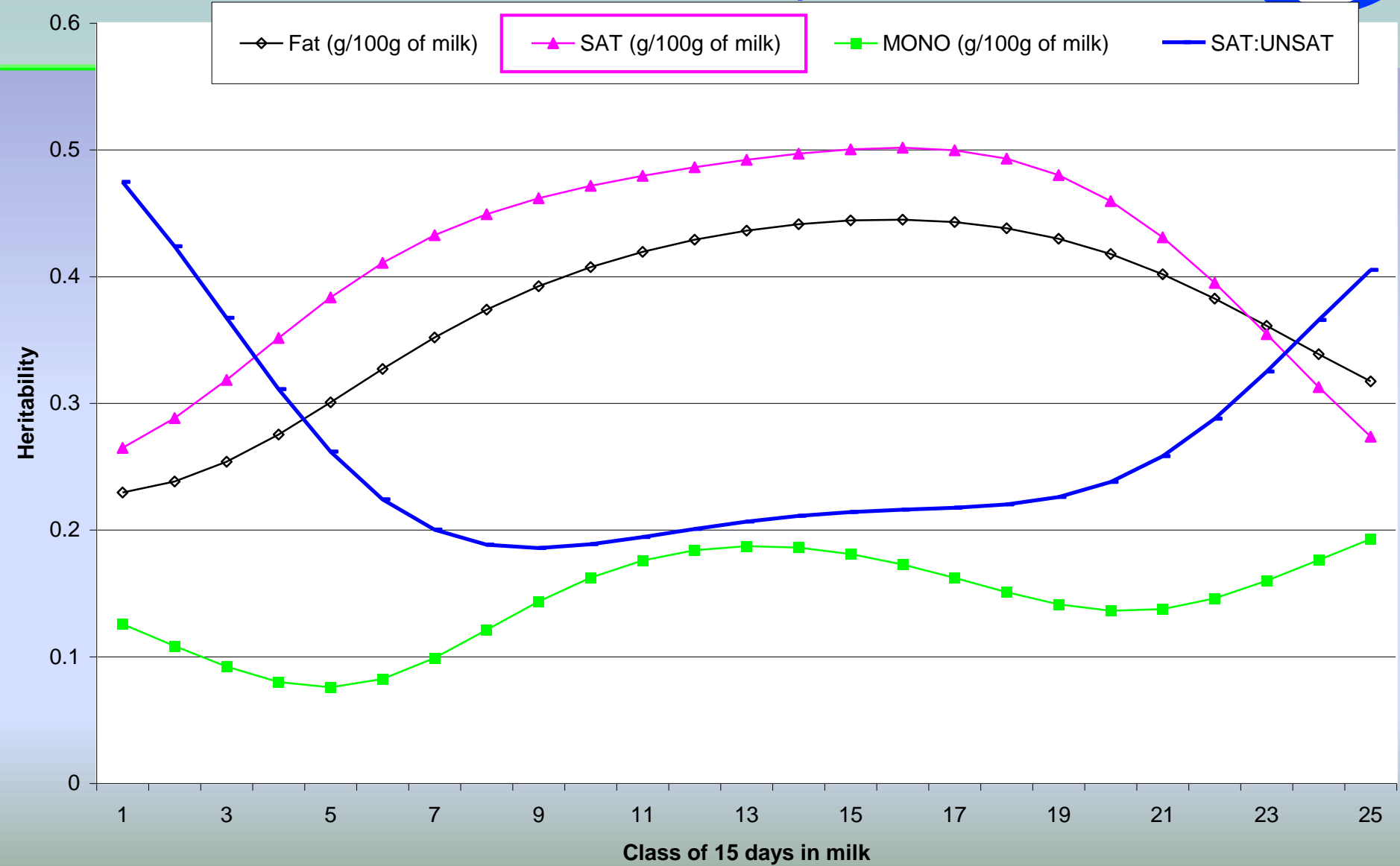
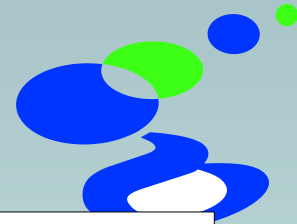
Results: Lactation Effect



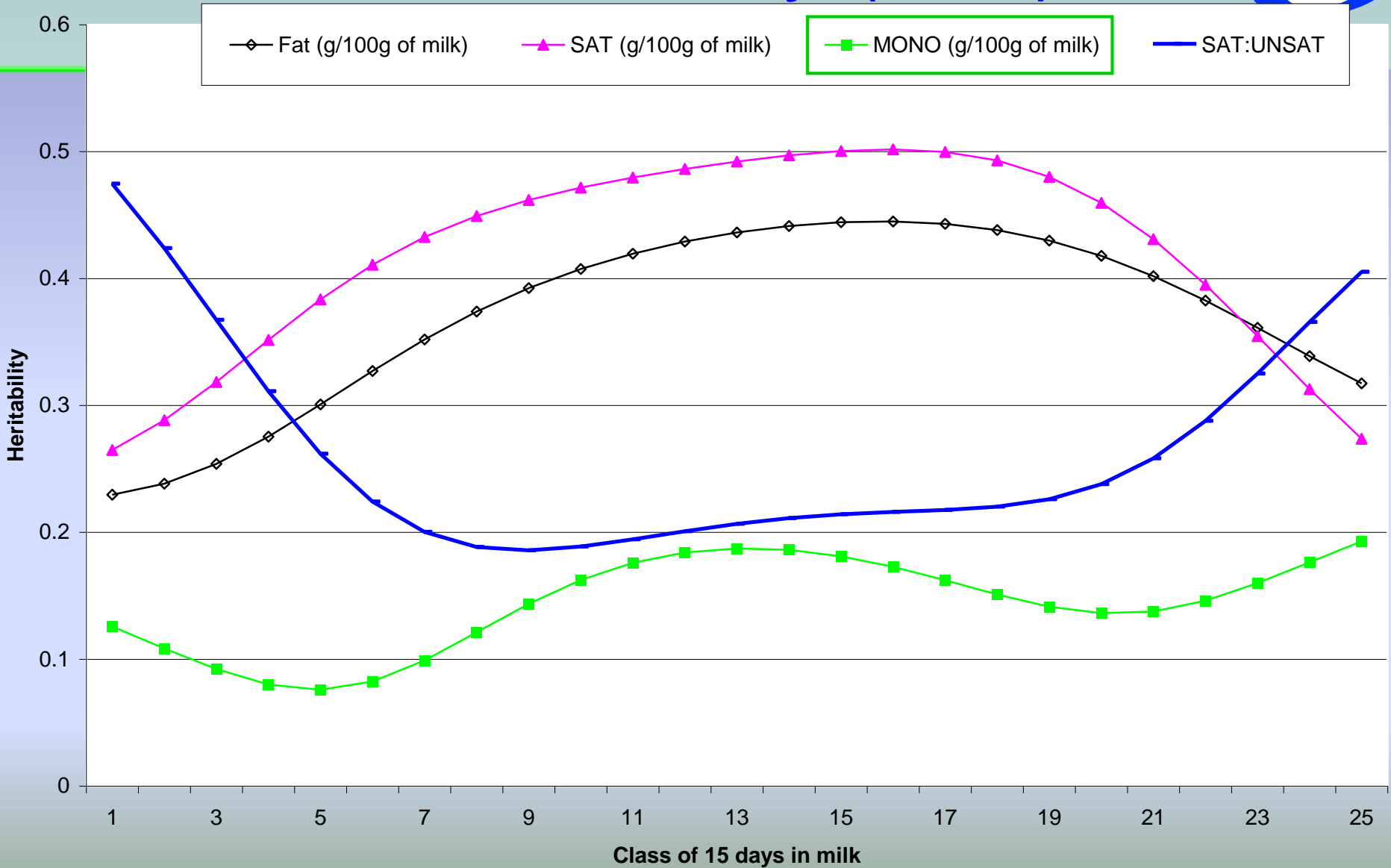
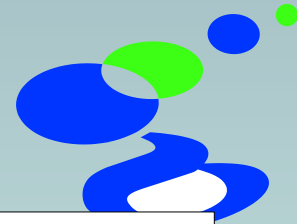
Results: Season Effect



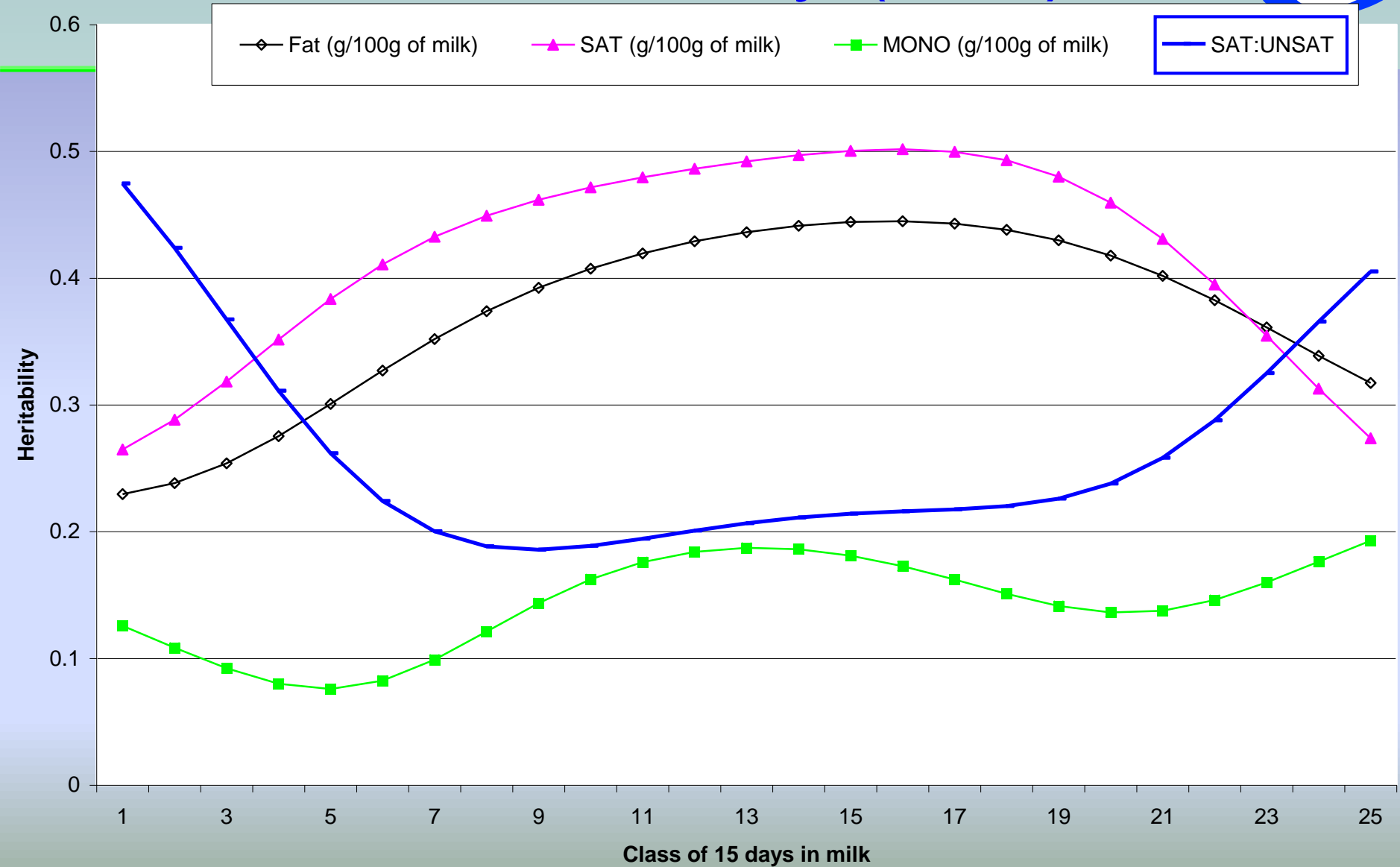
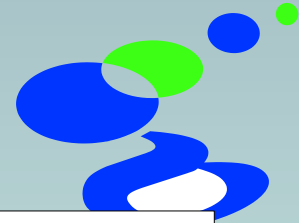
Results: Heritability (milk)



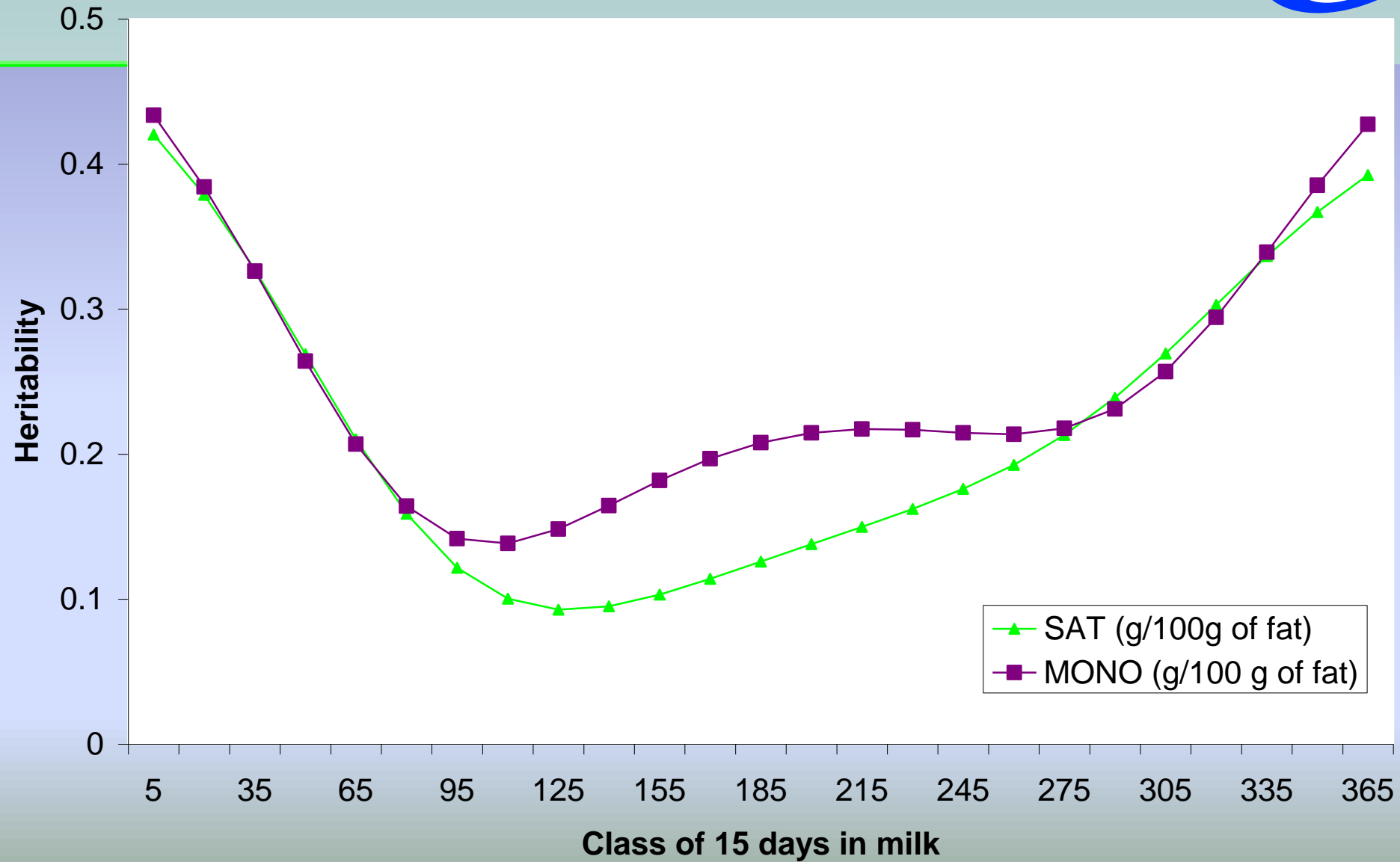
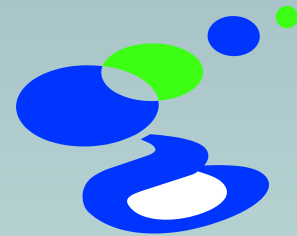
Results: Heritability (milk)



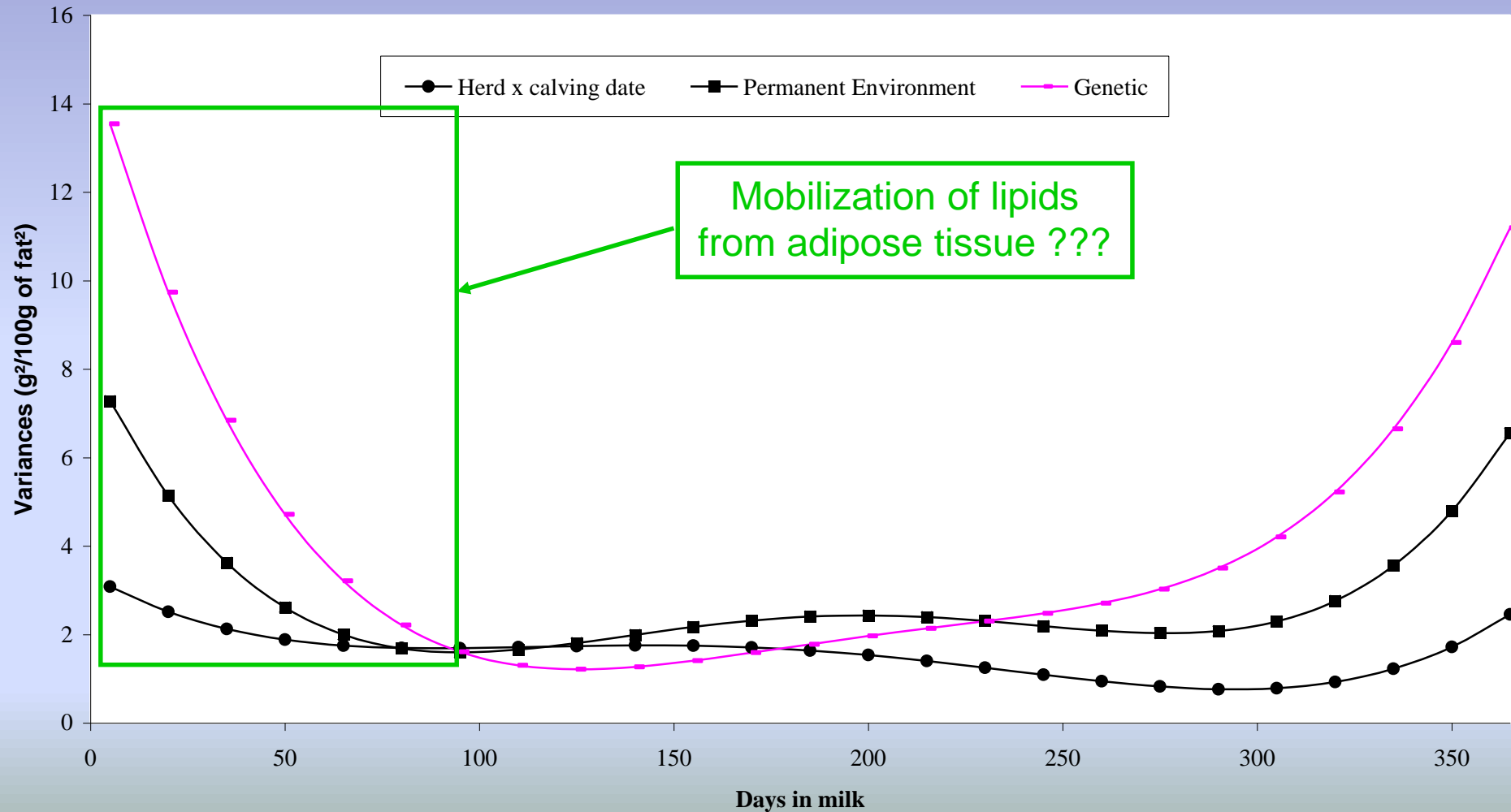
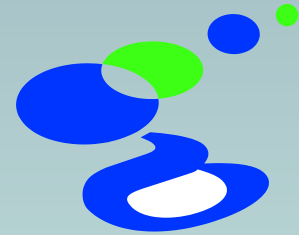
Results: Heritability (milk)



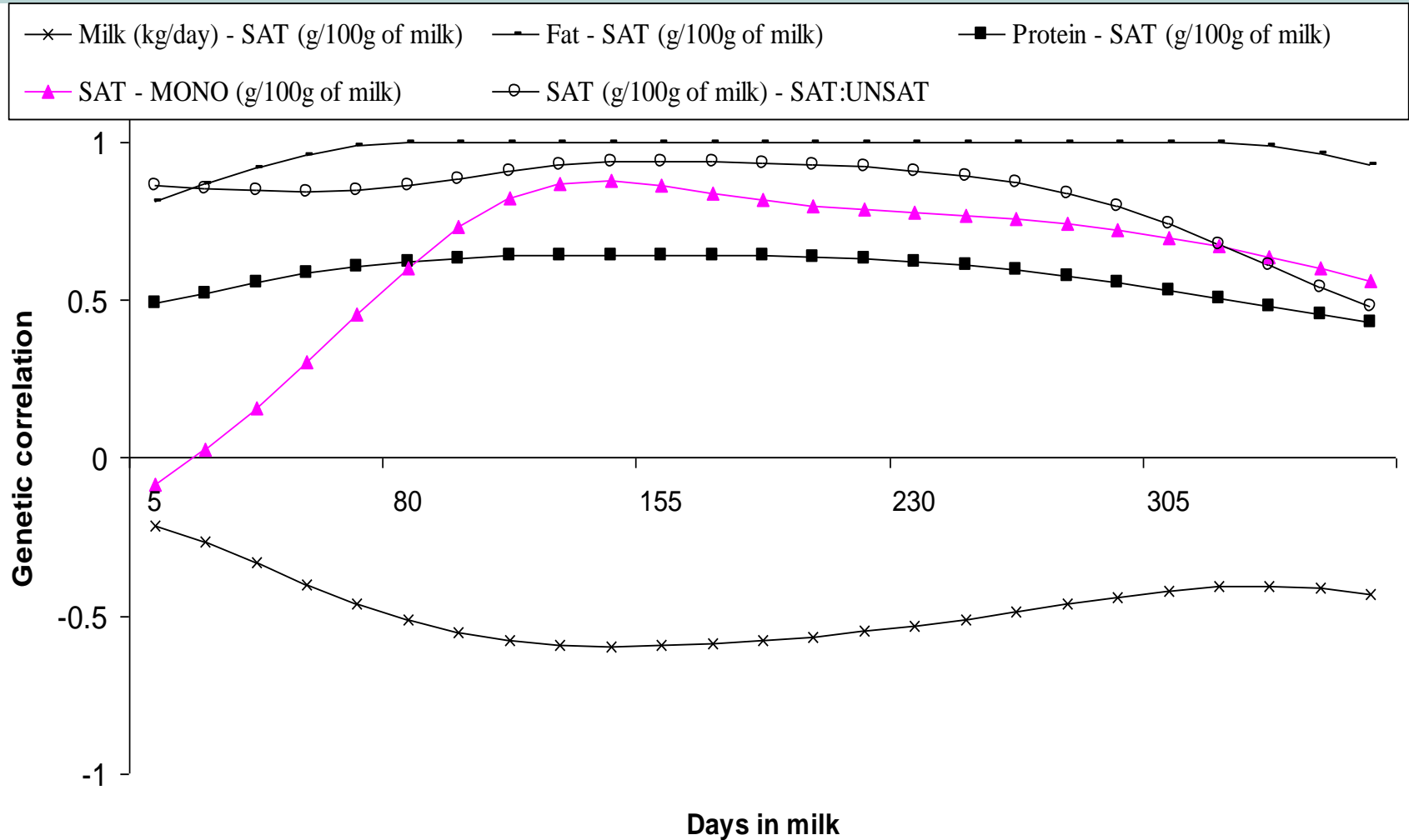
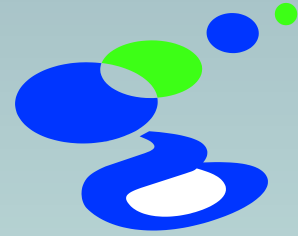
Results: Heritability (fat)



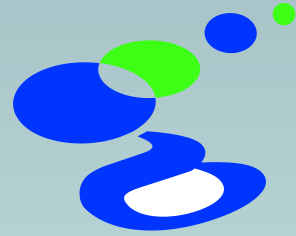
Results: Variances (%SAT)



Results

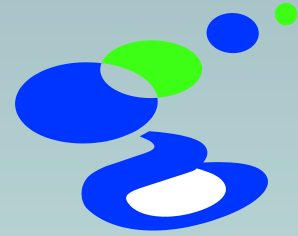


Conclusion



- Results confirm the genetic variability of fatty acids
- Genetic parameters of fatty acids change throughout the lactation:
 - Highest heritability and additive genetic variance at the beginning and at the end of the lactation
 - Correlations between SAT and MONO change within the lactation
- Partly influenced by the fatty acid production??

Thank you for your attention



Acknowledgments

FNRS grants:

2.4507.02

F.4552.05

2.4623.08

Walloon Breeding Association

Milk Committee of Battice

soyeurt.h@fsagx.ac.be