

Genomic regions associated with bovine milk fatty acids

Aniek Bouwman, Marleen Visker, Johan van Arendonk and Henk Bovenhuis
Animal Breeding and Genomics Centre, Wageningen University

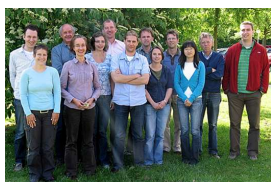


**Animal Breeding &
Genomics Centre**

Acknowledgements

Dutch Milk Genomics Initiative

Animal Breeding & Genomics Centre
Dairy Science & Technology



More info: www.milkgenomics.nl



Cooperative cattle
improvement organization



Dutch technology foundation



Dutch dairy organization

Aim

Find regions on the bovine genome
that have an effect on milk fatty acids



Introduction

Biosynthesis of milk fat is complicated process

Find genes causing variation

To better understand the biosynthesis of milk fat

Genomic regions

Previously: identified genomic regions associated with fatty acids from winter milk sample

Confirm: genomic regions associated with fatty acids from summer milk sample



Phenotypes

~2,000 first lactation Holstein Friesian cows

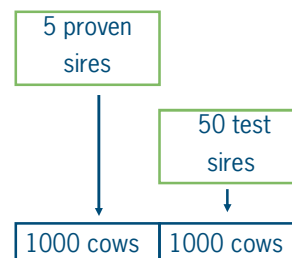
~400 farms throughout the Netherlands

Morning milk samples

- Winter
- Summer

Individual fatty acids measured

- Gas Chromatography
- C4:0-C18:0, C10:1-C18:1, CLA (C18:1 *cis9,trans11*)



Associations between genome and fatty acids

~50,000 SNP markers

- AA, AB, or BB



Per marker we tested if phenotype of AA cows differs from phenotypes of AB and/or BB cows

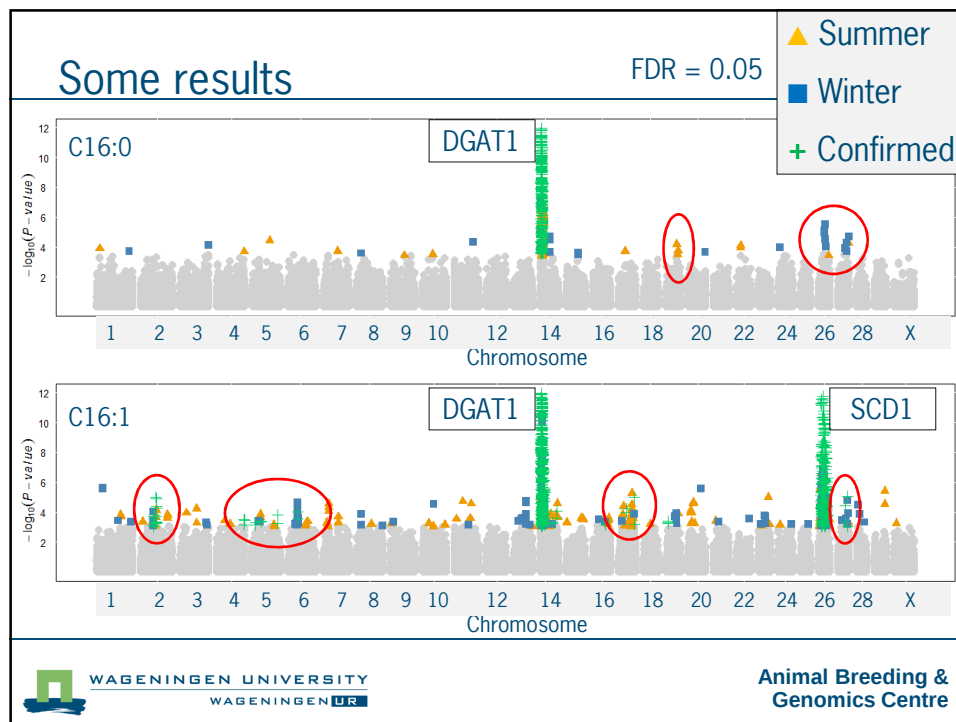
Significant difference: marker expected to be close to the gene with the effect on the phenotype

Summer versus winter

Trait	Mean Summer	Mean winter	r_p	r_g
C4:0-C14:0	24.8	25.8	0.48-0.56	0.93-0.98
C16:0	29.2	32.6	0.42	0.77
C10:1-C16:1	3.2	3.3	0.45-0.67	0.97-1
C18:0	9.9	8.7	0.45	0.90
C18:1	20.6	18.2	0.41	0.92
CLA	0.6	0.4	0.36	0.81

High genetic correlation:

Genetically the same trait in summer as in winter



Confirmed

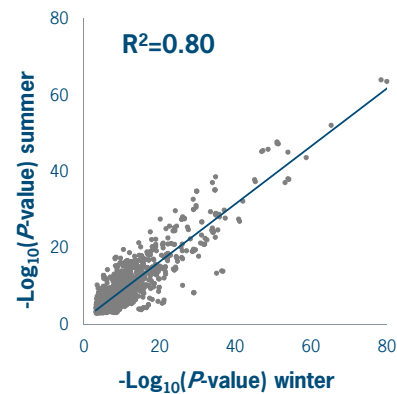
	BTA	2	5	6	13	14	17	19	26	27
C4:0								■		
C6:0			+	+	+	+	+	▲		
C8:0			+		+	+	+	+		
C10:0			+		+	▲	+	+	+	
C12:0								+		
C14:0						+		+	■	■
C16:0						+		▲	■	■
C10:1			+			+		▲	+	■
C12:1						+			+	■
C14:1			+		■	■			+	■
C16:1		+	+	+	■	+	+	■	+	+
C18:1						+		■		
CLA						+		■		

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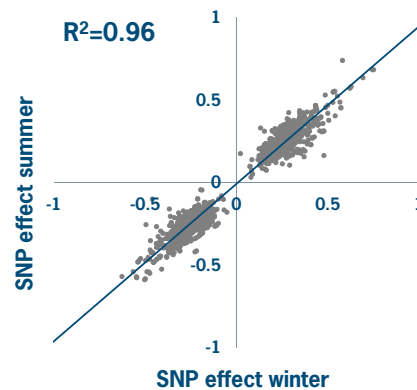
Summer versus winter

Significance SNPs



SNP effects

- Same direction



Conclusions

Summer & winter fatty acids genetically same trait

Confirmed:

- Expected results DGAT1 and SCD1
- Other regions, some with candidate genes

High correlation between confirmed regions

