

Possible methods for changing the glycolytic potential

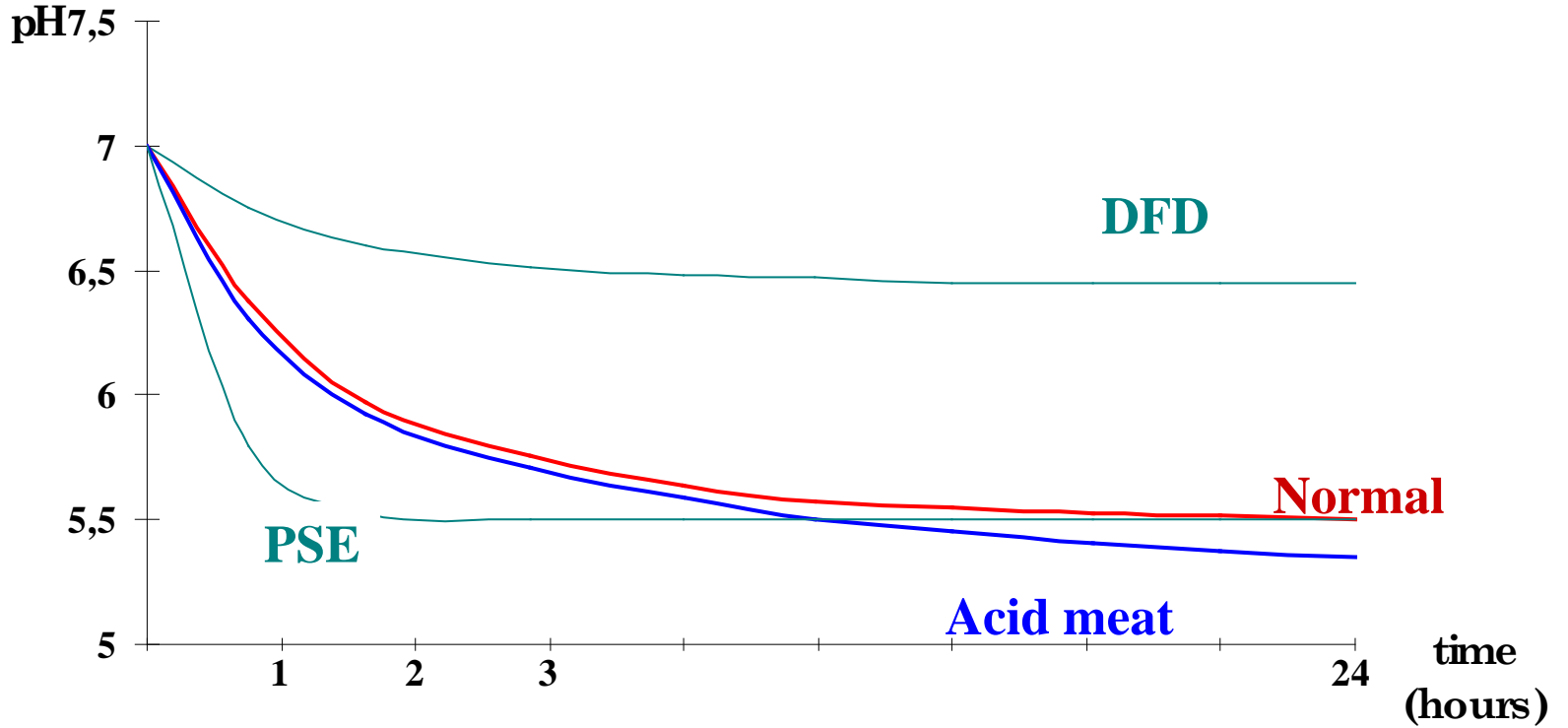
C. LARZUL



Introduction

- **Meat quality is influenced by muscle pH decrease**

Muscle pH decrease





Introduction

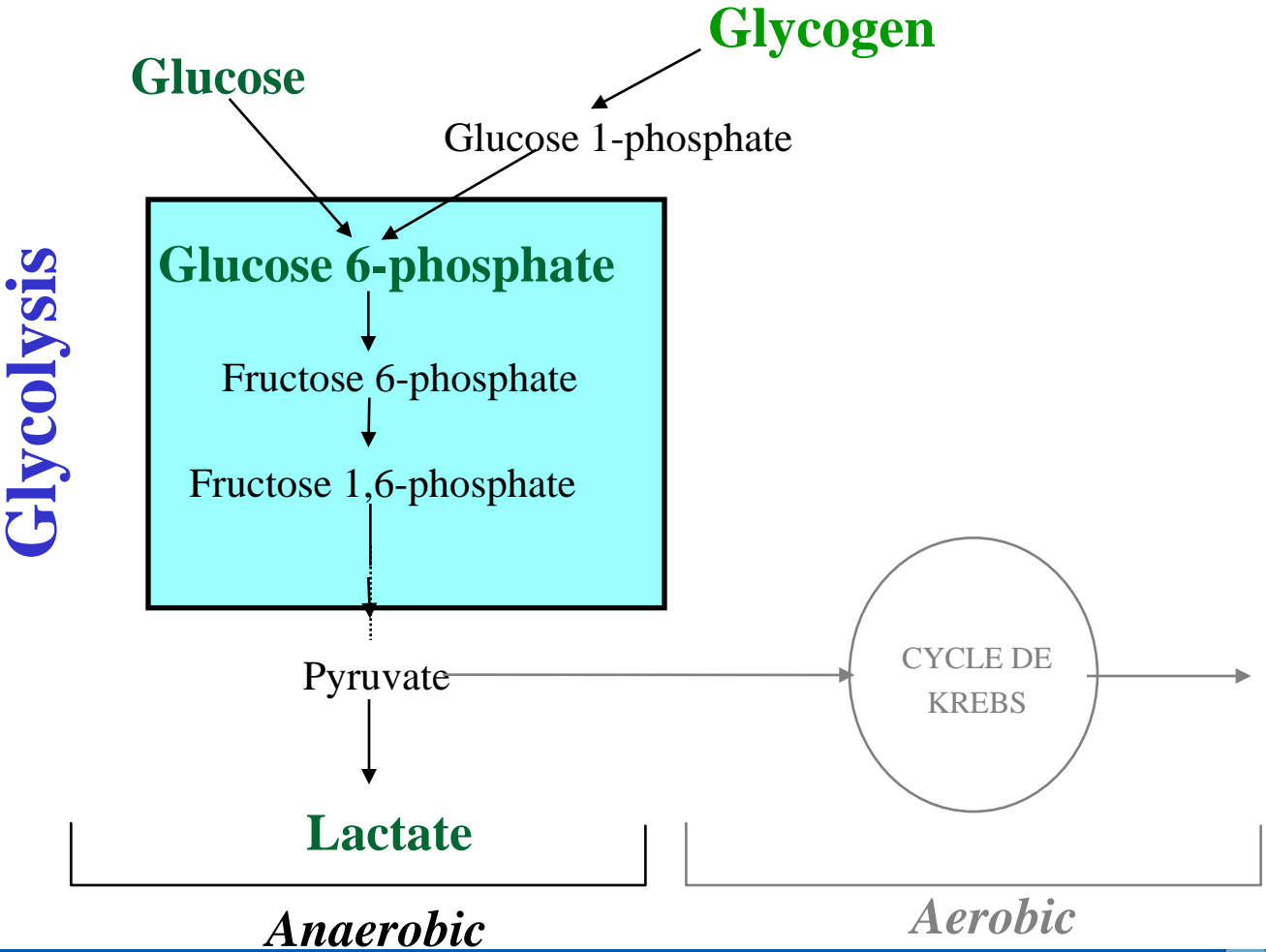
- **Meat quality is influenced by muscle pH decrease**
- **Muscle pH decrease is influenced by glycogen store at slaughter**



Introduction

- **Meat quality is influenced by muscle pH decrease**
- **Muscle pH decrease is influenced by glycogen store at slaughter**
- **Glycogen store at slaughter is estimated by glycolytic potential**

Muscle acidification





Glycolytic potential

- Sum of main muscle glucidic compounds susceptible to transformation into lactate:

$$\text{GP} = 2 \{[\text{glycogen}] + [\text{glucose}] + [\text{glucose-6-P}]\} + [\text{lactate}]$$

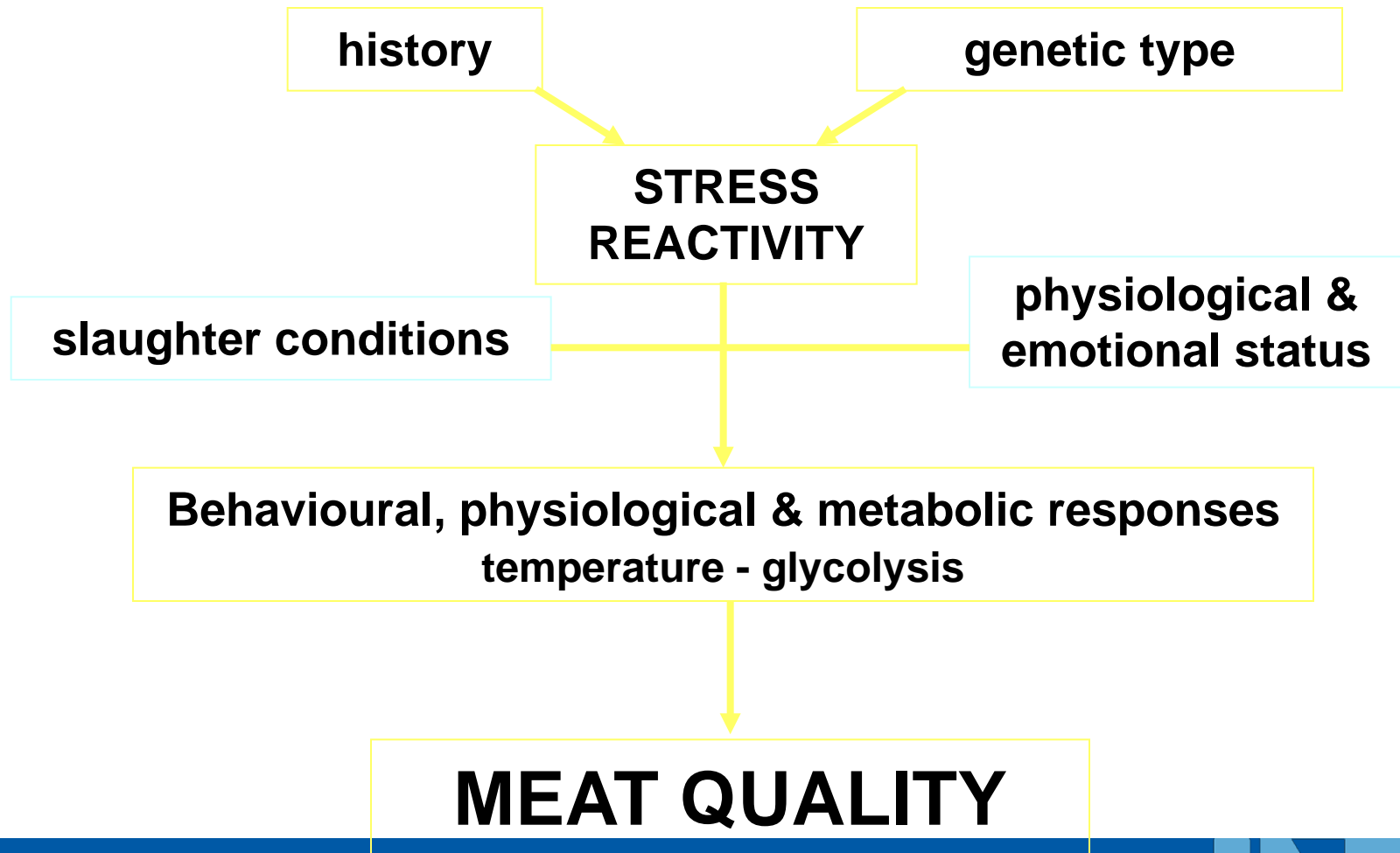
- Changing GP = control meat quality
 - To much = acid meat
 - Not enough = DFD meat



Main factors affecting GP

- Rearing
- Feeding
- Pre-slaughter treatment
- Sex/age
- Genetics

Behaviour and stress reactivity





(Pre)slaughter stress

- Before slaughter: decrease muscle glycogen store
- At slaughter: increase muscle metabolism

Separations, mixing, fighting, density

Social stress

Changing environment and situation
Human presence

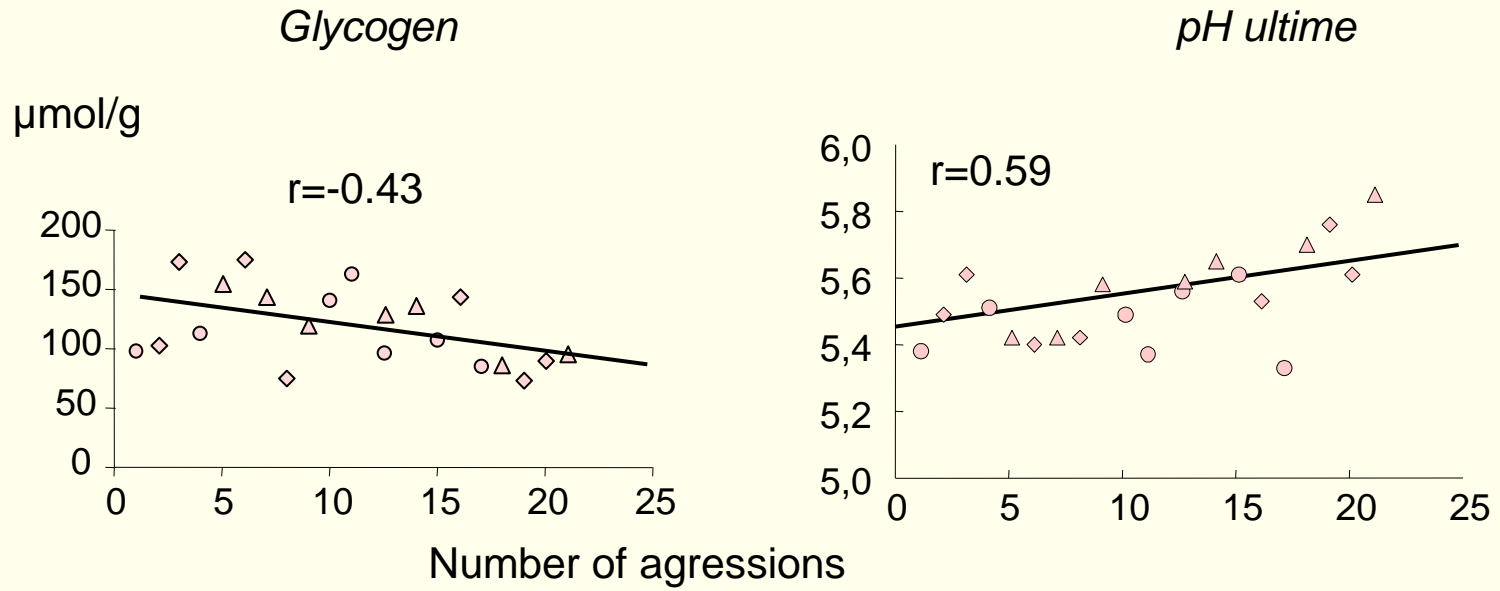
Fear

Fasting, capture, transportation, aggressions

Physical incomfort

Mixing / fighting

Longissimus lumborum

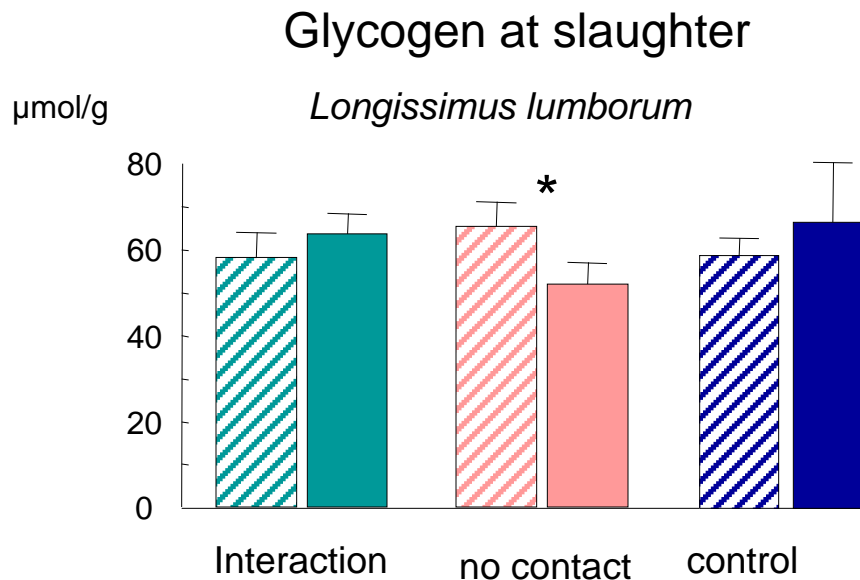


Terlouw et al., 2001

Fighting = physical effort + adrenaline

Animal history, stress et meat quality

- Rearing: positive interactions / human presence but no contact / no human presence = control
- Slaughter: no human presence / human presence



Terlouw, Porcher, Fernandez, 2005



Main factors affecting GP

- Rearing
- Feeding
- Pre-slaughter treatment
- Sex/age
- **Genetics**

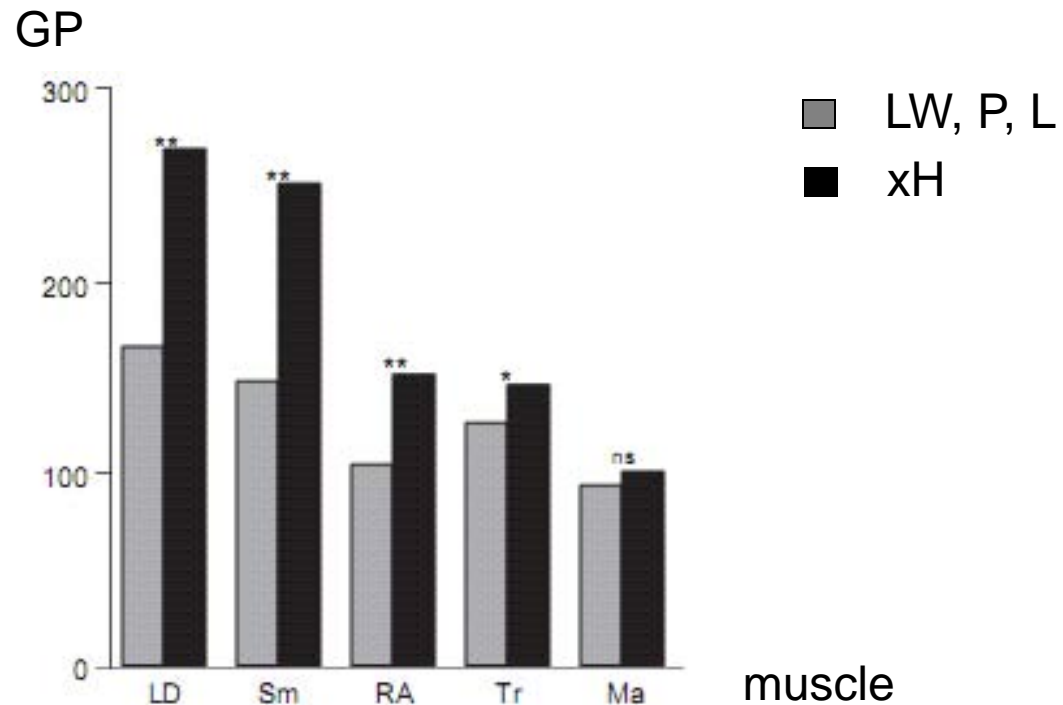


Genetic determinism

- Breed effect

Comparison between xH and other breeds

Higher GP in Hampshire and crossbred, but not in all muscles

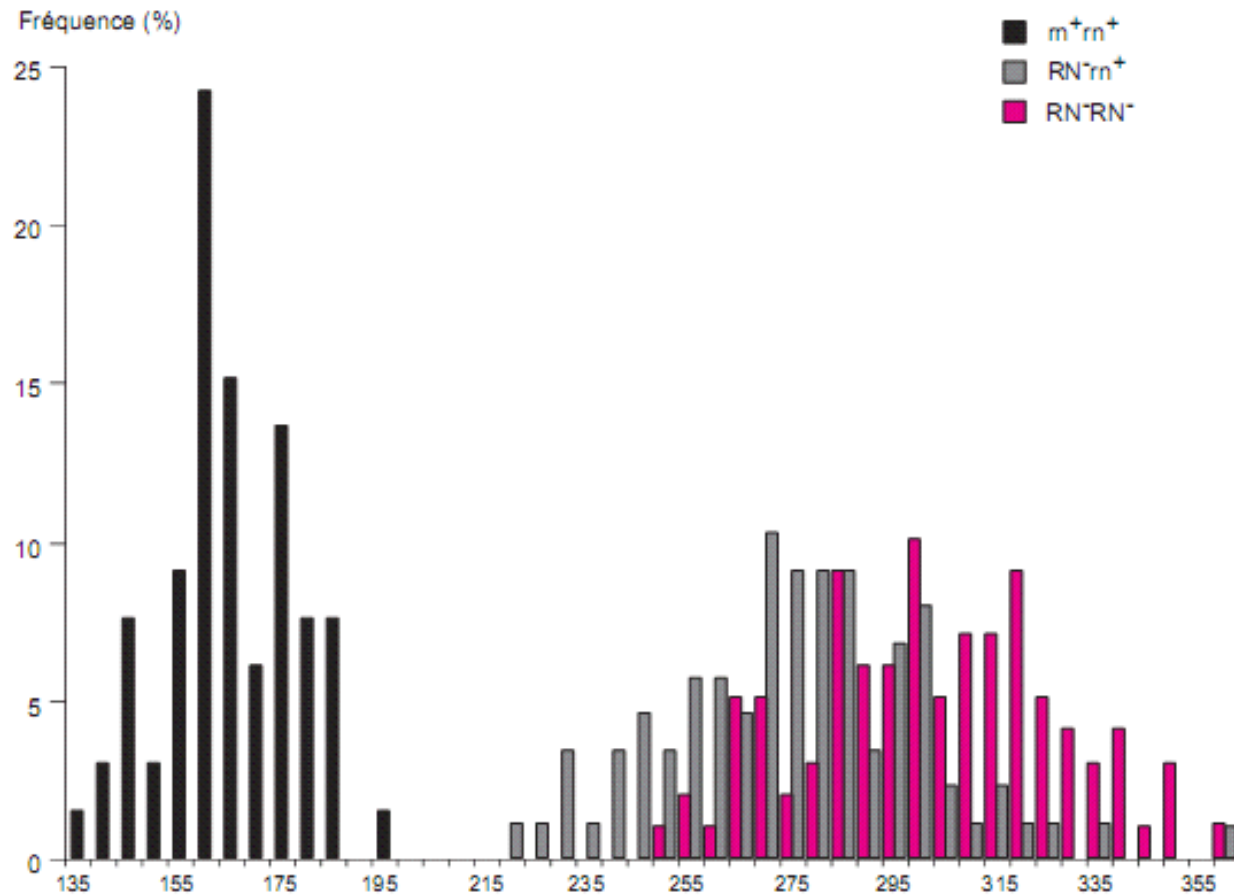


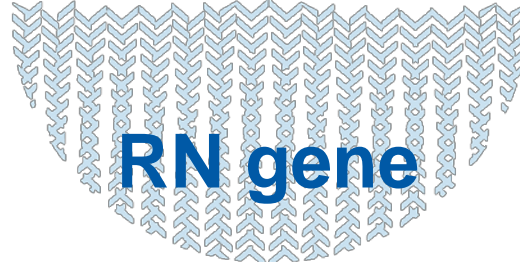


Genetic determinism

- Breed effect
- RN- allele

GP distribution for three RN genotypes





- Located on SSC15
- PRKAG3 gene: mutation A200G
- +3 mutations (T30N-G52S-I199V)
- 4 haplotypes found in commercial breeds

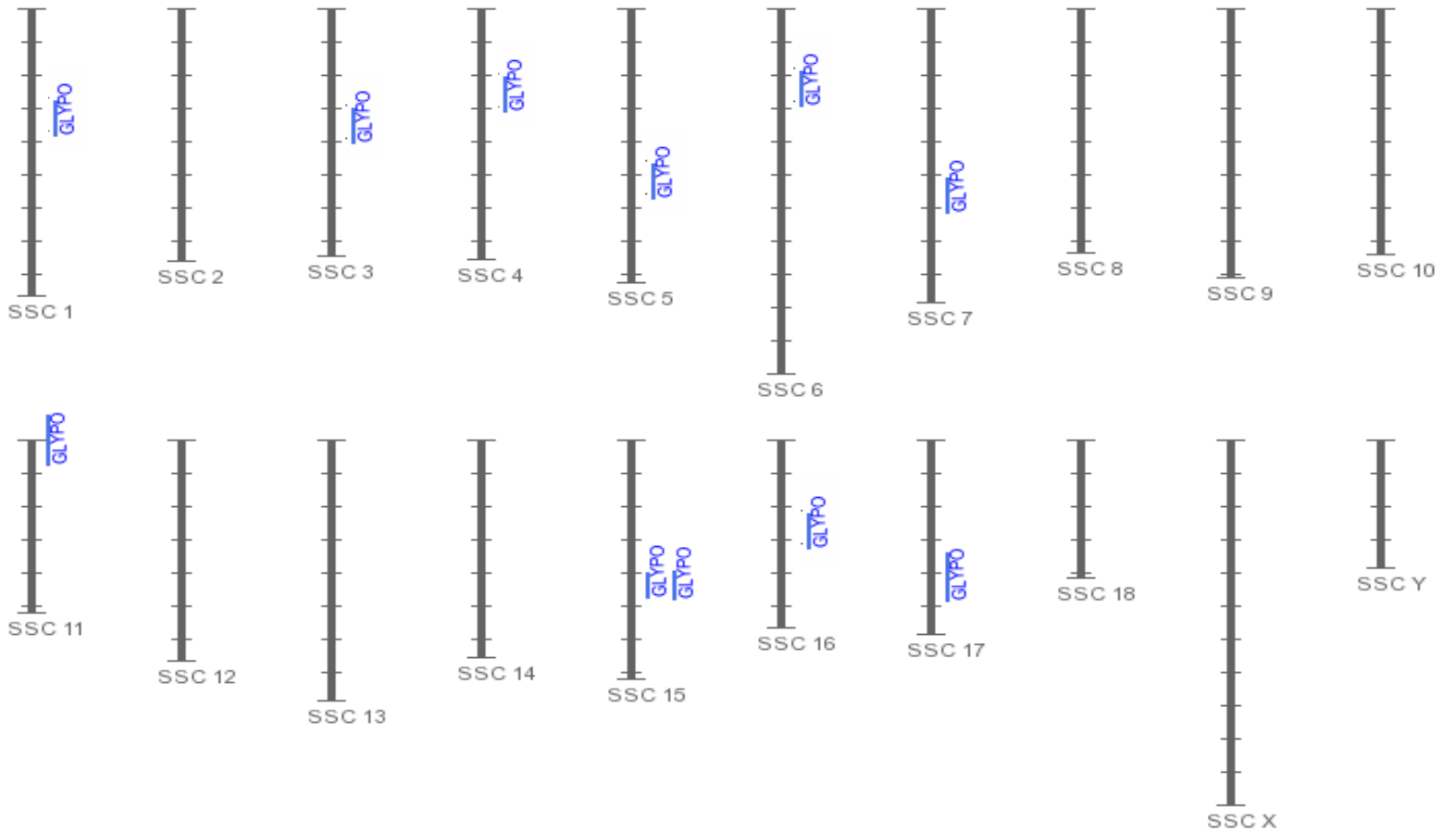
Ile199Val

--> decrease in muscle glycogen



Genetic determinism

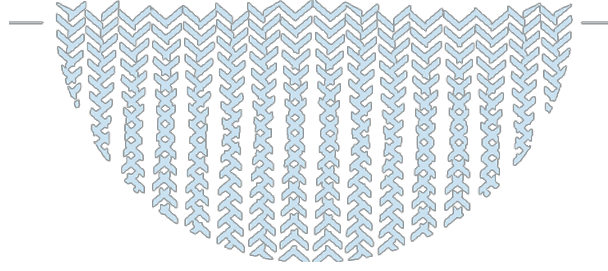
- Breed effect
- RN- allele
- Selection: moderate heritability (0.3)
- Quantitative Trait Loci





Conclusion

- Understand the interactions between animal history, genetics and reactivity at slaughter
- What about the differences between proglycogen and macroglycogen ?
- In selection: expectations from new tools (high density genotyping, genomics and other omics)



Thank you