Session 15

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A gene flow strategy for defining unknown parent groups in a beef cattle genetic evaluation

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INTRODUCTION

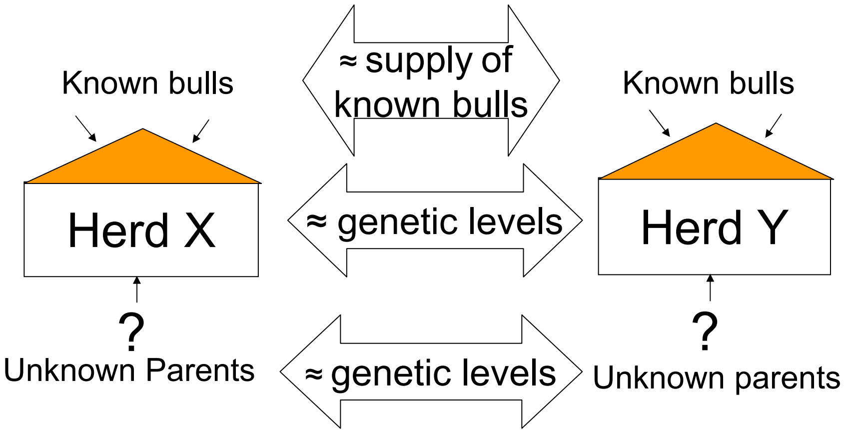
- Heterogeneity in beef cattle populations :
  - Genetics
  - Knowledge of pedigree
- Heterogeneity taken into account by unknown parent groups (UPG) in genetic evaluations
- Usual criteria: birth period, native country, selection path
- In beef cattle, extra heterogeneity due to the use of NS & AI

⇒ A method to define relevant genetic groups

⇒ Applied to the French Charolais population

How to define relevant genetic groups ?

Base assumption



⇒ Definition of **UPG** from information about **known bulls**

Identification of production regions

- Principal component analysis (PCA)
  - 4 traits at birth (BW) and at weaning (WW, MS, SS)
  - + 16 other parameters on 55 French departments:
    - AI rate
    - Age at calving and calving season
    - Demography and subscription to the Breed Association
- Classification of PCA results on 4 time periods
  - ➢ 14 regions defined
- Reproducer supply
  - ➢ AI rate (<50% and >50%)
  - ➢ Regionalized for herds with low AI rate

Identification of Unknown Parent Groups

Definition criteria: Time period * AI rate * Region

1. **Mean genetic level of known bulls** used in herds of each cell

2. **Definition of UPG** when:
   - ➢ Similar bull supply
   - ➢ Difference in mean genetic level of known sires < 10% σg

	AI > 50%	AI < 50%		
		Center	West	North-East
< 1972	1			
1972-1982	-	1	1	1
1983-1991	1	1	1	1
1992-1998	1	1	1	1
1999-2006	1	1	1	1

16 UPG

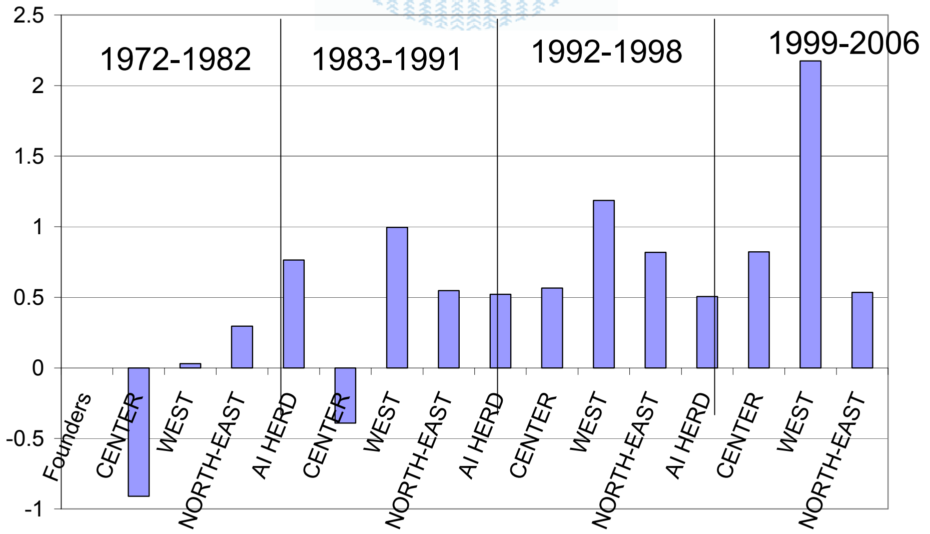
Genetic evaluation

- Sire model without / with **16 UPG**

  *SS = birth_month + age_dam + CG*sex + age_scoring + sire + permanent_environment + residual*

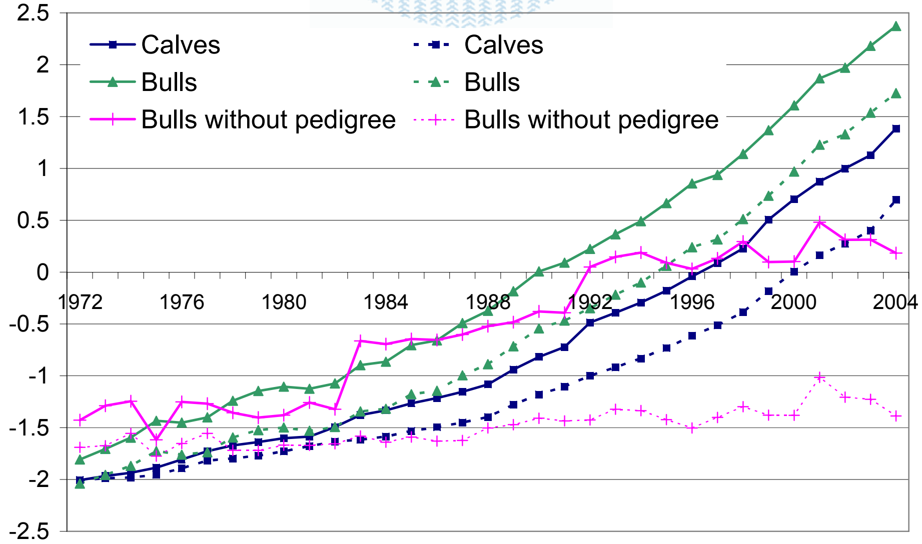
- Estimation of the genetic level of **unknown bulls** (UPG estimates)
  - Consistency and significance across UPG estimates
  - Homogeneity of the UPG
    - ➢ Random division in two subgroups (10 replicates)

UPG effects on SS (standardized by σ_g)



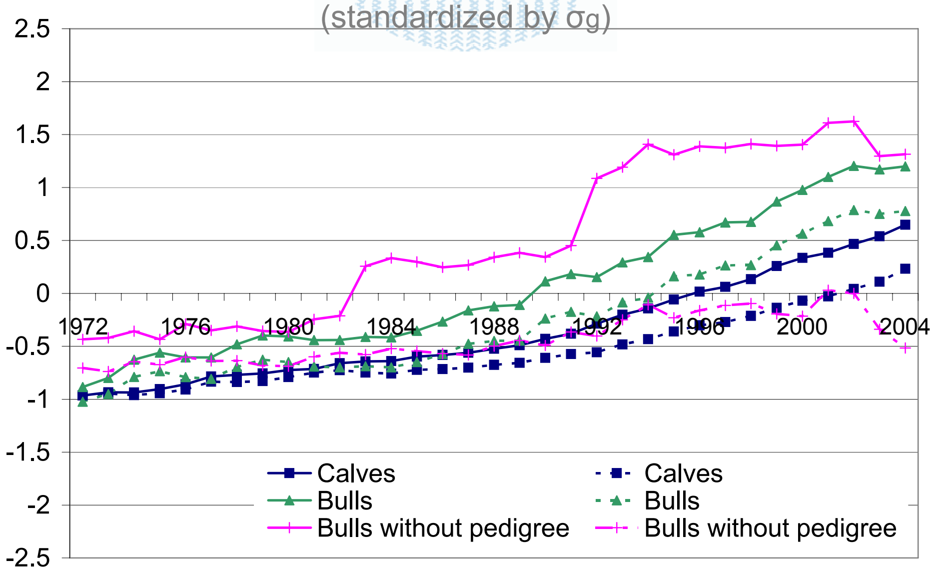
Genetic levels on SS with / without UPG

(standardized by σ_g)



Genetic levels on MS with / without UPG

(standardized by σg)



Conclusion

- Temporal but also regional genetic heterogeneity in the Charolais population
- Bulls without pedigree potentially selected for other objectives
- Base assumption for the UPG definition:
  - Maybe not optimal
  - But estimation of significant genetic differences
- Implications:
  - Limited impact on the ranking of the best bulls
  - More cows with unknown pedigree selected for the renewal