



THE UNIVERSITY  
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# Joint genetic analysis of Holstein-Friesian dairy cows performing in Sub Saharan Africa

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# Genetic Improvement Challenges

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- Sparse availability of data and recording systems in different countries Ngongoni *et al.* (2006)
- Very few countries perform routine genetic evaluations Chebo and Alemayehu. (2012)
- Currently, no joint genetic evaluations across countries Torsell, (2007)
- Would joint genetic evaluations be feasible and useful?

# Objectives of Joint Analysis

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- Assess and evaluate the availability of common sires being used within/ across the countries
- Test the feasibility of joint genetic analysis between countries in sub-Saharan Africa



# Data Acquisition

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Production; Reproduction; Pedigree

## Kenya

Holstein-Friesian

## South Africa

Holstein-Friesian

## Average herd size

**Kenya;** 144/cows/herd

**South Africa;** 99/cows/herd



# Methods

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- R and ASReml *Gilmour et al. (2009)*
- Cows in parities 1 to 5
- Outliers & missing records excluded
- Animal model: HYS combinations (5+ records)
- Born/calving per year (10+ animals)
- Country in joint evaluation



# Data Structure



	Kenya	South Africa
Breed	Holstein-Friesian	Holstein-Friesian
Records	15,418	35,470
Sires	1,739	924
Dams	4,593	14,898
Daughters	7,930	26,682
Herds	55	270
Average milk yield (Litres)	4,760.0 (s.d 1,789.0)★	8,843 (s.d 2,575.0)★
Average AFC (months)	36.0 (s.d 13.0)	29.0 (s.d 3.4)★
Average CI (days)	485.0 (s.d 211.0)	429 (s.d 93.0)★
Average daughters/sire	5	29

**AFC:** age at 1<sup>st</sup> calving; **CI:** calving interval

# Data Issues

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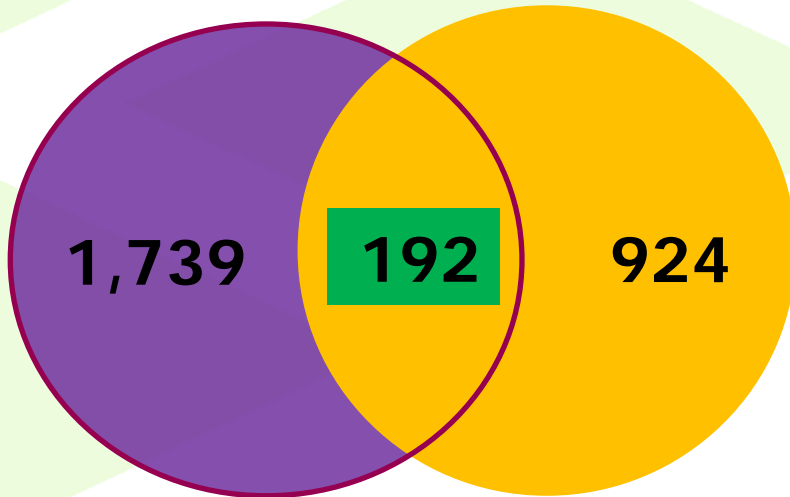
- Pedigree
  - Kenya; 2,082 sires
  - South Africa; 6,260 sires
- Pedigree data problems
  - Sire international identities and origins
  - Sire dates of births
  - Sire herd book numbers
- Production data problems
  - Cow yields, lactation/parity numbers
  - Cow dates of birth
  - Cow date of calving/lactation

# Common Sires (Kenya & SA)

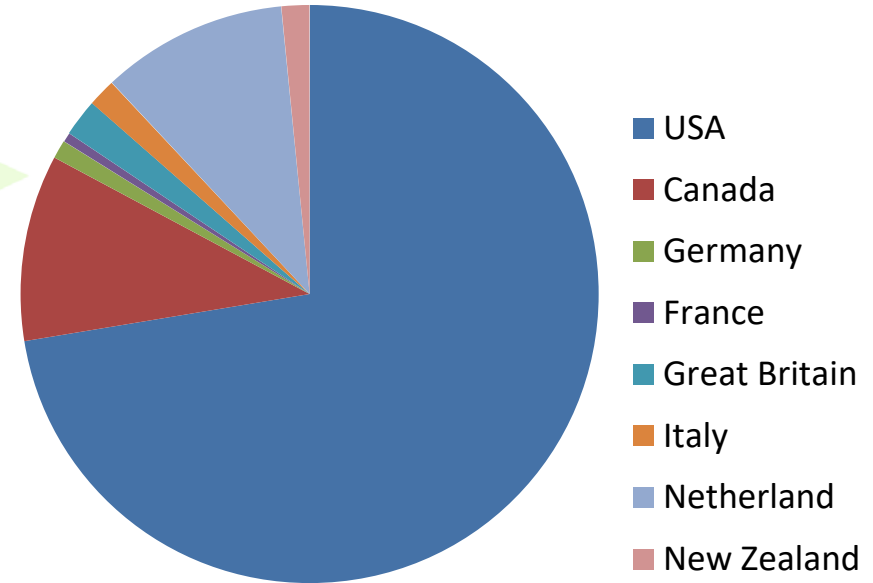
- Holstein-Friesian Sires
- Sources of Germplasm

Kenya

South Africa



Kenya; 85 local sires; South Africa: 1,526 local sires

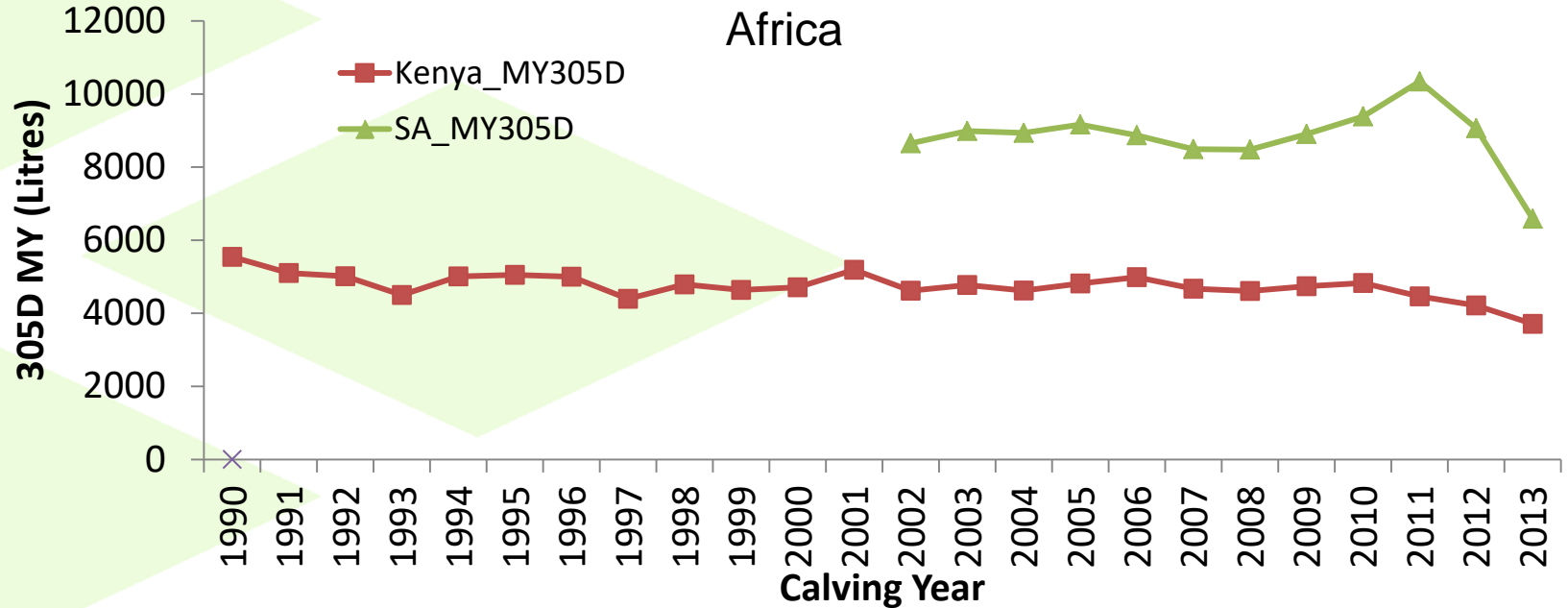




# Phenotypic Trend in 305D MY



Phenotypic trends in 305-day MY in Holstein-Friesians cows in Kenya and South Africa



**Kenya:** 23 calving years; **South Africa:** 11 calving years

# Within and Between-Country Genetic Analysis



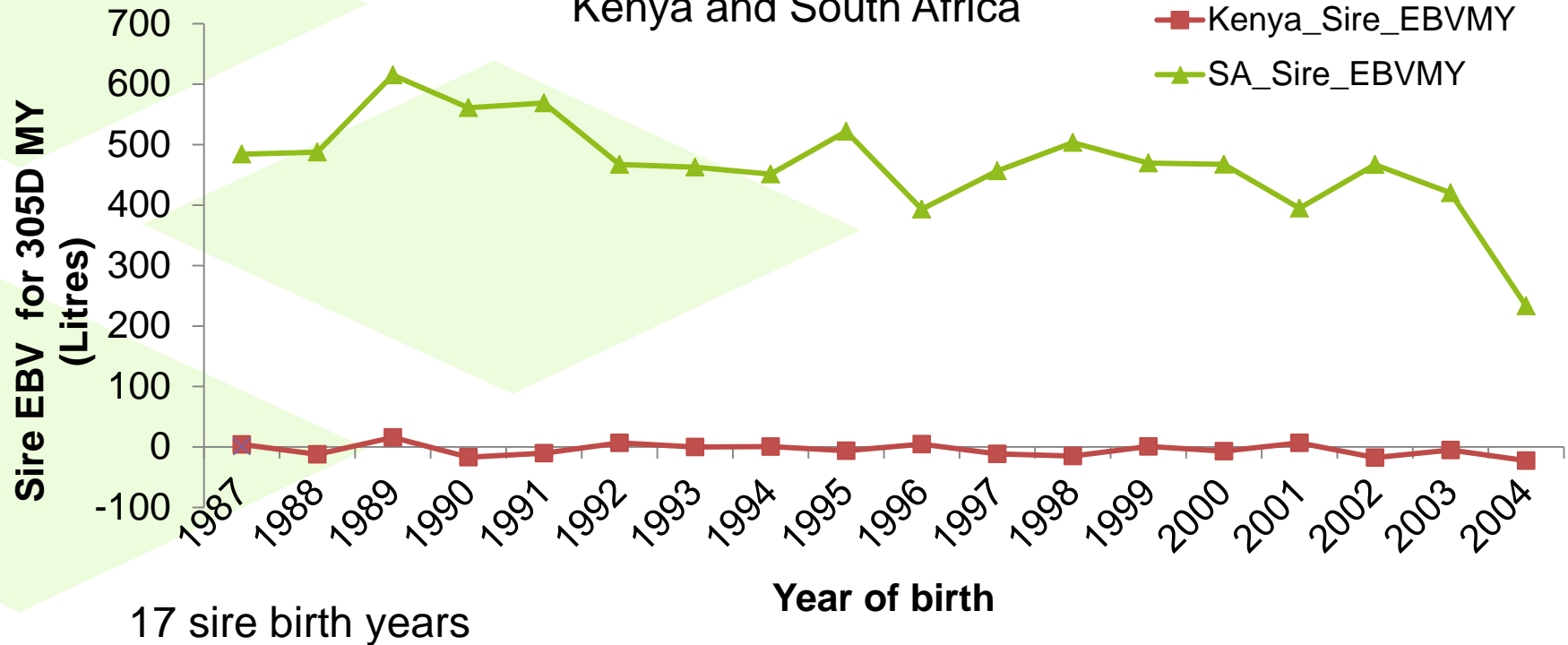
	Kenya	South Africa	Joint Analysis
$h^2$ of MY	0.03 (0.01)	0.14 (0.02)	0.10 (0.01)
$h^2$ of CI1	0.12 (0.08)	0.02 (0.01)	0.17 (0.03)
$h^2$ of AFC	0.31 (0.01)	0.18 (0.03)	-
R of MY	0.33 (0.01)	0.40 (0.01)	0.39 (0.01)
Genetic correlation MY-CI1	0.23 (0.12)	0.51(0.07)	-
Genetic correlation MY-AFC	-0.49 (0.08)	-0.24 (0.13)	-

$h^2$ : heritability; **R**: repeatability; **CI**: calving interval; **AFC**: age at 1<sup>st</sup> calving

# Genetic Trend in 305D MY within-Country(Sires)



Estimated Breeding Values (EBVs) for 305-day MY in Holstein-Friesians sires in Kenya and South Africa

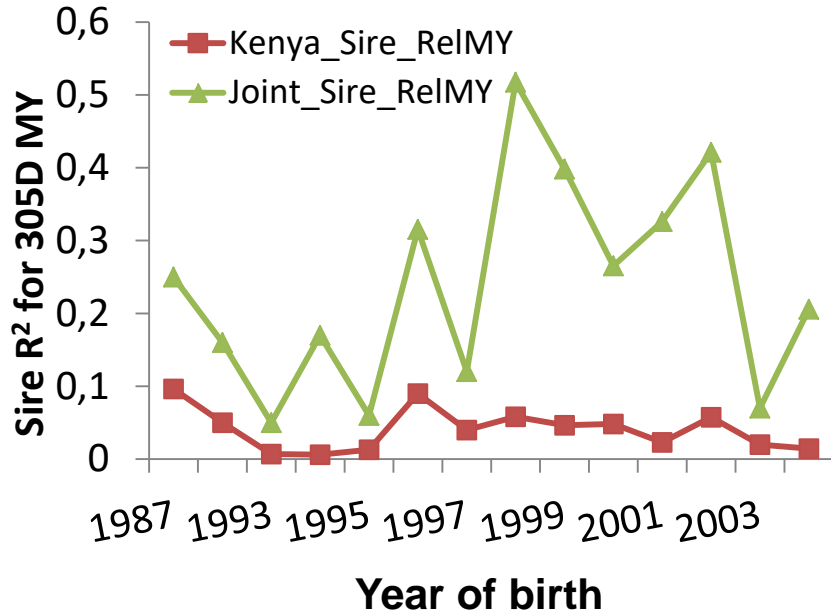


# Reliability of 305D MY

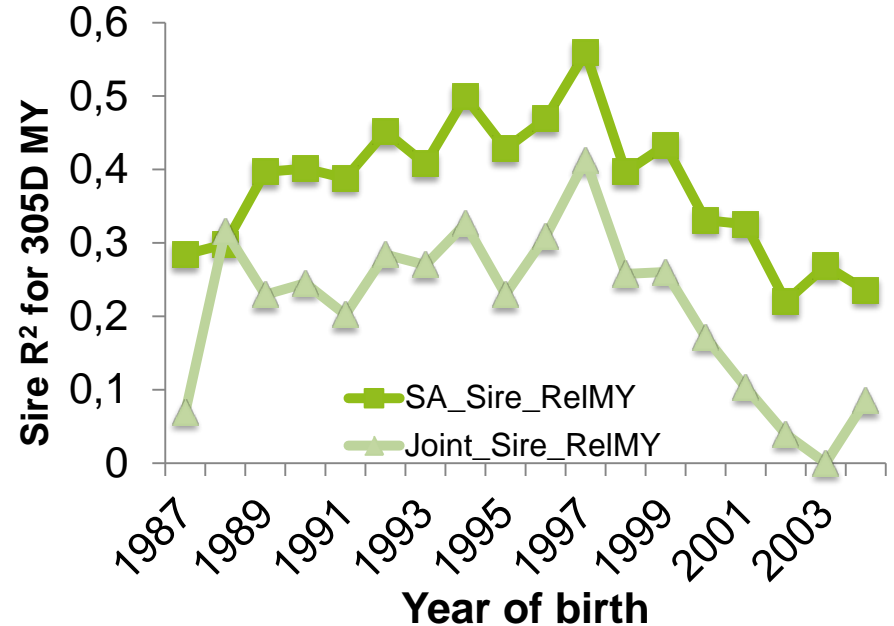
## within & between-Country(Sires)



Reliabilities( $R^2$ ) for 305-day MY in Holstein-Friesians sires in **Kenya**



Reliabilities( $R^2$ ) for 305-day MY in Holstein-Friesians sires in **South Africa**



17 sire birth years

# Conclusions

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- Both local and international sires are used in both countries
- There is need for proper recording in order to allow joint analysis
- Sire reliability for MY varied within and across country
- Joint genetic evaluations are feasible and have potential especially where there are insufficient data from individual countries

# Acknowledgements

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# Thank You!

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