Estimates of parameters for scan records of Australian beef cattle treating records on males and females as different traits

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MEAT & LIVESTOCK AUSTRALIA

Introduction

- Distinct differences in growth pattern
  - bulls grow faster & remain leaner
- Are traits measured on males & females ‘genetically’ the same ?
  - important for traits related to carcass composition
  - to be treated as different in genetic evaluation ?
- Examine genetic correlation between sexes for ultrasound scan records

Data

- Real-time ultrasound scan records taken in the field
  - accredited scanners
  - 300 to 700 days of age
- 4 breeds
  - **A** : Angus
  - **H** : Hereford
  - **PH** : Polled Hereford
  - **SG** : Santa Gertrudis

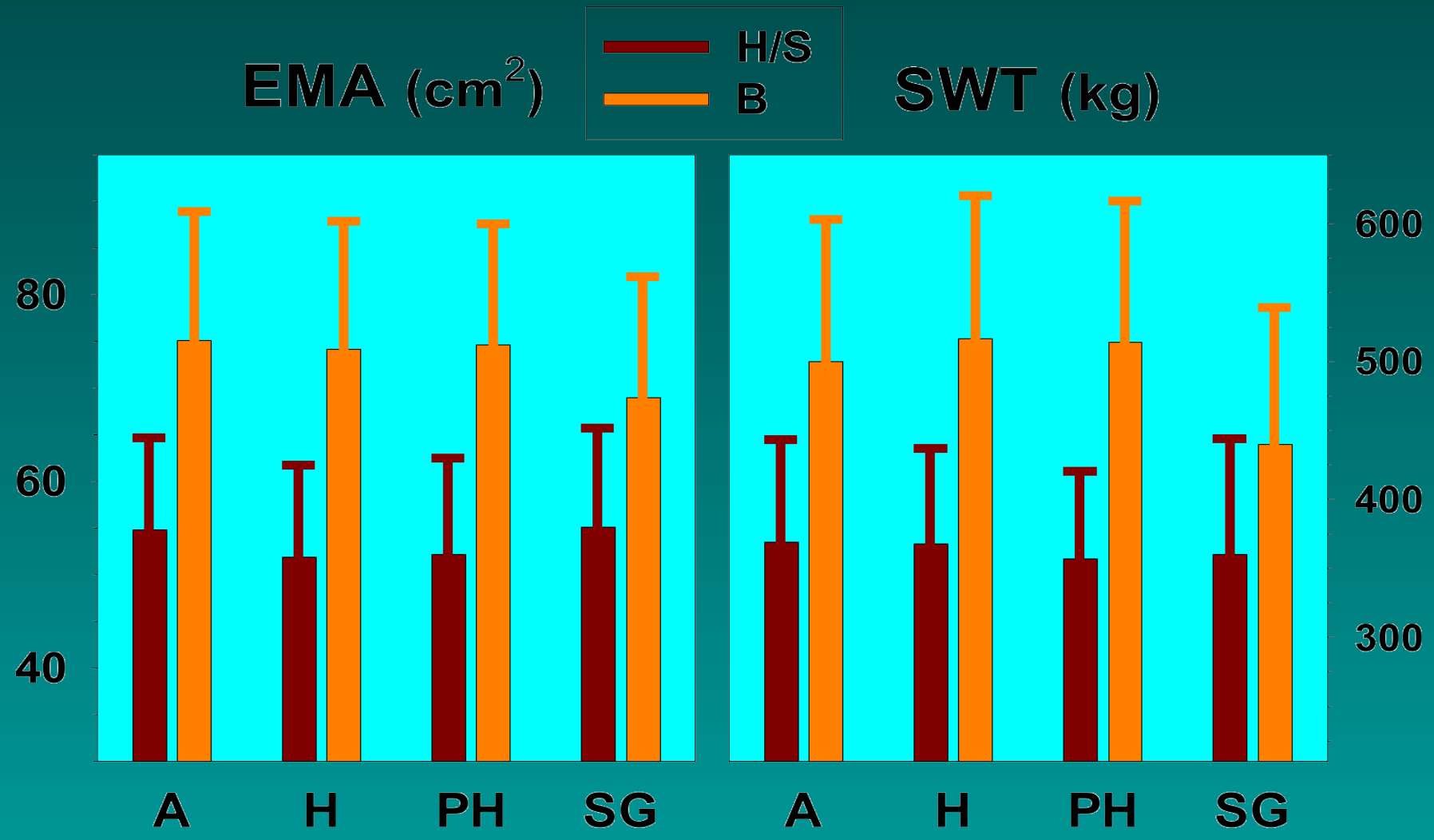
Traits

- **P8** : P8 fat depth (mm)
- **RIB** : fat depth at 12th/13th rib (mm)
- **EMA** : eye muscle area (cm^2)
- **SWT** : scanning weight (kg)

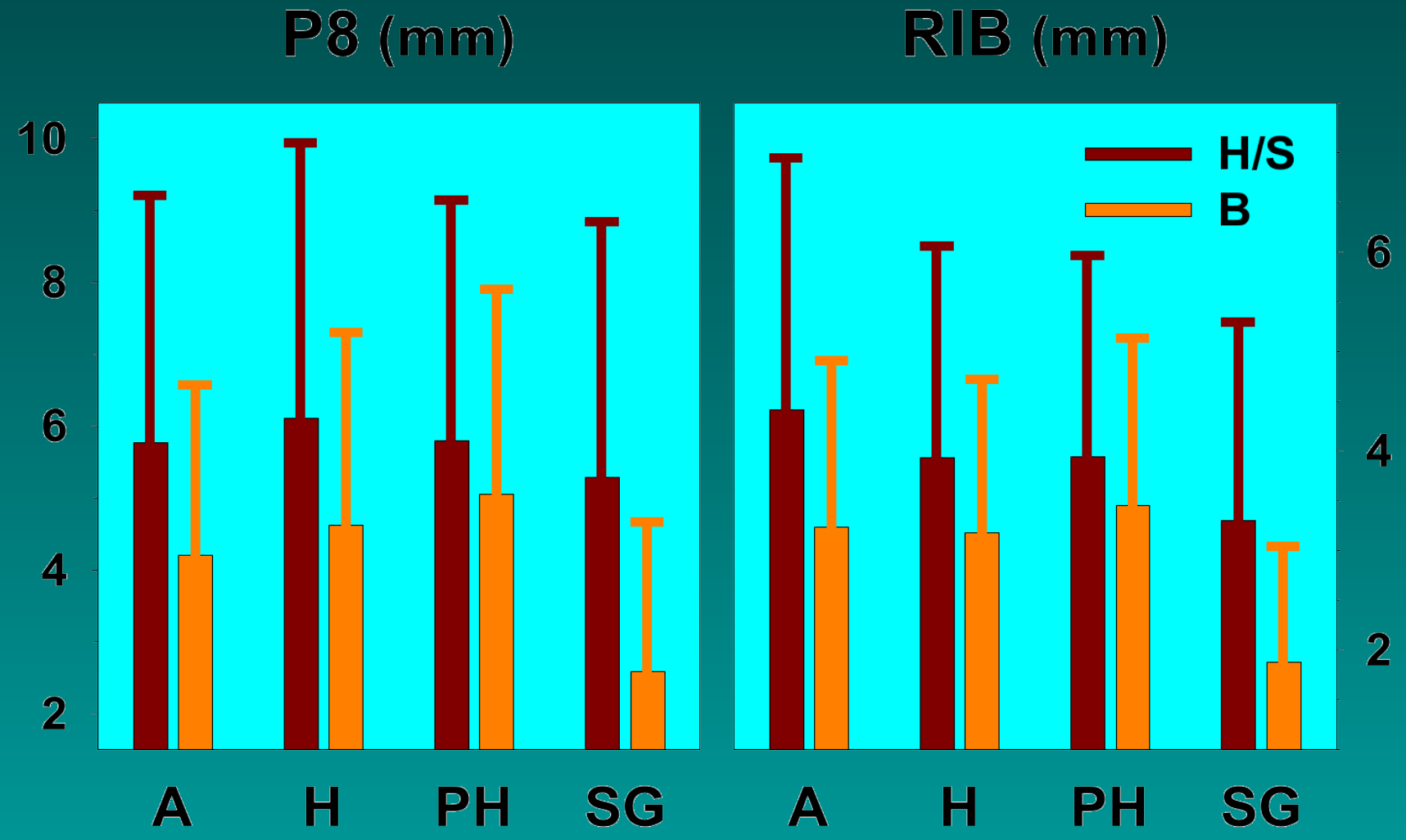
No. of records (EMA)

	Angus	Hereford	Polled Hereford	Santa Gertrudis
	A	H	PH	SG
H/S	14,124	10,499	4385	3165
B	18,583	15,064	4824	3547

Means & standard deviations

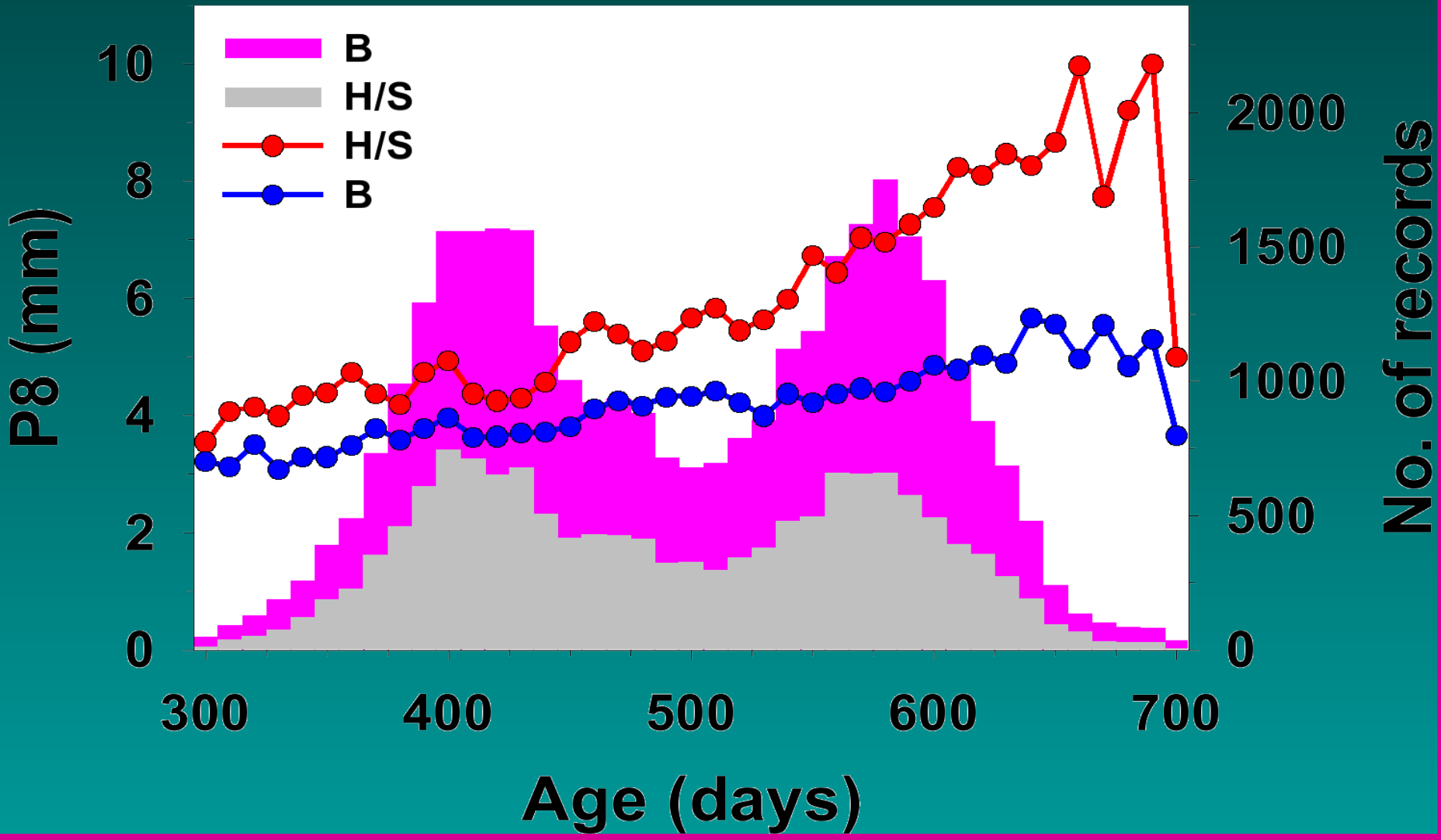


Means & standard deviations -2



Means & no. of records for ages

Angus, P8 fat depth



Analysis

- Bivariate REML analyses
  - treat records on heifers+steers & bulls as two separate traits
  - no error covariance
- Fixed effects
  - herd-date of scanning-management group subclasses (contemporary groups)
  - 60 day ‘age slicing’ within CG
  - birth type (single vs twin)

Analysis - continued

- ‘heifer factor’
  - dam age class (<29, 29+ mon)
- dam age
- age at scanning

} linear & quadratic covariables

- Random effects
  - animals’ additive genetic effects
    - include pedigree information
  - sire x herd interaction

Phenotypic variances

- Distinct differences between sexes & breeds (SG)
  - largely attributable to scale effects
    - CVs for a trait similar across sexes & breeds
    - CVs highest for SG
- Fat depths highly variable
  - CV : 32-46%
- EMA & SWT less variable
  - CV : 7-11%

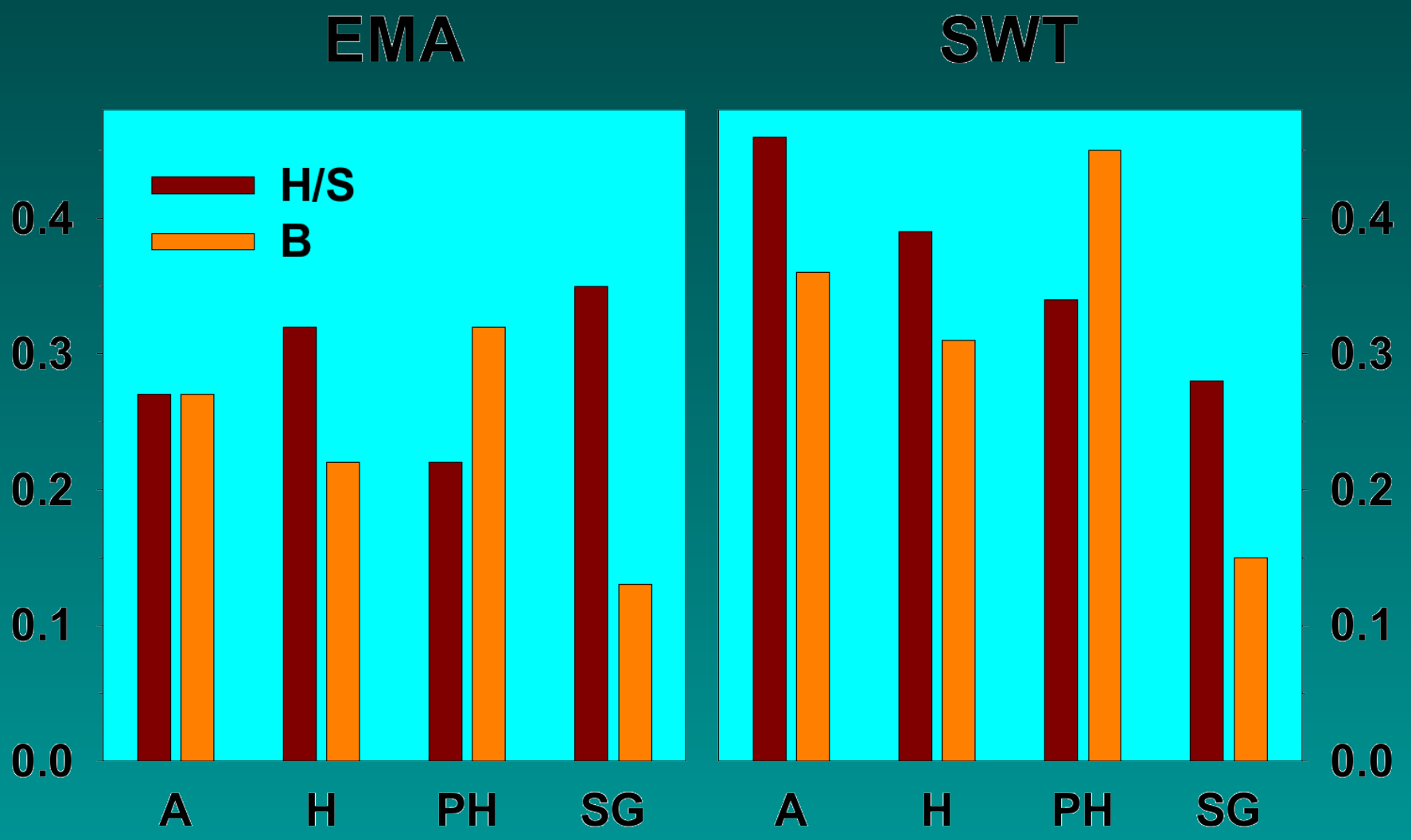
CV (%) - fat depth

		A	H	PH	SG
P8	H/S	34.4	35.3	33.7	38.0
	B	38.2	36.0	34.3	45.9
RIB	H/S	31.7	31.7	31.3	37.5
	B	33.0	30.5	30.1	37.7

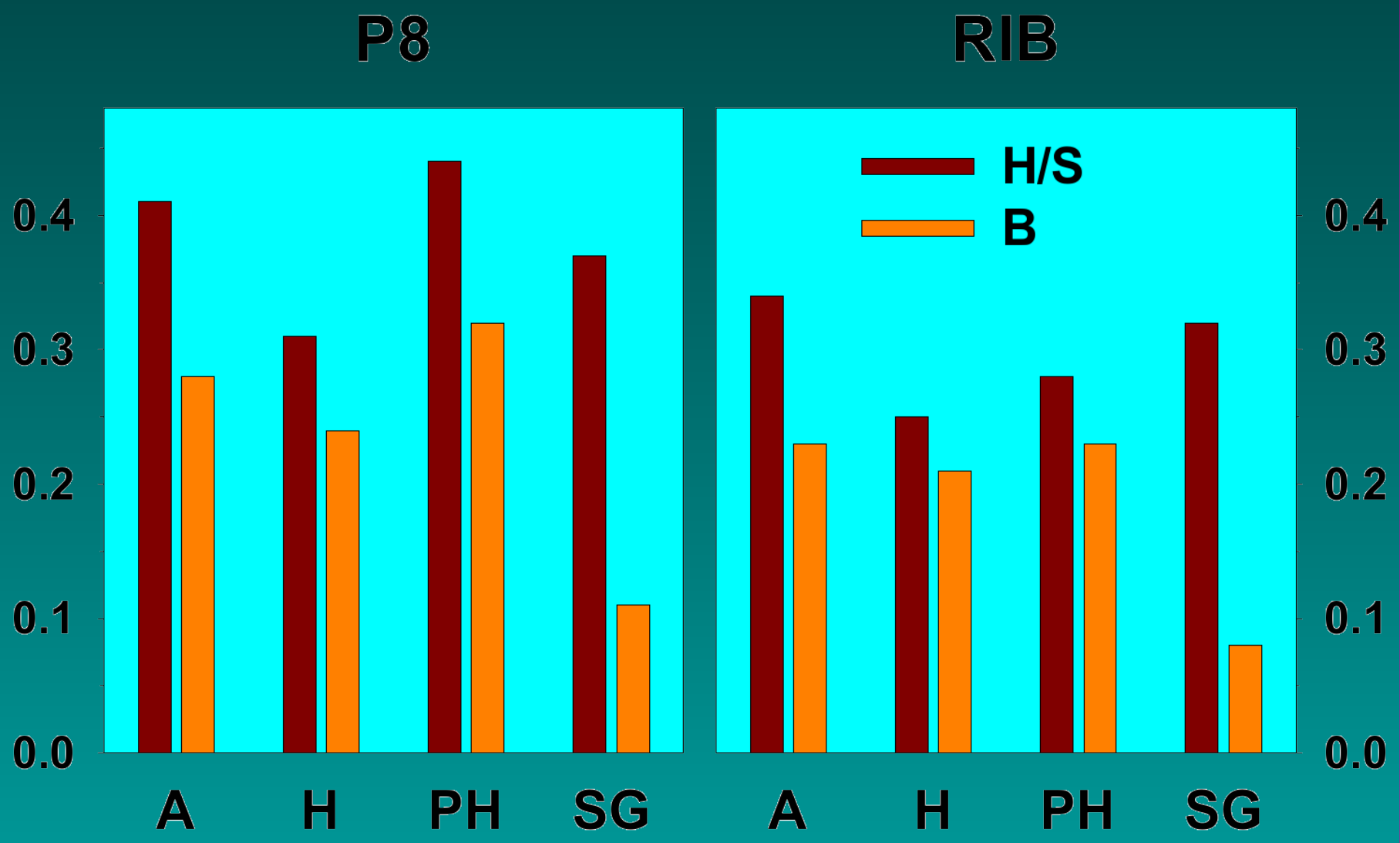
CV (%) - other traits

		A	H	PH	SG
EMA	H/S	9.6	10.9	10.6	9.2
	B	8.9	9.4	9.1	8.7
SWT	H/S	7.8	8.6	8.3	8.5
	B	7.3	7.7	7.4	8.7

Heritability estimates -1



Heritability estimates -2

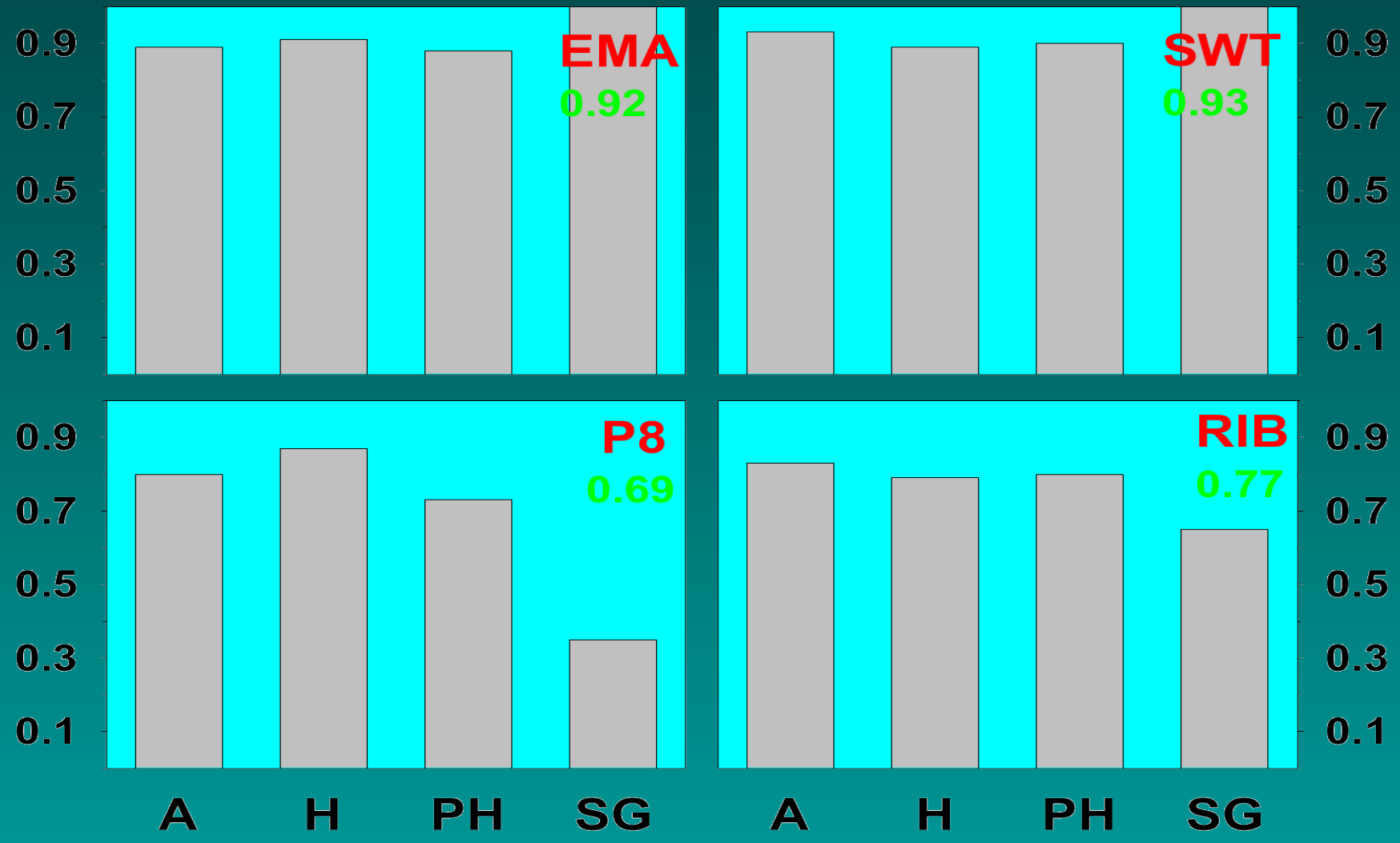


Results -1

- Heritabilities for fat depth consistently higher in heifers/steers than in bulls
  - P8 : 0.38 *vs* 0.24
  - RIB : 0.30 *vs* 0.19

  } **Average over breeds**
- Less consistent results for other traits
  - EMA : 0.29 *vs* 0.23
  - SWT : 0.37 *vs* 0.32
- Problems : records for SG bulls

Genetic correlation between sexes



Results -2

- Genetic correlation between sexes
  - close to unity for ‘size’ traits
    - SWT : 0.93
    - EMA : 0.92

    } Average over breeds
  - considerably lower for fat depths
    - P8 : 0.69
    - RIB : 0.77

Conclusions

- Fat depth measurements on females more informative than on males
  - higher mean (at same age)
  - more variable
  - more heritable
- Scan males at sufficient fat level to ensure genetic variability is expressed
  - older ages

Conclusions - continued

- Treat fat depth measurements on males & females (+steers) as different traits
  - now implemented in BREEDPLAN