Estimates of genetic parameters for scan measurements in Australian Brahmans and Santa Gertrudis adjusting for age versus adjusting for weight at scanning

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MEAT & LIVESTOCK AUSTRALIA

AGBU

Introduction

- Scan records taken in the field provide information for BREEDPLAN carcass EBVs
  - adjusted to common market weight
- Should scan records be adjusted to common age or common weight ?
  - effects on genetic parameters ?

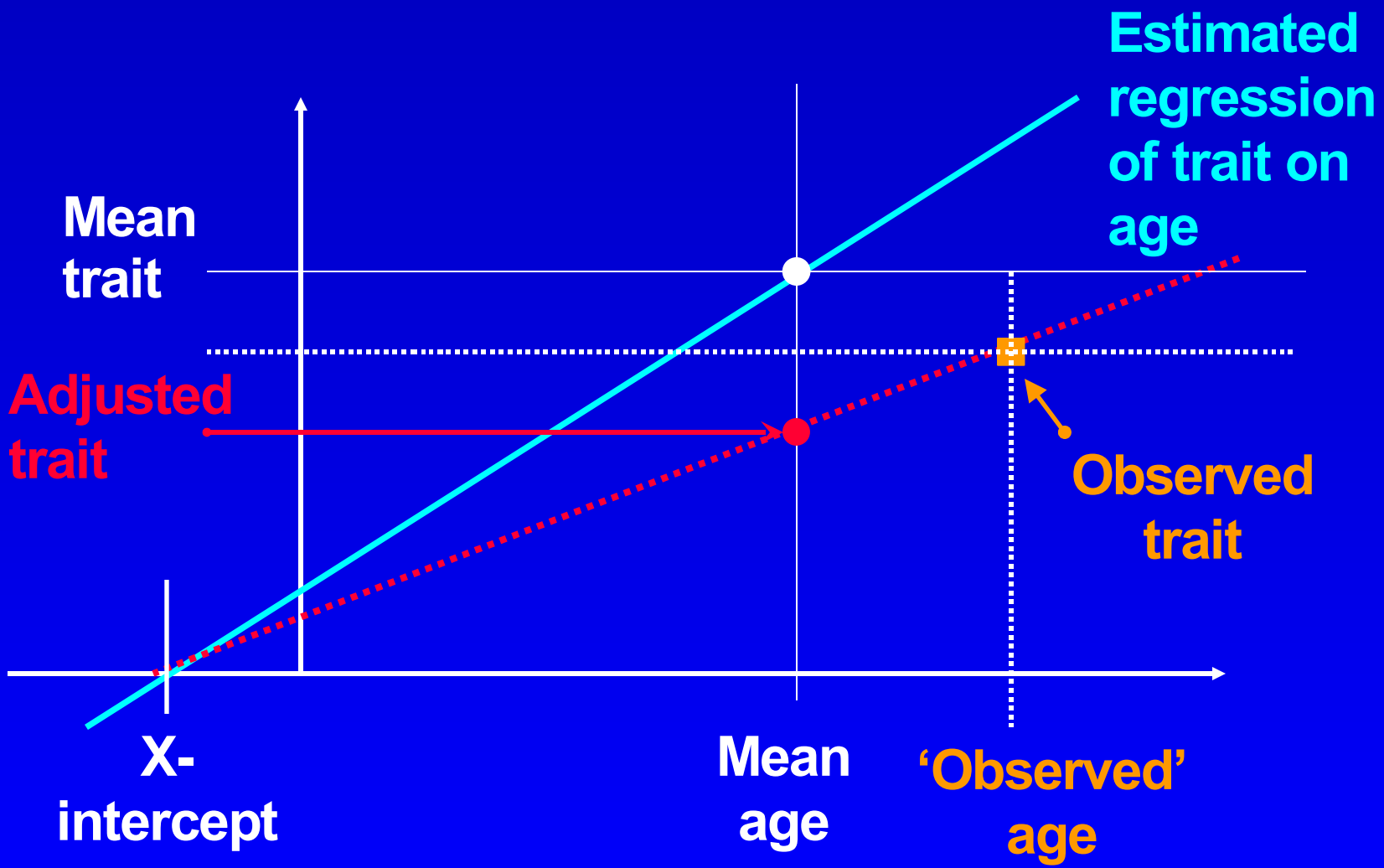
Data

- Field ultrasound scan records (up to 9/96)
- Breeds
  - Santa Gertrudis (N=5587)
  - Brahman (N=3634)
- Traits
  - P8 fat depth (mm) **P8**
  - Fat depth at $12^{th}/13^{th}$ rib (mm) **RIB**
  - Eye muscle area (cm^2) **EMA**
  - Weight at scanning (kg) **SWT**

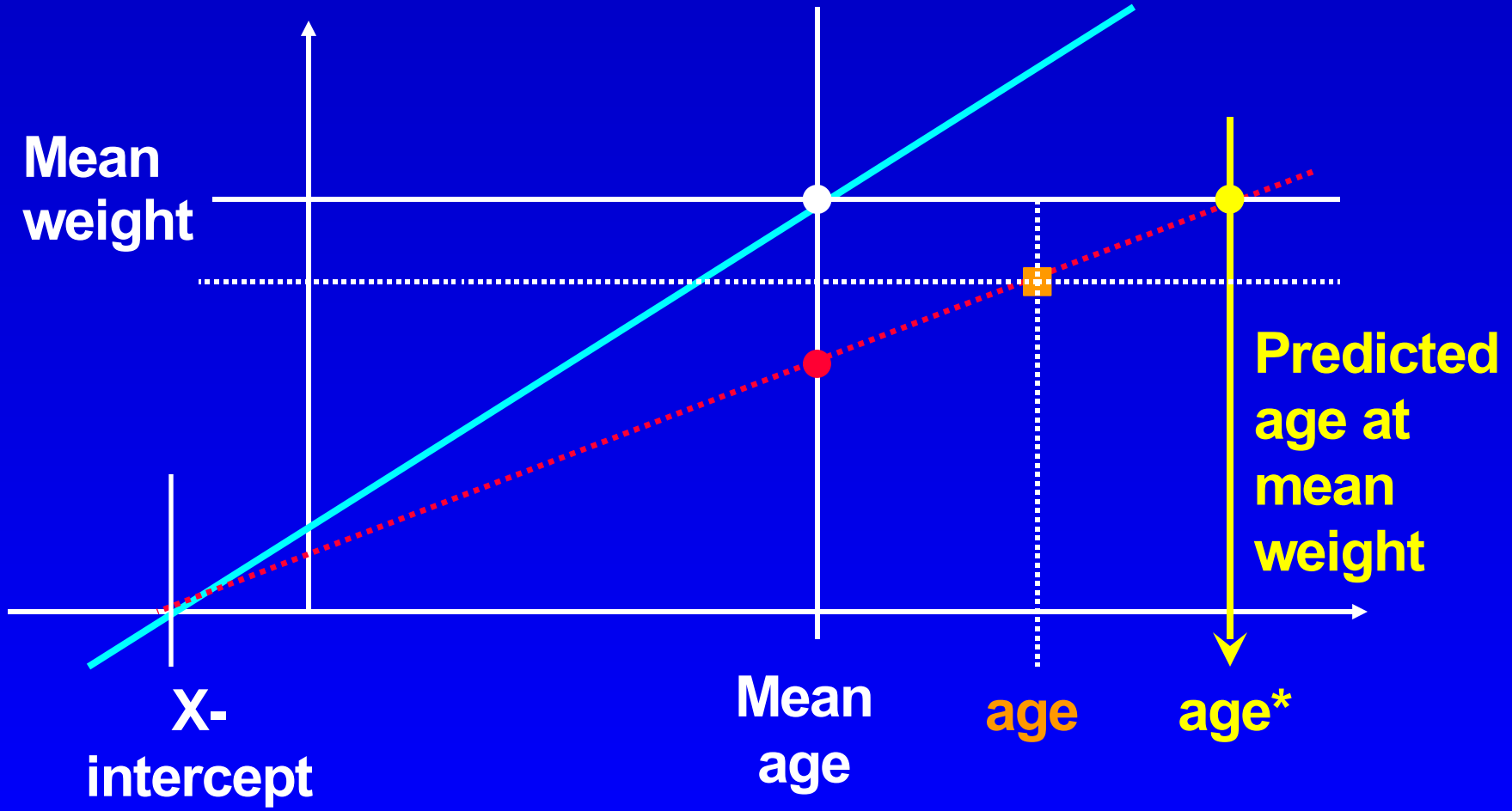
Adjustment of records

- Account for age within model of analysis
  - fit linear & quadratic covariable (within sex)
- Pre-adjust to mean age
  - X-intercept approach
- Pre-adjust to mean weight
  - Calculate predicted age at mean weight
  - X-intercept adjustment using predicted age

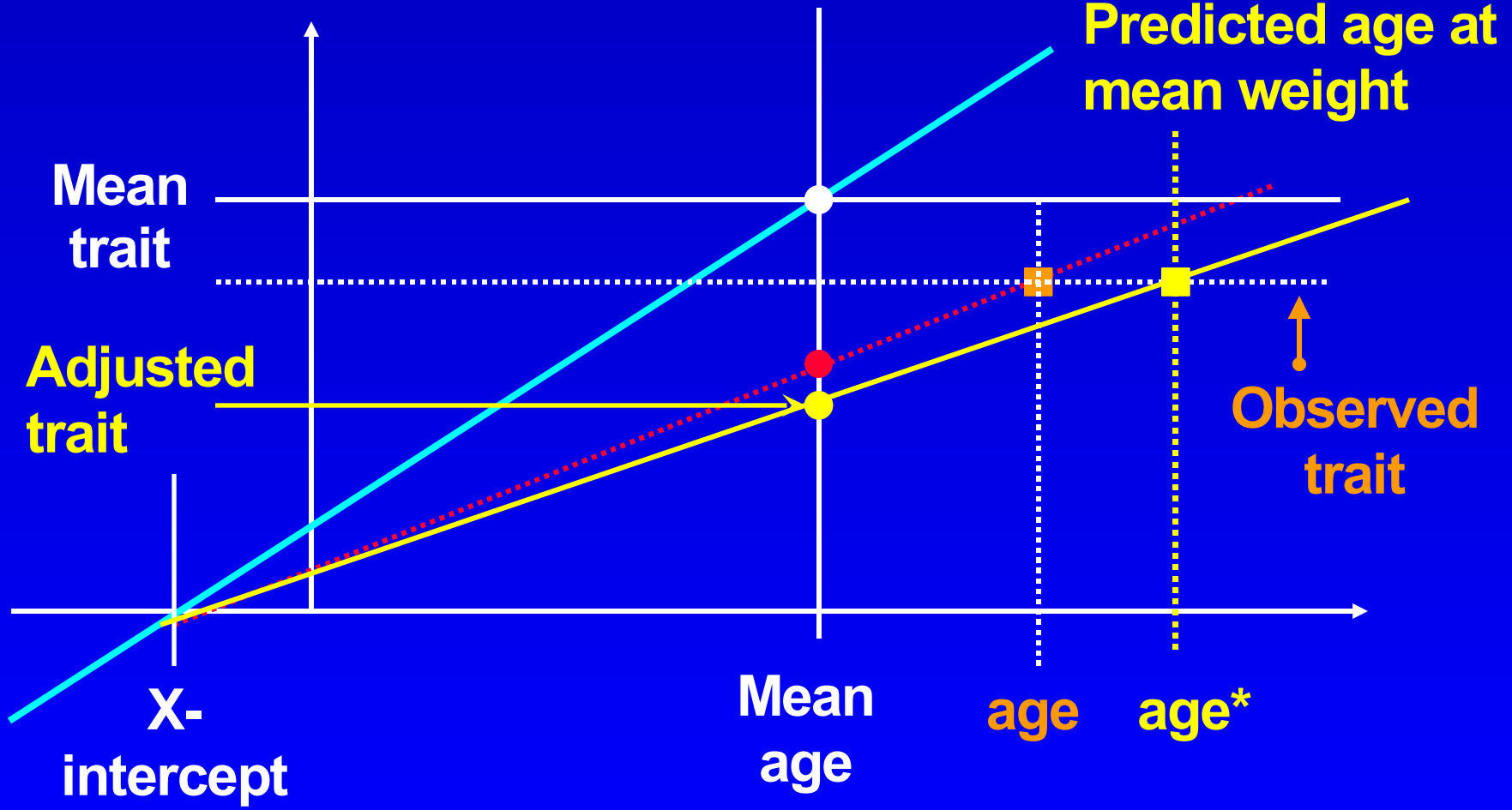
Adjusting to common age



Adjust to common weight : Step 1



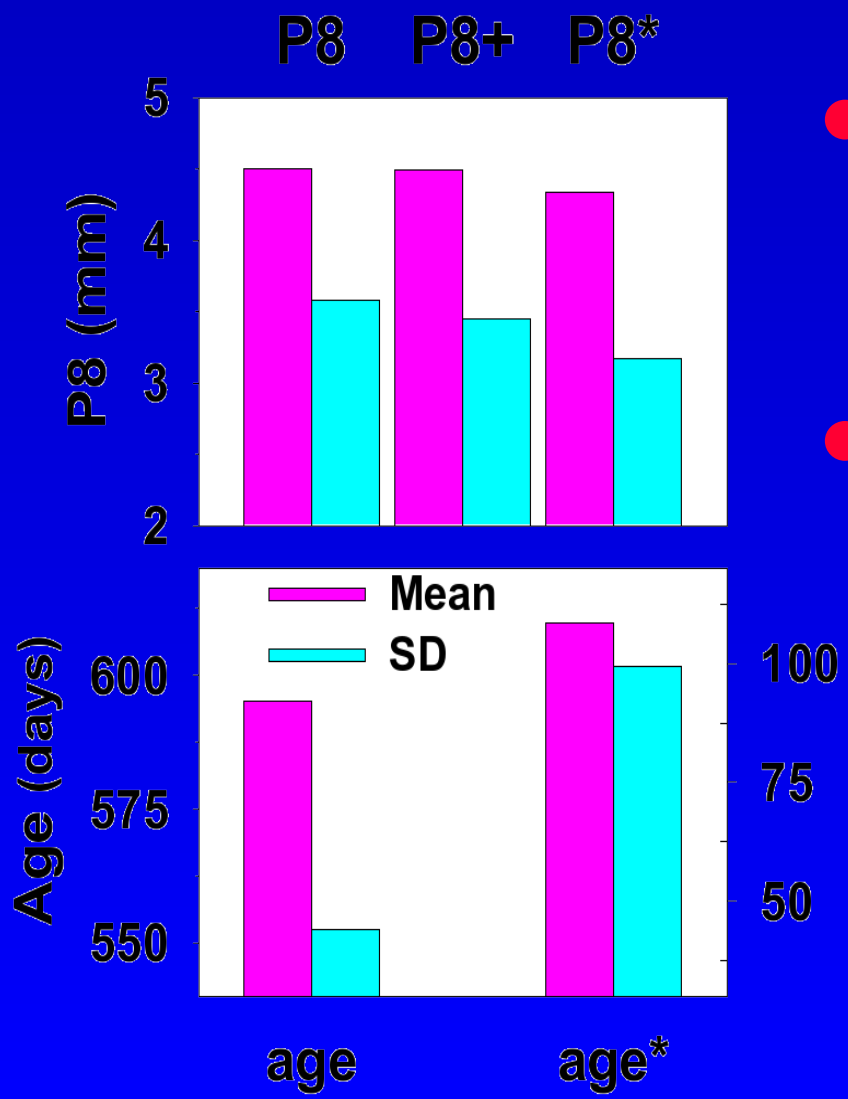
Adjust to common weight : Step 2



Notation

- No superscript :
  - unadjusted trait
- Superscript "+" :
  - trait pre-adjusted to mean age
- Superscript "*"
  - trait pre-adjusted to mean weight

Effect of adjustments
(P8, 600 days, Santa Gertrudis)



- Adjust to mean age
  - little effect on mean & sd of trait
- Adjust to mean weight
  - slight ↓ in mean
  - bigger ↓ in sd of trait
  - ↑ in mean age*
  - ↑ ↑ in sd age*

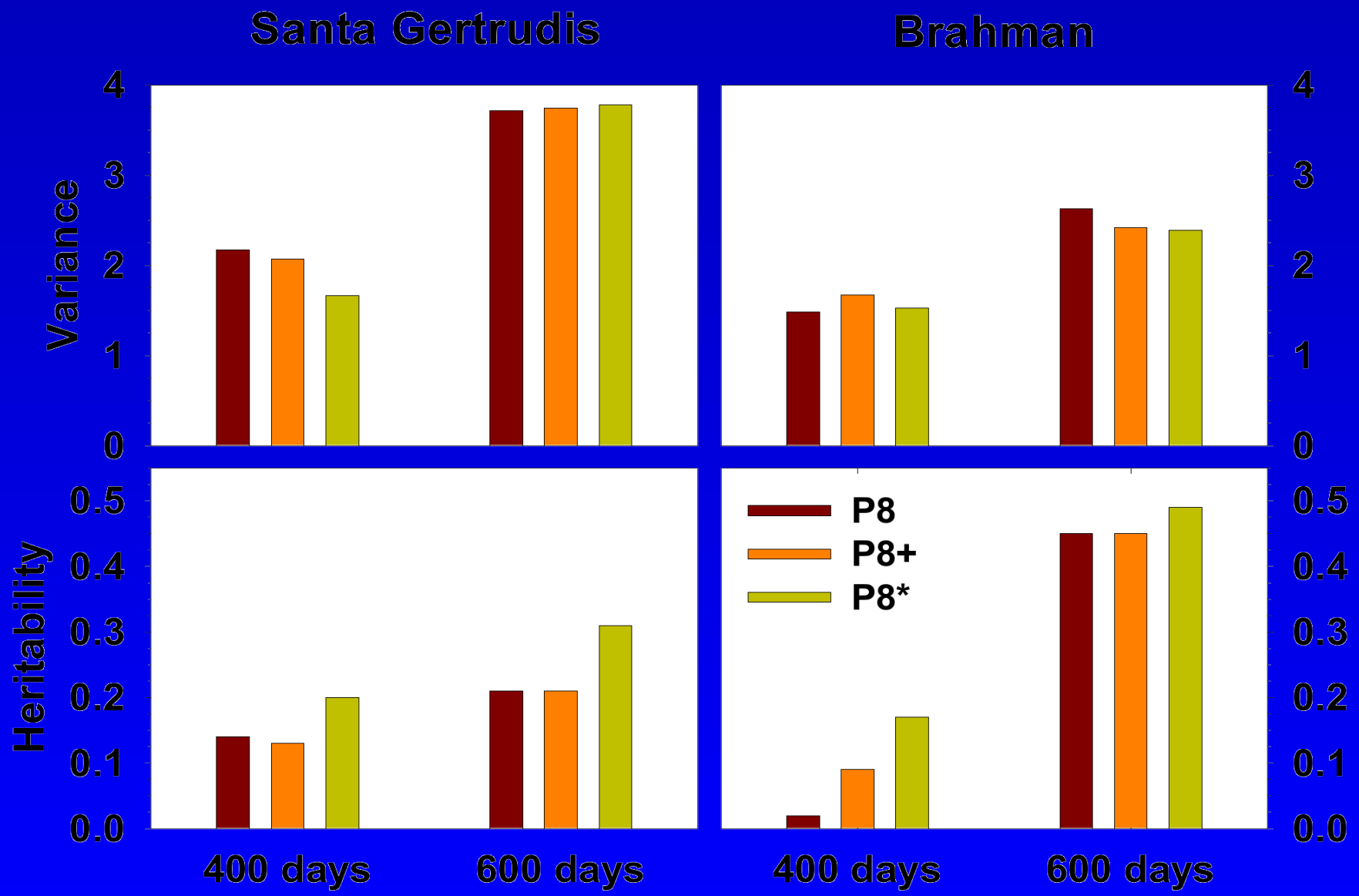
Analyses

- REML analyses - simple animal model
  - univariate & fourvariate
- Fixed effects
  - contemporary groups
  - “heifer factor” (heifer *vs* cow)
  - Dam age - linear & quadratic covariable
  - Age at scanning - linear & quadratic cov.
    - unadjusted records only➔ supply estimates of regression on age

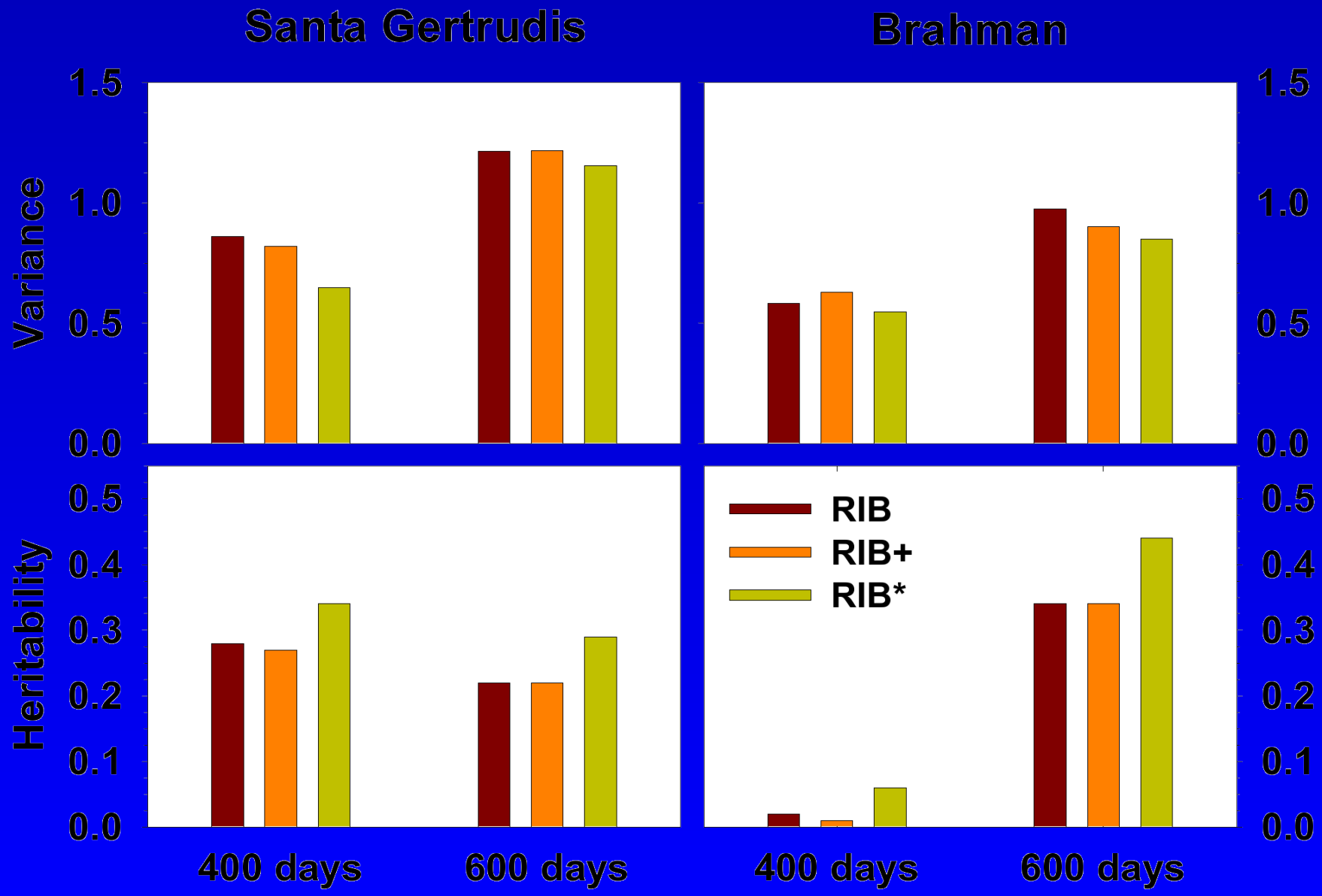
No. of records

	400 d	600 d
Santa Gertrudis	1152-1230	3684-3688
Brahman	745-791	2177-2303

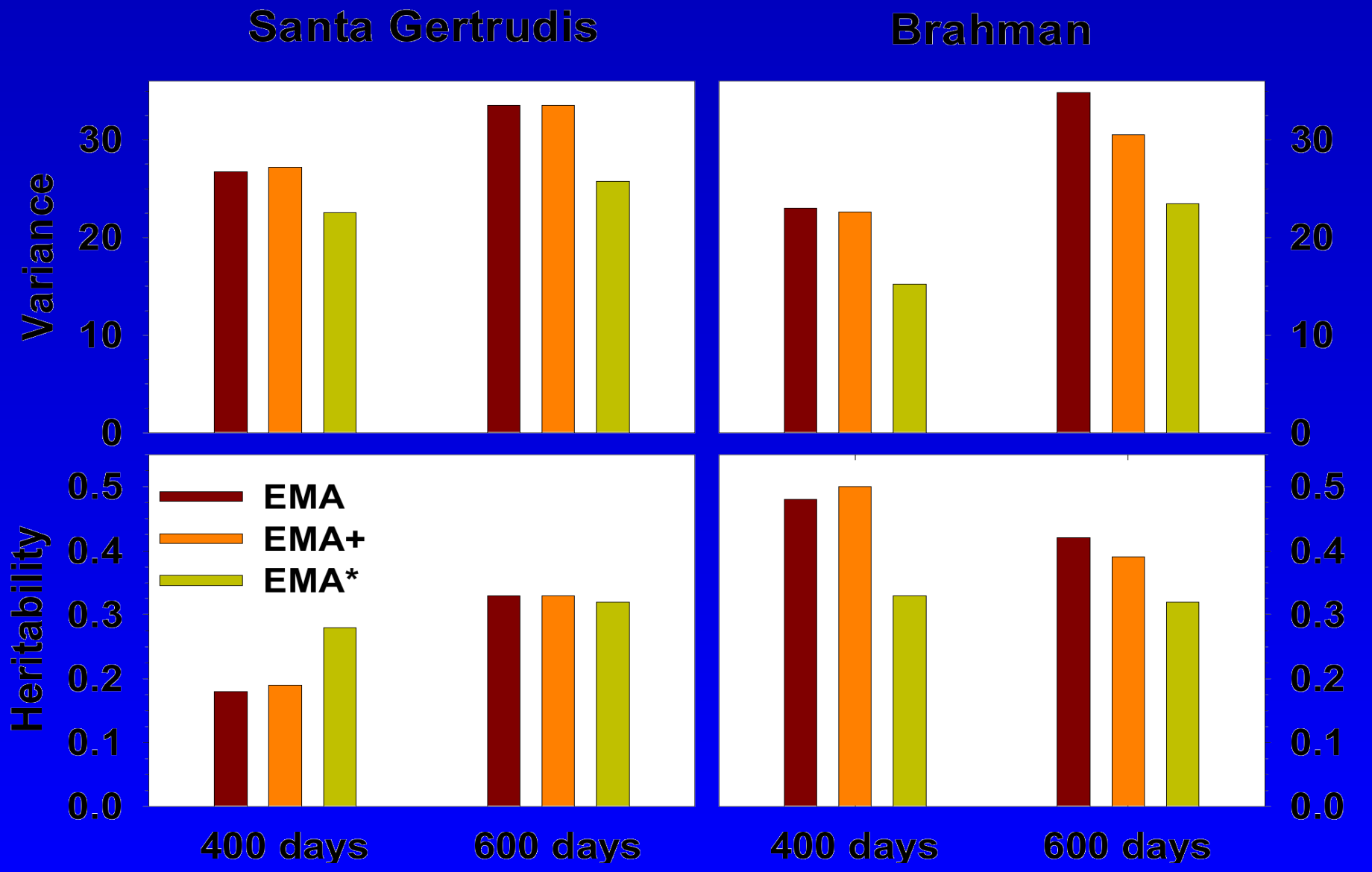
P8 fat depth


Santa Gertrudis
Brahman
Variance
Heritability
0
1
2
3
4
0.0
0.1
0.2
0.3
0.4
0.5
P8
P8+
P8*
400 days
600 days
400 days
600 days

RIB fat depth



Eye muscle area

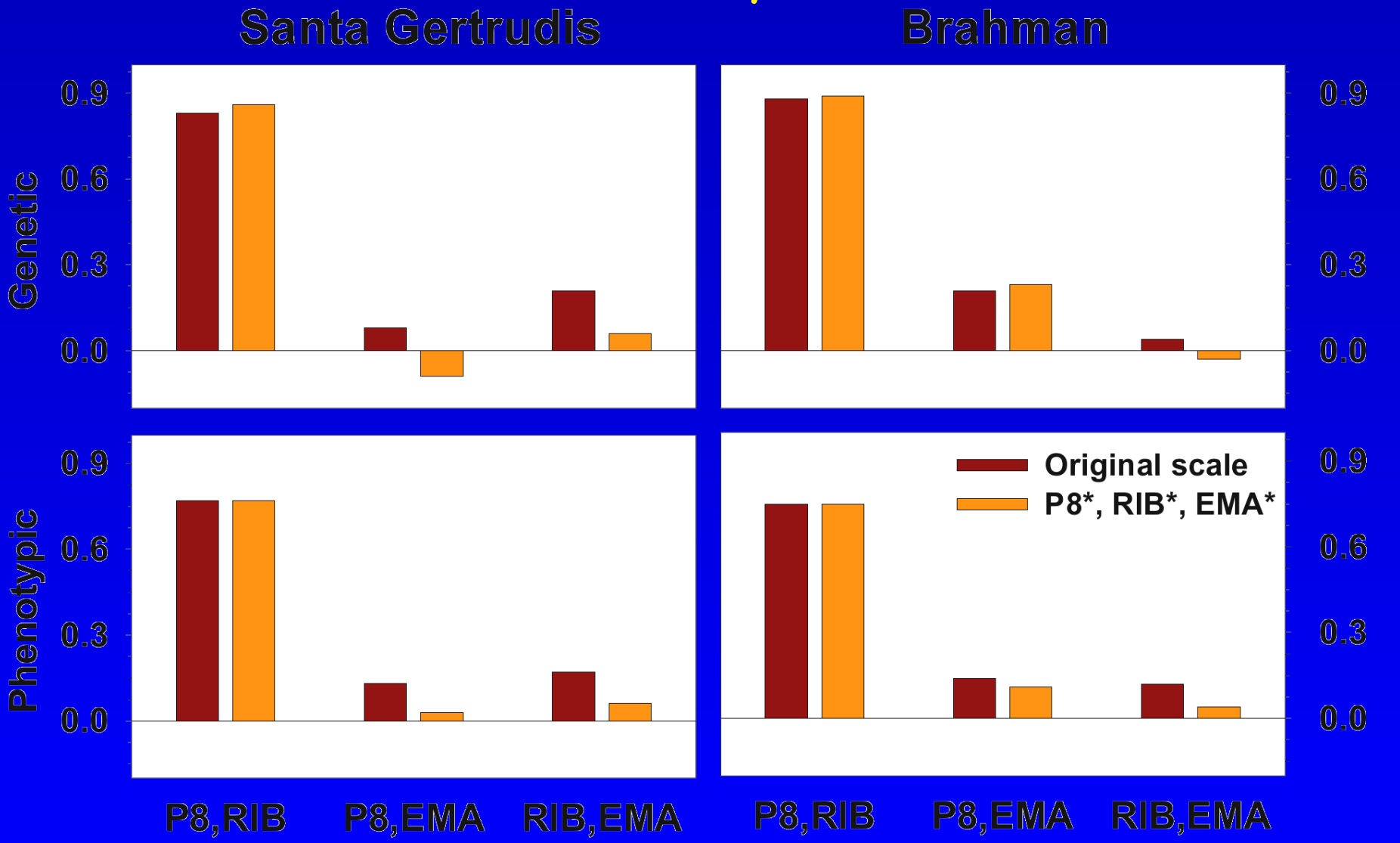


Results - 1

- Heritabilities
  - similar magnitude than in *bos taurus*
  - higher for scanning at later ages
- Adjusting to common weight tended
  - to reduce phenotypic variance (EMA*, RIB*)
  - to increase heritabilities
  - produce predicted ages with much larger ranges & variances than observed ages
- Similar results for pre-adjustment for age & adjustment within model of analysis

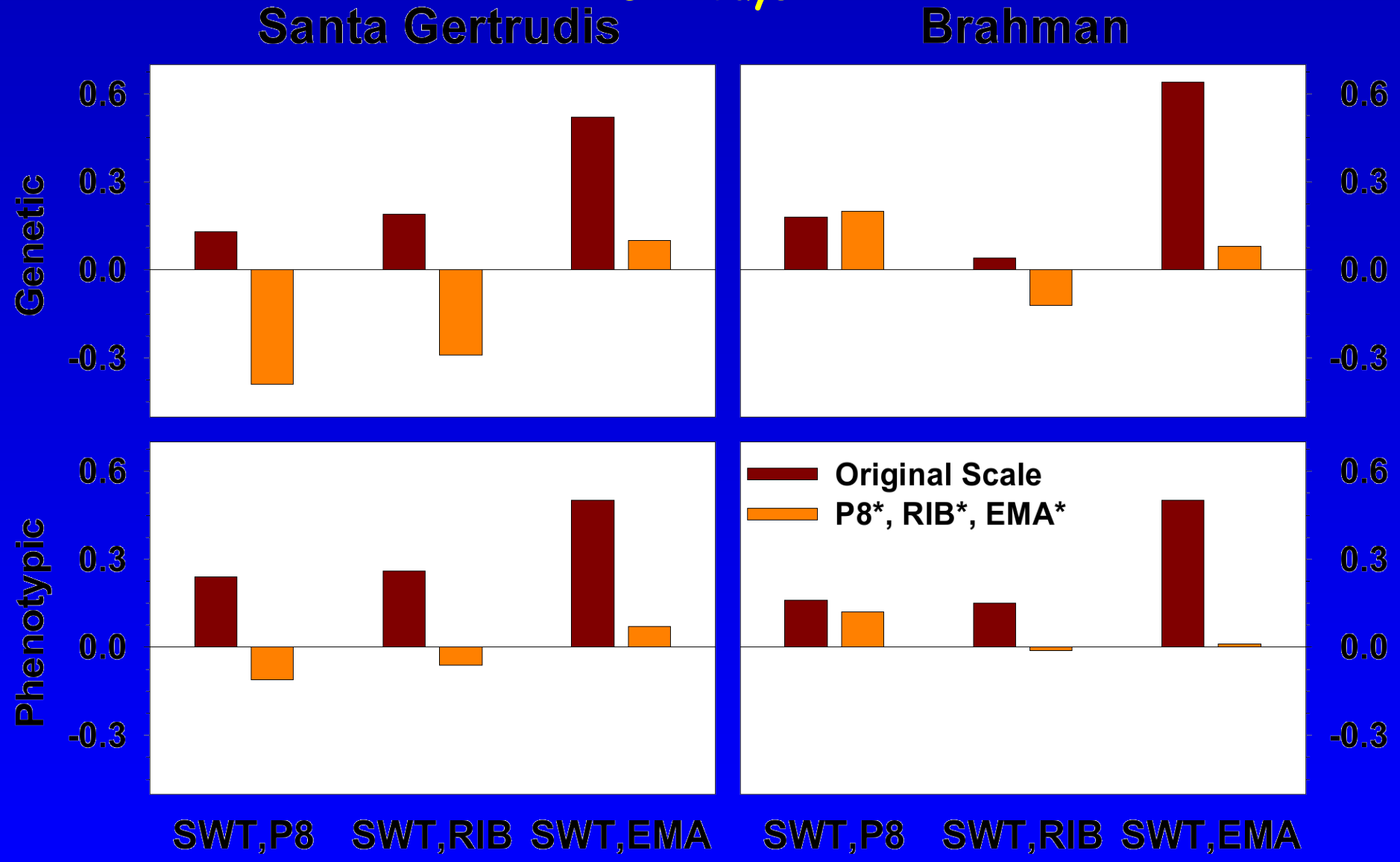
Estimates of correlations -1

600 days



Estimates of correlations -2

600 days



Results -2

- Correlation estimates
  - high r (P8, RIB)
  - moderate r (SWT, EMA)
  - low r otherwise
- Adjusting to common weight changes correlation structure
  - no change r (P8, RIB)
  - slight ↓ r (EMA, fat depth)
  - ↓ ↓ r (SWT, scan traits)

Conclusions

- Adjusting scan records to common weight rather than age increases heritabilities
- But : correlations with scanning weight are reduced/close to zero
  - implications for genetic evaluation when most animals have weight records only & obtain EBVs for carcass traits through correlated information ?