Growth breeding value redistributes weight to the saddle region in lambs

Gardner, G.E., **Anderson, F.**, Kelman, K.R., Pannier, L. and Pethick, D.W.

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Objectives

- Lean meat yield (LMY %).
- Role of genetics.
- Modelling of carcase composition using CT data from the Information Nucleus Flock.
- Current selection methods are increasing muscle where we'd like.

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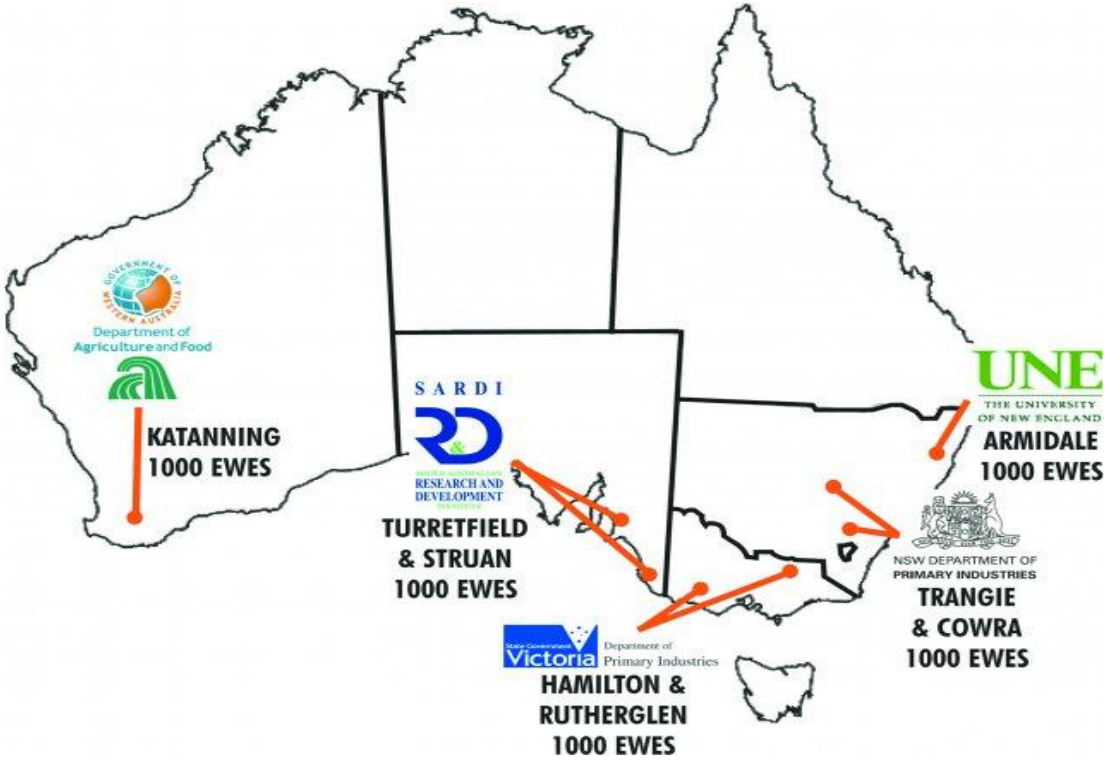
Sheep CRC Information Nucleus Flock



Acknowledgements

Graham Gardner
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Andrew Blakely
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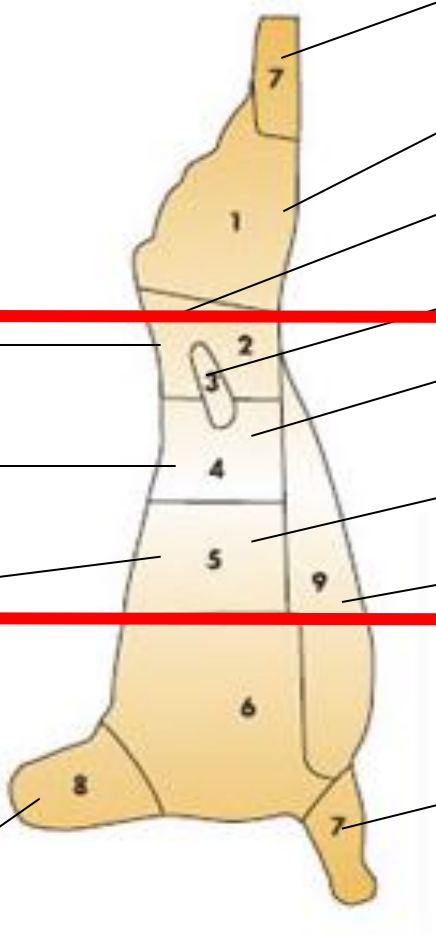
Lean meat yield %



Shank

Hind quarter

Leg

Chump

Tenderloin

Rump

Eye of Loin

Saddle

Loin Chop

Frenched Cutlet

Rack

Breast & Flap

Shoulder

Fore Shank

Neck Chop

Fore quarter

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Lean meat yield %

Shank

Hind quarter

Leg

Saddle

tlet

$$$$$$

Neck Chop

Fore quarter

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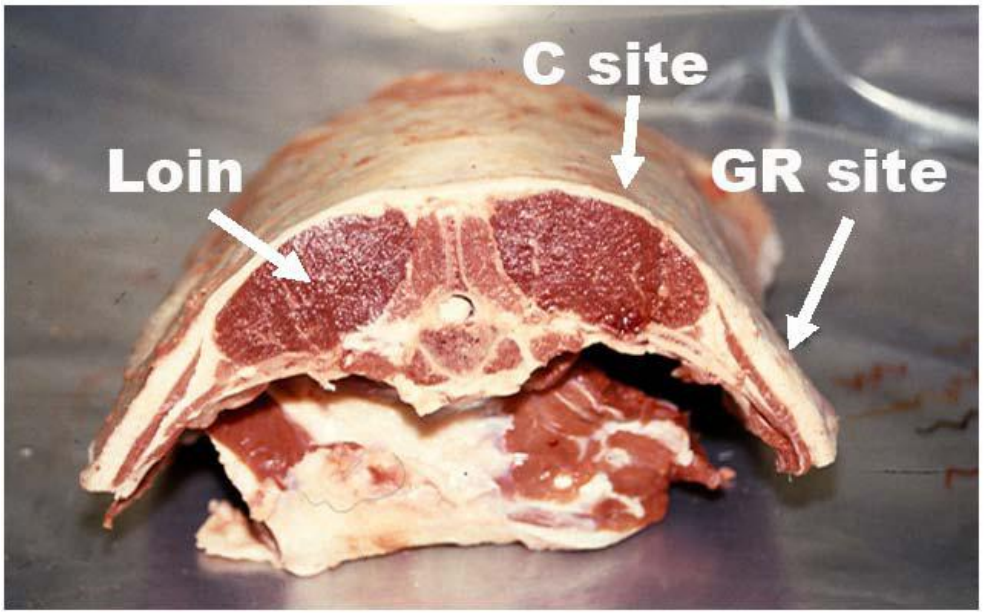
Australian Sheep Breeding Values - ASBVs

- PWWT – Post weaning weight
- PFAT – C site fat depth
- PEMD – Post weaning eye muscle depth

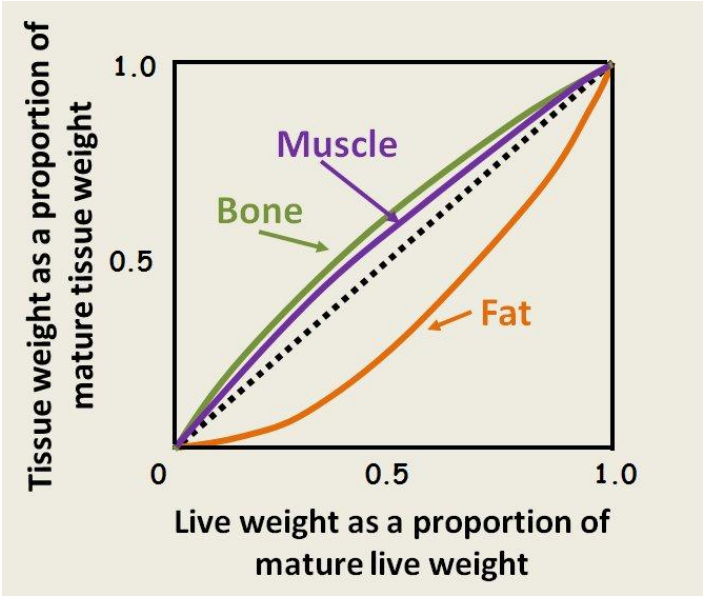
Industry Indices

- Carcase plus
- Carcase 2020



PWWT ASBV

- PWWT ASBV selects for increased mature size
- At the same carcase weight will be 'less mature'



Butterfield 1988

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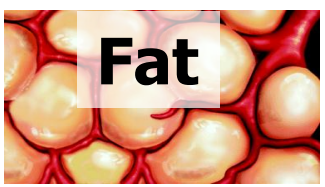
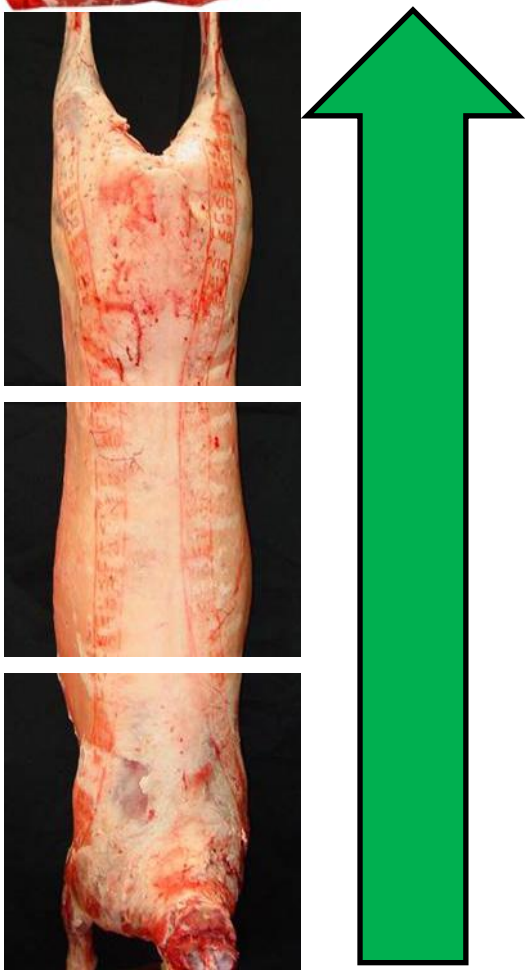
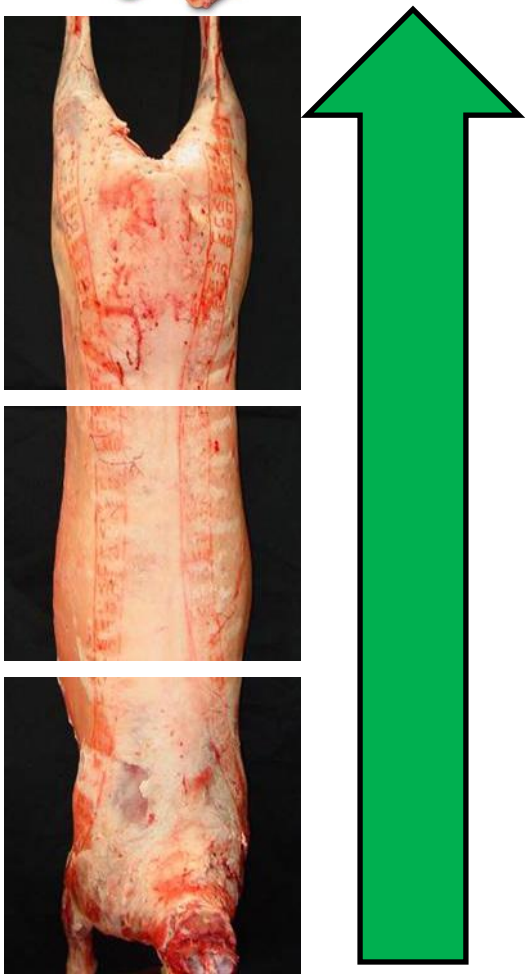
Hypothesis PWWT







Method

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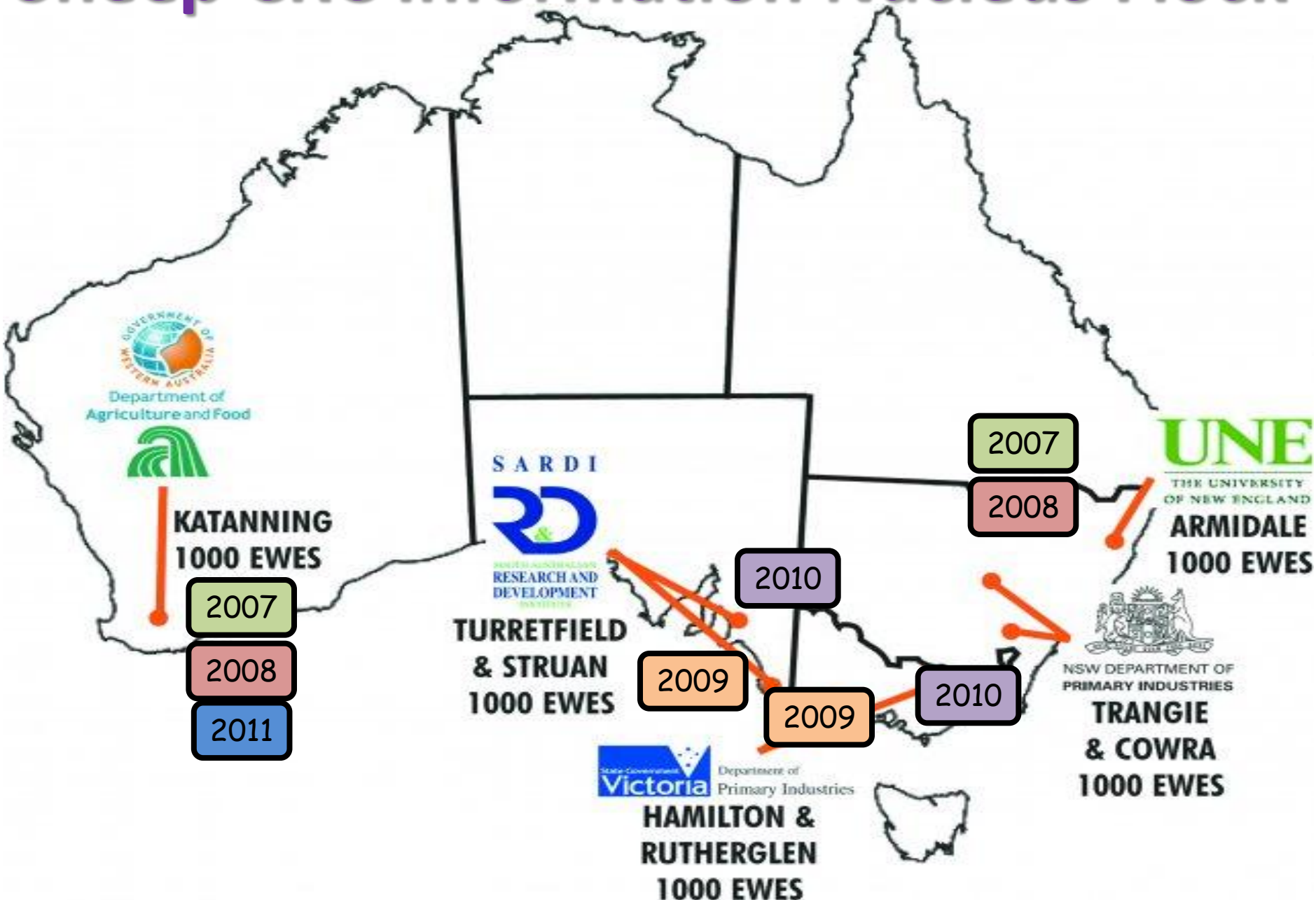
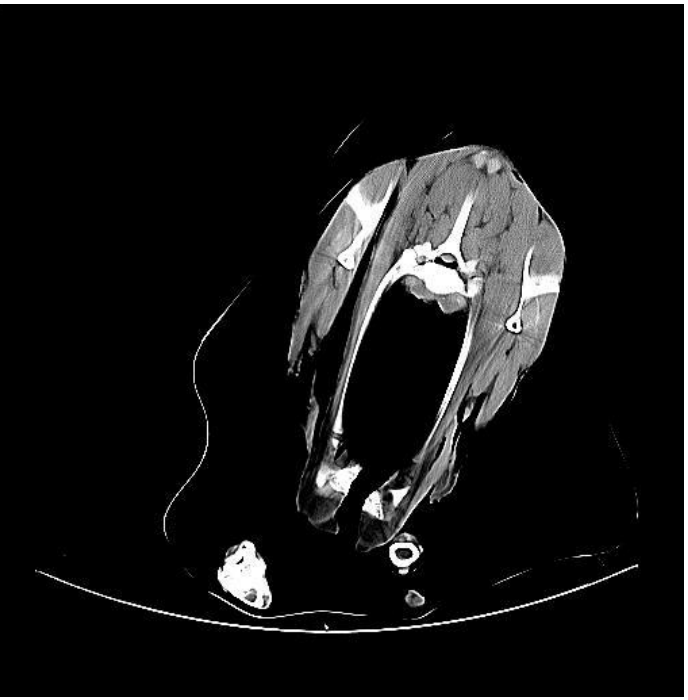
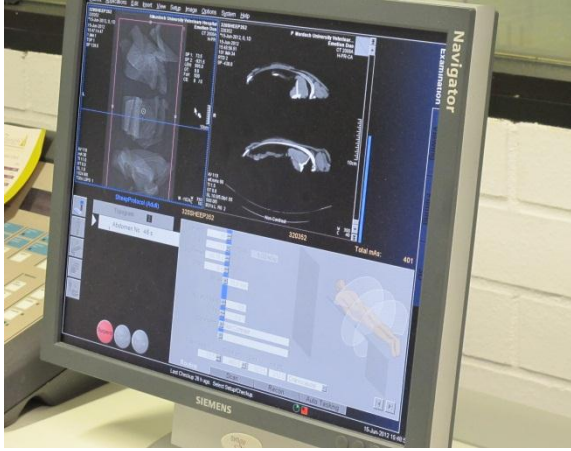
Sheep CRC Information Nucleus Flock

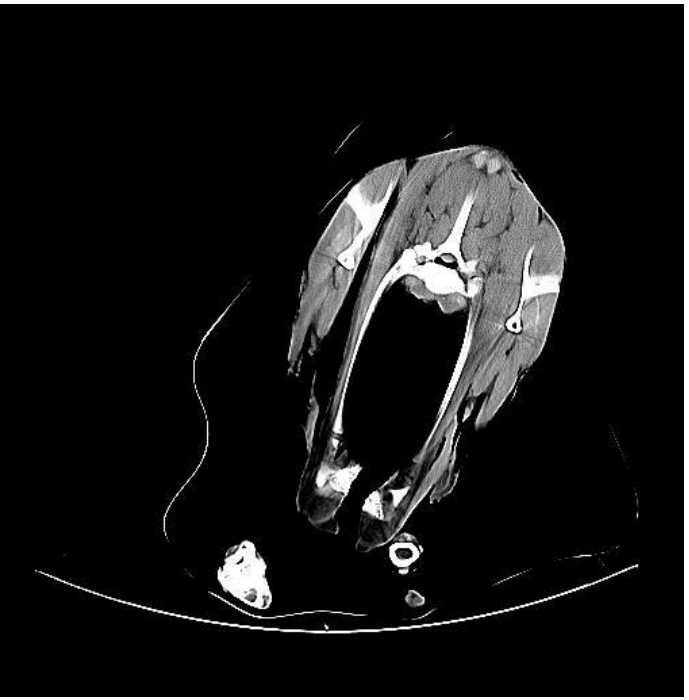


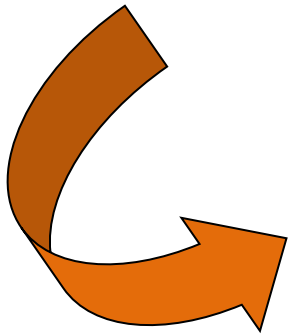
CT scanning

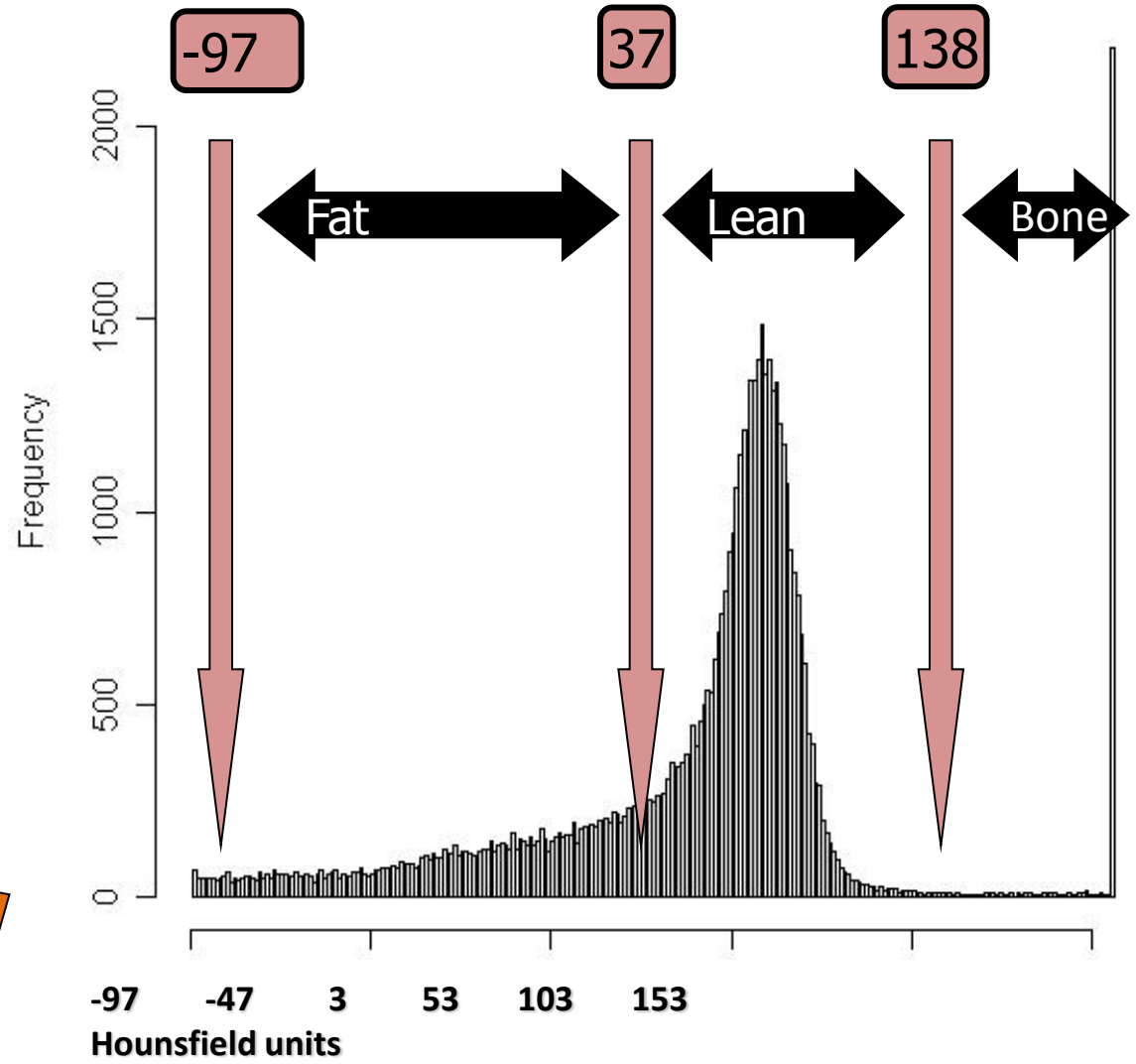




Converting image to tissue type







Data

Carcass composition by CT Scanning

Birth Year	Site	Number of animals scanned
2007	Kirby	246
2007	Katanning	181
2008	Kirby	398
2008	Katanning	120
2009	Hamilton	122
2009	Turretfield	151
Total		**1218**

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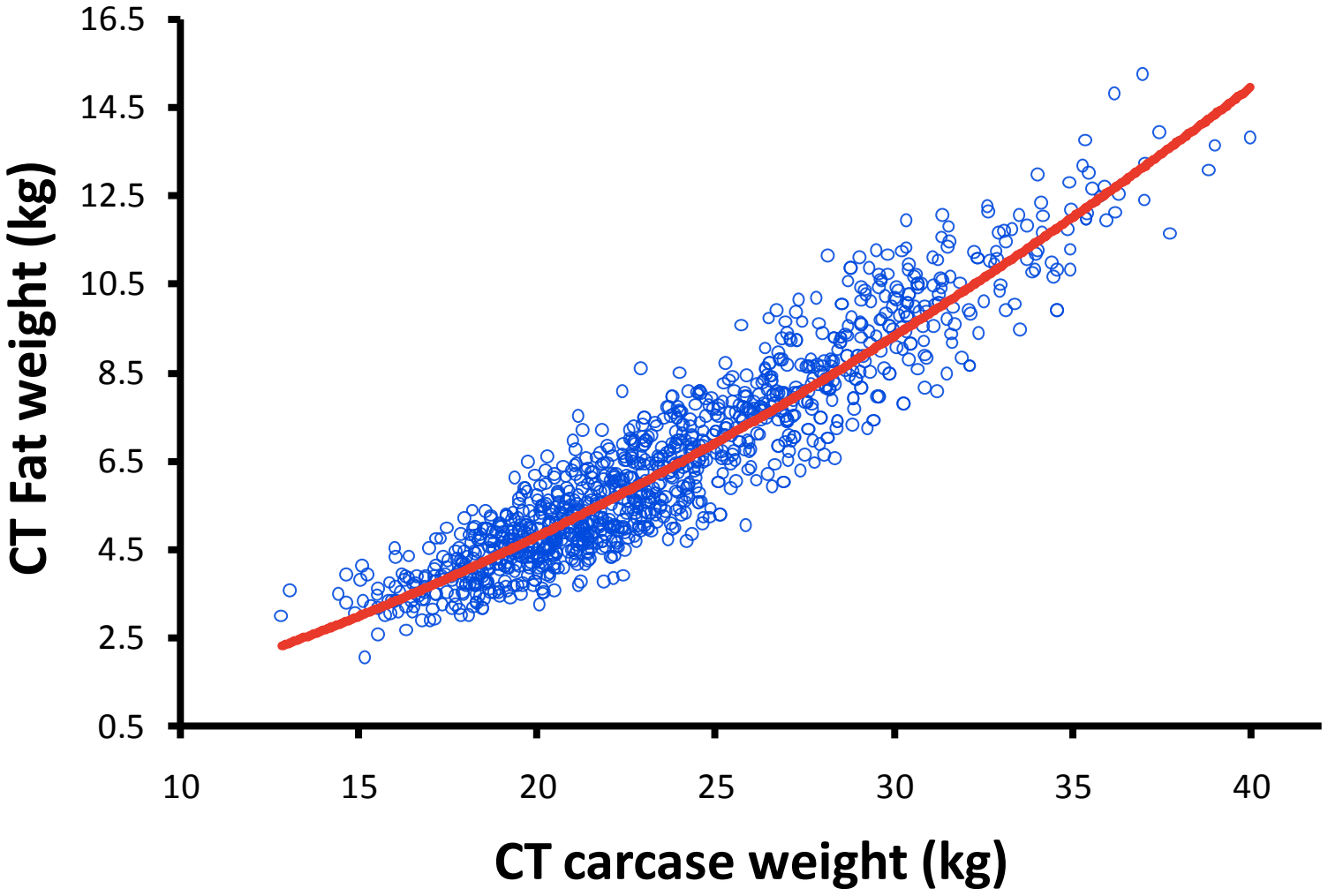
Carcase composition: raw data



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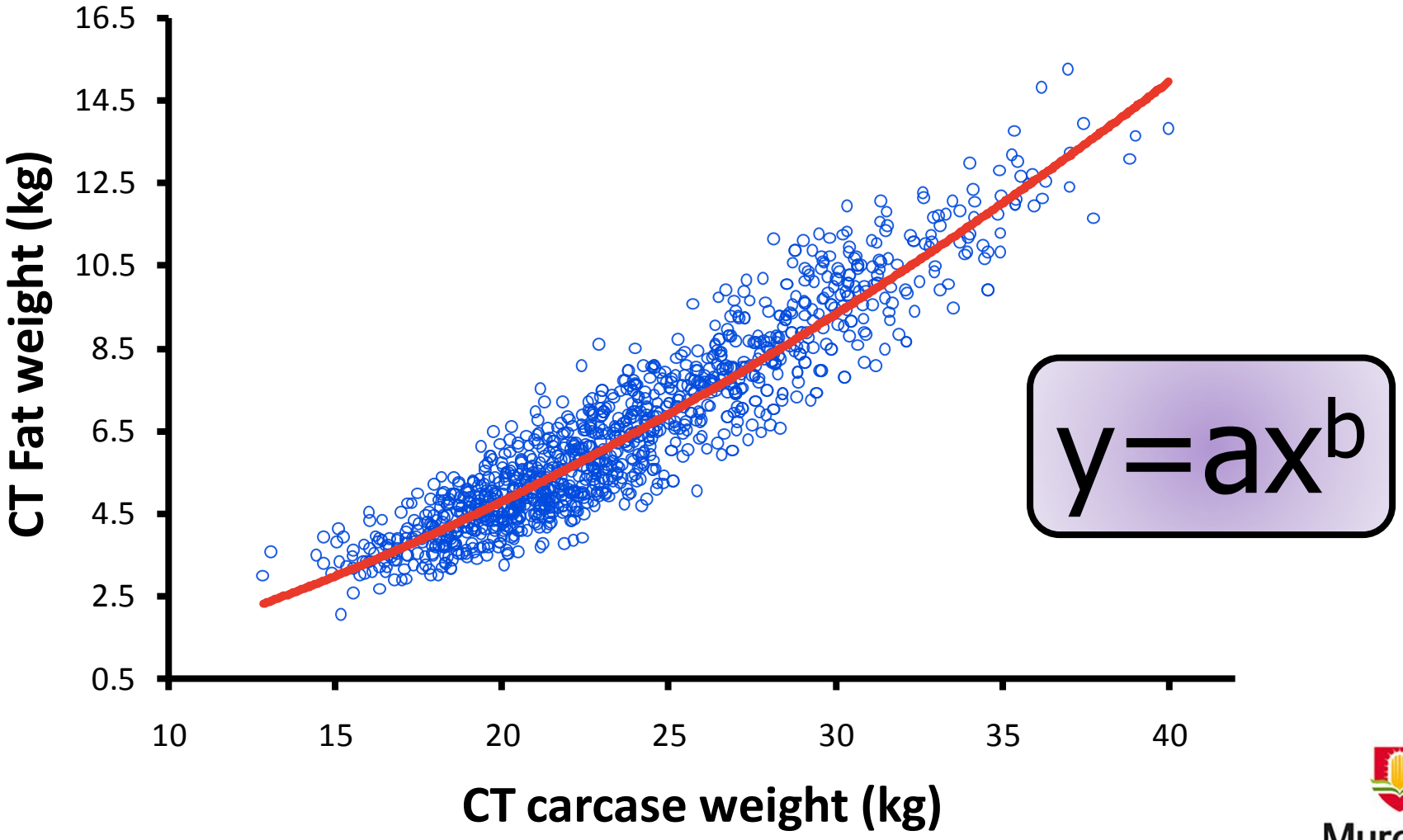
Carcase composition: raw data



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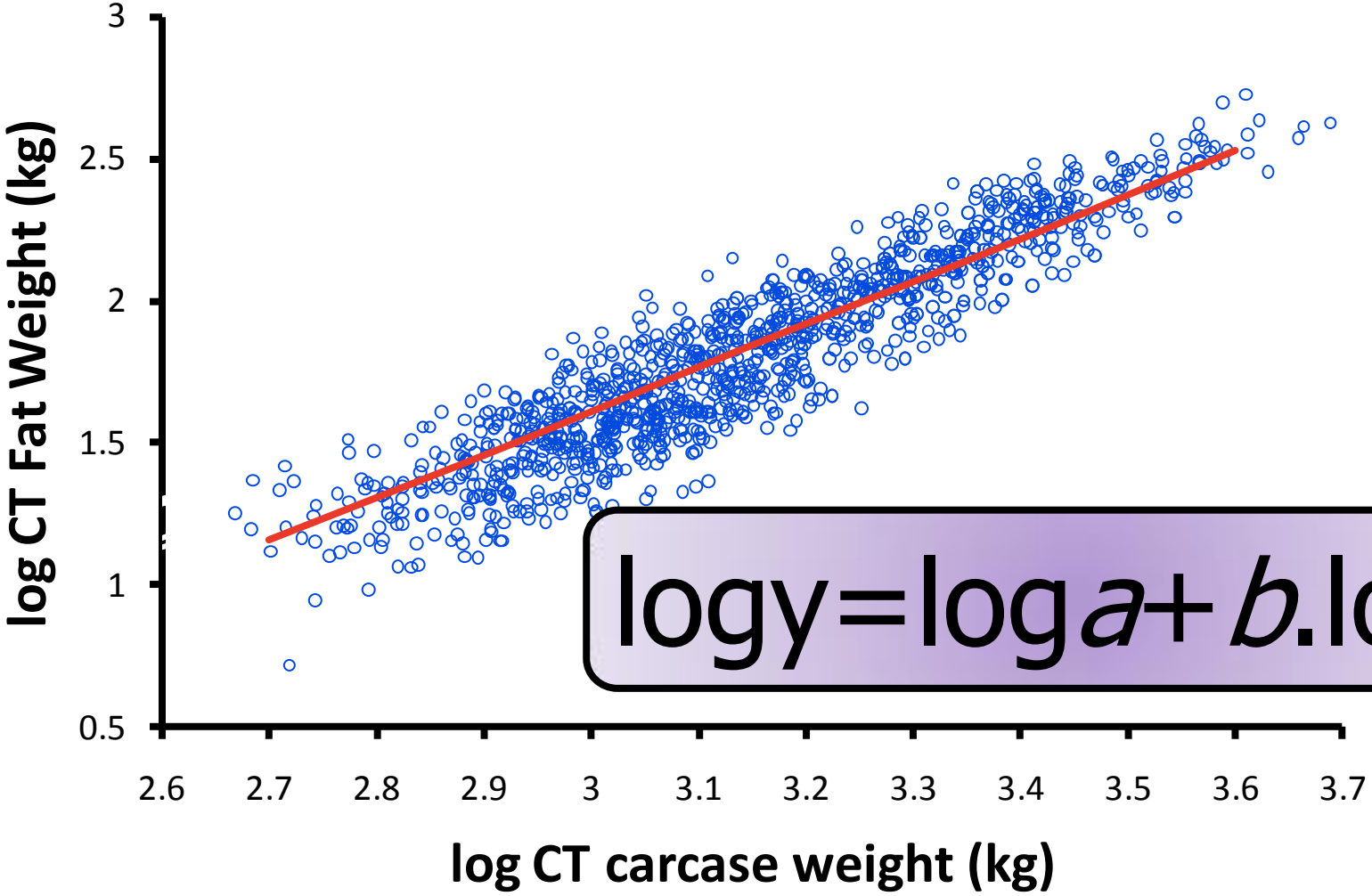
Carcase composition: log data



$$\log y = \log a + b.\log x$$

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Phenotypic Model

$$\log y = \log a + b.\log x$$

log CT lean wt

Fixed effects

- **Flock-year**
- **BTRT**
- **Sex**
- Sire type
- **Kill group** (Site-year)

Covariates

- **Log CT carcase wt**
- ASBVs

Random

- **Sire**
- **Dam*Drop**

Phenotypic Model

$$\log y = \log a + b.\log x$$

log CT lean wt

Interpret differences as percentages

Fixed effects

- **Flock-year**
- **BTRT**
- **Sex**
- Sire type
- **Kill group** (Site-year)

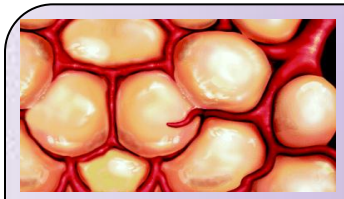
Covariates

- **Log CT carcase wt**
- ASBVs

Random

- **Sire**
- **Dam*Drop**

Whole carcase composition



log CT Fat = log a + b.log CT carcase wt

log CT Lean = log a + b.log CT carcase wt

log CT Bone = log a + b.log CT carcase wt

Lean distribution

log Hind Qrt Lean = log a + b.log carcase lean

log Saddle Lean = log a + b.log carcase lean

log Fore Qrt Lean = log a + b.log carcase lean

Results

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Whole carcase composition

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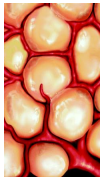
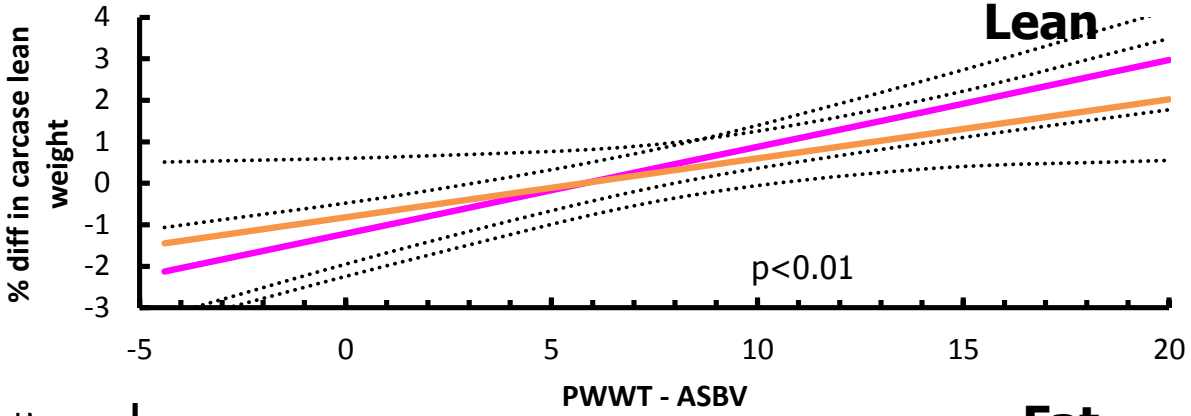
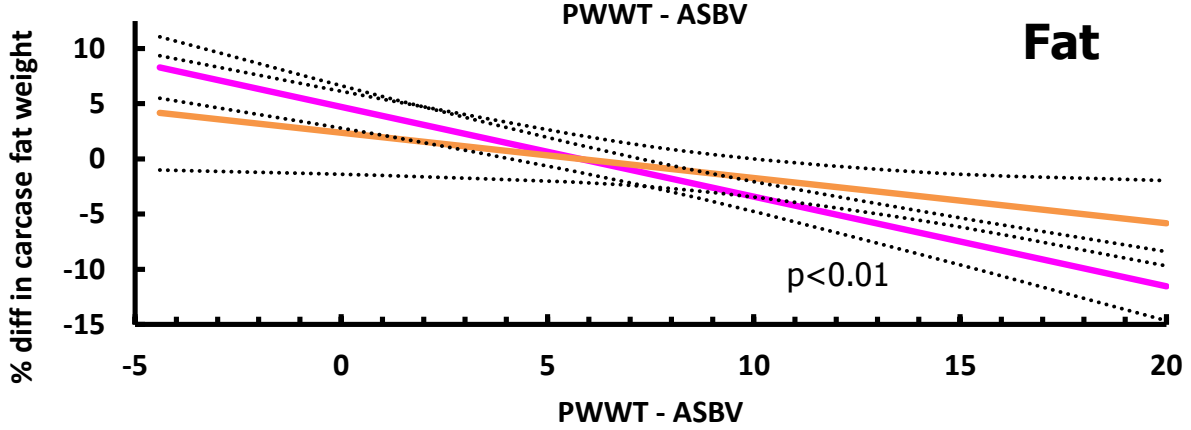
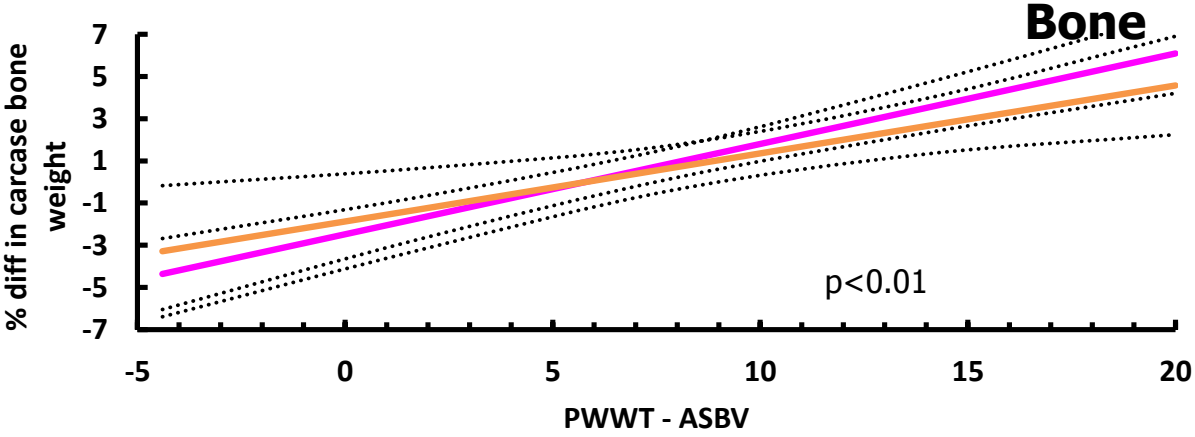
Effect of PWWT ASBV on whole carcase composition









Kirby 07
Kirby 08
Hamilton 09
Turretfield 09
Katanning 07
Katanning 08

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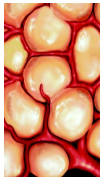
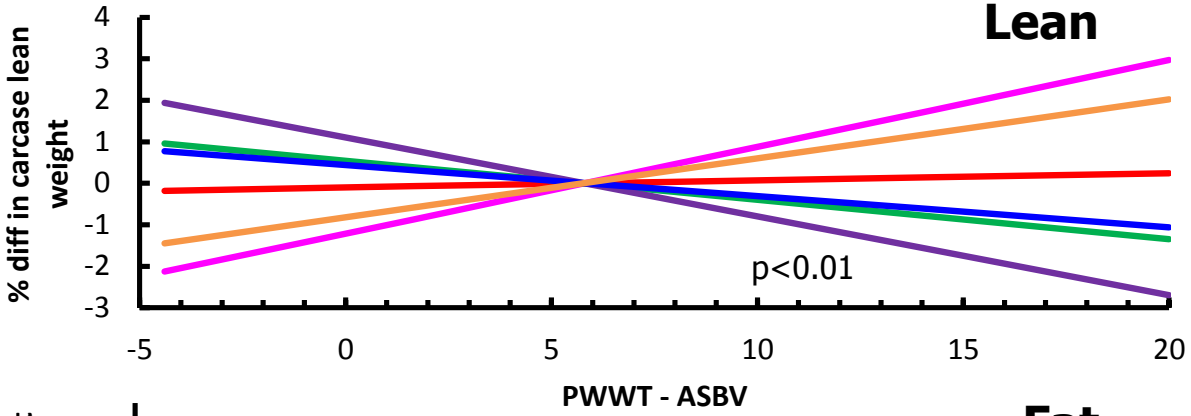
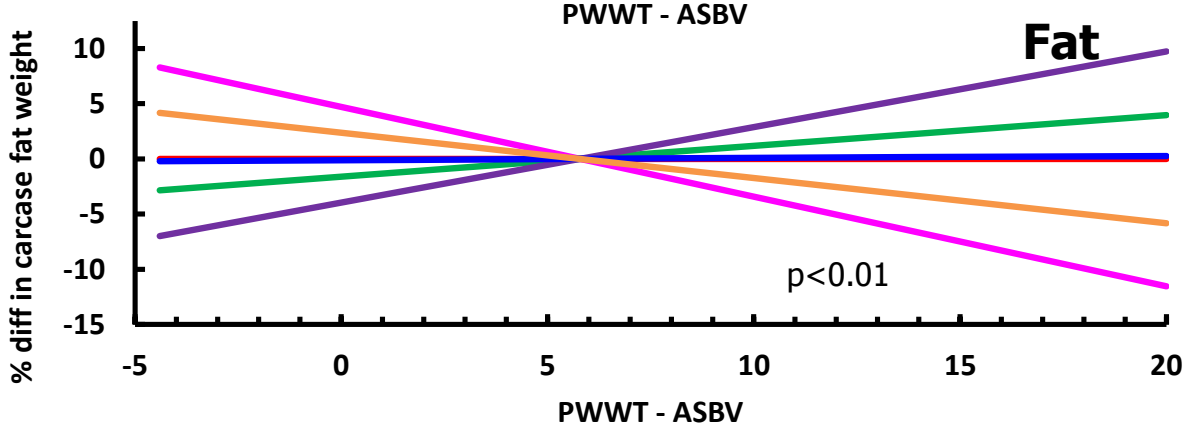
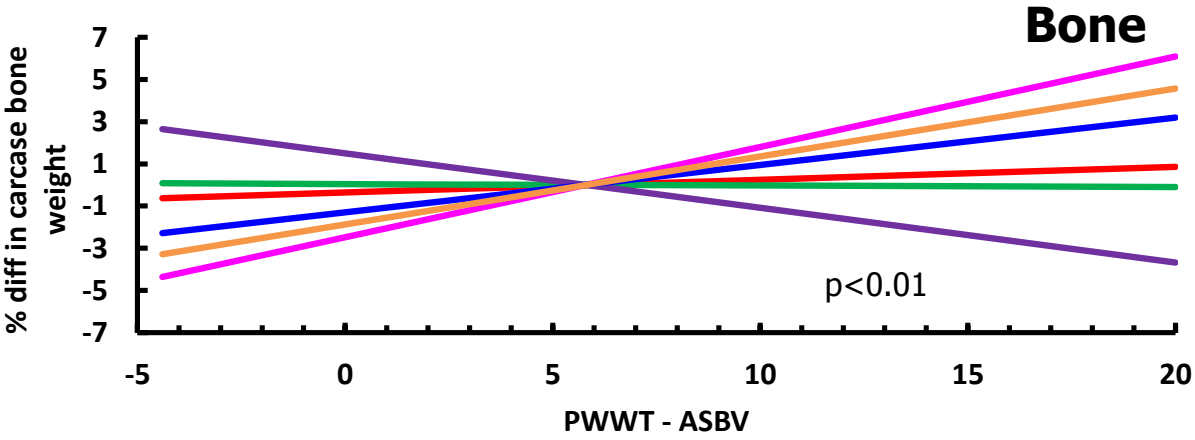
Effect of PWWT ASBV on whole carcase composition









Kirby 07
Kirby 08
Hamilton 09
Turretfield 09
Katanning 07
Katanning 08

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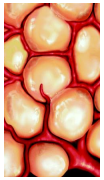
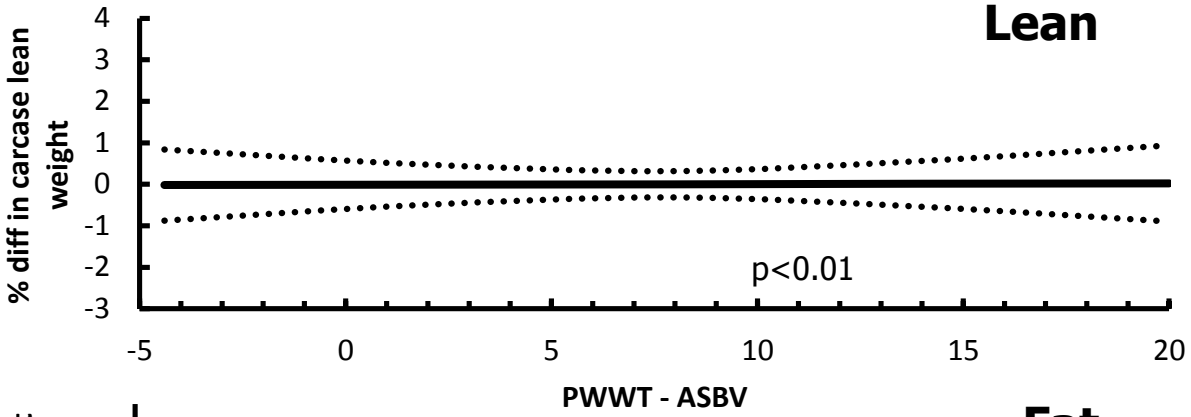
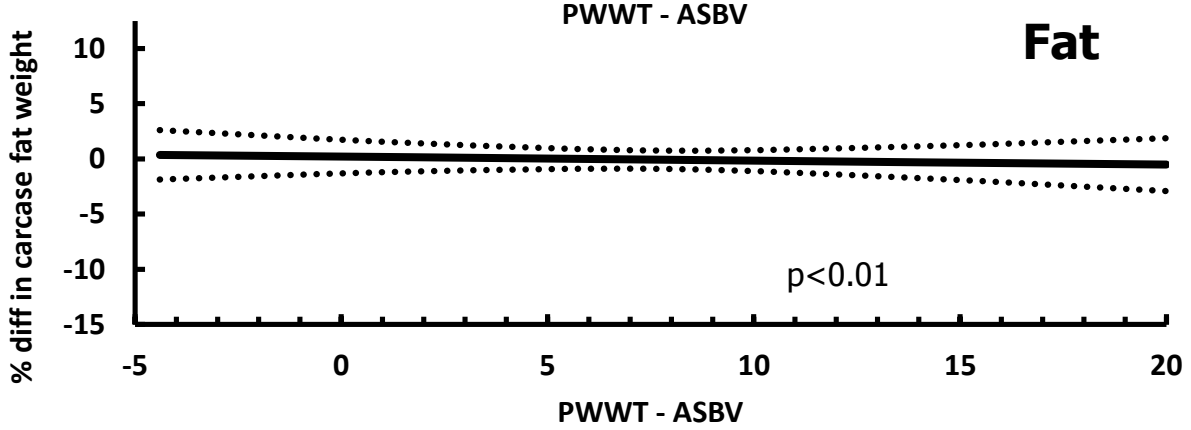
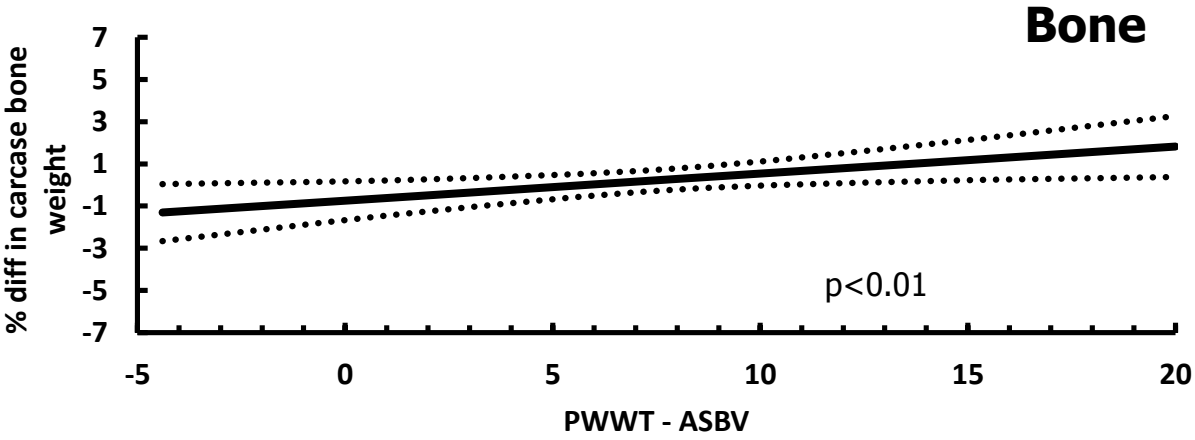
Effect of PWWT ASBV on whole carcase composition









Kirby 07
Kirby 08
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Katanning 08

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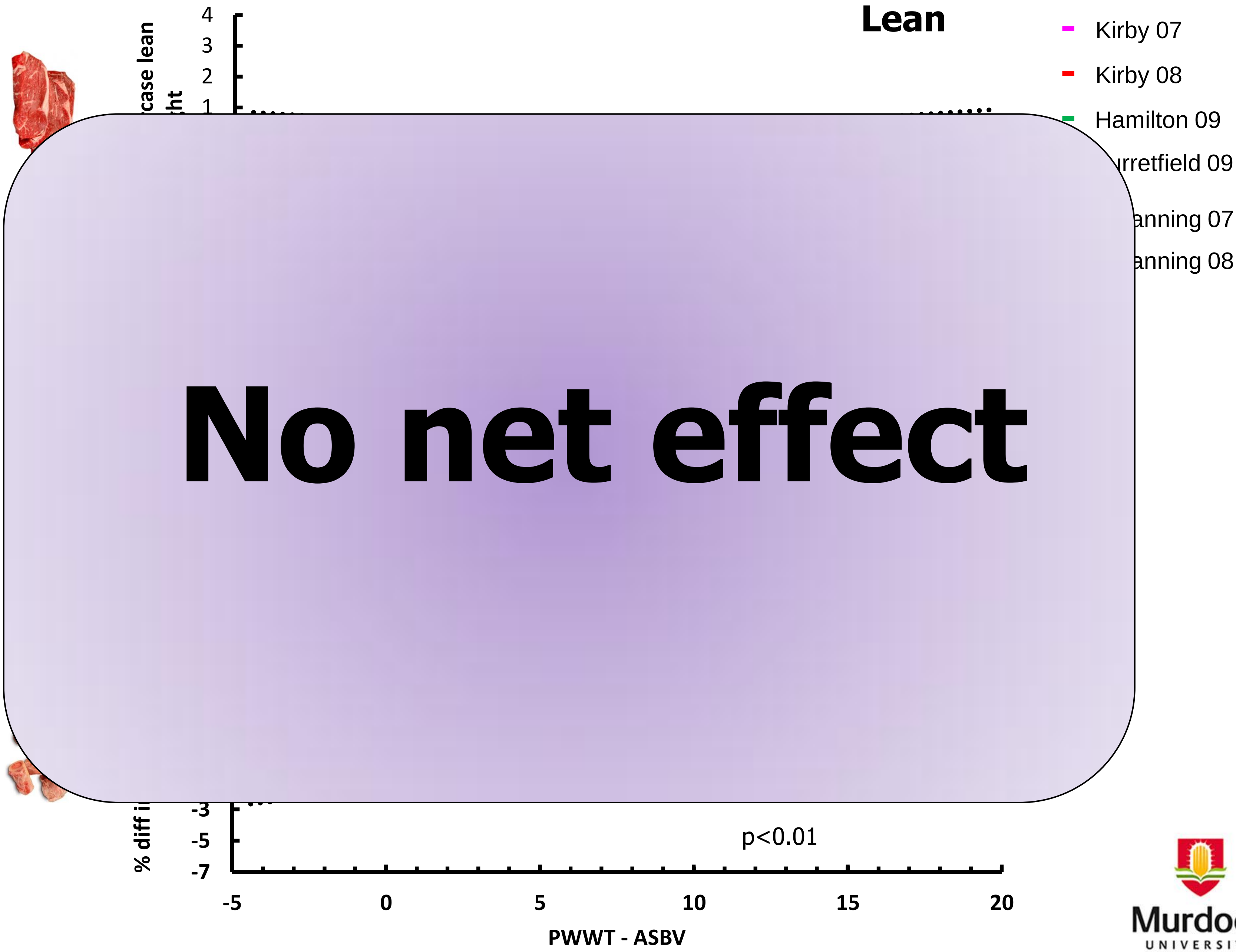
Effect of PWWT ASBV on whole carcase composition



No net effect

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Tissue distribution

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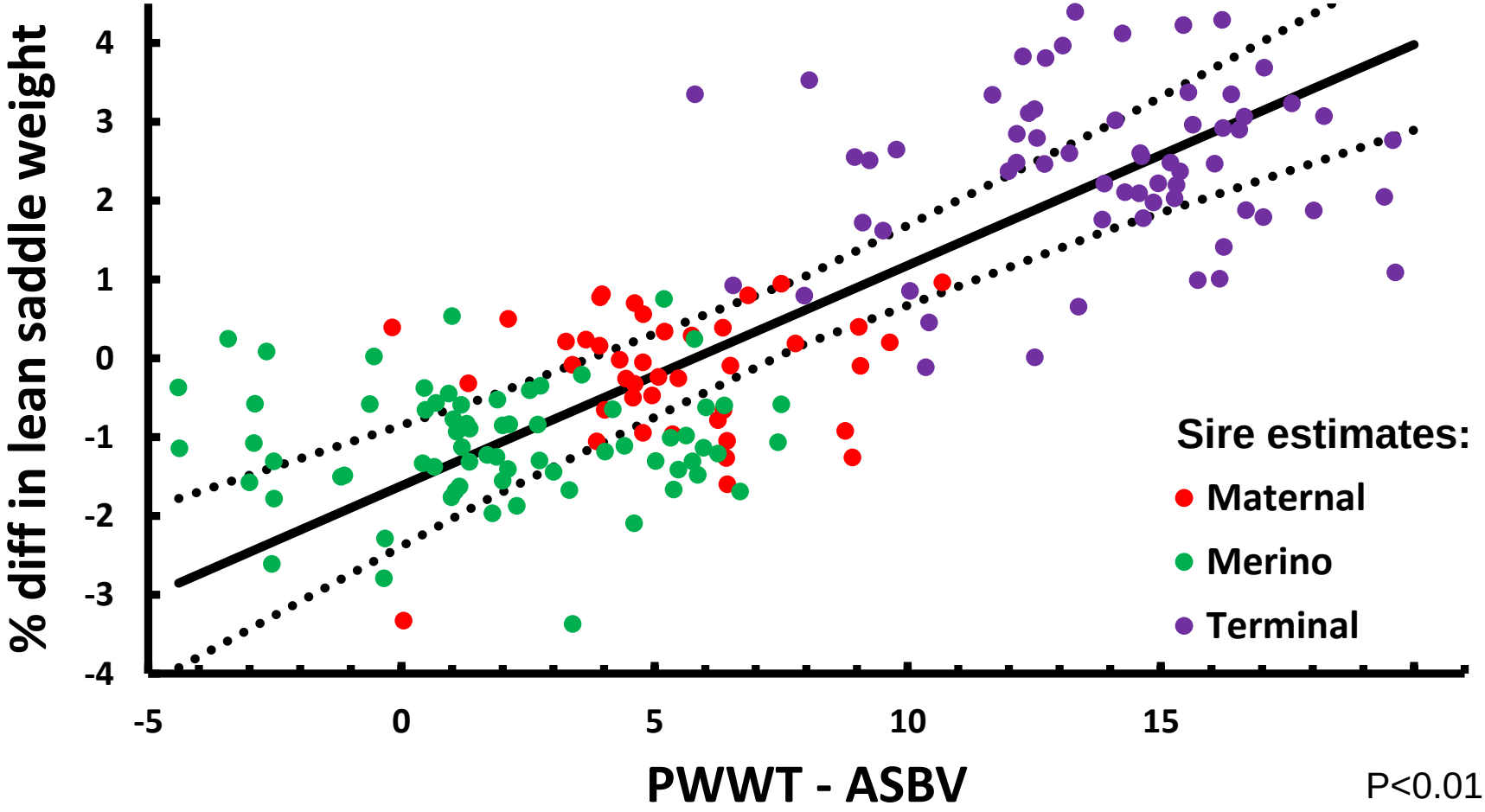
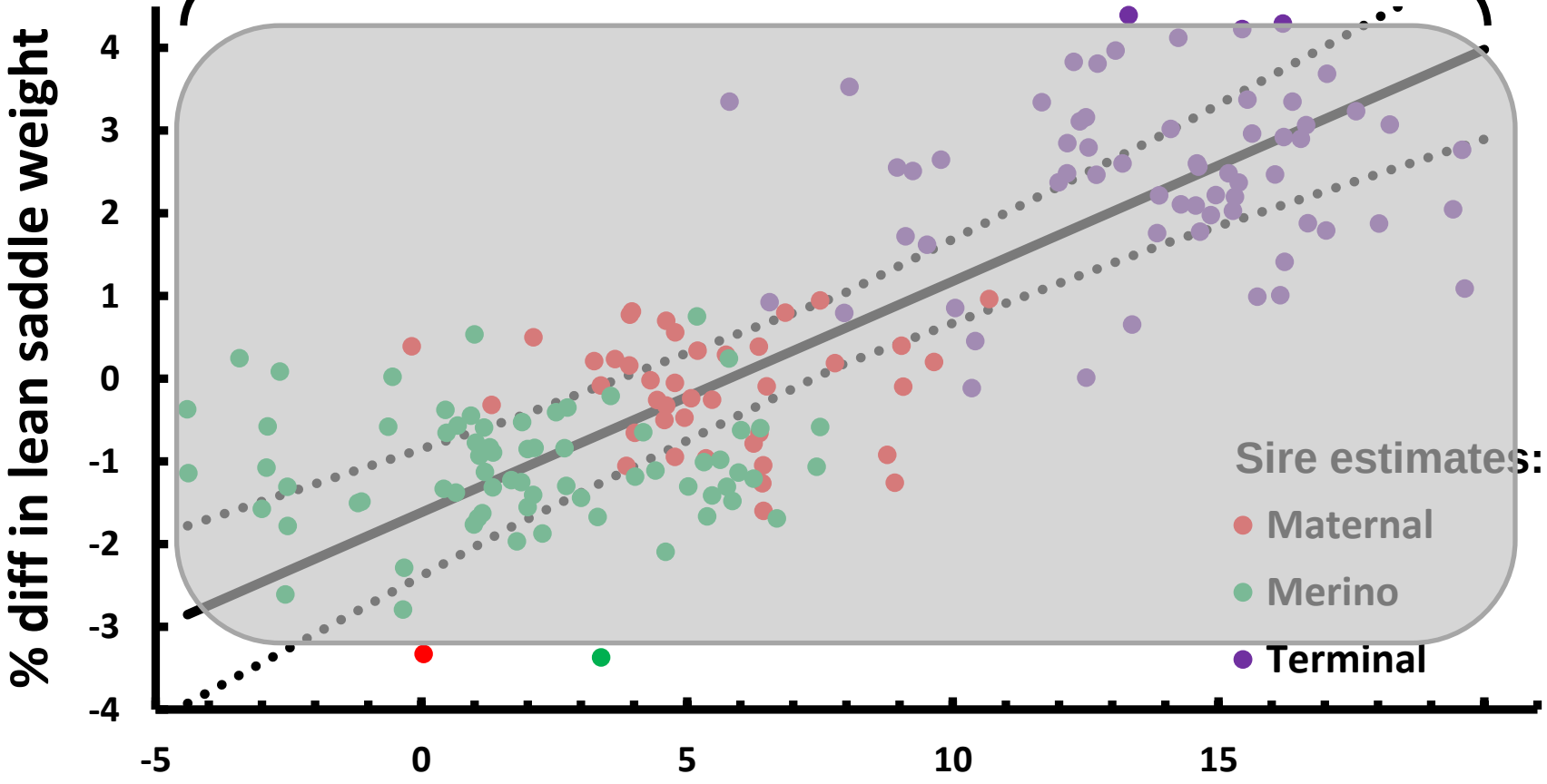
Sire estimates for saddle lean using PWWT-ASBV



P<0.01

Sire estimates for saddle lean using PWWT-ASBV

25 units



P<0.01

Sire estimates for saddle lean using PWWT-ASBV

25 units

% diff in lean saddle weight

4
3
2
1
0
-1
-2
-3
-4

-5
0
5
10
15

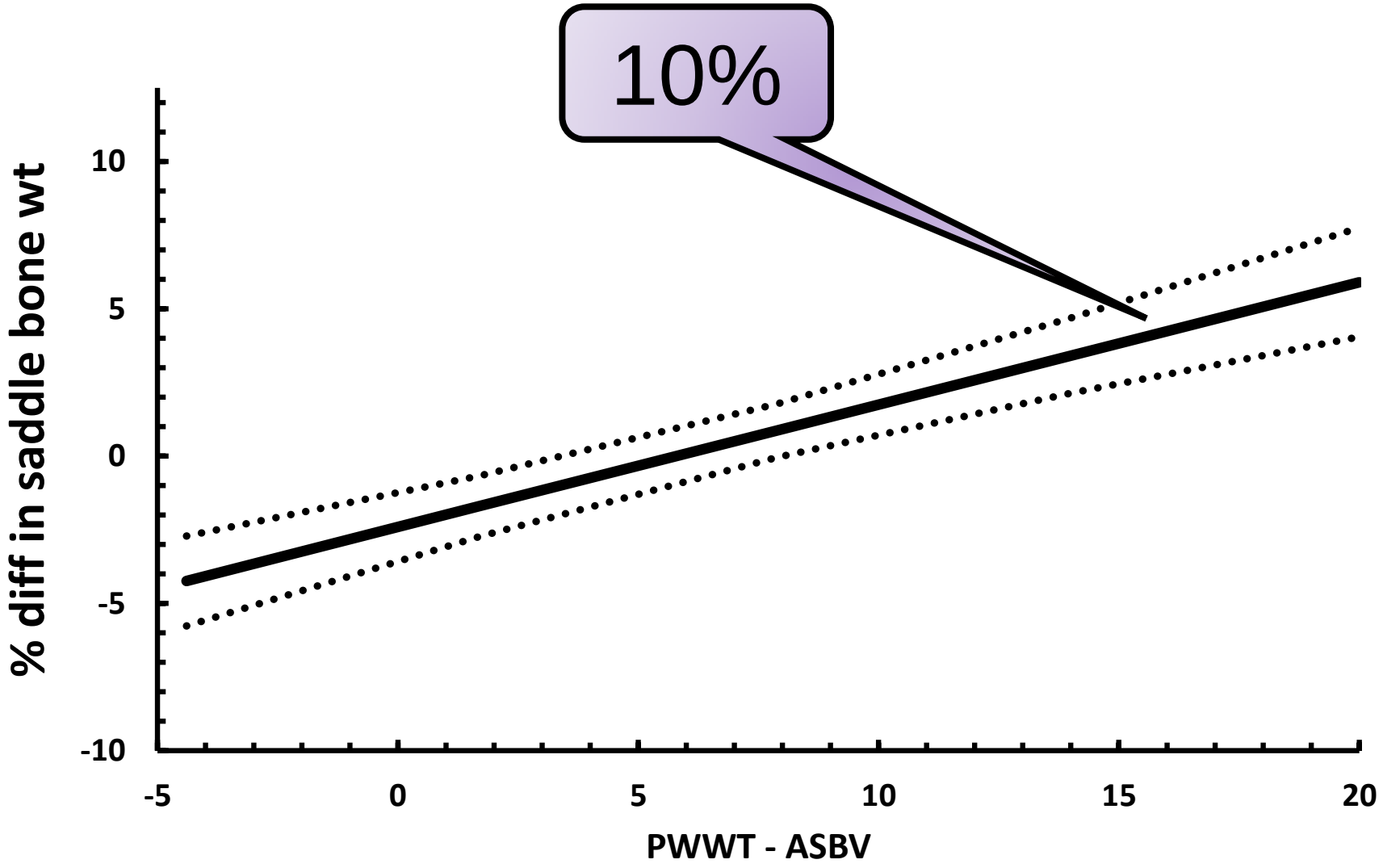
PWWT - ASBV

7%

Sire estimates:
Maternal
Merino
Terminal

P<0.01

PWWT-ASBV effect on saddle bone



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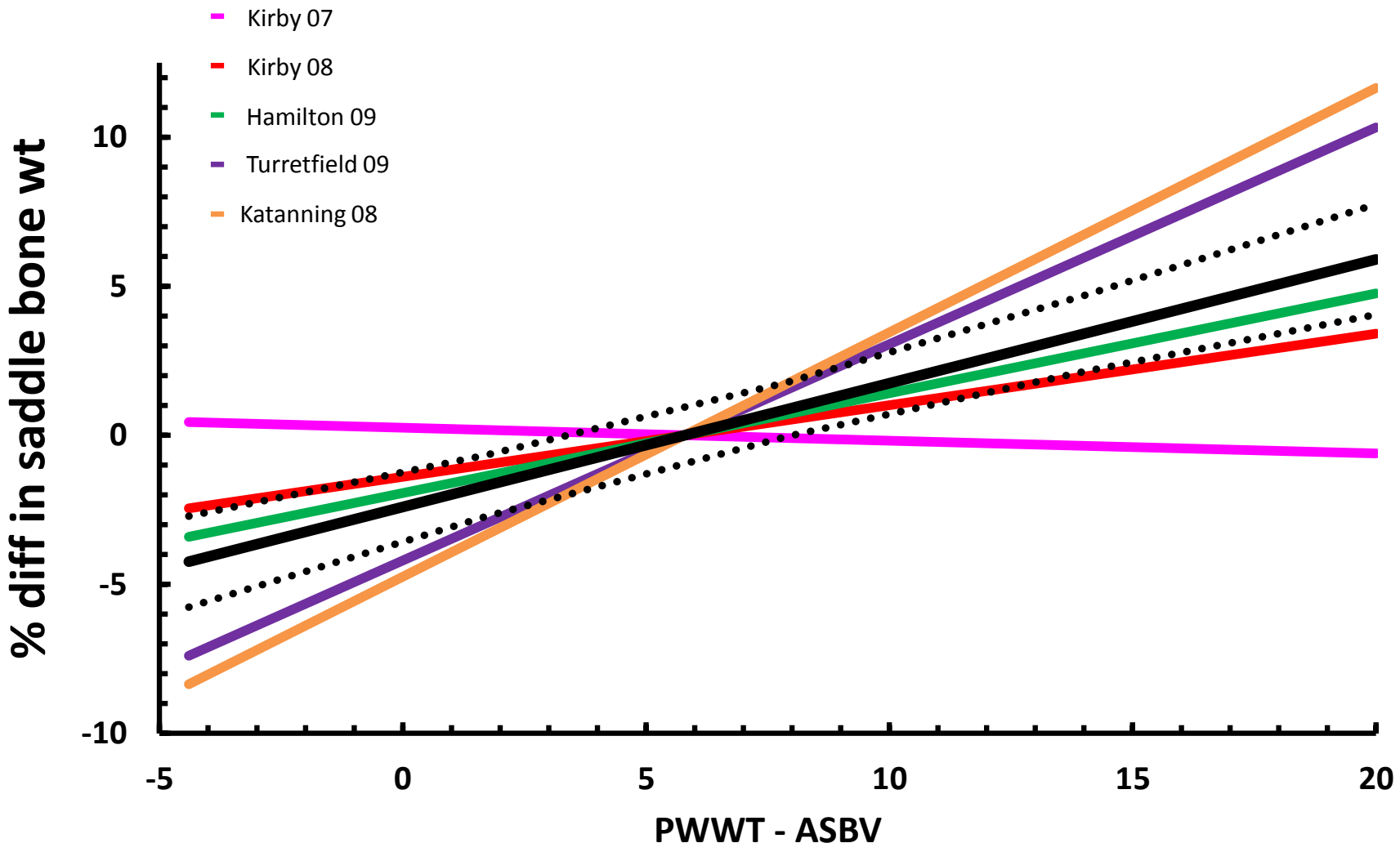
PWWT-ASBV effect on saddle bone



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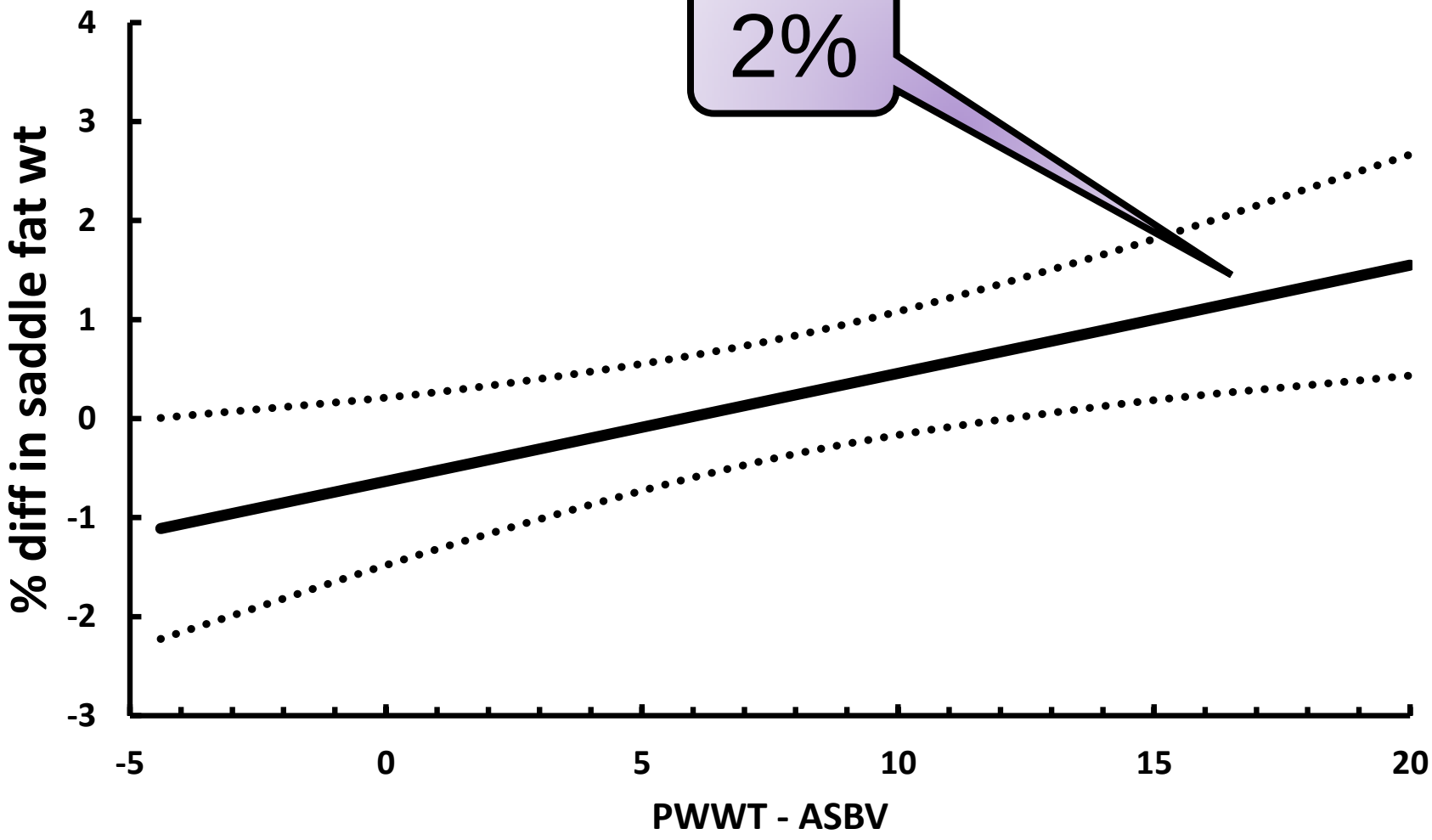
PWWT-ASBV effect on saddle fat



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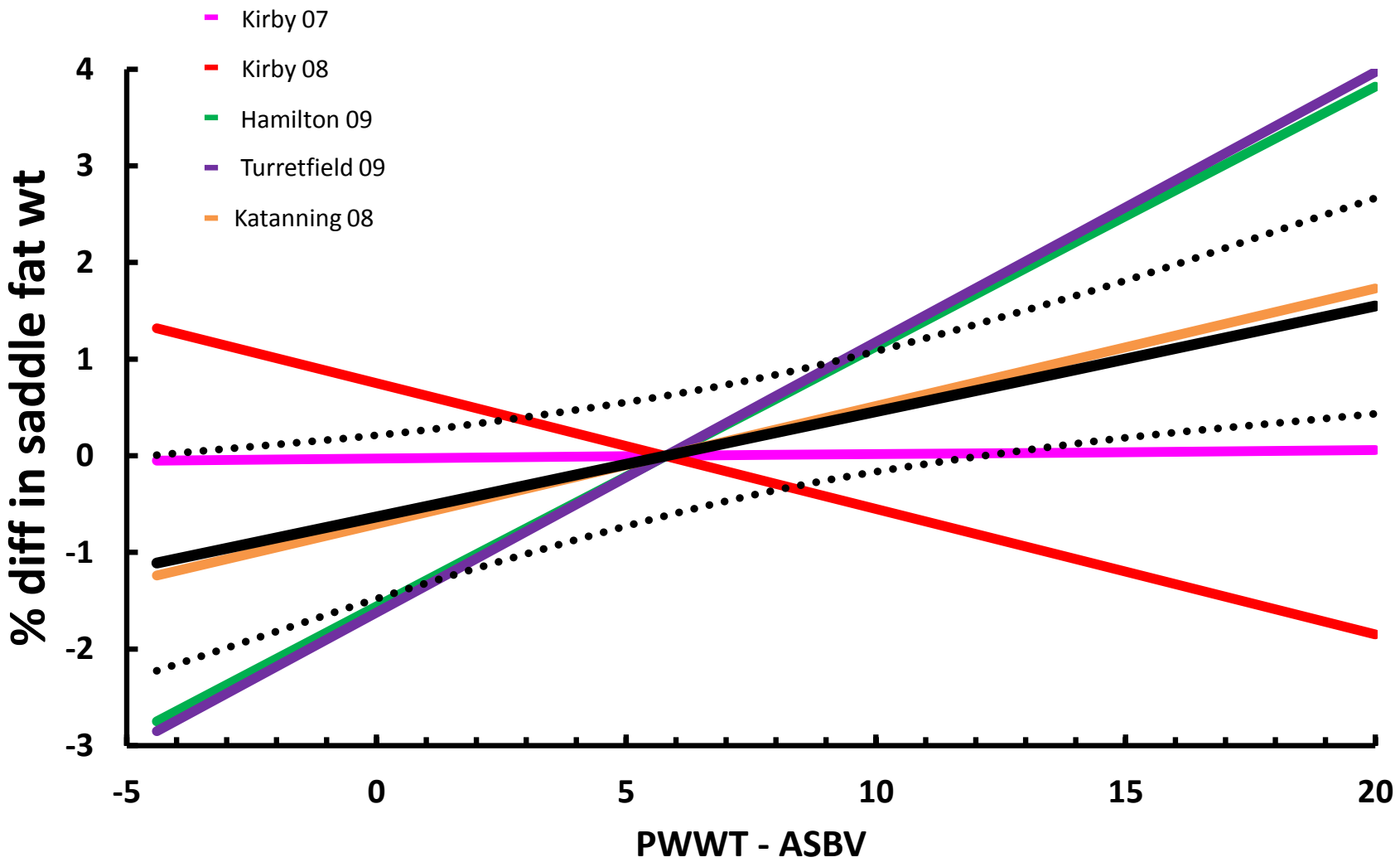
PWWT-ASBV effect on saddle fat



P<0.01

Effects of PWWT

variable

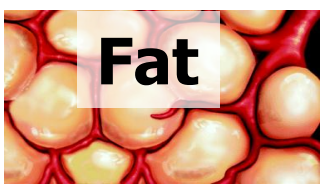
+2.0%

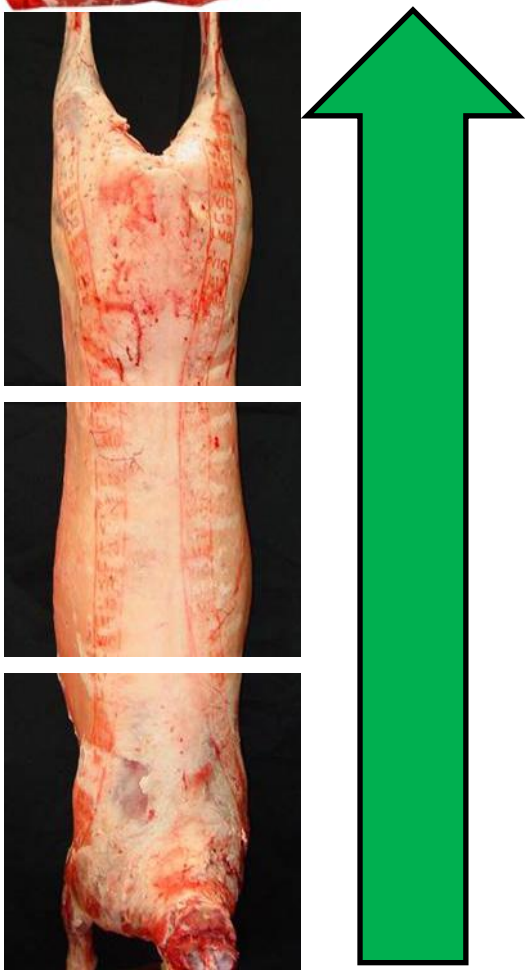
+7%

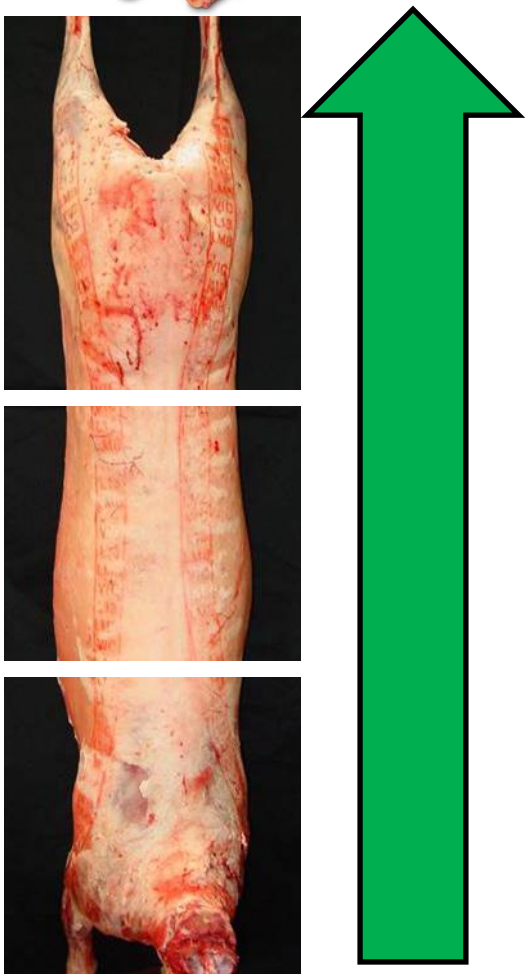
variable

+10%

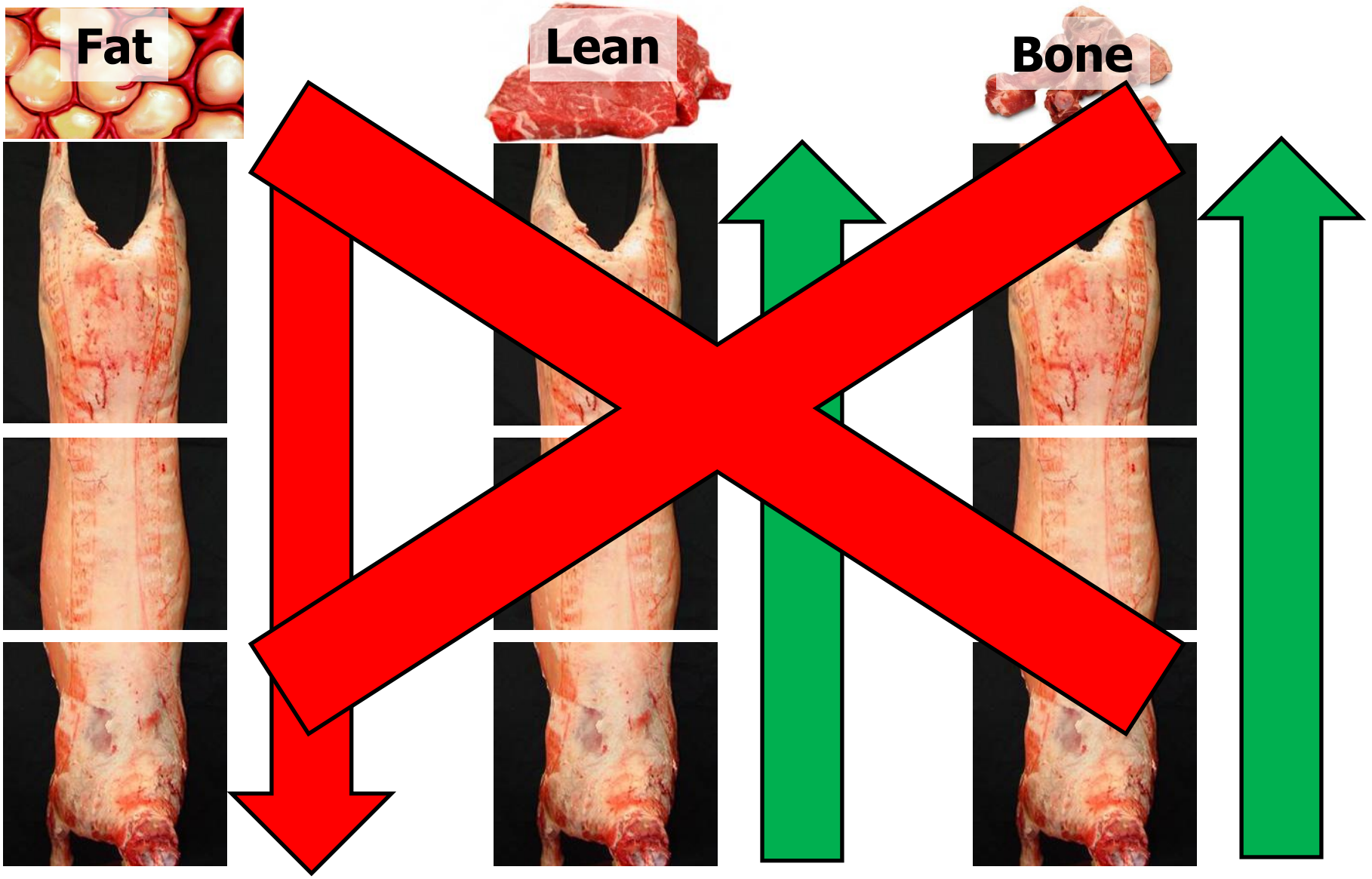
Hypothesis PWWT



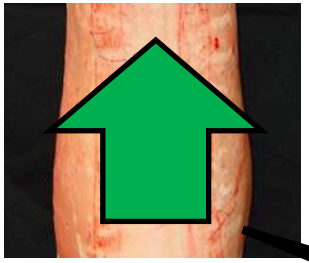


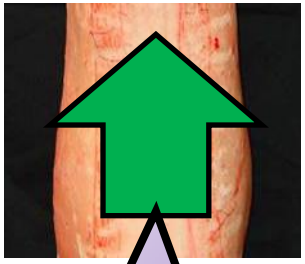


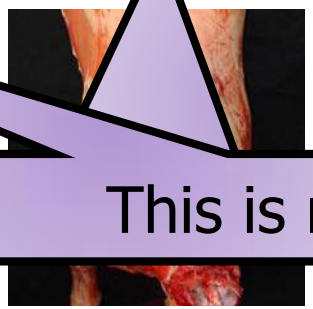
Hypothesis PWWT



Hypothesis PWWT







This is new!!

Lean redistribution effects……?

- Altered body dimensions?
- Fibre type shift? More fast-glycolytic fibres?

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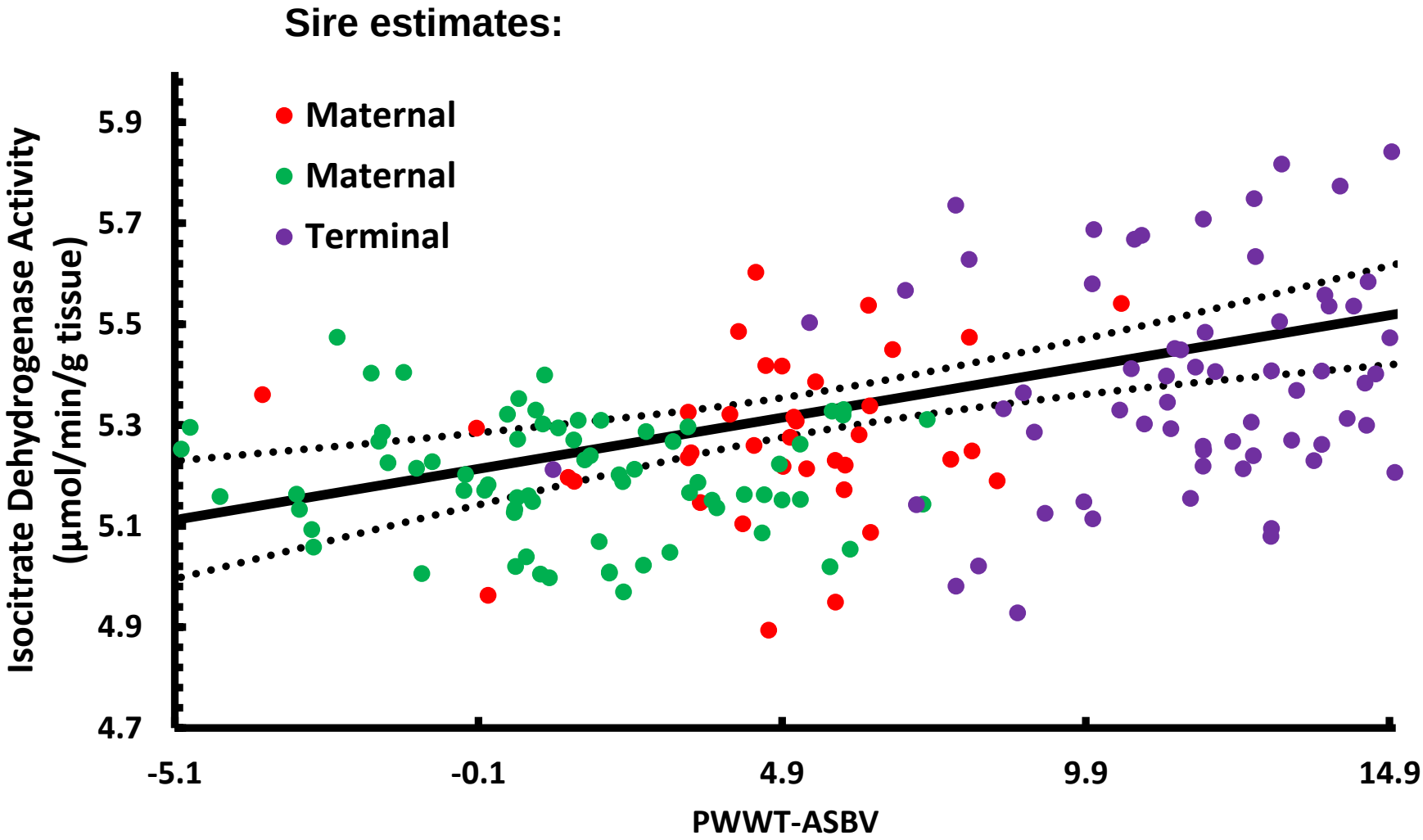
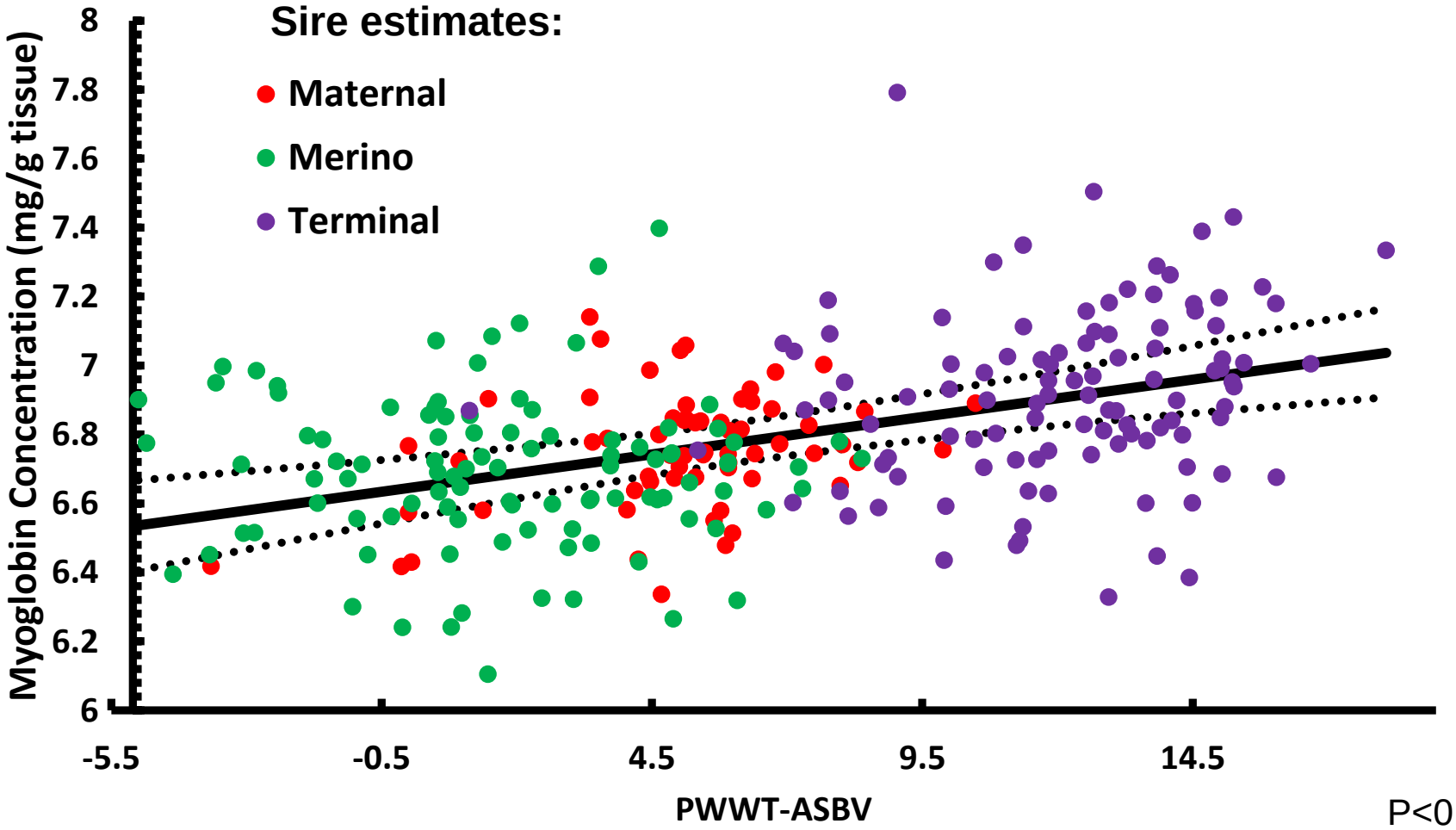
PWWT effect on ICDH activity



P<0.05

PWWT effect on myoglobin concentration



P<0.05

Future directions

- Finalise CT data (2012)
- Economic analysis of current findings
- Mechanistic experiments to help explain lean redistribution

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Conclusion

- PWWT delivered no net increase in LMY%.
- PWWT causes redistribution of all tissue types to the saddle region.
- PWWT will likely positively impact carcase value.

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