



Carcase and quality traits for 2020 – what will rams need to possess ?

Dave Pethick



Summary

- Lean Meat Yield
- Eating quality
- Human health snapshot

**Increased rate of improvement of
lean meat yield and quality**

**LMY increase
Maintain retail price**

Consumer demand

Leanness

'Muscling'

Eating Quality

+

Nutritive value

- Tenderness
- Juiciness
- Flavour

- Omega 3
- Iron
- Zinc



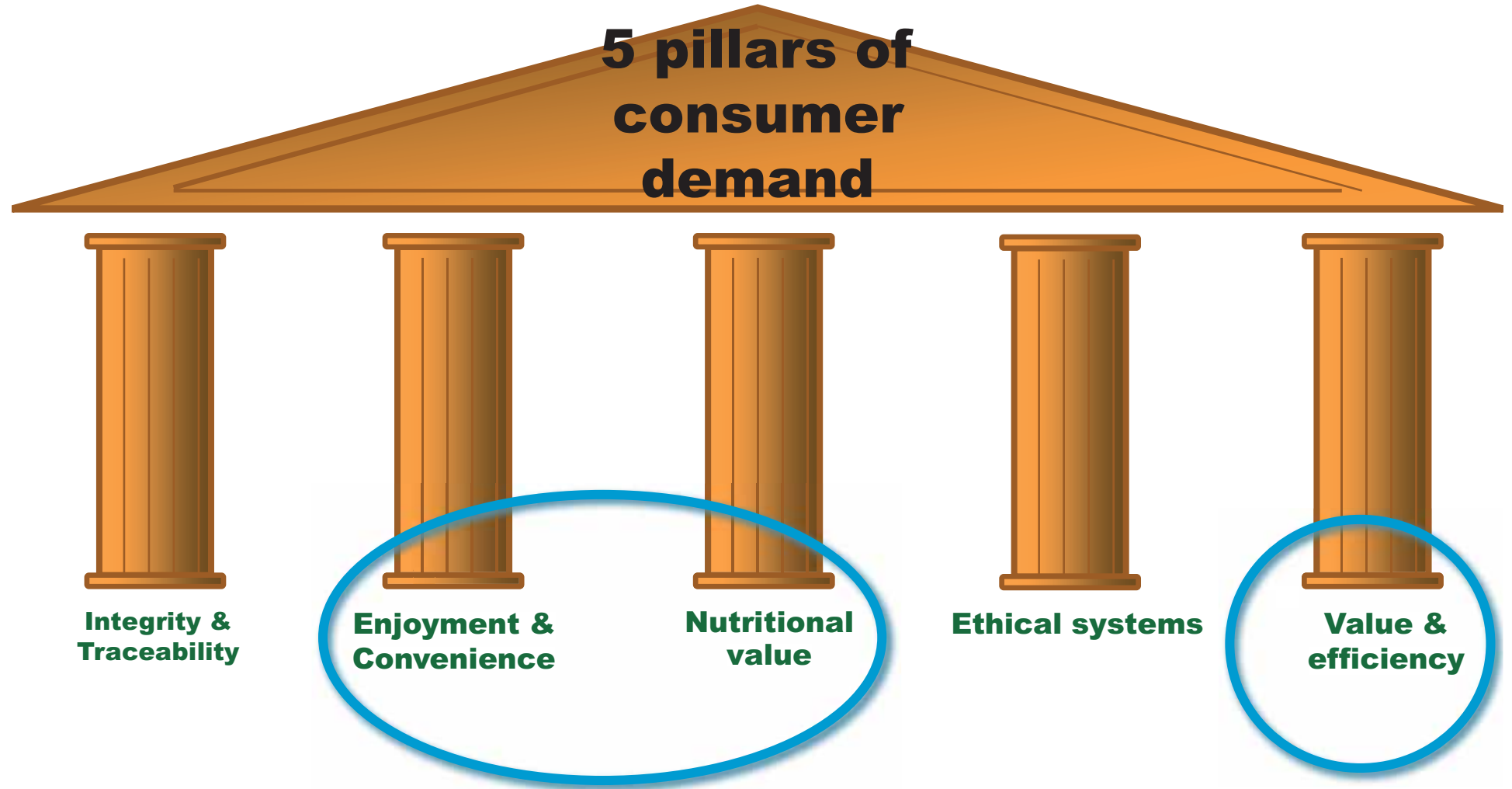
Lean meat yield

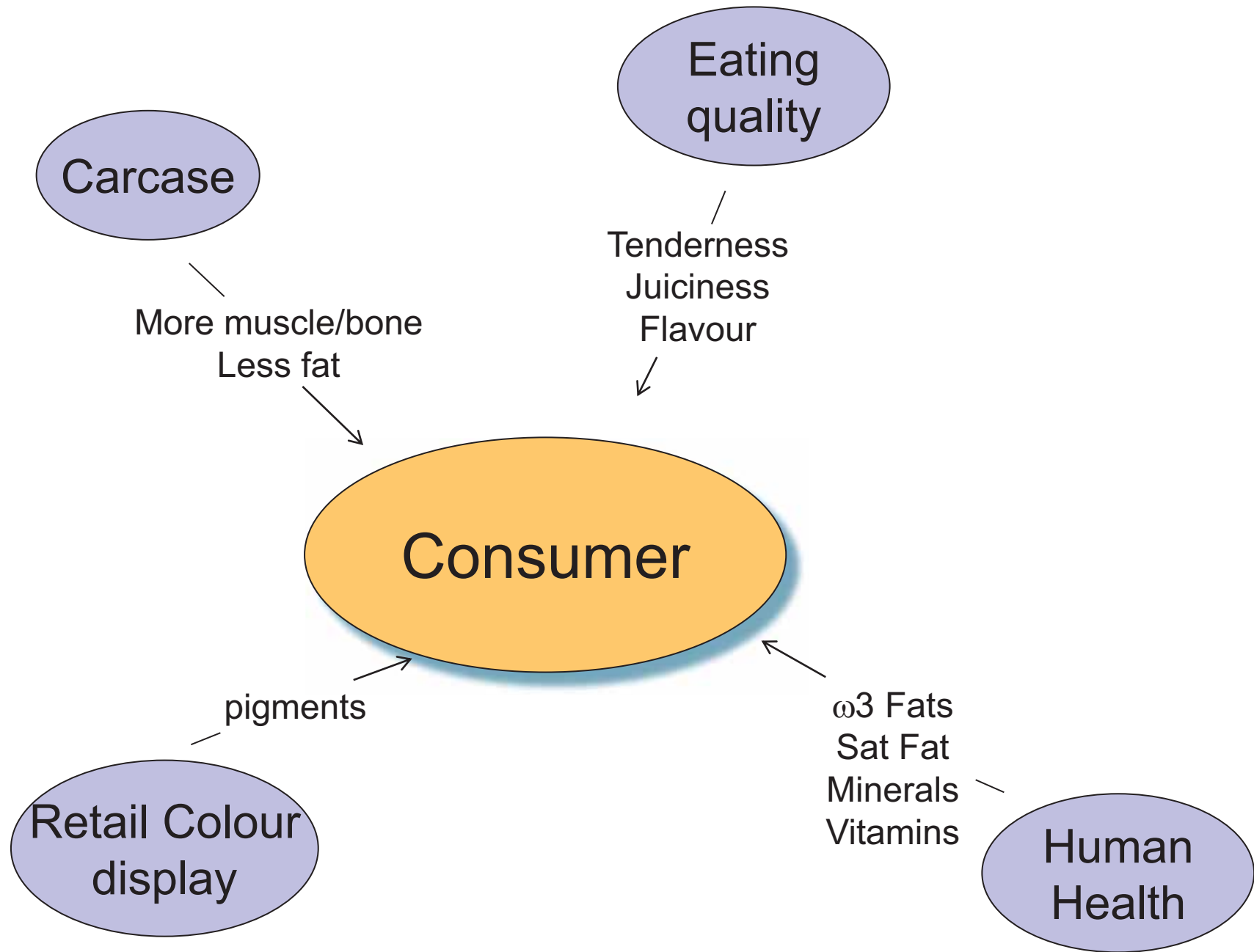
Very important for profitability and consumer satisfaction - consumers prefer meat NOT bone and fat !

Lamb 'lean' is expensive



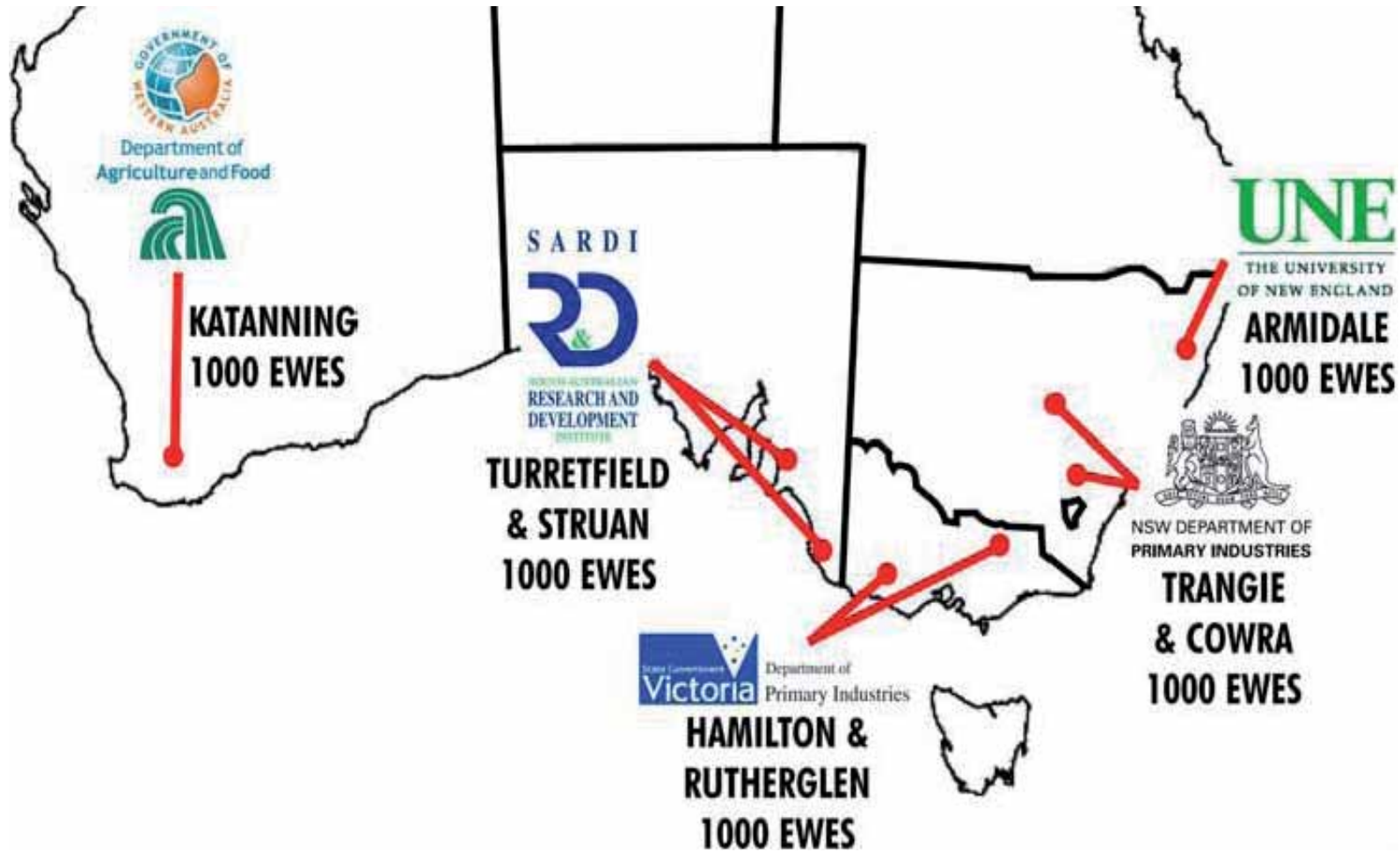
Back to basics – the CONSUMER





Into the Future
with
Information Nucleus

100 sires/dams, range of production systems – 5 years



Measure new & traditional meat phenotypes

- Carcase
- Lean meat yield (bone, muscle, fat)
- Skin traits
- Glycogen, pH, fresh colour
- Retail colour
- Tenderness (shear force, connective tissue)
- Muscle fat phenotypes (omega 3, intramuscular fat)
- MSA consumer eating quality
- Iron, Zinc

DELIVERY ⇒ **Info nucleus** ⇒ **Sheep Genetics Aust.**

Key terminal sire traits for LMY



SHEEP GENETICS AUSTRALIA



- Growth (WWT, PWWT)
- Reduced fat depth (PFAT)
- Eye muscle depth (PEMD)

What are they doing ?

Carcase - preliminary heritabilities

| | |
|------------------------|------------|
| ■ LMY (%) | 0.34 |
| ✓ Eye muscle (area/wt) | 0.30, 0.35 |
| ✓ Fat depth (GR, C) | 0.50, 0.23 |
| ■ HCW | 0.35 |
| ■ Dressing % | 0.25 |

PWWWT ASBV

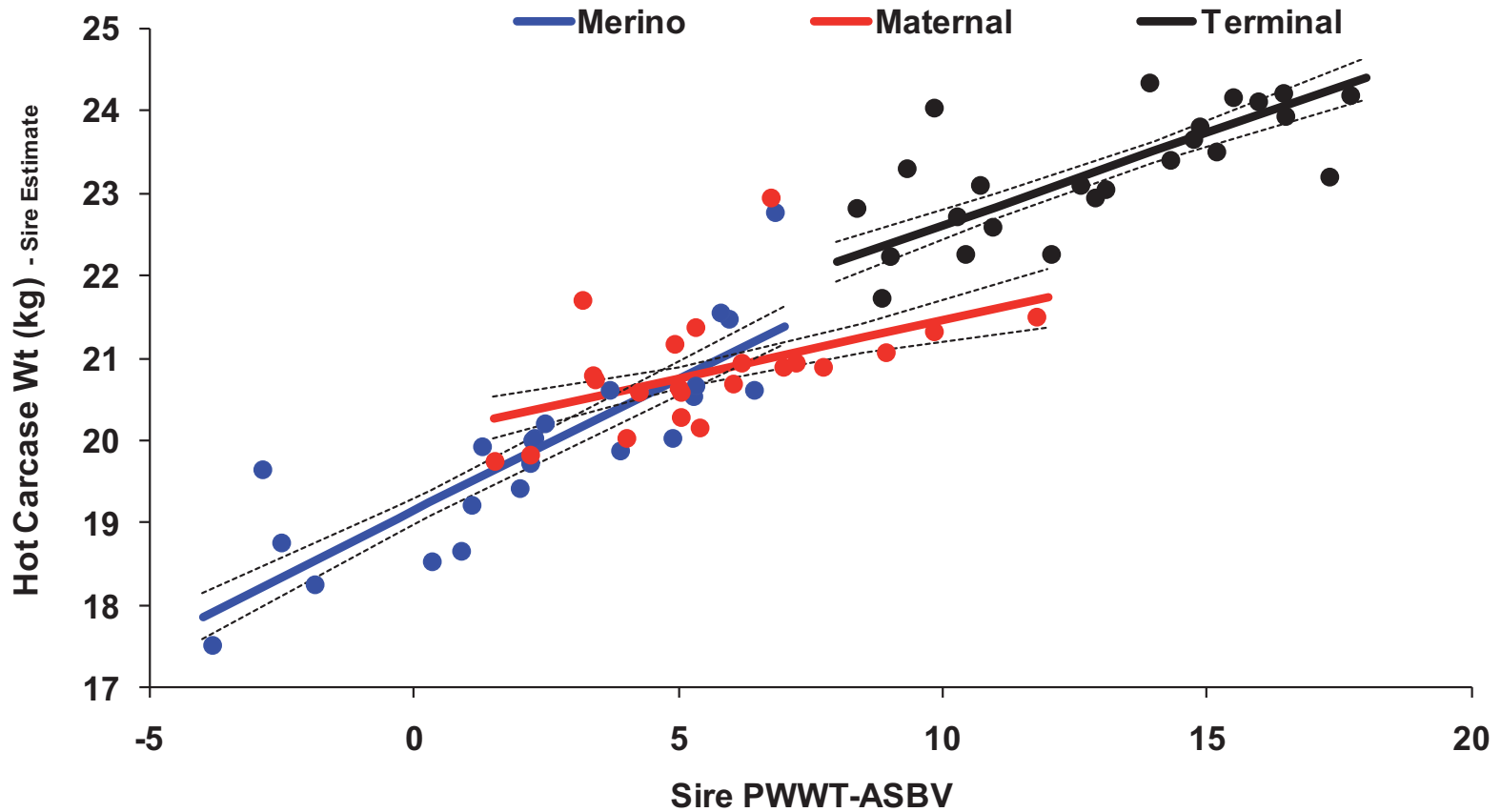
You all know this!



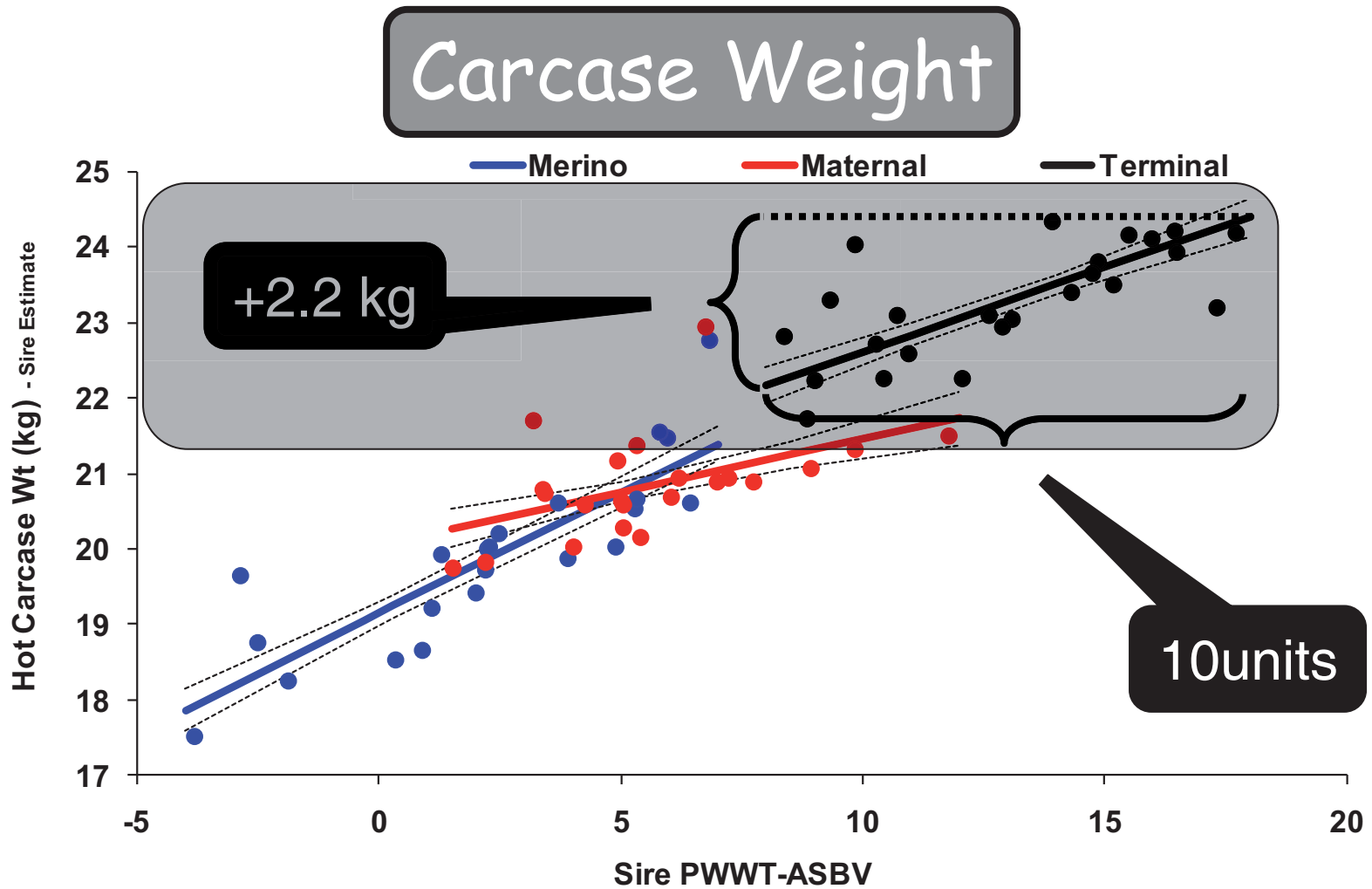
PWWT

PWWT - They're Heavier!

Carcase Weight



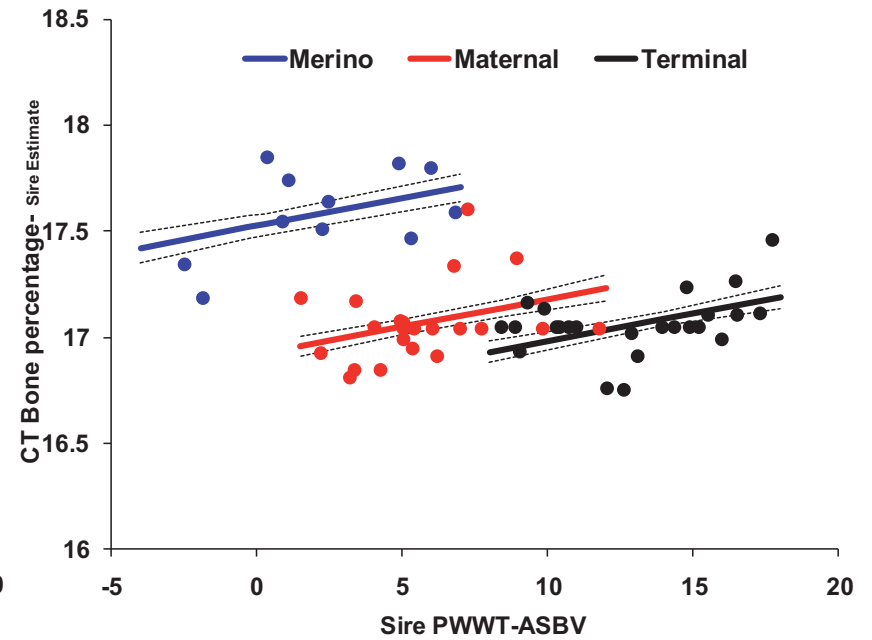
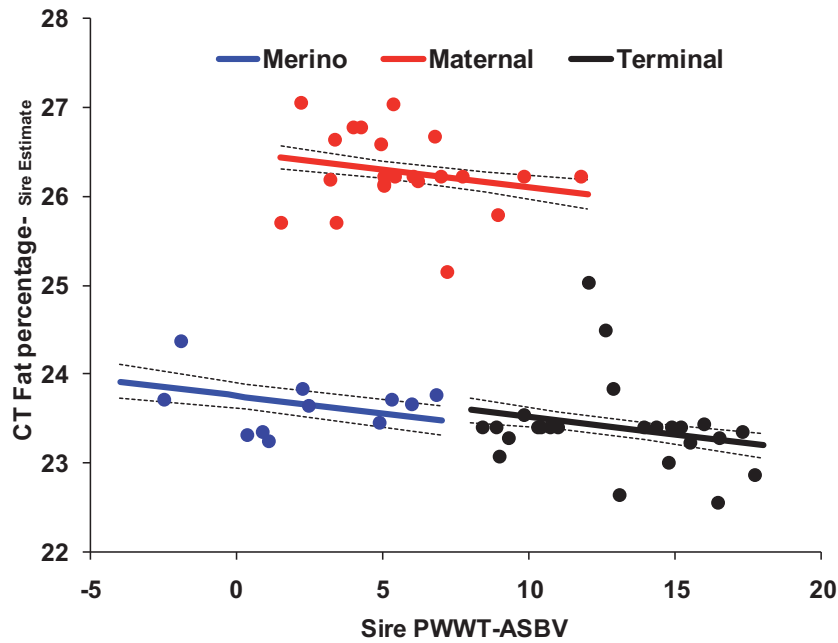
PWWT - They're Heavier!



PWWT - More bone & less fat

CT Fat%

CT Bone%

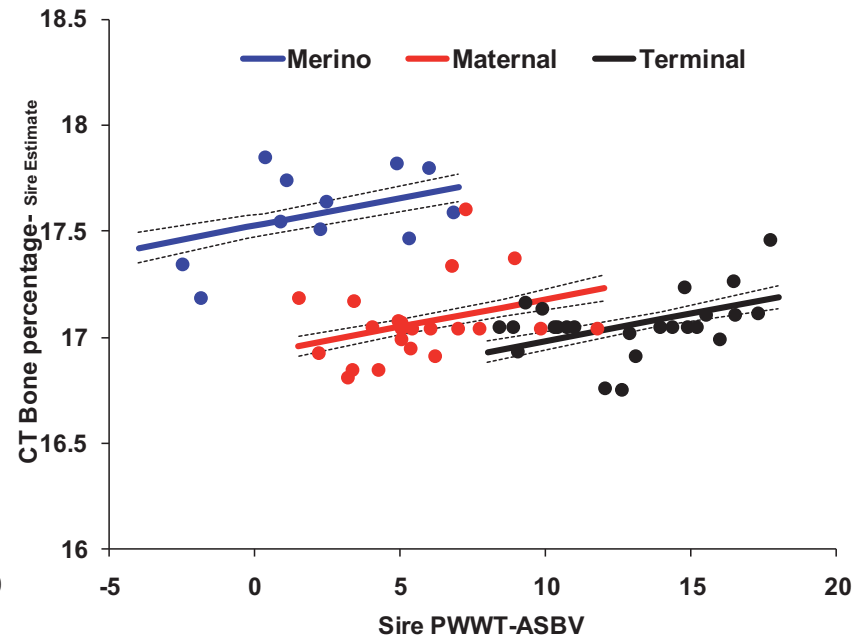
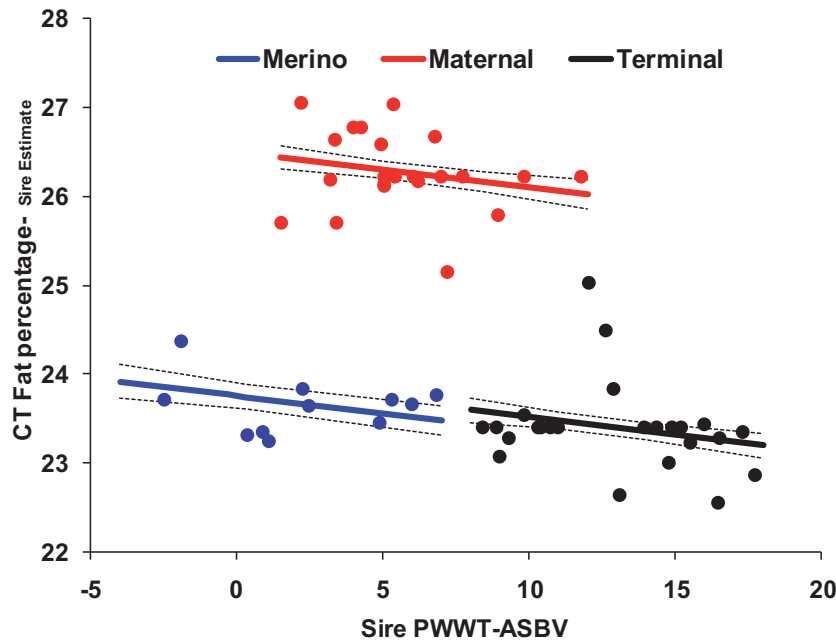


PWWT - More bone & less fat

Targeting a larger mature size?

CT Fat%

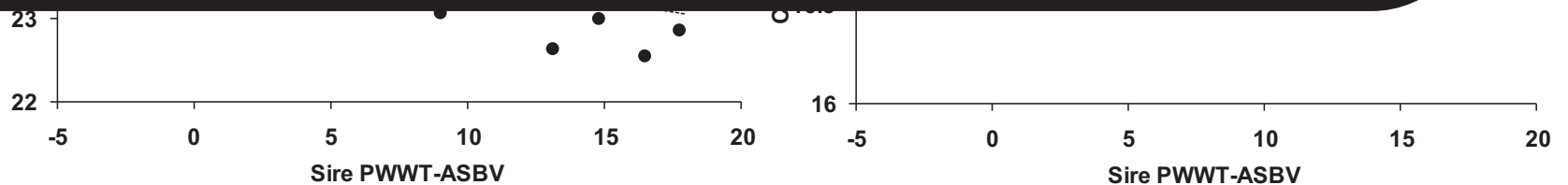
CT Bone%



PWWT - More bone & less fat

Targeting a larger mature size?

But no increase
in LMY%!



Growth is good-

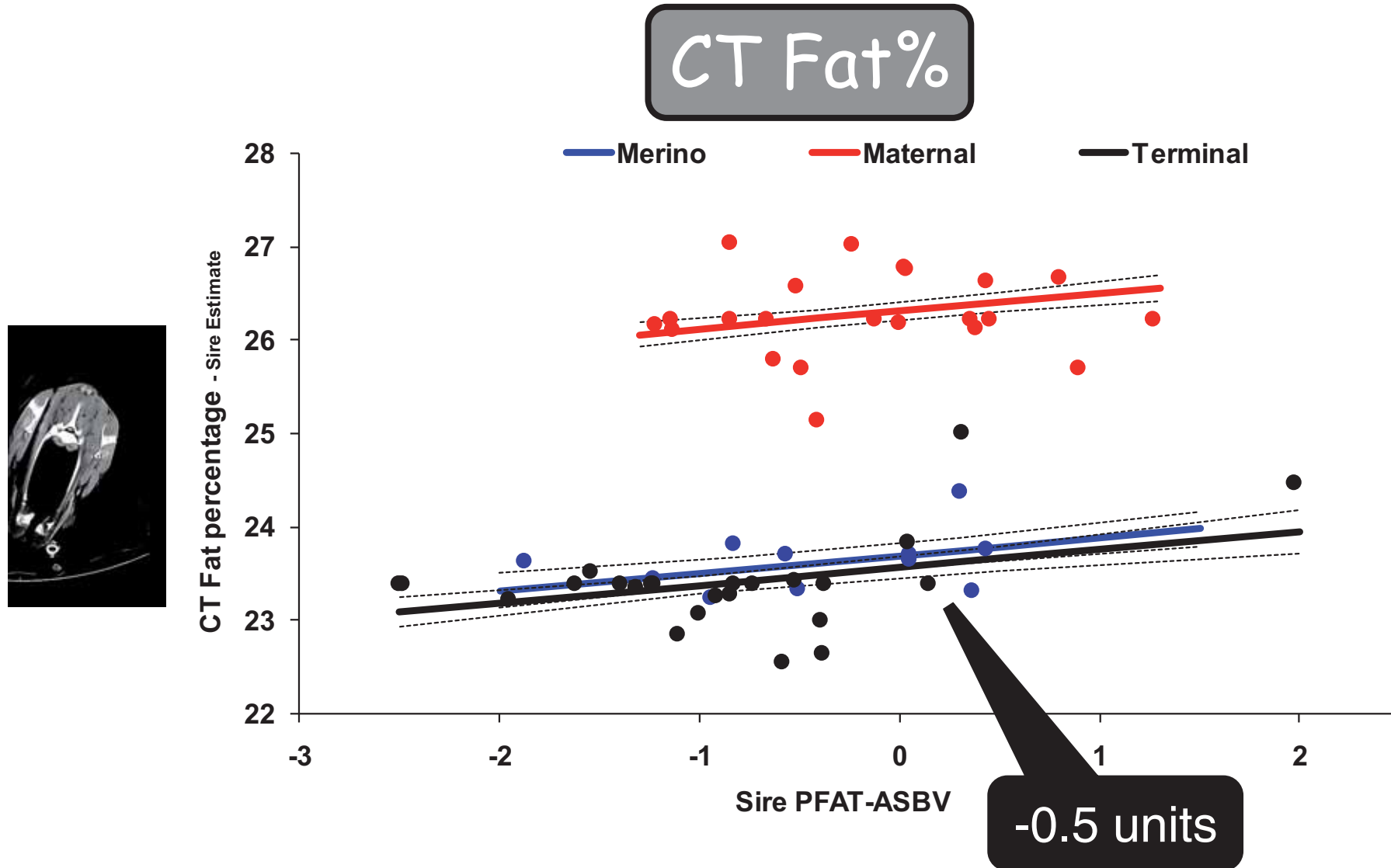
...but watch birth
weight/lambing
ease

PFAT ASBV

PFAT

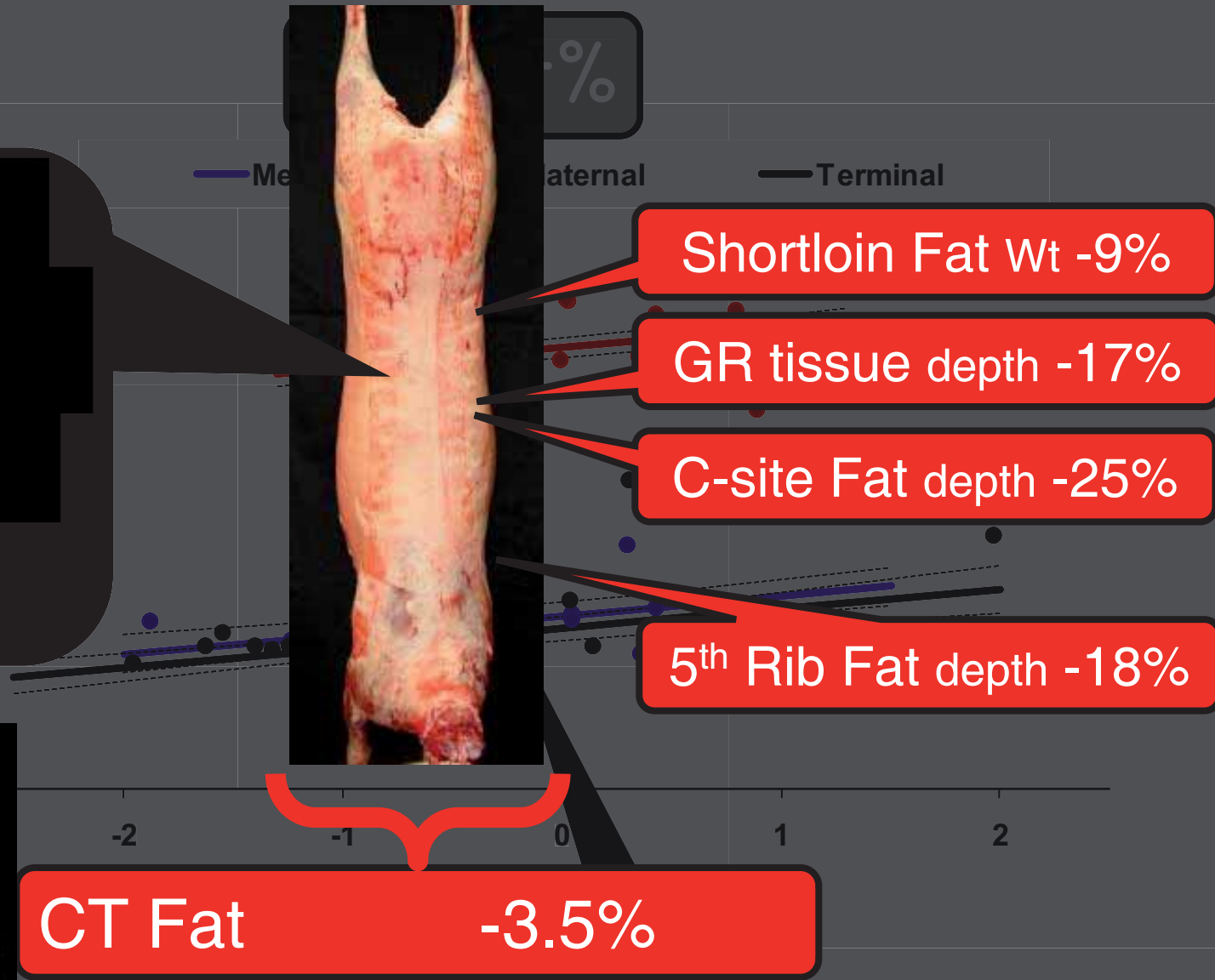
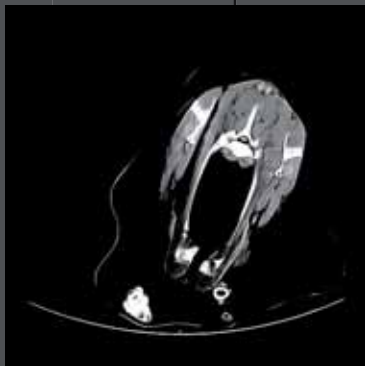
No effect on carcass wt!

PFAT – decreases fat wt



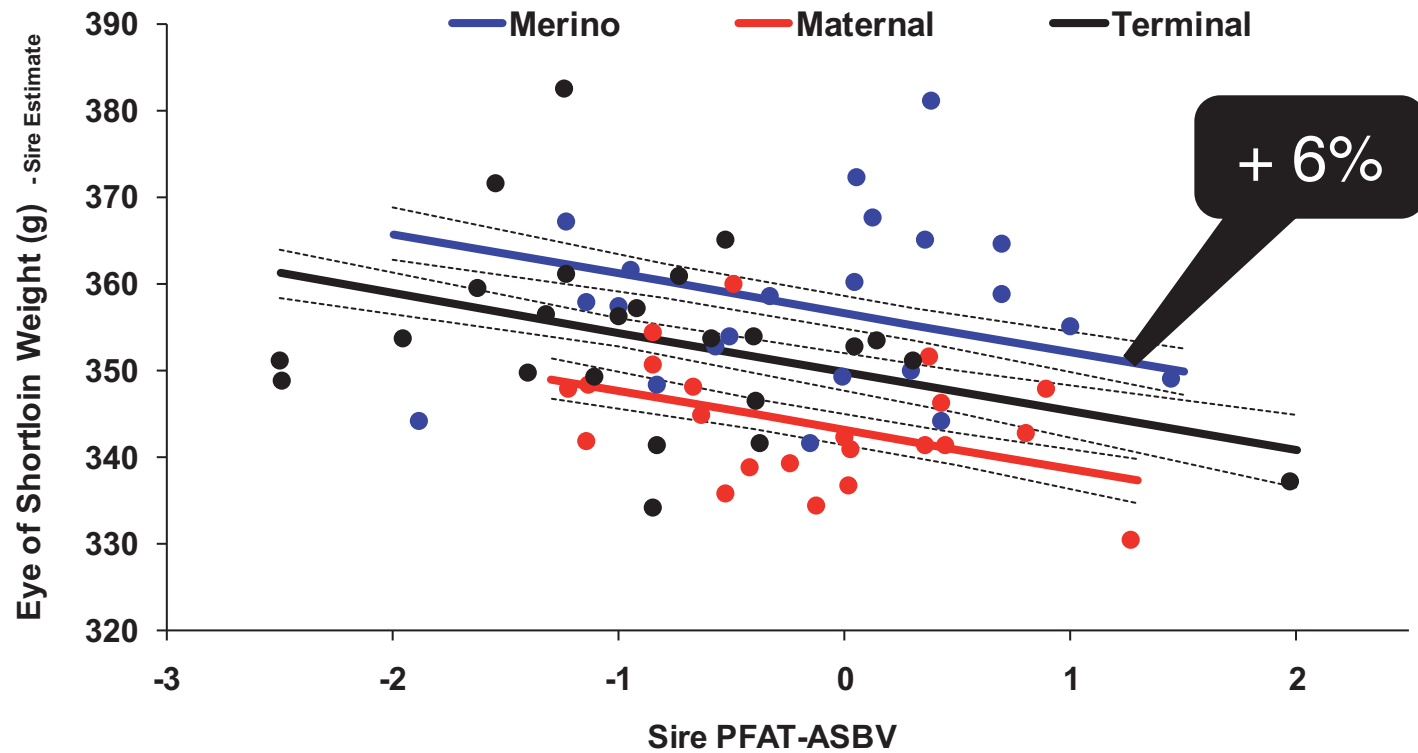
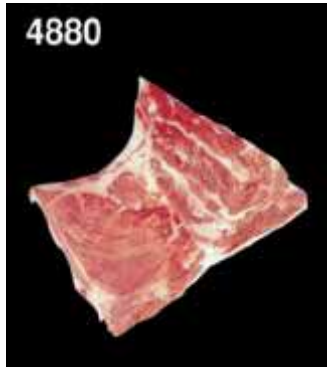
PFAT – decreases fat wt

Effect
focused
on the
loin!



PFAT – increases muscle wt

Loin Weight



PFAT – increases muscle wt

Effect focused on the loin!

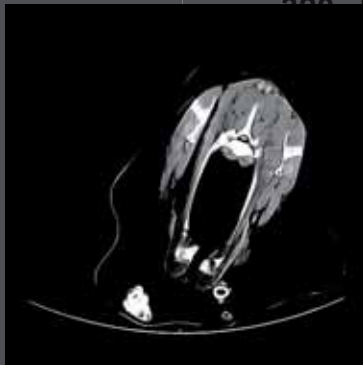


Round Wt +3.5%

Topside Wt +0%

Loin Wt +6%

CT Lean% + 0.31 units

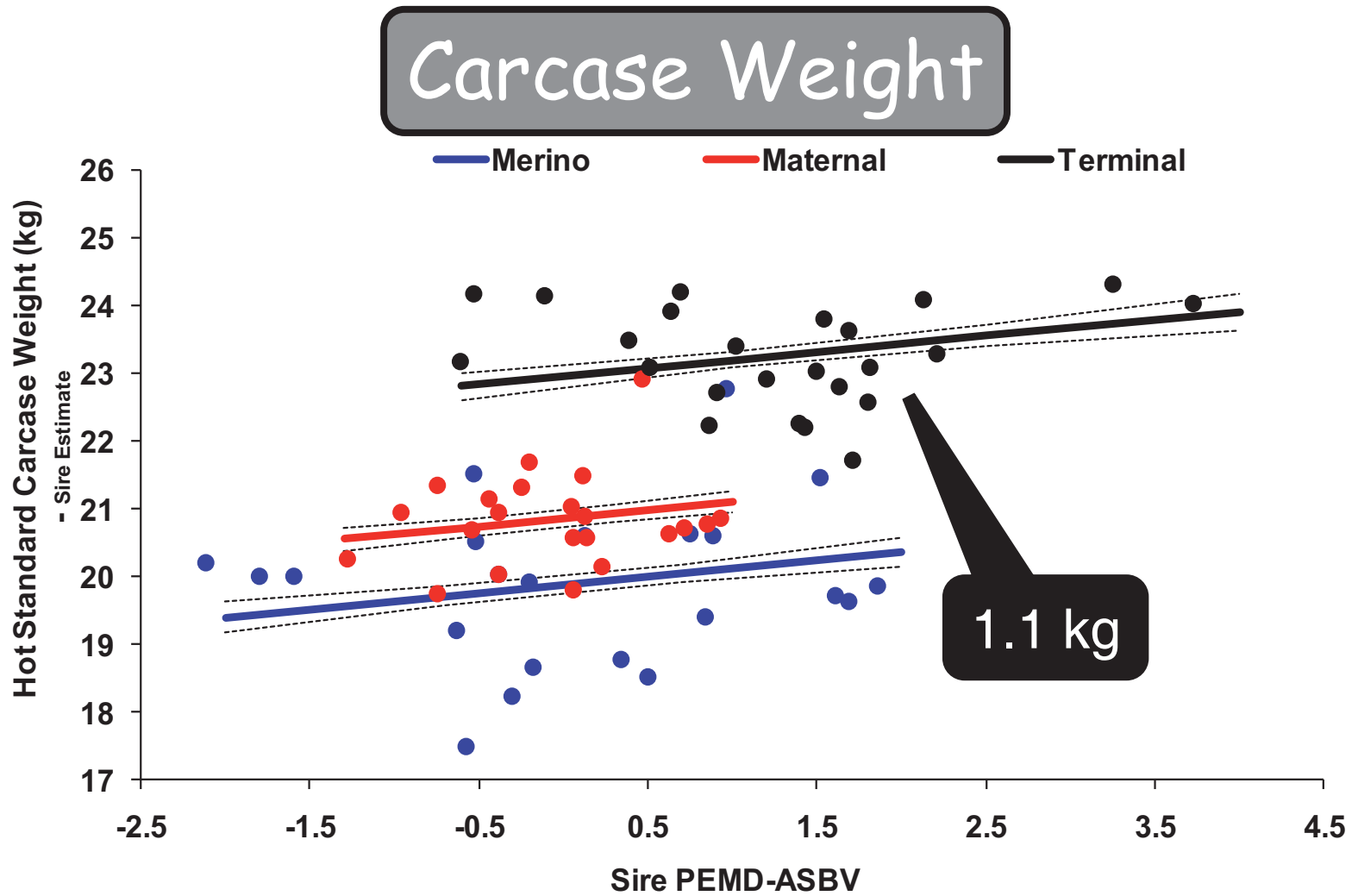


PEMD ASBV

PEMD

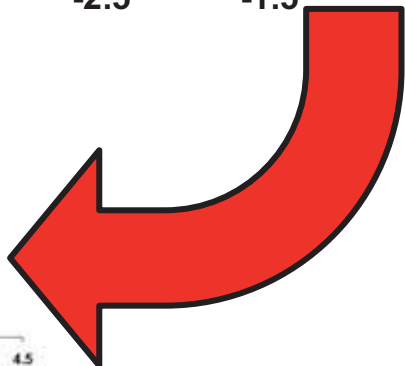
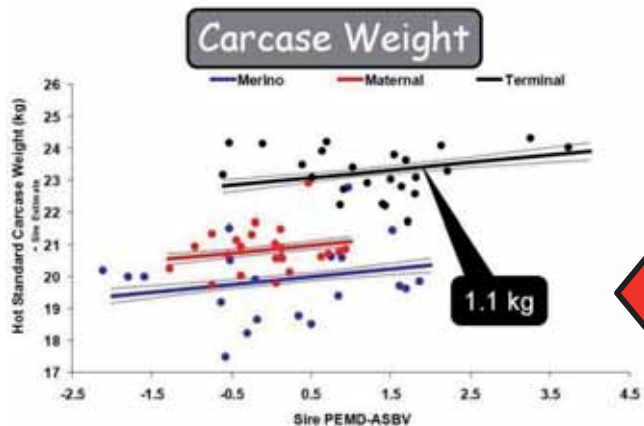
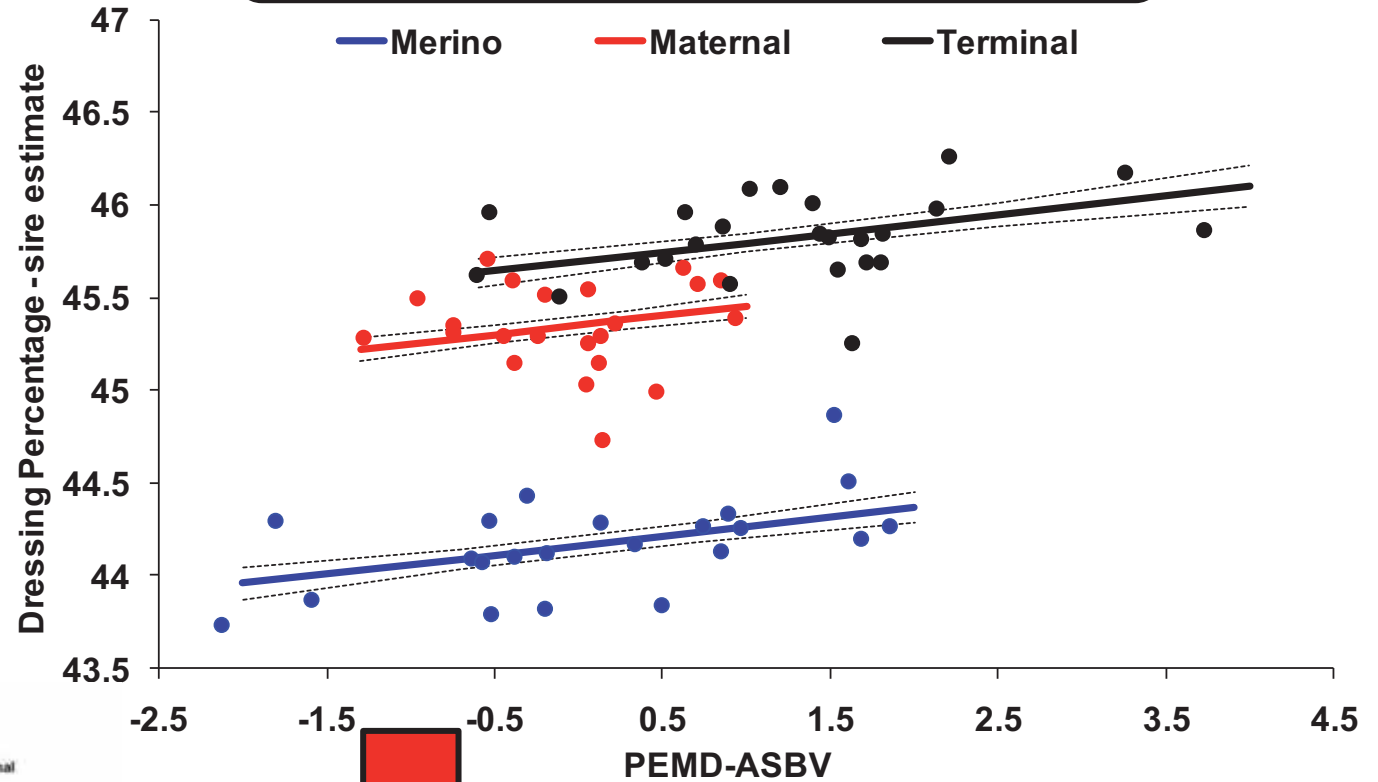
No effect on live wt
at slaughter!

PEMD - They're Heavier!



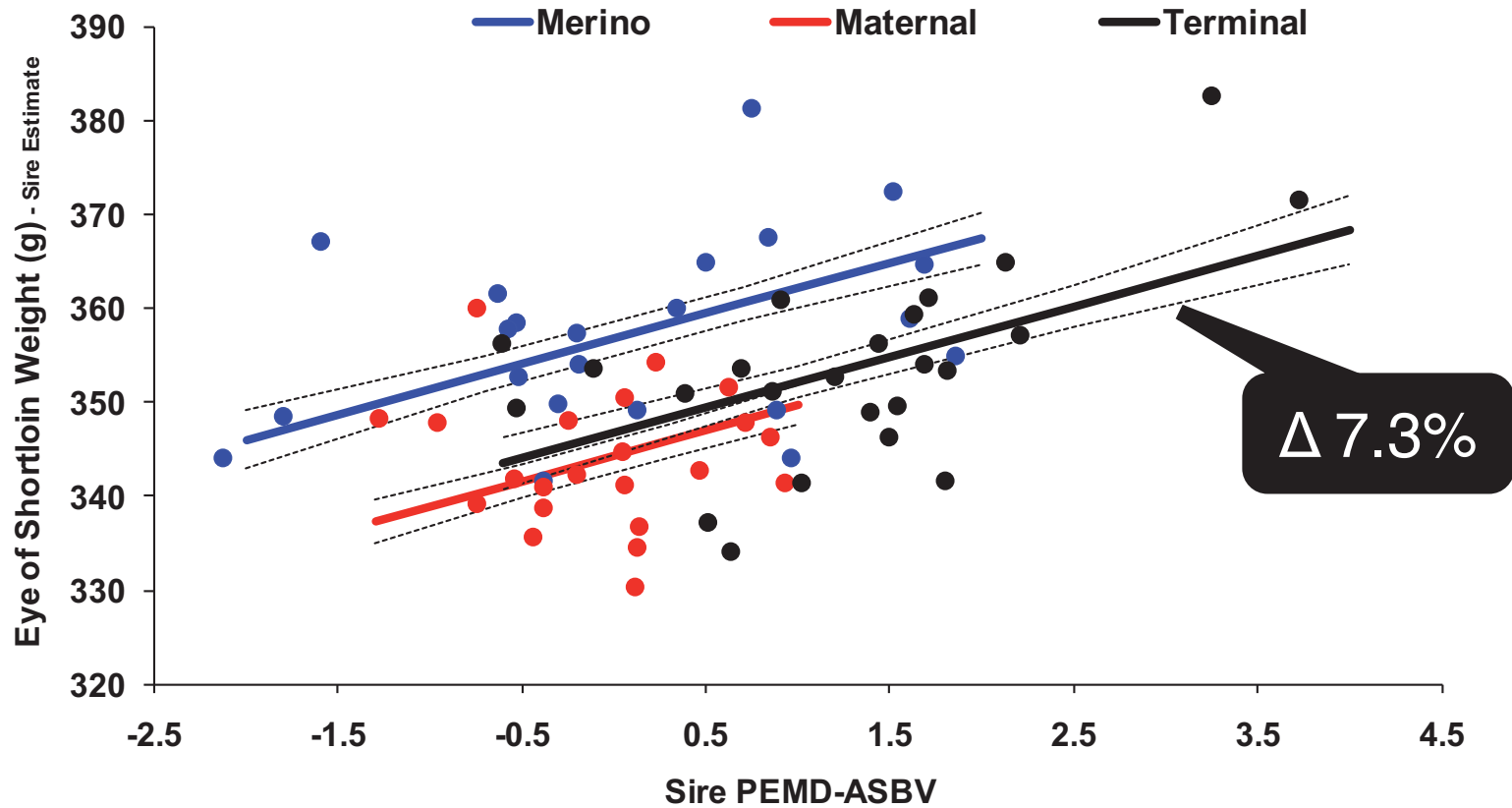
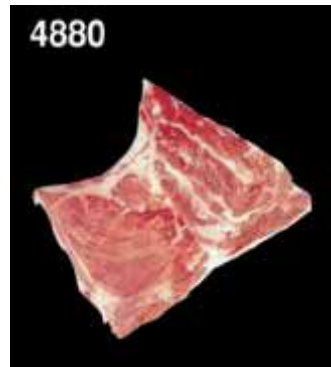
PEMD – They're Heavier!

Dressing Percentage

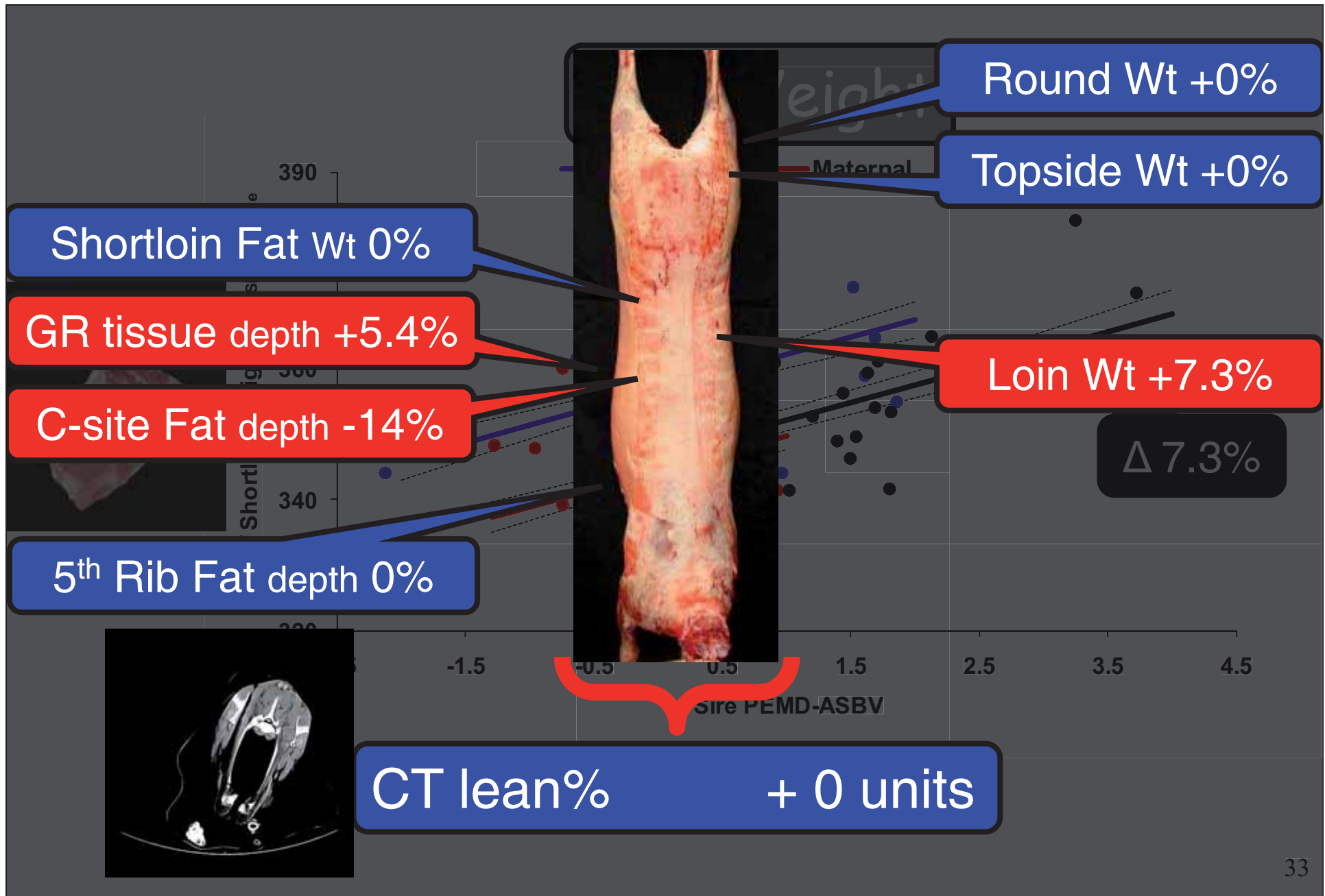


PEMD – increases loin wt

Loin Weight



PEMD – increases loin wt



PEMD – increases loin wt



Round Wt +0%

Topside Wt +0%

**Localised
effect!**

Loin Wt +7.3%

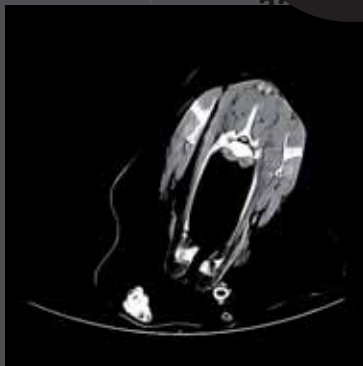
$\Delta 7.3\%$

Shortloin F

GR tissue de

C-site Fat de

5th Rib Fat



-1.5

-0.5

0.5

1.5

2.5

3.5

4.5

Sire PEMD-ASBV

CT lean%

+ 0 units

Carcase Traits Summary!



SHEEP GENETICS AUSTRALIA



- Growth (PWWT)
 - For heavier carcasse
- Reduced fat depth (PFAT)
 - For leaner carcasse
- Eye muscle depth (PEMD)
 - For more muscle where you need it!

All doing their job

Carcase traits

- Maybe consider HQ leg trait

- Heritability

 - Topside wt 0.22

 - Round weight 0.24

Eating quality traits

heritability

- Tenderness (shear force) 0.38
- Intramuscular fat 0.39

INF data – mean intramuscular fat

- Ideal value 4-6%
 - Current average is 4.2% (Xbred lamb)
 - So we are OK but ‘bumping’ toward the bottom end
-

Important correlations - genetic

- LMY vs IMF: - 0.54 □
 - GR fat vs IMF: +0.47 □

 - LMY vs tenderness -0.39 □
 - IMF vs tenderness +0.71 □
-

Eating quality

- There is a clear –ve association between yield and eating quality
- We must measure both and manage
- Bread and butter genetics of course

INF intramuscular fat data says:

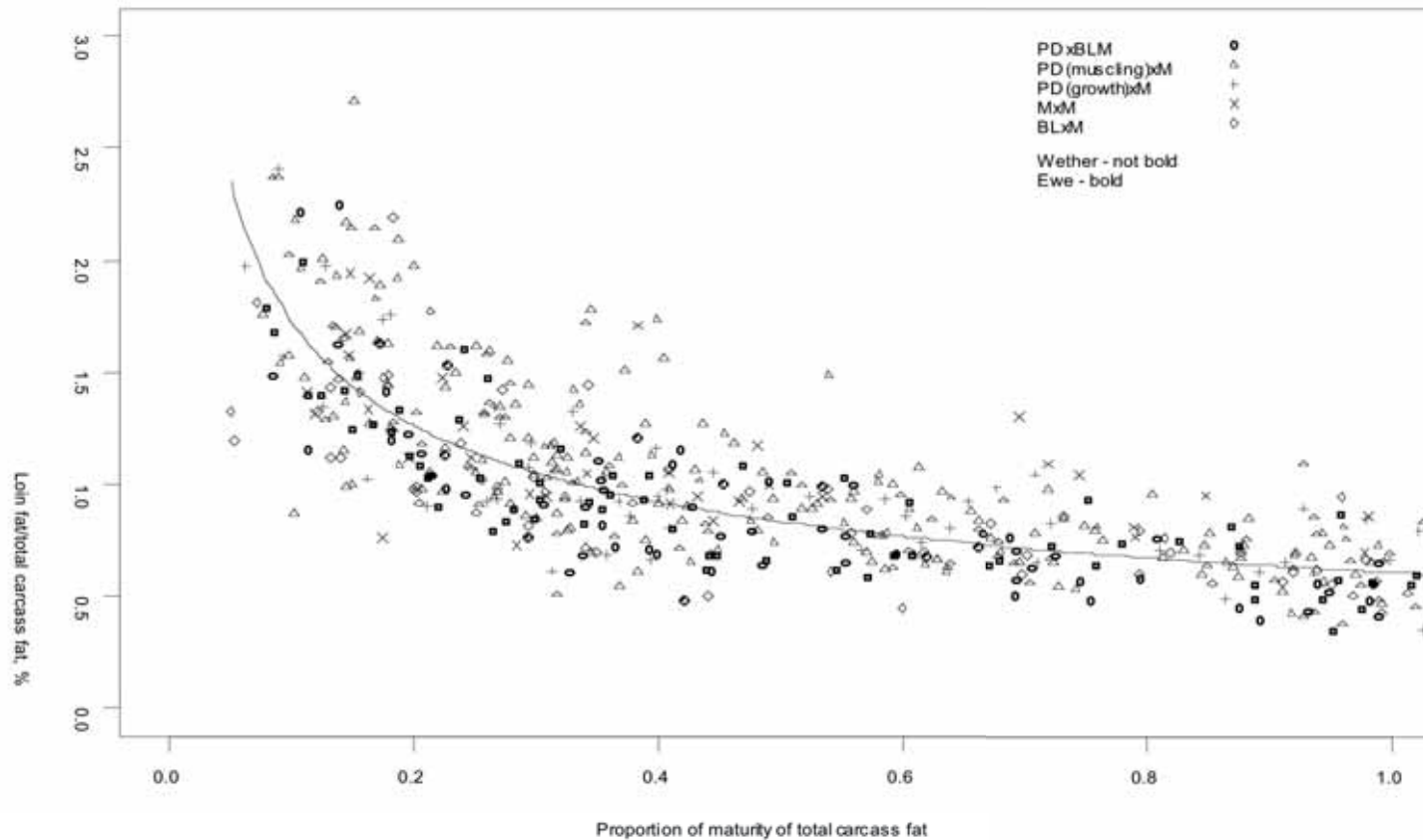
- 3 → 6% IMF
 - Shear force tenderness down by 1 kg
 - This a serious
 - PLUS we know IMF influences flavour – thought to be the key vehicle
 - Flavour a key driver for lamb
-

How does IMF develop ?

IMF is EARLY maturing in lamb !

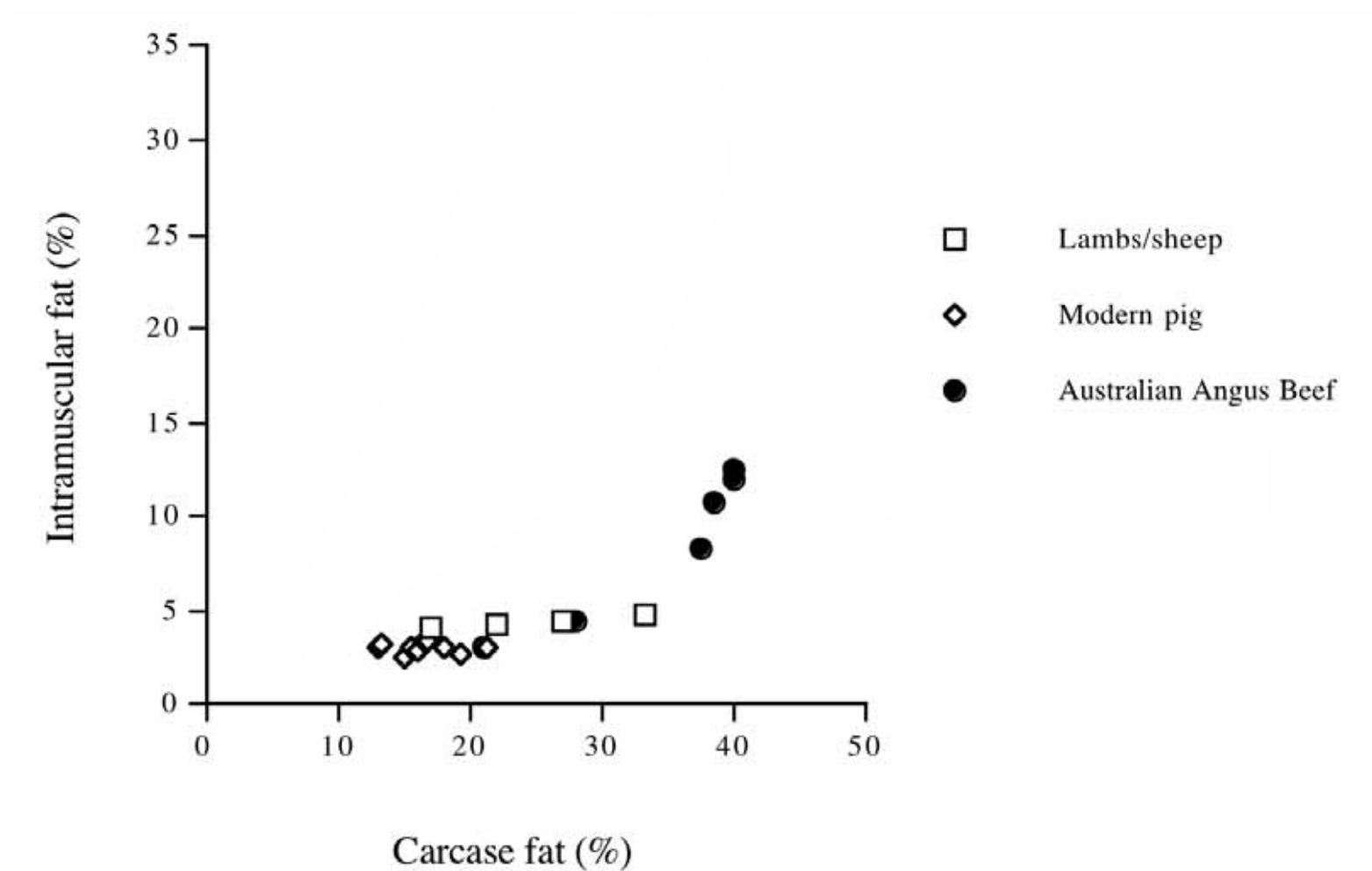
Lambs/young sheep – serial slaughter expt

(n=665 loins, McPhee et al. 2007)



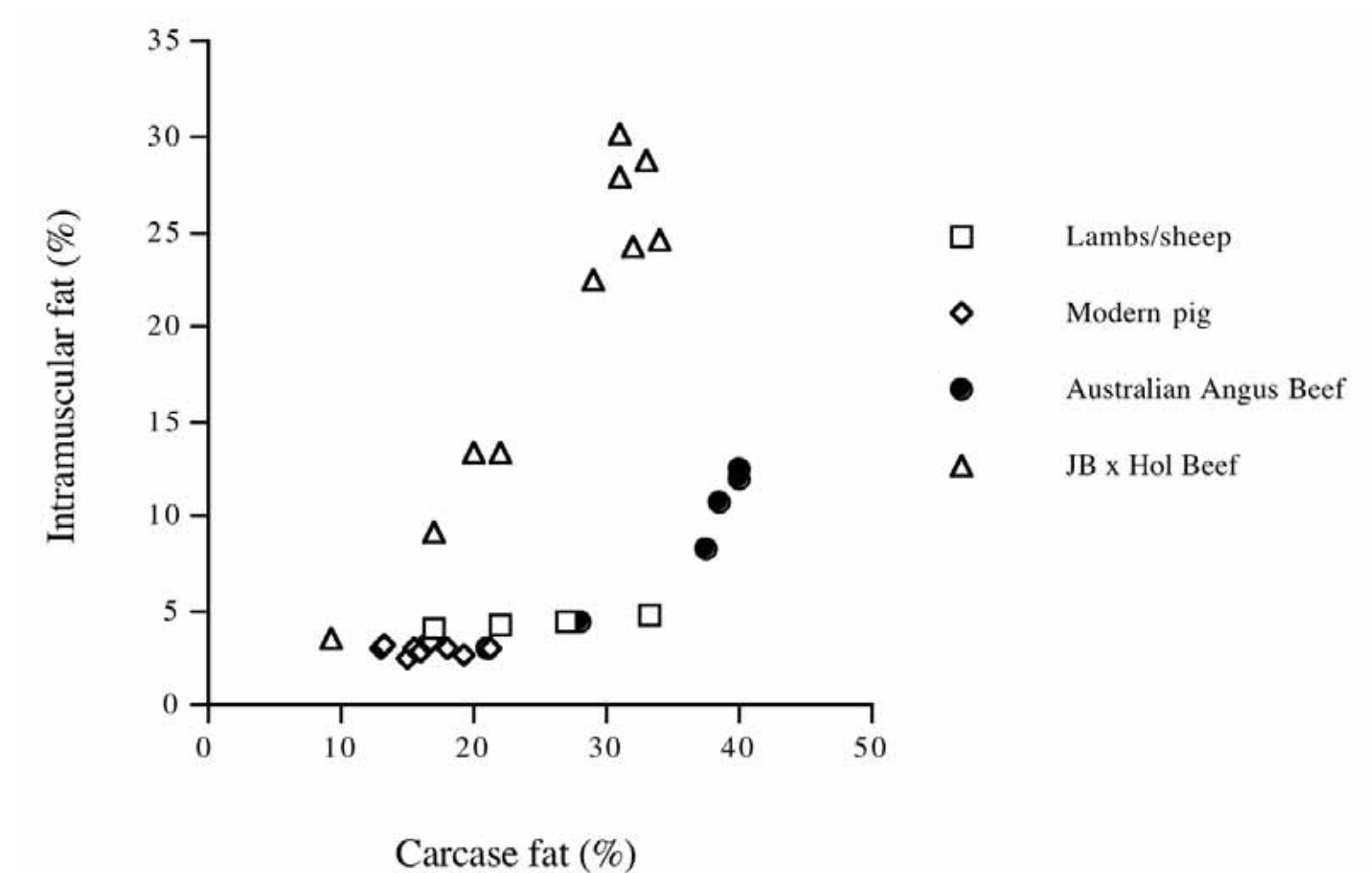
Marbling or IMF

Livestock must be very fat to promote marbling



Marbling or IMF

Genetics can change this !

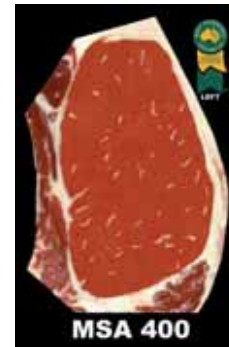
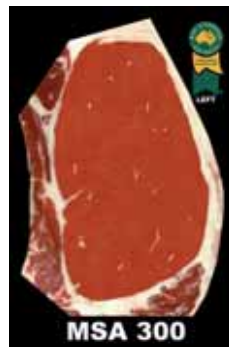


Quick reality check



4* cuts in moderate carcass wt beef

- Optimal processing ✓
- No hormones ✓
- Get'em young (< about 140 oss = 18-24 months) ✓
- Have just enough marble = solid score 1 (4-6% IMF) ✓



The plan is to evolve an MSA Mark II

- Evolve a new predictive MSA lamb model
 - Incorporating new genetic and non genetic effects
 - Manage yield and eating quality
-

MSA Mark II

- Still not possible to 'grade' every lamb carcass (i.e. to get a marble score)
 - So the cheapest and simplest option is to use genetics to underpin the eating quality
 - This could be used on a 'mob' basis
-

MSA Mark II

Suggest it will use eating quality genetics

- Loin shear force and consumer scores
 - Loin intramuscular fat
 - Topside tenderness and consumer scores
 - Flavour genetics and consumer scores
-

MSA Mark II

In other words EQ claims will in part relate to the sires used



MSA Lamb mark II

Grade cuts into:

- 2* - unsatisfactory
 - 3* - Good every day
 - 4* - Better than every day
 - 5* - Premium
-

Willingness to pay data

(Price relative to 3*, n = number consumers)

| | <i>n</i> | Ungrade | 3* | 4* | 5* |
|------|----------|---------|------|------|------|
| Mean | 1,858 | 49% | 100% | 147% | 200% |

Australian consumers - lamb

Preliminary EQ data – sire solutions for tenderness and overall liking

- MLA and CRC have finished consumer testing the loin (high quality) and topside (lowest quality) from 740 INF lambs:
- The sire solutions suggest about 10 points variation
- This variation maybe be enough to underpin
 - A 4 vs 5 star loin grill
 - A fail versus 3 vs 4 star topside grill
 - Depending on sire used
- A further 940 lambs will be tested in 2011

New directions – next steps

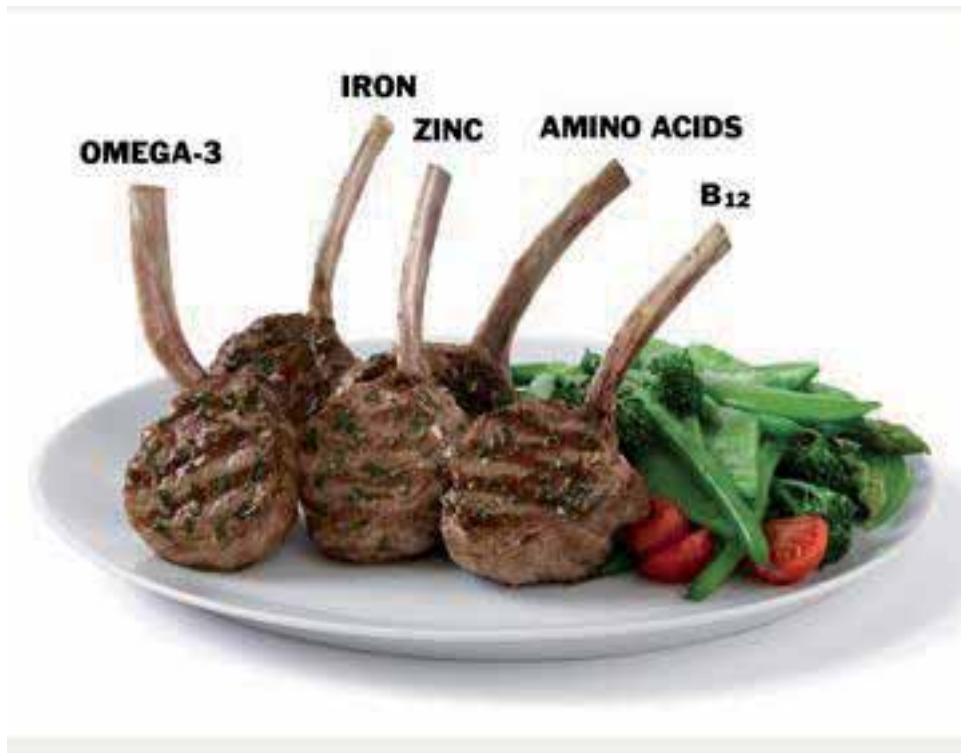
FIRST

- Calibrate our new meat science data against consumers
- Including understanding of how to get a tender topside

THEN

- Use ‘bread and butter genetics’ = LAMBPLAN™ to manage the eating quality with lean meat yield
 - Plus deliver MSA mark II
-

National and International campaign



Human health - heritabilities

- Minerals – Iron, Zinc

- ✓ Myoglobin (red meat Fe) 0.22

- ✓ Zinc 0.21

- Omega 3 fatty acids

- ✓ 3 key fatty acids 0.25-0.37

We can clearly manage these as well

Conclusions - LMY

- Still a very important trait
 - Important consumer trait
 - ✓ Growth
 - ✓ Muscle
 - ✓ Fat
 - ✓ Dressing %
-

But now can balance this with

- Eating quality
 - Human health
-

Outcomes

- Improve product quality
- Increase efficiency of production
- Improve TOTAL consumer appeal

Position AUS lamb as premier meat on Planet!

THE END
