



The Genetic way forward

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The "Genetic Resource" of a lifetime

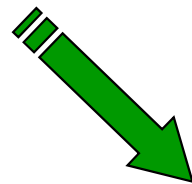


Breeding the right lamb every time

Put them
on the
ground....



Make
sure they
live....



Make
them
grow...



Make sure
they eat OK!



Get the
carcase right
and high
yields



Breeding the right lamb every time

NLB NLW
SC



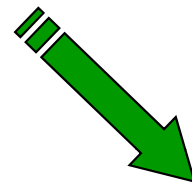
BWT
LE
GL
Lamb Sur
WEC



IMF
Shear Force
FE, ZN, Om 3



PFAT
PEMD
Dr%
SLY%
Ph
Colour



WWT
MWWT
PWT



What will we find?

- We can manage and choose our genetic direction
 - Every trait will have reasonable genetic range (25%)
 - ASBVs will be the only way to manage these traits
 - Genetics and management systems will be redesigned
- Market signals will likely be limited initially
 - but this didn't stop breeding for reduced fat and increased yield
 - role of leading breeders is pivotal



Sire Selection thus far

- Diversity
- High industry usage/footprint
- Key traits



Breed Makeup per year

- Merino (all types and styles)
- Maternal
 - Coop, Corriedale, Samm, Dohne and BL
- Terminal
 - Suffolk, Texel, Poll Dorset and White Suffolk



Where are we today

- Have approximately 280 rams with progeny with full phenotype, wool and carcass measurements
- Have data from 2007 and 2008 for eating quality on 190 sires
- In 2010 will be sampling 1000 lambs for loin and topside for consumer eating quality
 - What the relationship between traits that we measure in a lab and what people think?



Without the Sheep CRC (the head in the sand approach)



- Without knowledge we would be.....
 - Increasing birth weight and lambing ease
 - Getting sheep bigger
 - Reducing fat
 - Reducing IMF
 - Increasing shear force
 - Reducing eating quality
 - Reducing FE and ZN
 - Reducing SS



Whats new from the Sheep CRC (a snapshot...of a lot of things)

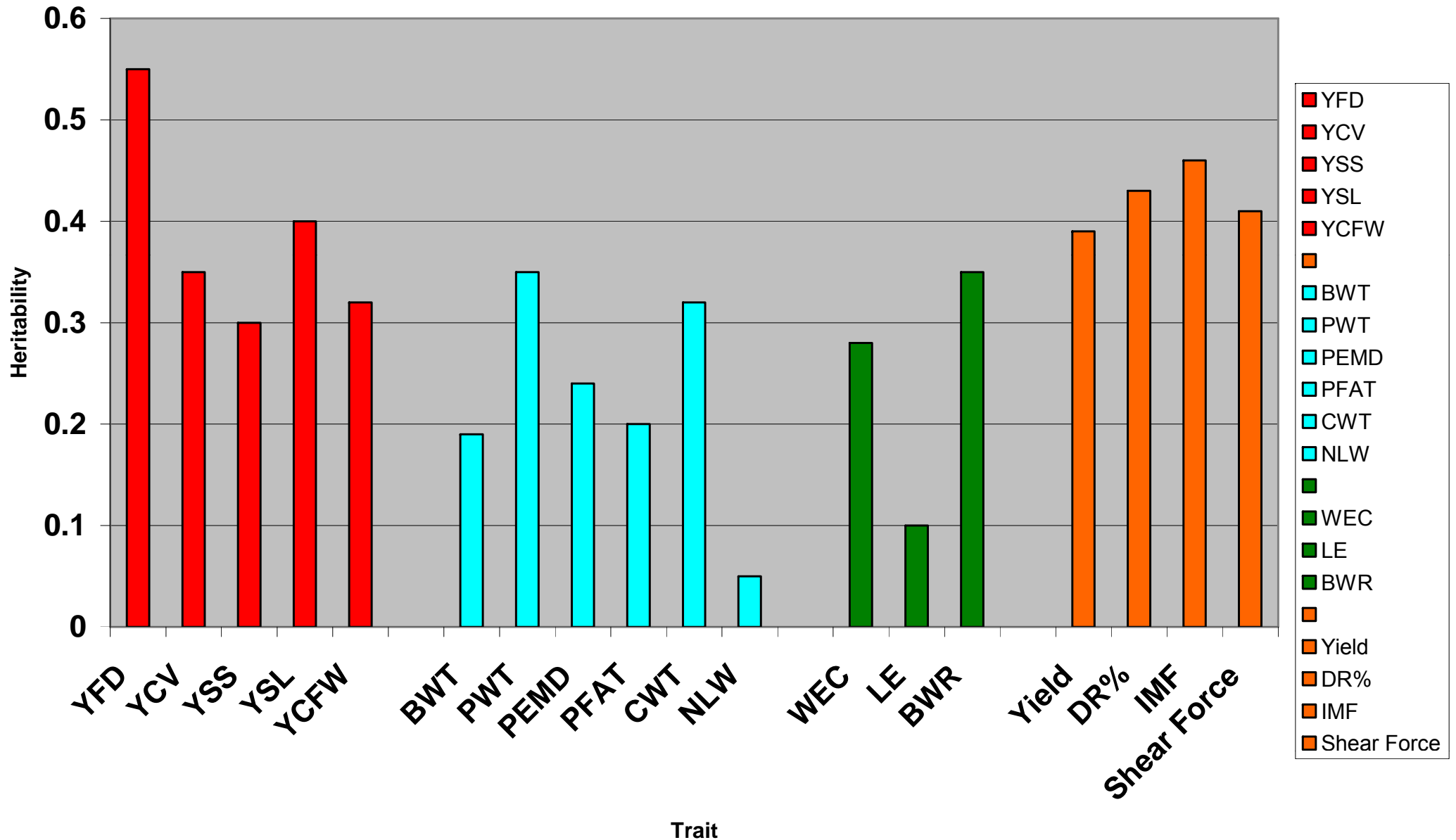


- Lambing Ease (LE)
- Muscle, Worms (WEC) and Staple Strength (SS)
- Dressing % (DR%), intramuscular fat (IMF) and shear force
- A little on wool.....



Heritability of Meat and Wool Traits

Heritability of Traits important to the Sheep Industry



The Key are the correlations



- Most traits are likely to be correlated to other traits...rare that they are not
- We are changing the “non visable” traits every time we make selections
- It is really nice to find favourable ones
- It is not nice to find unfavourable ones
- In most cases the correlations are manageable



Lambing Ease

- You can lose both the ewe and the lamb and that is one of the major drivers of lost profit
- Dystocia is one of the causes of difficult births, i.e. lamb is too big for pelvic area
- Birth Weight correlated with lambing ease.
- However, there are other significant factors such as shape of shoulders, pelvic shape/area and lambing “will”.

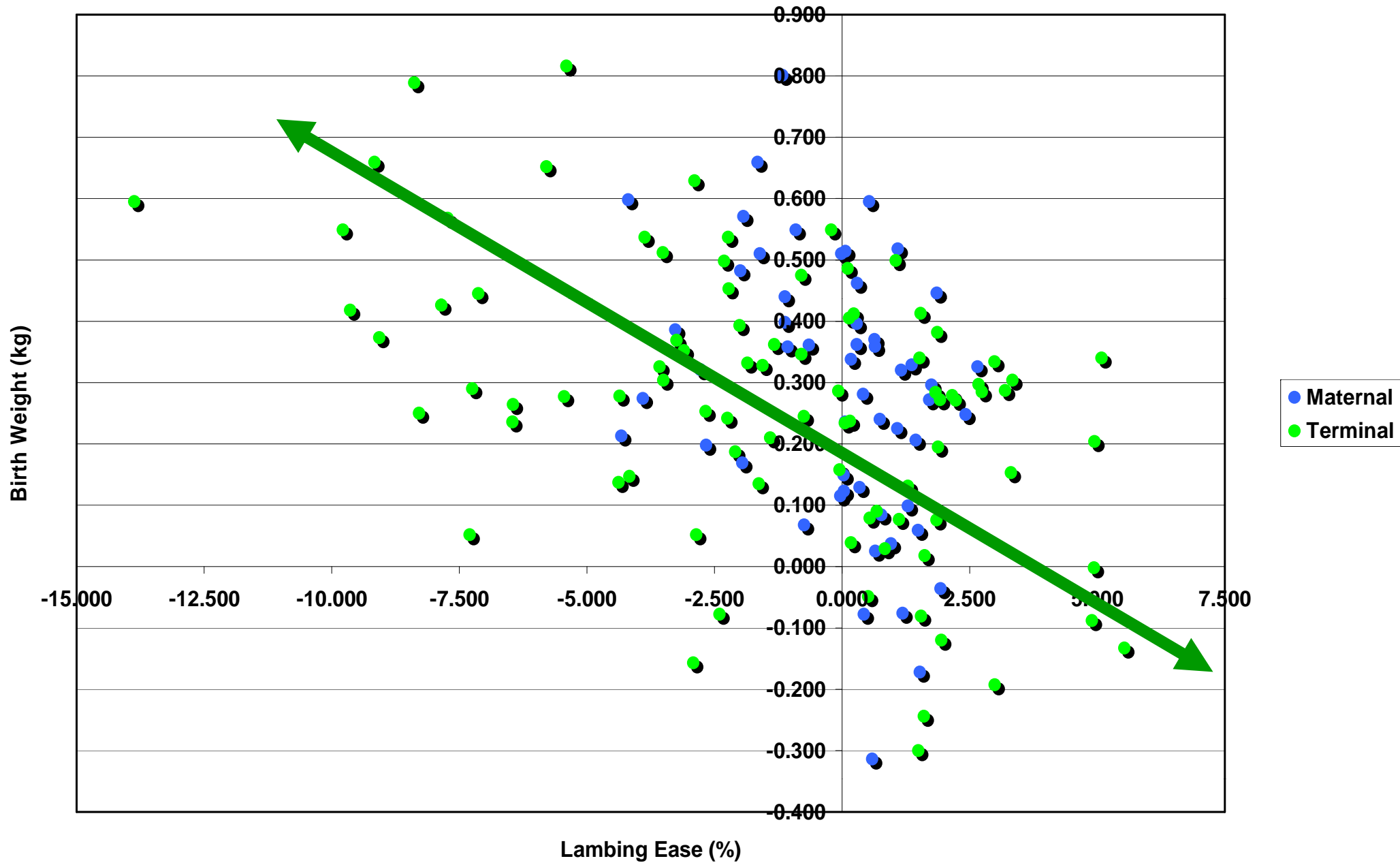


Heritability and fixed effects

- Lambing Ease h^2 0.10
- Lambing Ease m^2 0.06
- Low heritability, therefore hard to make progress without ASBVs
- Genetic effects are large...eg male vs female is 2%



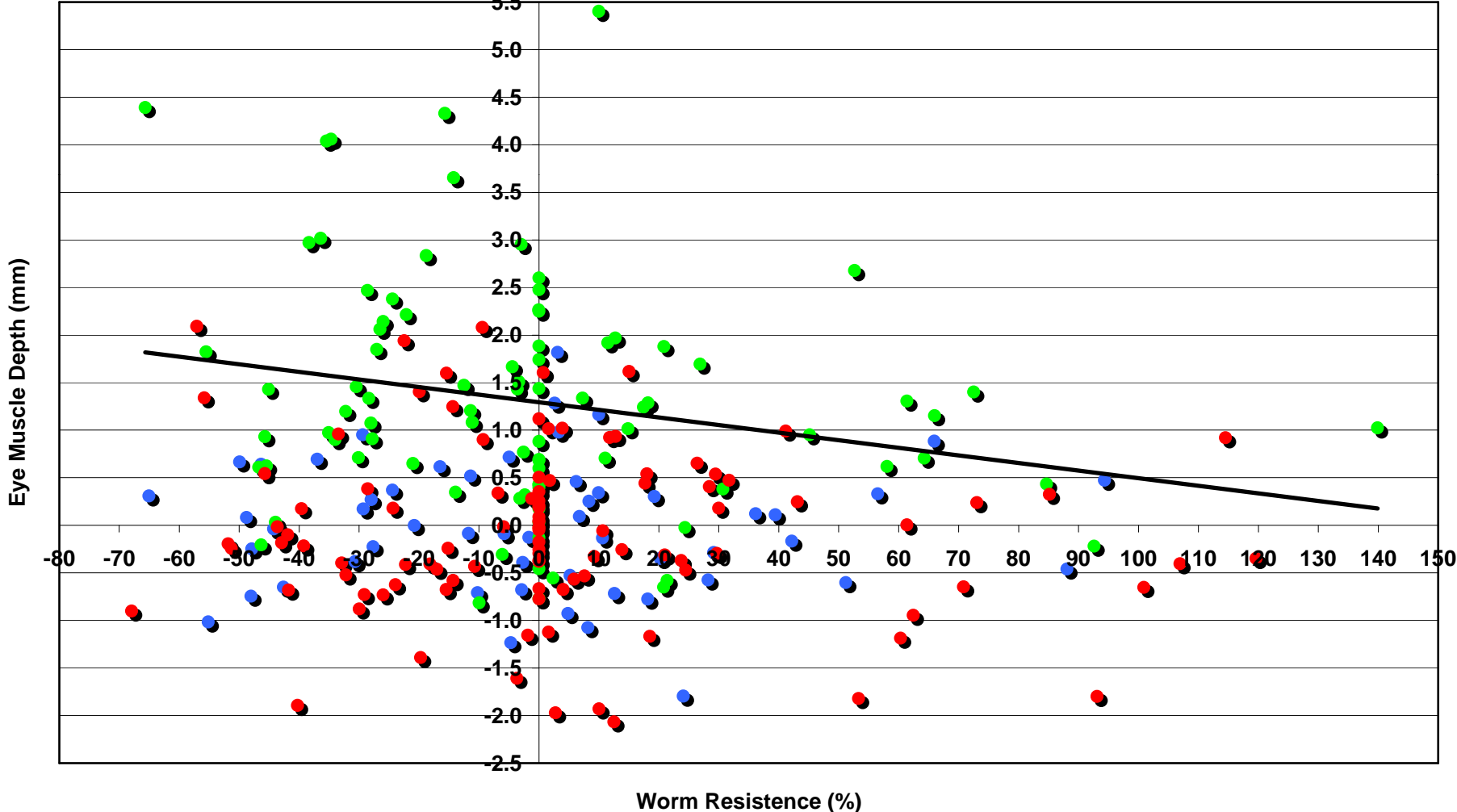
Birth Weight vs Lambing Ease



Worms and Meat

Eye muscle Depth vs Worm Resistance

● Maternal ● Terminal ● Merino — Linear (Terminal)



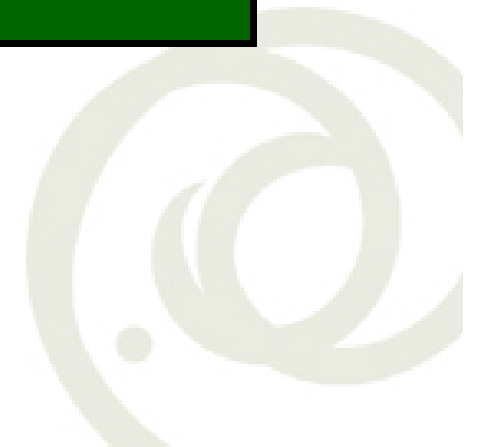
New Meat Traits (Still in R&D)



Trait	H ²	Breed Effects	Sire Effects	Merino
Yield	Mod	*	***	1% Higher
Toughness Shear Force	High	*	***	Higher
Colour	Mod	*	***	Darker
Dress %	High	*	***	Lower
IMF	High	**	***	Higher

Genetic Correlations

Trait	EMA	LMY	DR%	IMF
LMY	0.38			
DR%	0.65	0		
IMF	0	-0.5	0	
Shear	0.22	0.34	0	-0.71



Lean meat yield – Less fat!



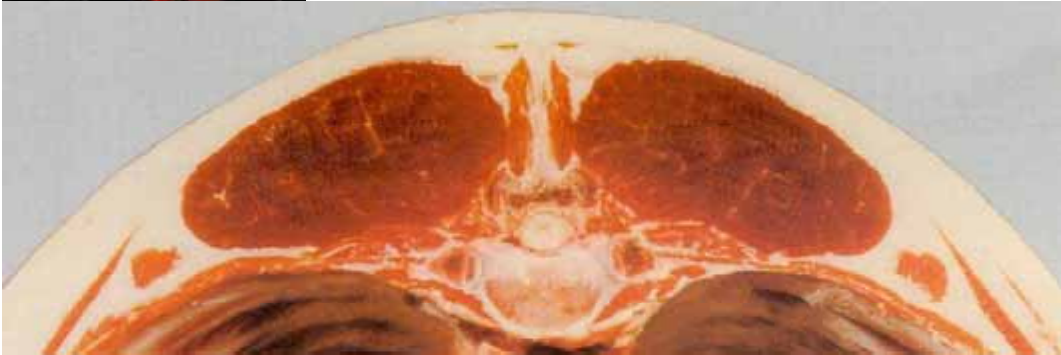
Score 4

Carcase Wt 22 kg
GR 20.0 mm
Fat Score 4

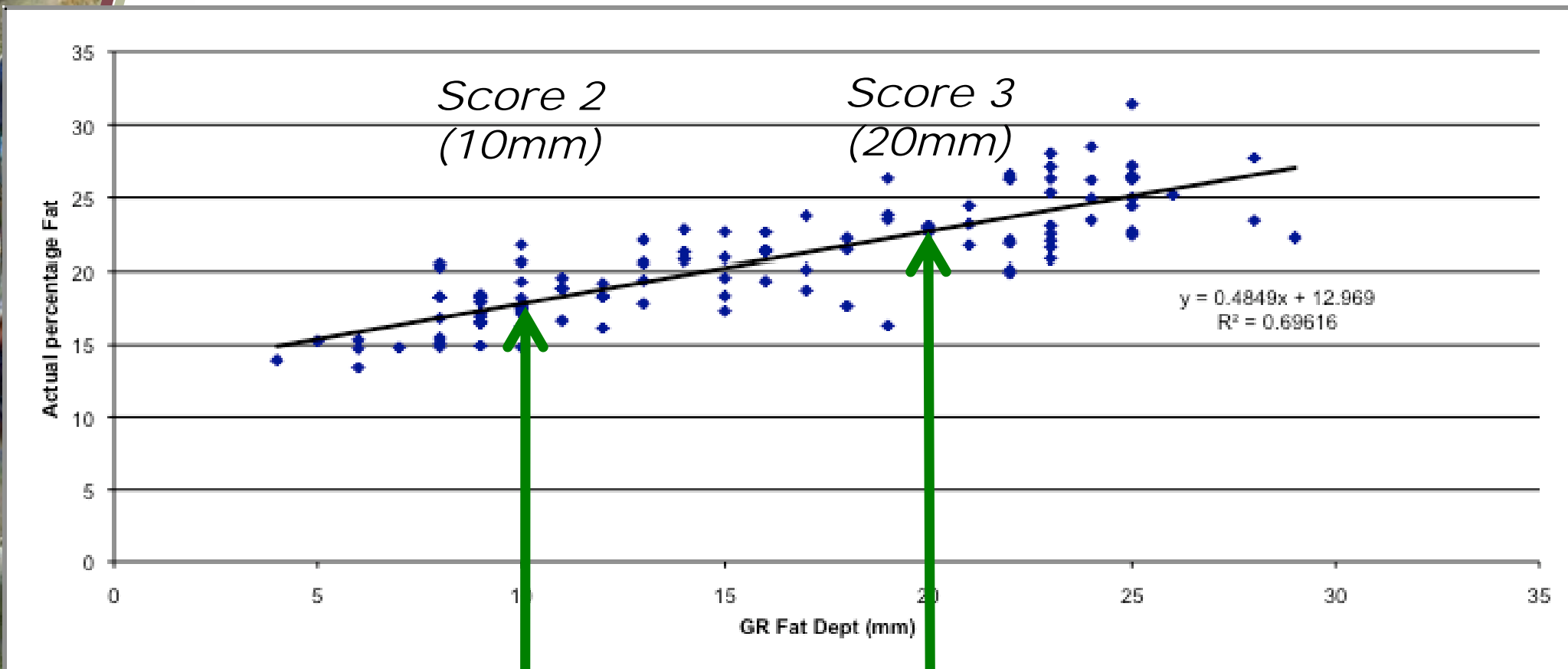


Score 2

Carcase Wt 22 kg
GR 10.0 mm
Fat Score 2



Lean meat yield – Less fat = more meat!



At 22kg HCW = 1.2kg fat = waste



This fat is wasteful for ALL

- Little return on fat for processor
- Extra cost of trim = labour
- Extra feed cost to producer



This fat is wasteful for ALL

- Little return on fat for processor
- Extra cost of trim = labour
- Extra feed cost to producer
 - Assume feed lamb from 35kg to 50 kg
 - Score 4 - FCR 6 out to 7/8
 - Score 2 - FCR 5 out to 6
 - Score 4 lamb needs about 20kg EXTRA FEED

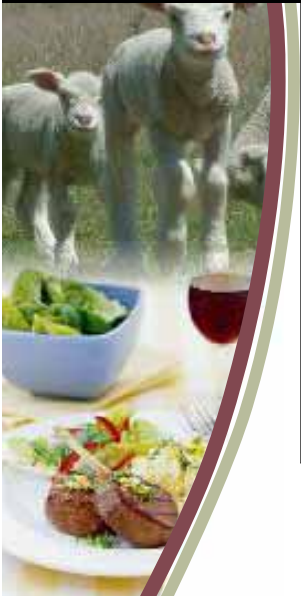
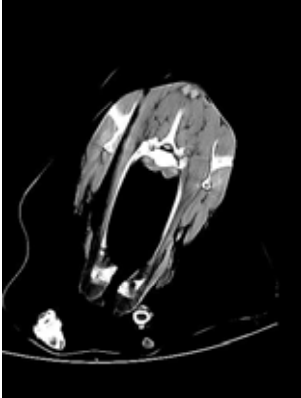
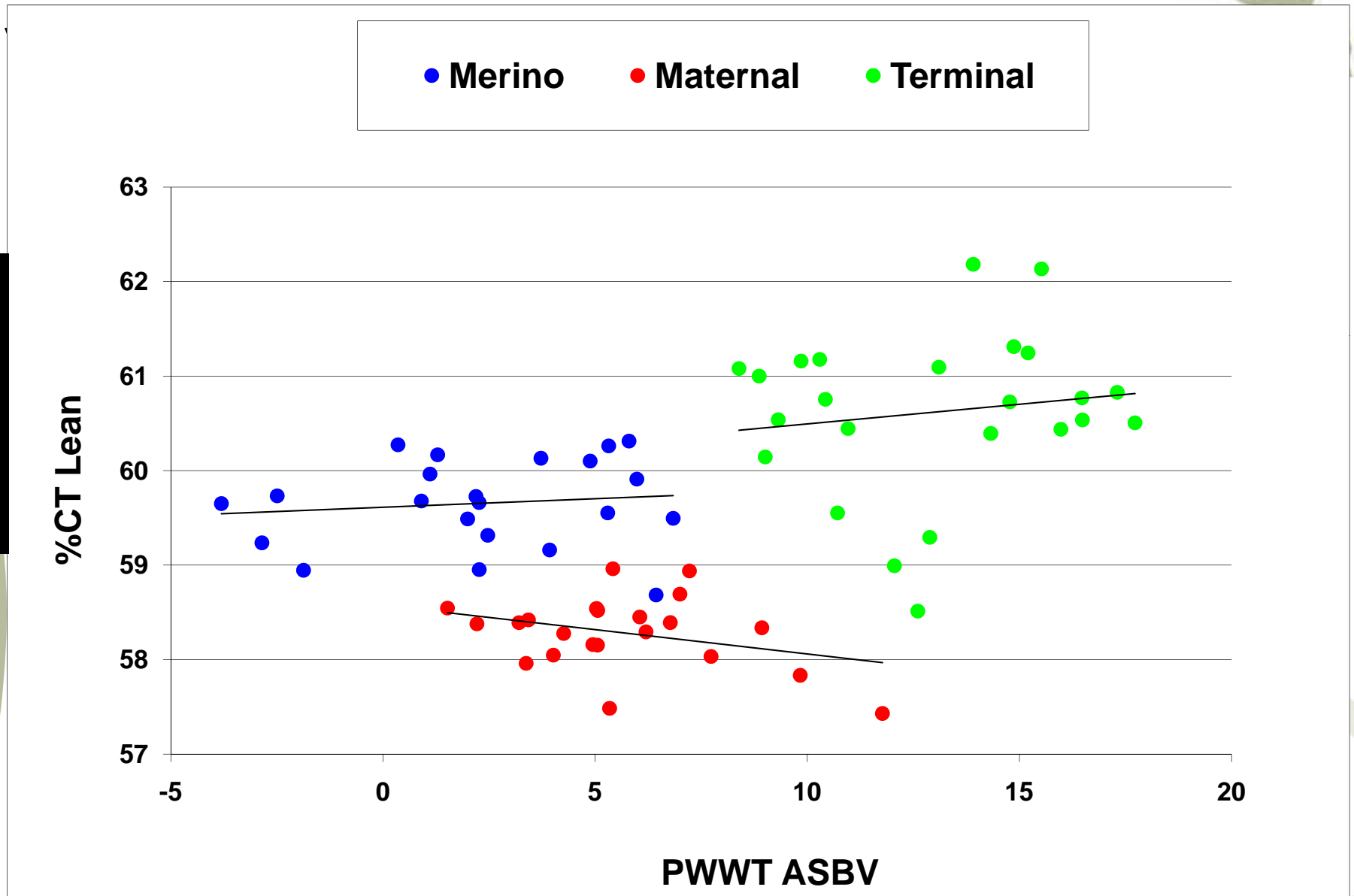


So which breeding values deliver fat/muscle?

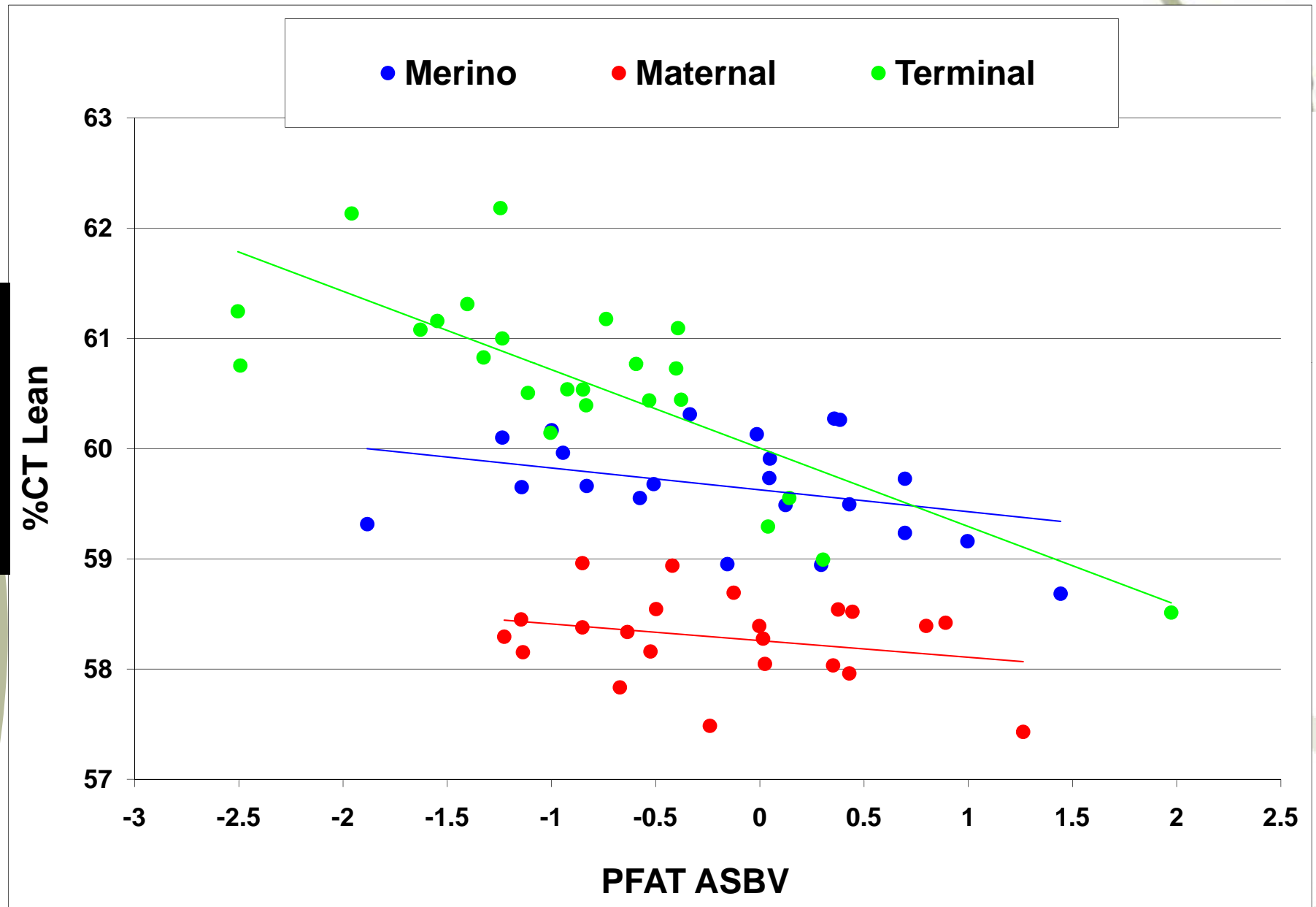
Yield = % meat



Does PWWT alone deliver



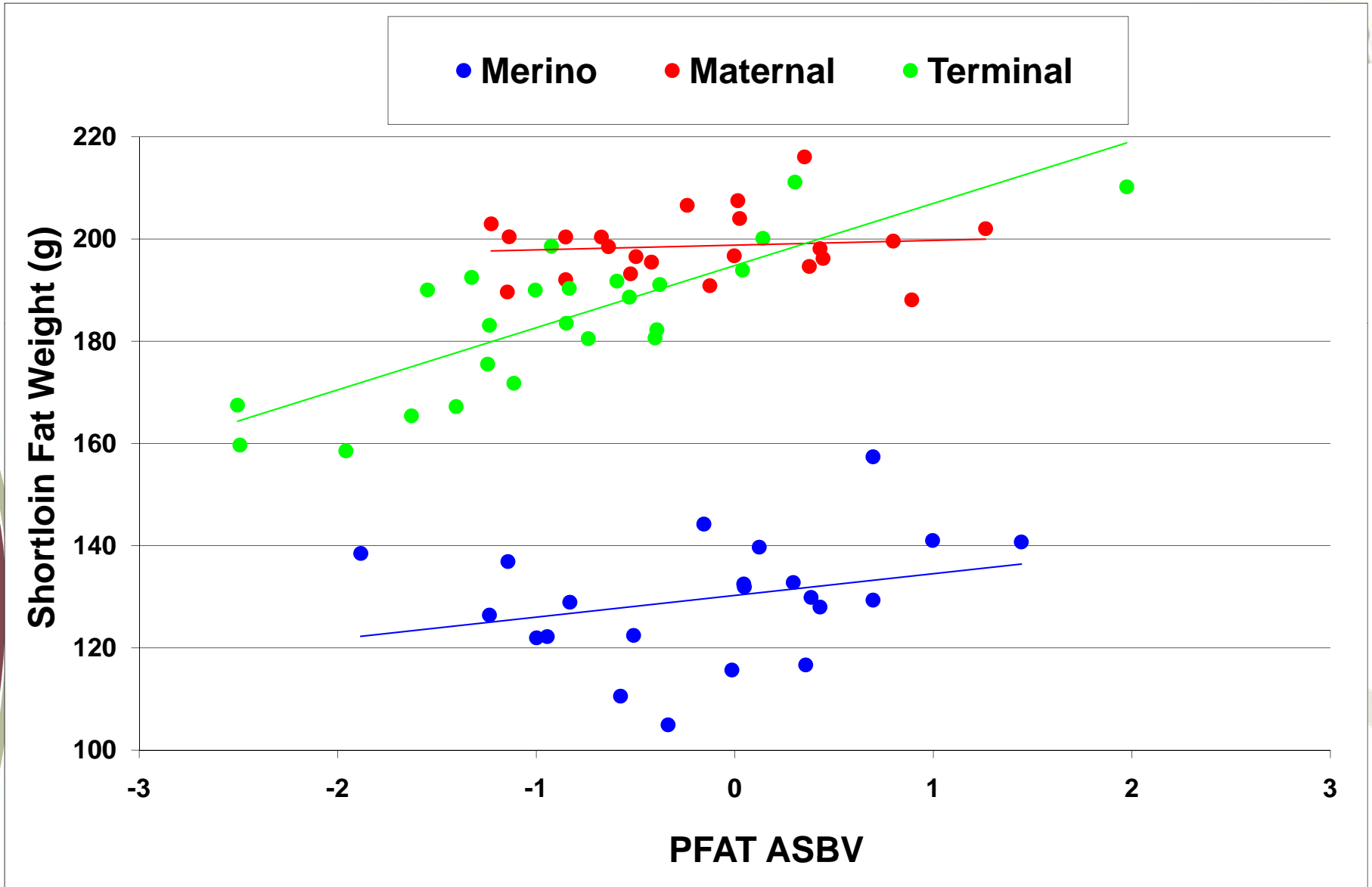
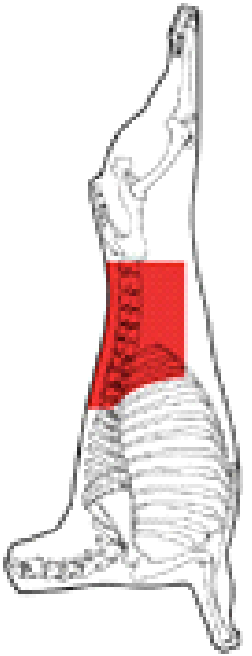
PFAT delivers yield!



(Note: results shown for 22.5kg HSCW)

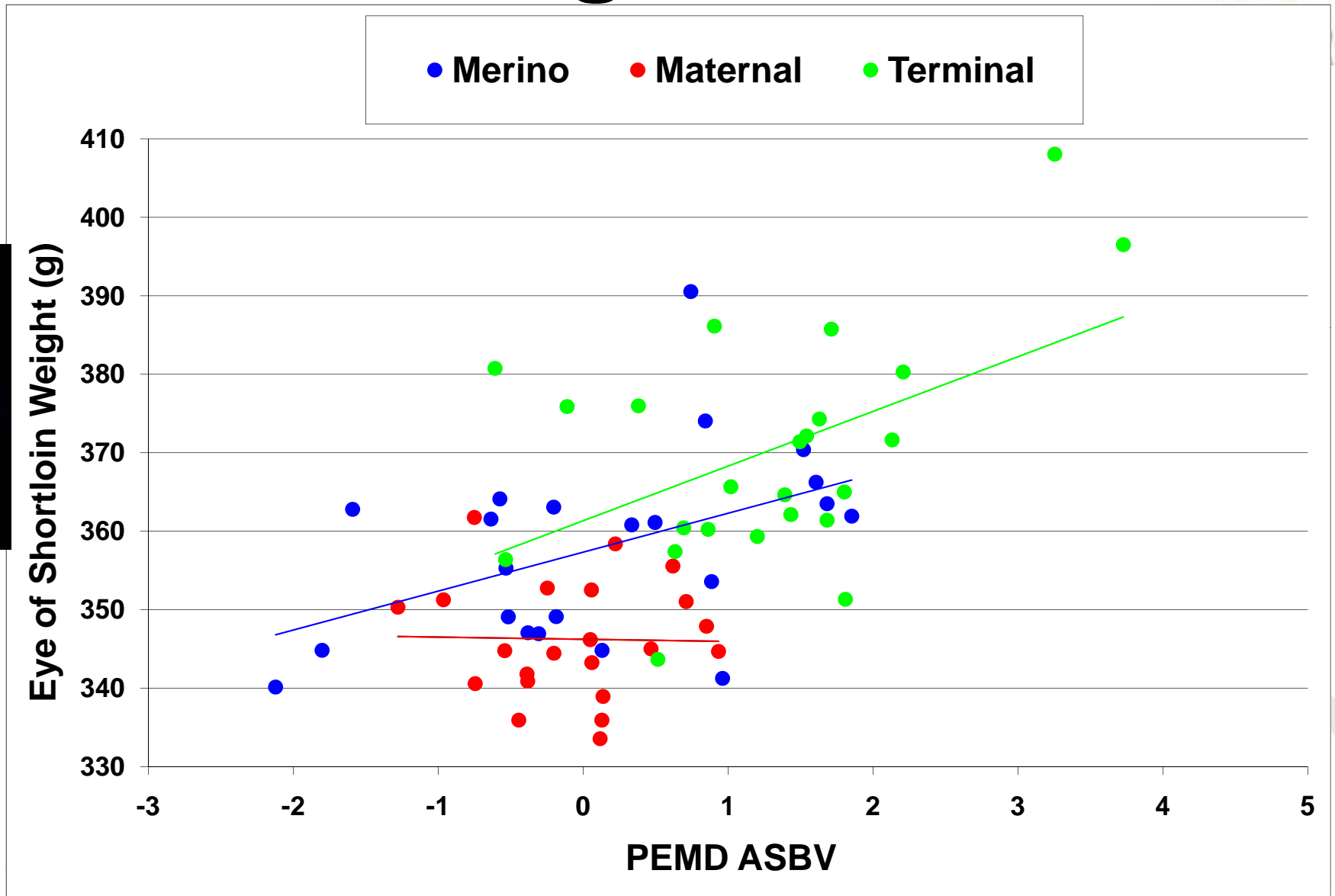
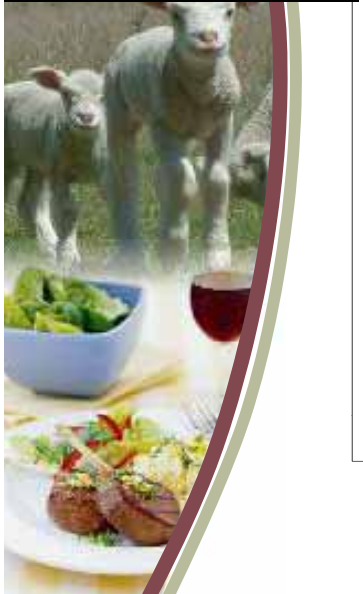
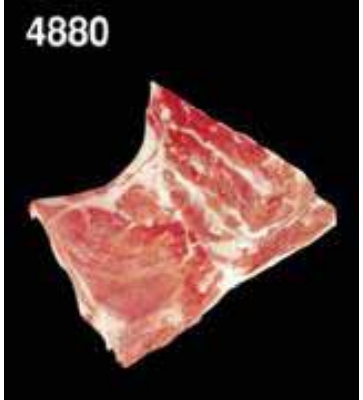


PFAT reduces carcass fat (ie Shortloin fat weight)



(Note: results shown for 22.5kg HSCW)

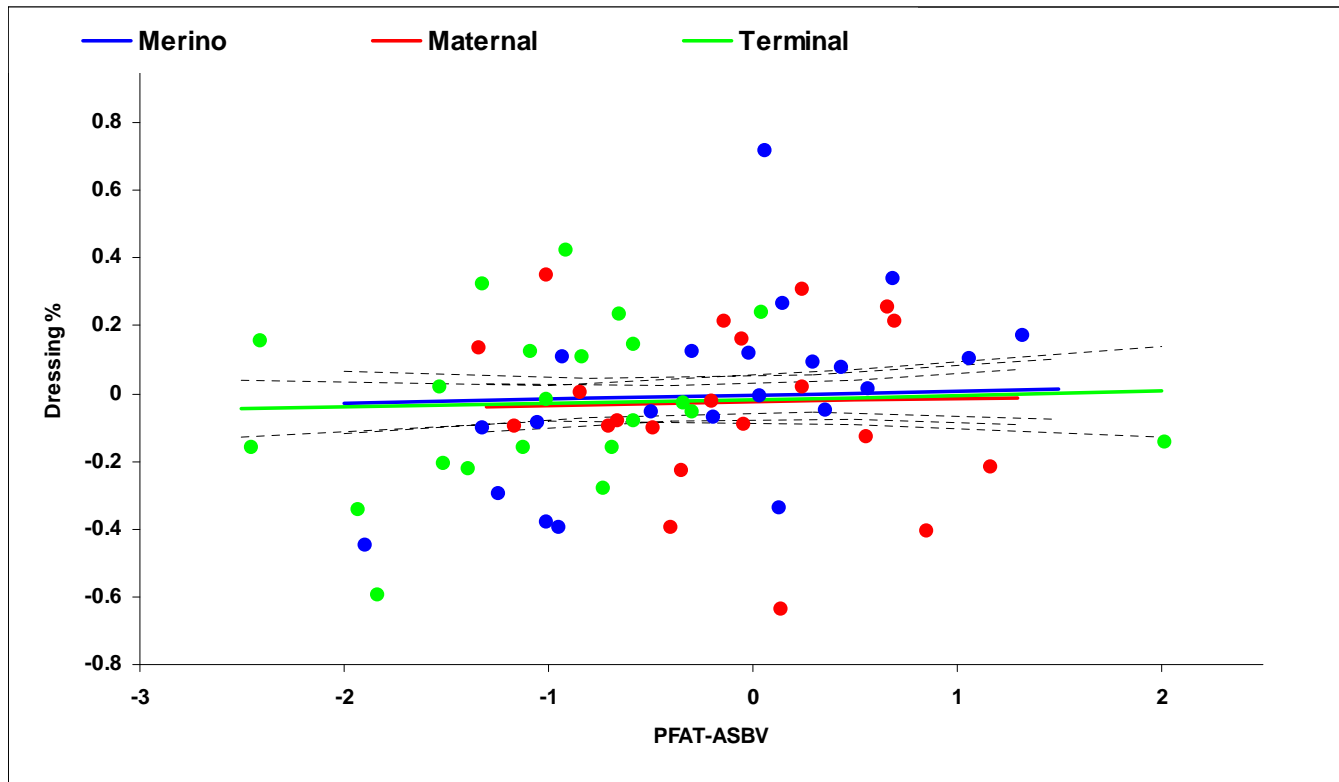
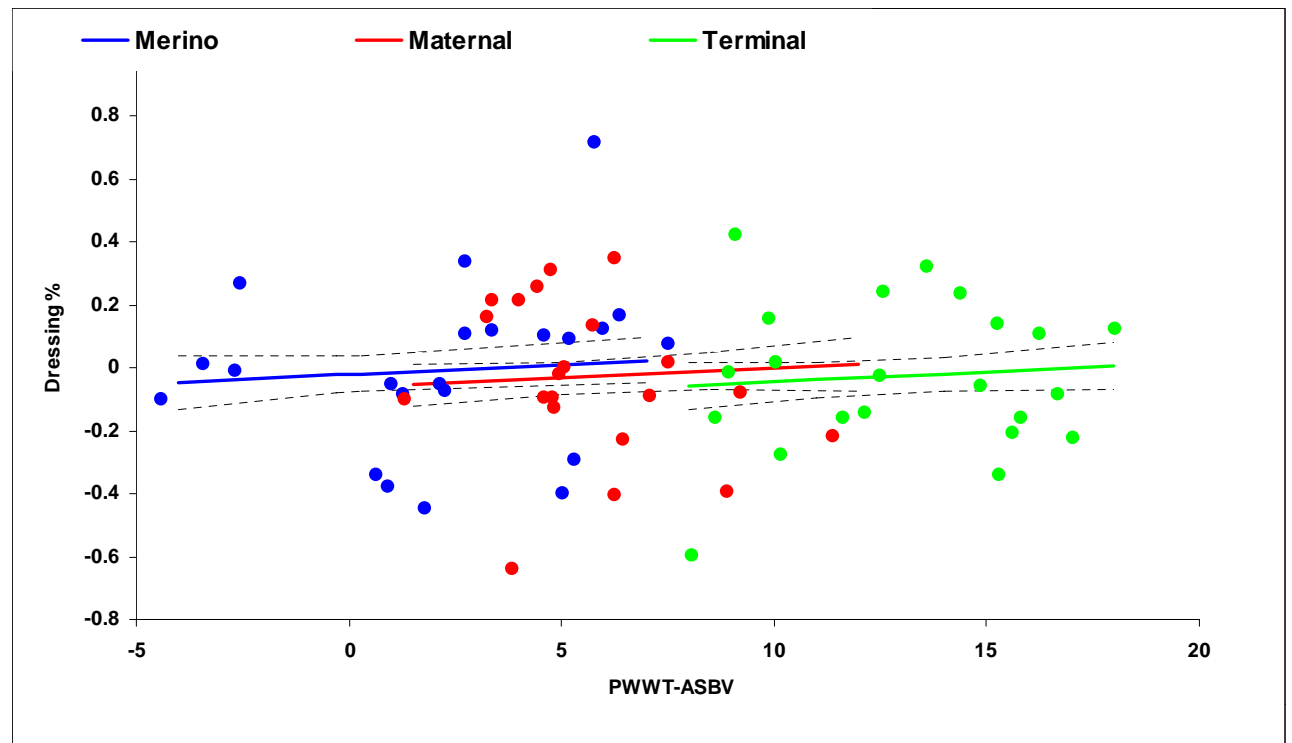
PEMD increases loin muscle weight



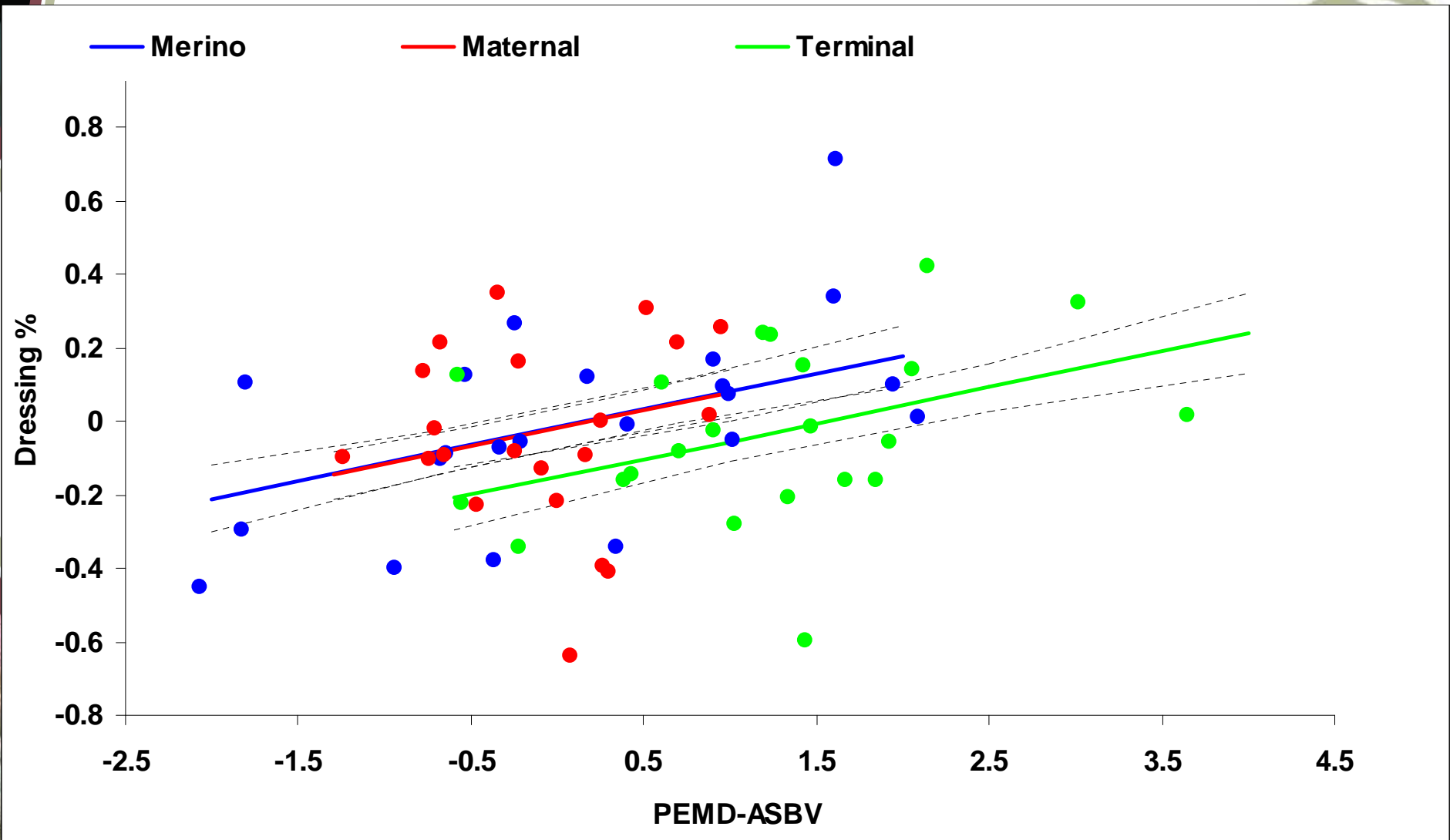
(Note: results shown for 22.5kg HSCW)

Dressing %

PWWT has no effect



PFAT has no effect



PEMD is correlated

Effect is 0.1% DR% per mm EMD

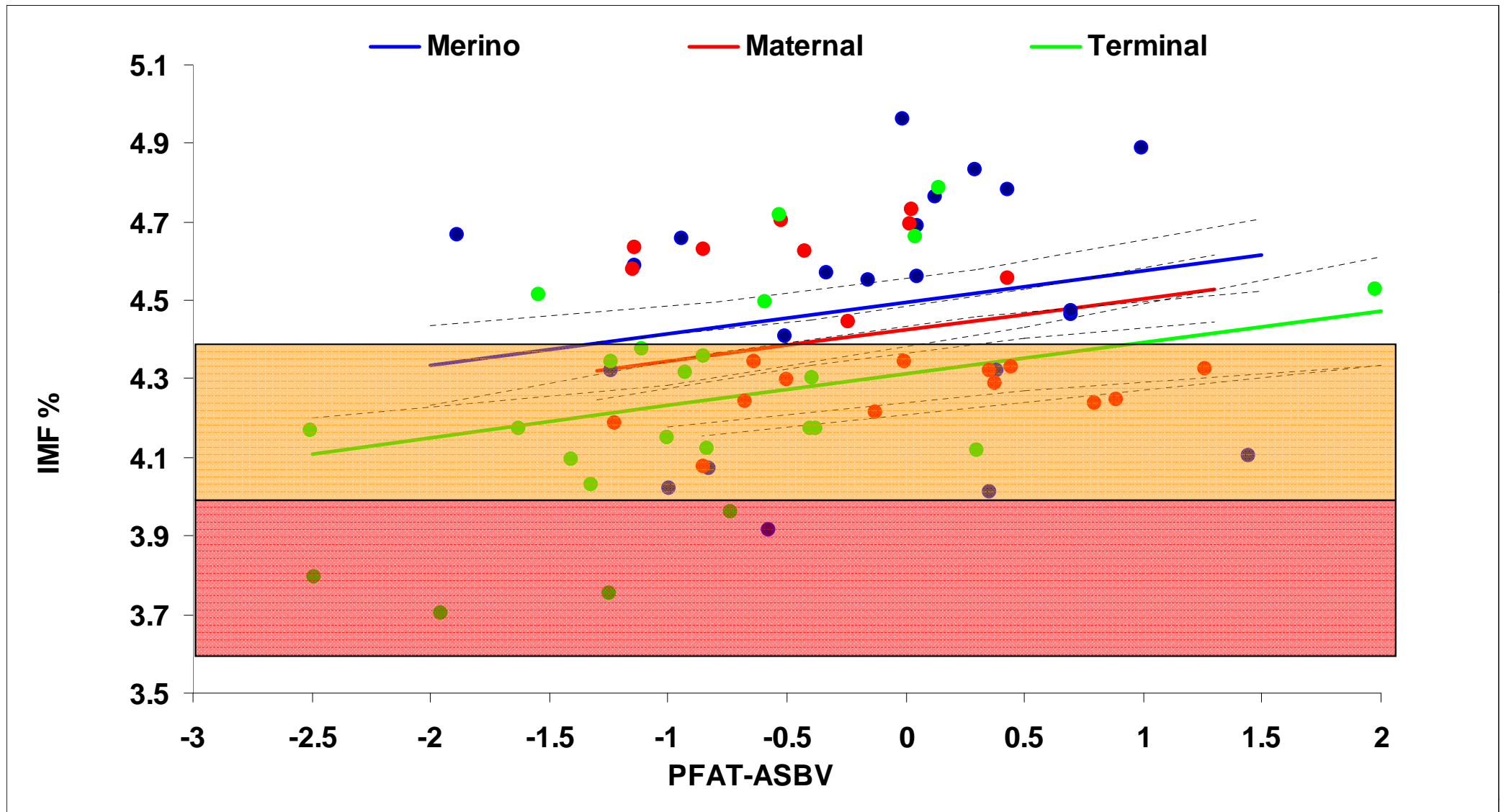
Sire effect is 1.9% = 1 kg carcass weight

About the same as 4kg growth

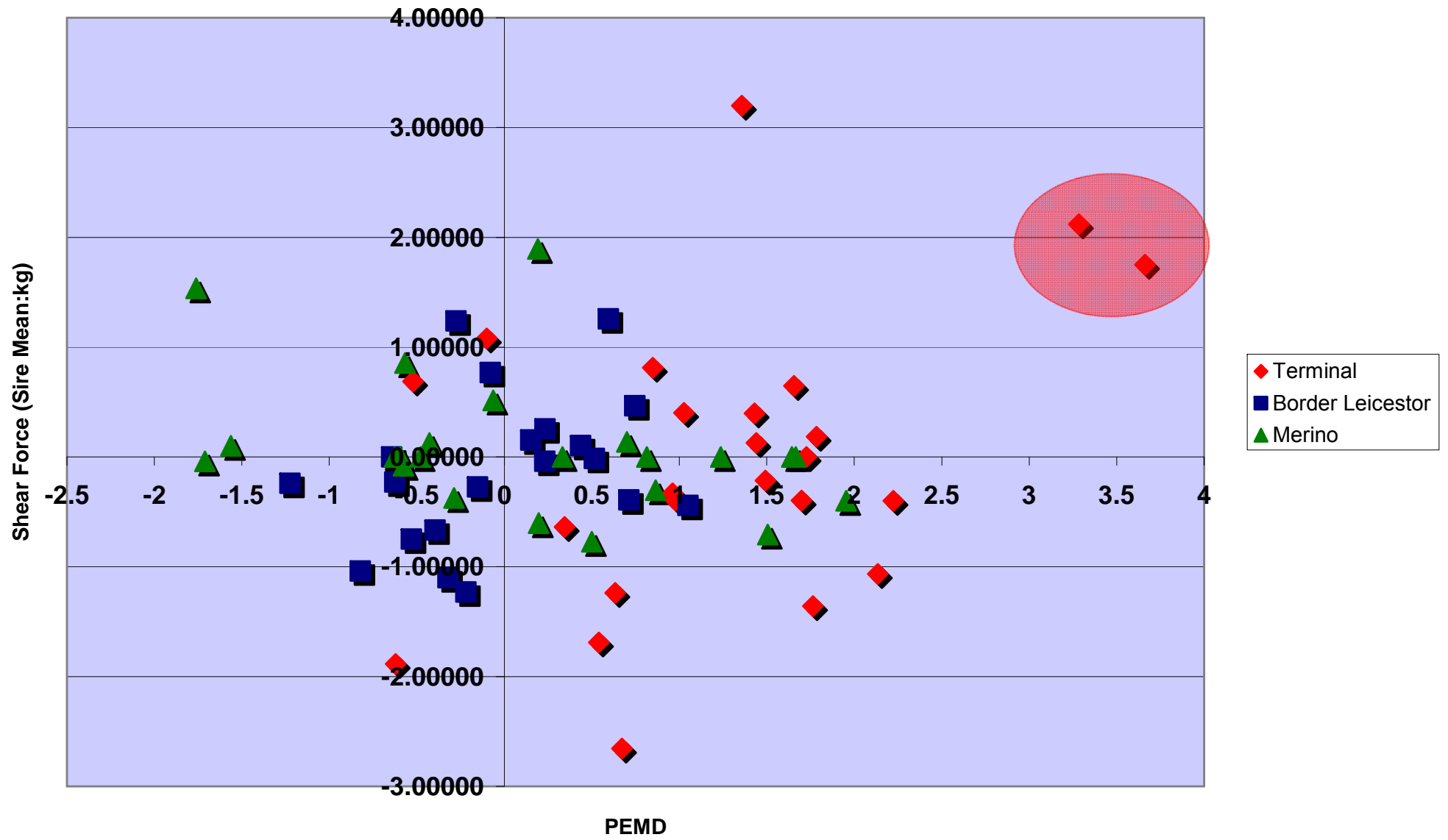
Use an ASBV to get this



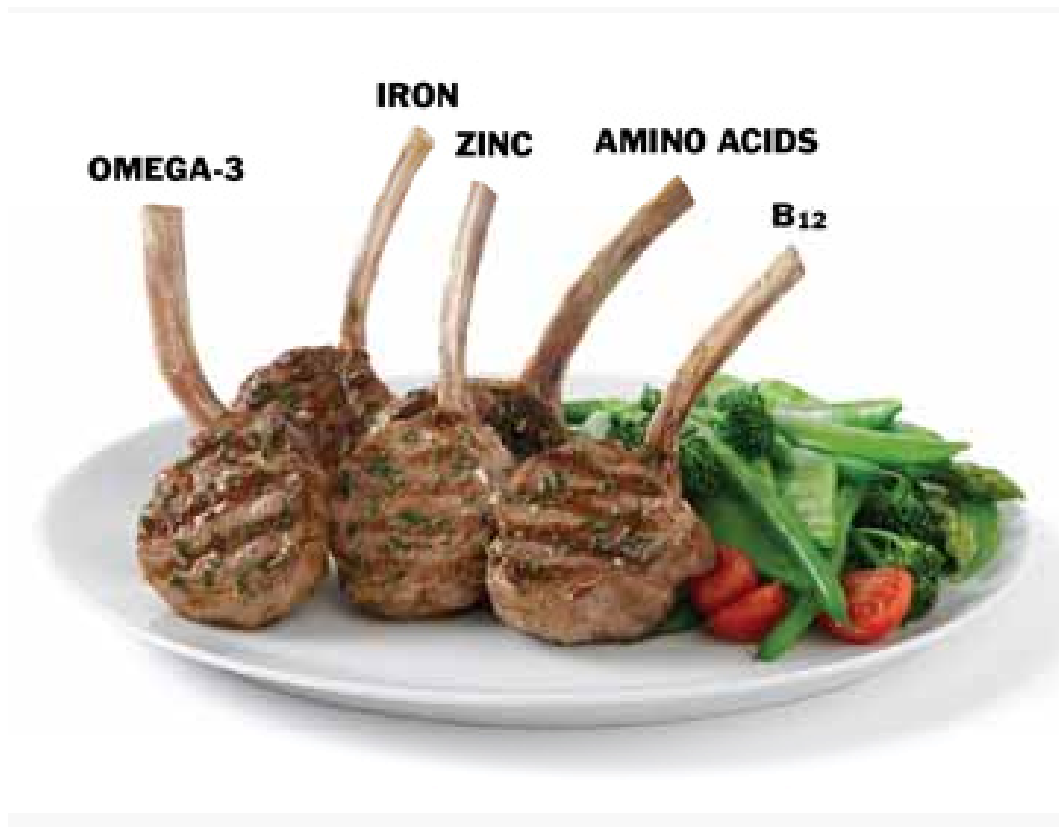
Variation in Intramuscular Fat!



Shear Force (Sire Mean) Day 5 vs PEMD



National and International campaign

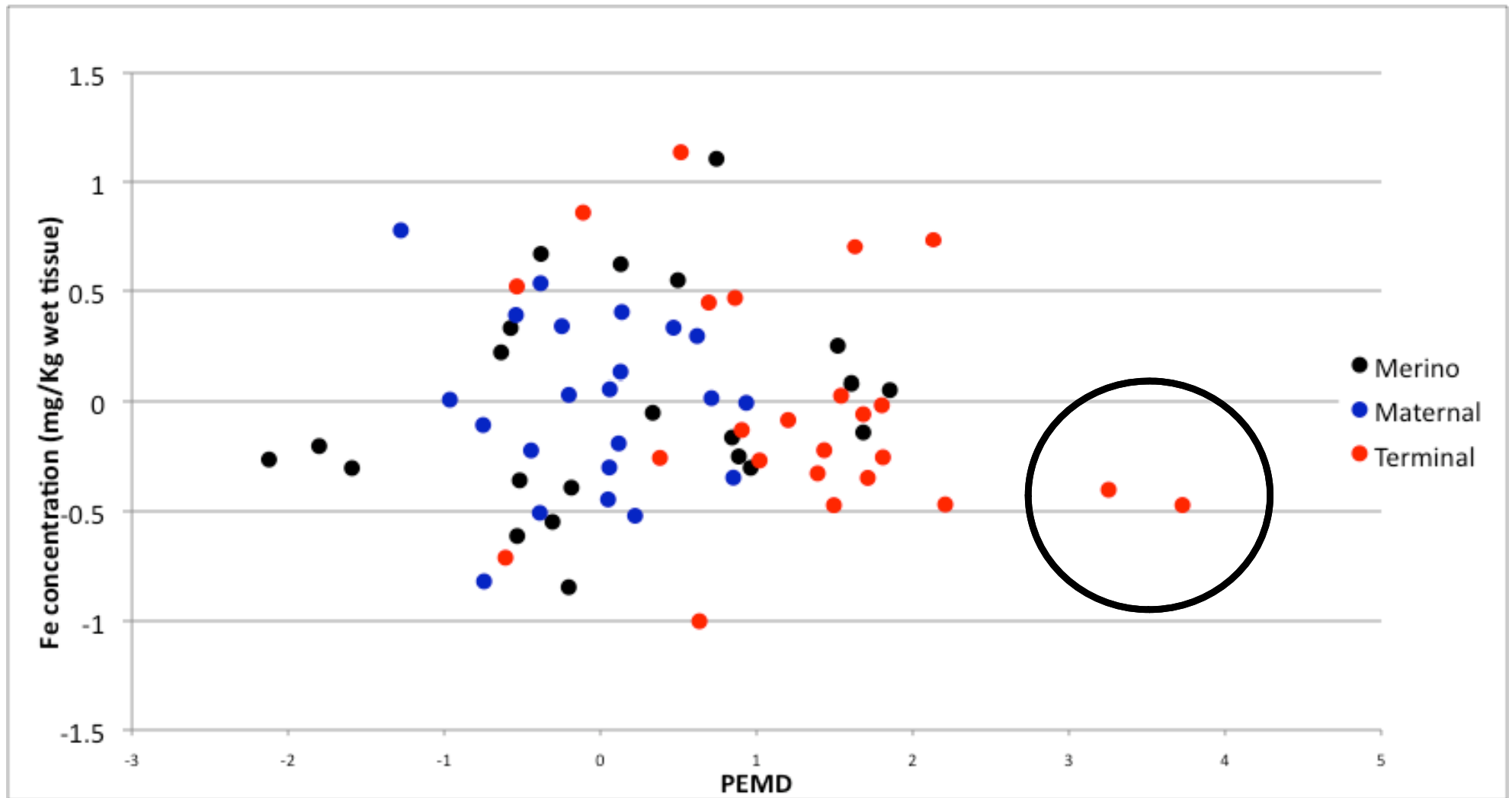


Descriptive stats (22mg/kg good source)

<i>Sire/Dam</i>	<i>Fe</i> (mg/kg)		<i>Zn</i> (mg/kg)	
Border L-M	20	91%	24	✓
Merino-M	24	✓	24	✓
Terminal - BLM	20	91%	24	✓
Terminal -M	20	91%	23	✓

Variance \approx 4.5, SEM \approx 0.25, n=2001

PEMD (muscle) vs Sire mean - Fe



In 2010

- Will be releasing IMF and Shear Force R&D breeding values by June 2010
- Will have some best practice guides to these traits
- Will likely impact on the extremes...breeders will remove extreme animals....
- Will have the consumer data...



The Genomic way forward

- We have SNP chip
- This technology can reduce generation intervals and assist selecting rams for difficult to measure traits
- We have initial results from R&D
 - testing whole genome associations to produce ASBVs for existing and new traits
 - checking their accuracy for high accuracy industry sires
- We still need to :
 - Refine how we get DNA for the text
 - further test the value proposition for breeders



The Genomic way forward

- Aim to work with ram breeders to:
 - genotype potential sires (young rams)
 - Produce breeding values from just DNA sample
 - Compare those breeding values with ASBVs when more data is added (progeny test)
- It's a partnership:
 - “We” will be contributing c. 60% of the cost
 - “You” will be asked to provide sample (swab the nose) and contribute \$100
 - All data will be used for R&D
 - The process starts now.....see the sheep crc web site.....

