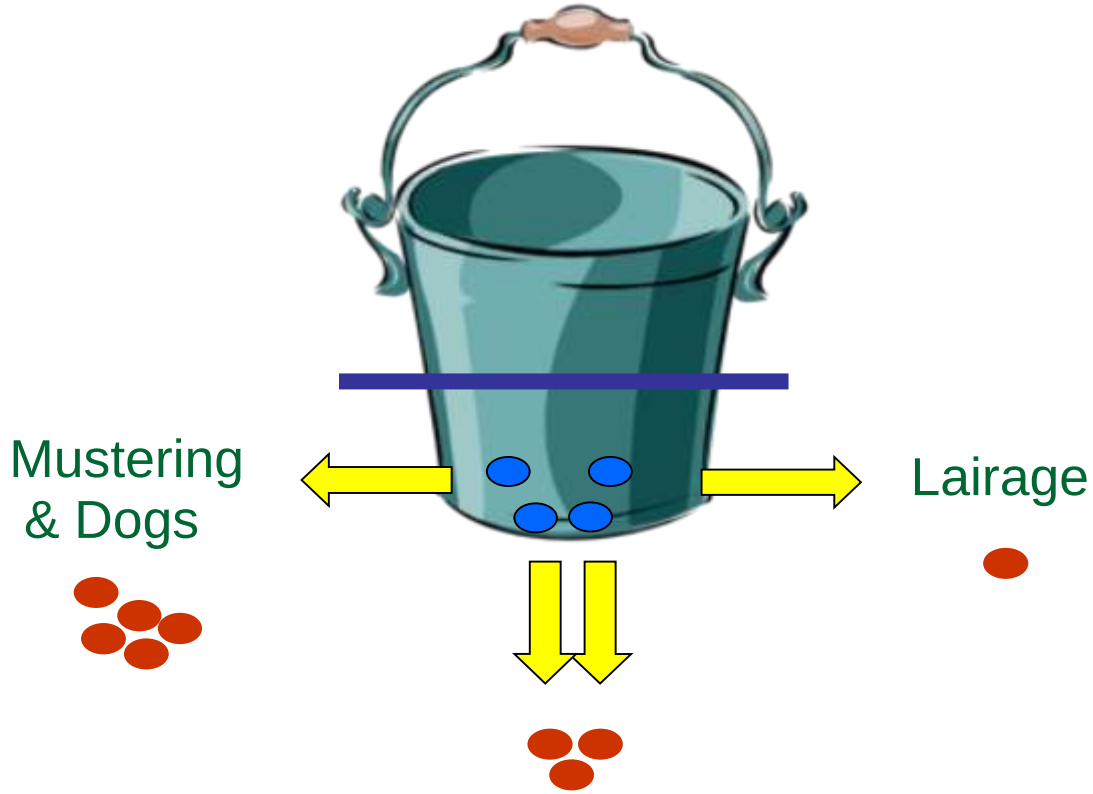
Bucket of muscle glycogen

Nutrition

Holds 2% when full

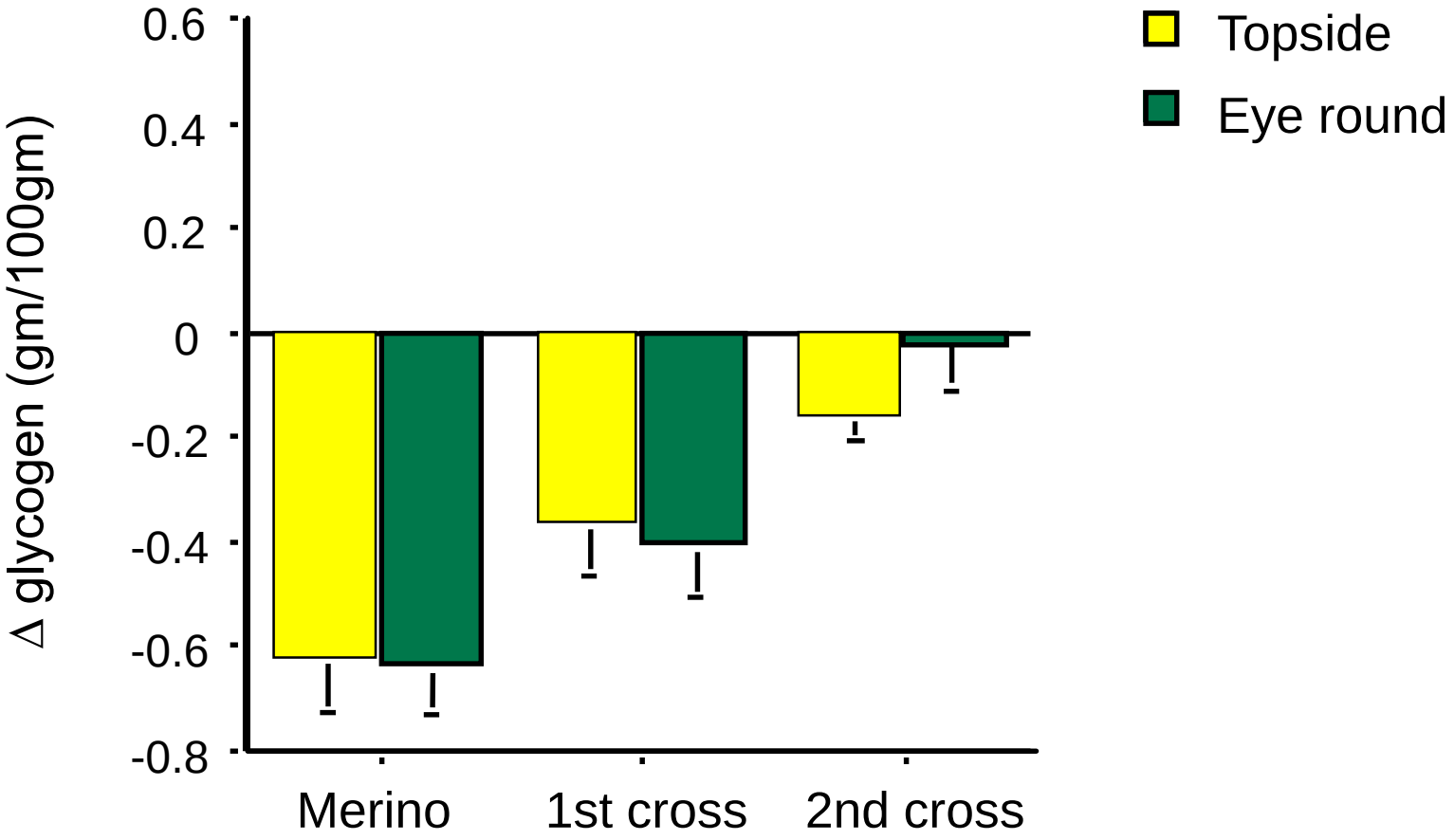
Stress can empty the bucket
needs to be at least half full at slaughter



Breed effects & stress - Merino's

- Clear evidence that Merinos show ↑ pH = dark cutting.
- Relates to stress sensitivity
- Plus Merino lamb is older and also darker
- Merinos need good pre-slaughter nutrition to fill the glycogen bucket
- ↑ muscle breeding value will protect glycogen in Merino's (Sheep Genetics)

Glycogen loss in Commercial slaughter of Merino's



Gardner et al. 1998 Aust J Agric Res

Why is finishing important (ii) Intramuscular fat

- Intramuscular fat is important for eating quality
- Ideally 5% or above to achieve high end product
- (current Merino average = 4.6%)
- 2 weeks of wt loss can reduce IMF by ‘1%’ units
- Strong genetic control (50% heritable)
- We now have breeding values for IMF (Sheep Genetics)

Eating Quality data

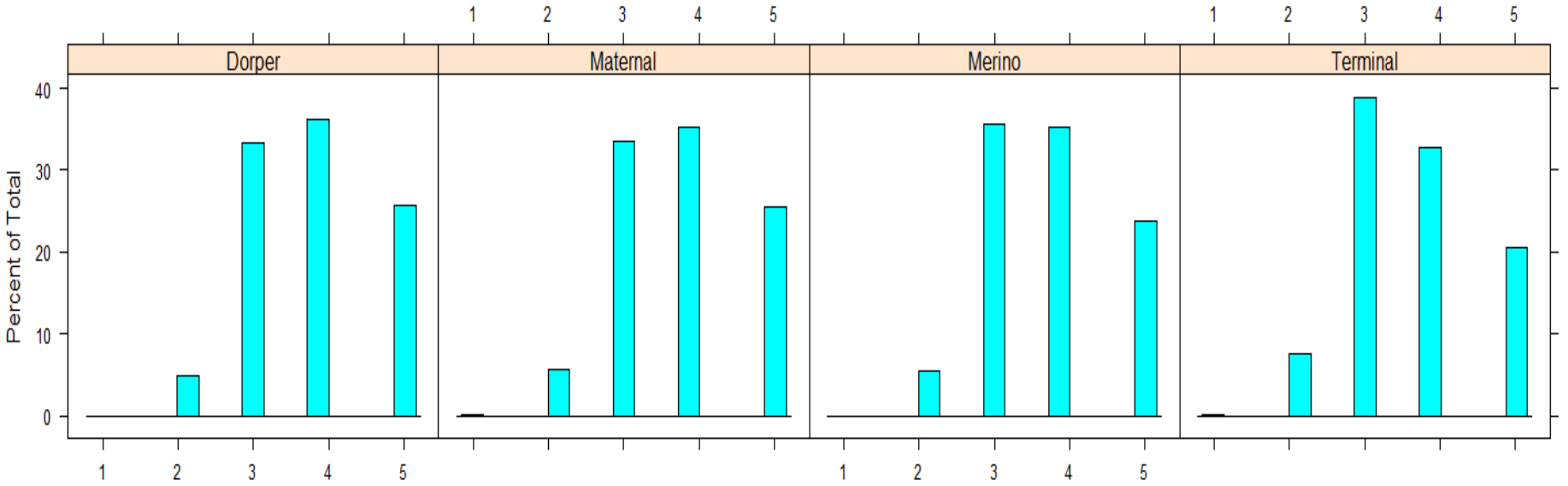
- 2,039 slaughter lambs
- Katanning (W Aust), Armidale (New South Wales)
- > 200 sires (terminal, maternal, Merino, Dorper)
- Same sires at both sites
- Approx 23kg HCW
- Short loin & topside grilled & tested by 10 consumers
- **6,800 consumers**

Pannier et al. (2015) Meat Science

Raw data - loin







N = 148 333 470 1088

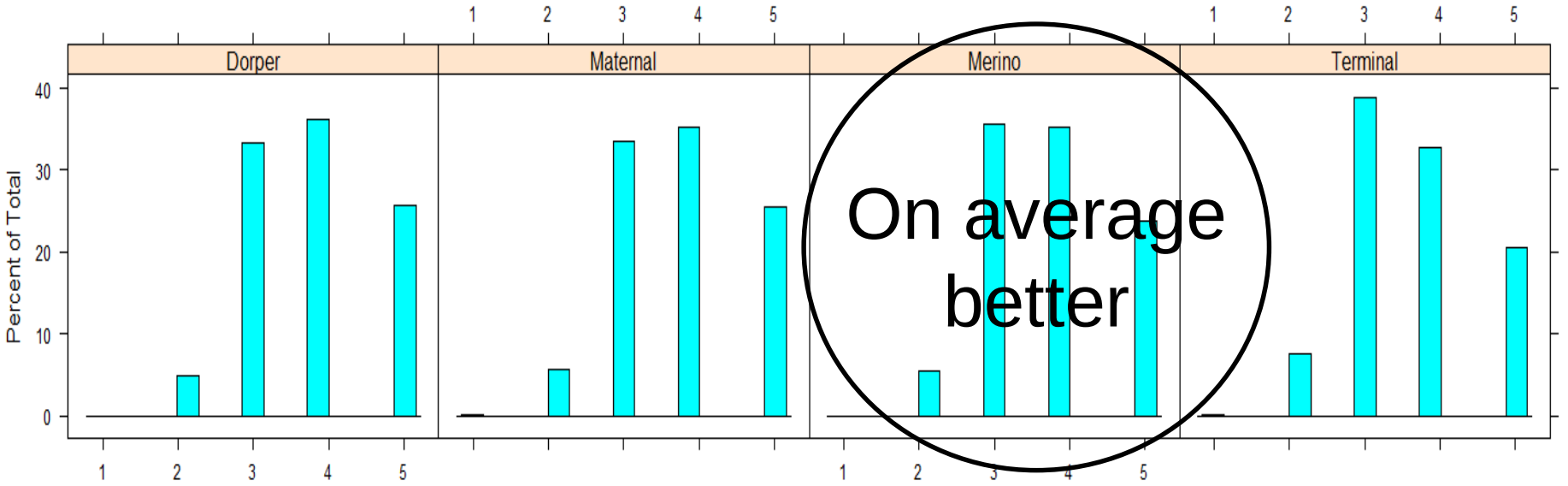
fail	pass	credit	distinction
2*	3*	4*	5*
7%	**34%**	**35%**	**24%**

SHEEP CRC

Raw data - loin







N = 148 333 stars 470 1088

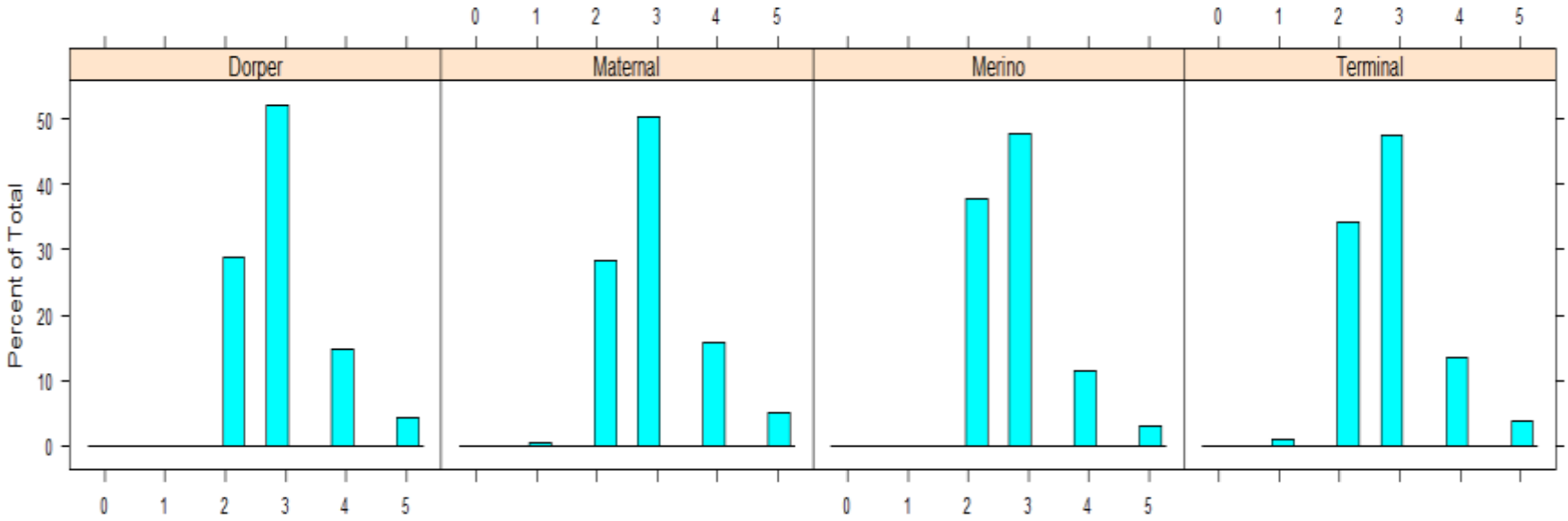
fail	pass	credit	distinction
2*	3*	4*	5*
7%	**34%**	**35%**	**24%**

SHEEP CRC

Raw data - topside







N = 148 333 stars 470 1088

fail	pass	credit	distinction
2*	3*	4*	5*
29%	**51%**	**15%**	**4%**

SHEEPCRC

New MSA grading model

Next we used carcase variables to predict the consumer score

- HCW
- LMY
- IMF
- Sire type

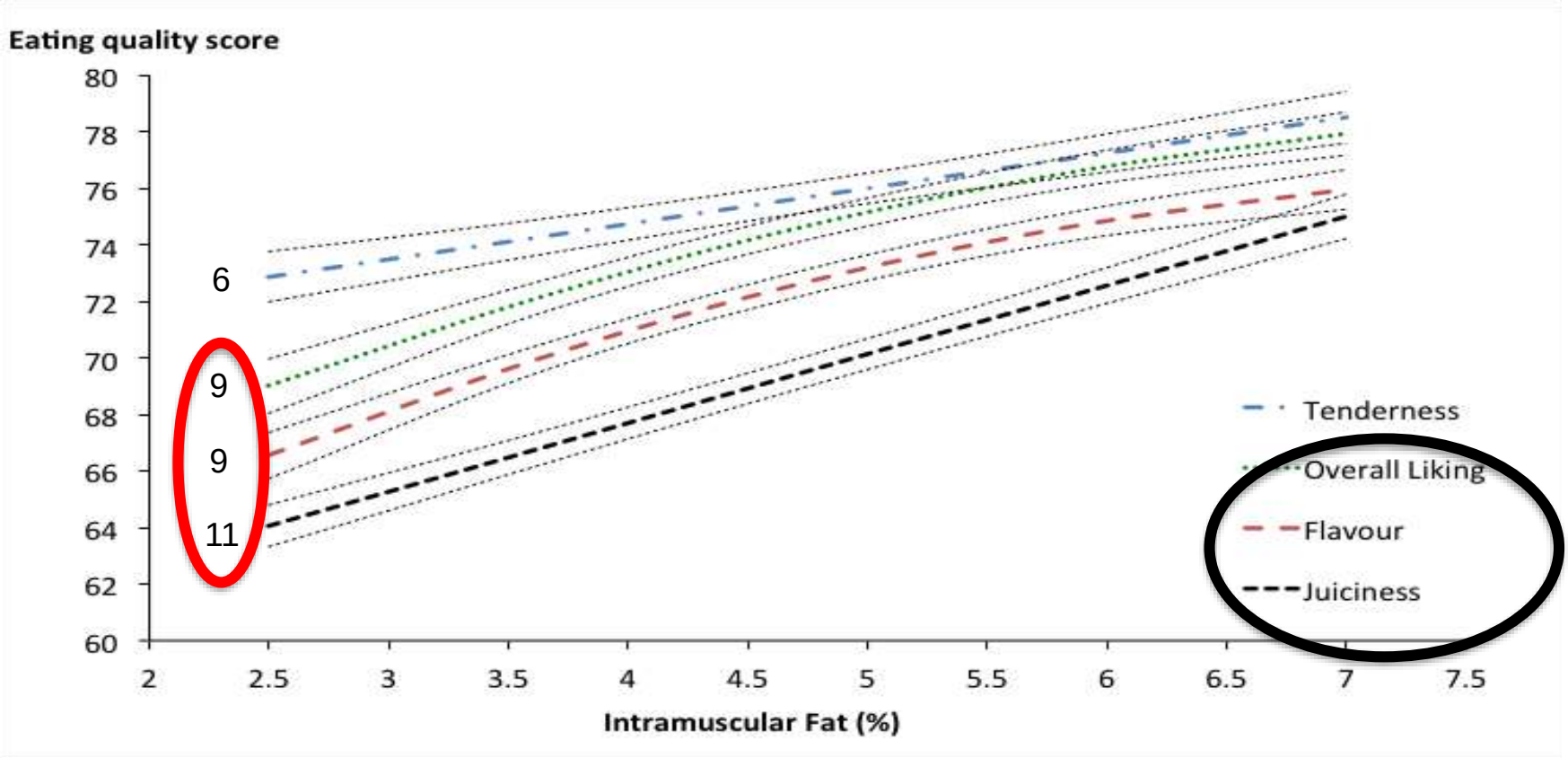
- All are significant predictors

Intramuscular fat (IMF)

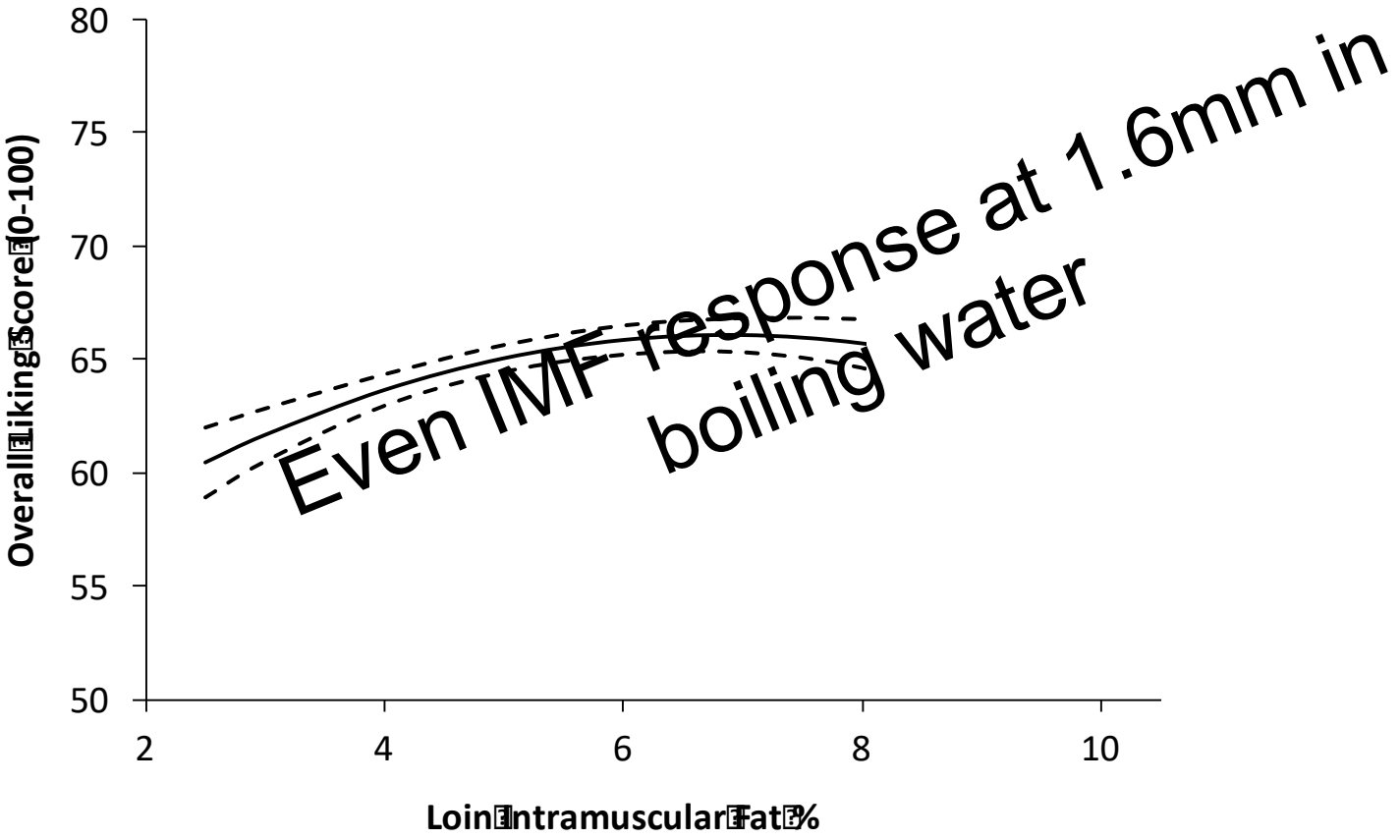
- Juiciness, flavour, tenderness
- 4.6 ± 0.04% (Merino mean)
- Ideal 4-5% ?
- High heritability (58%)
- Called marbling in beef
- Australian sheep breeding value

IMF vs MSA consumer score

IMF nails juicy and flavour

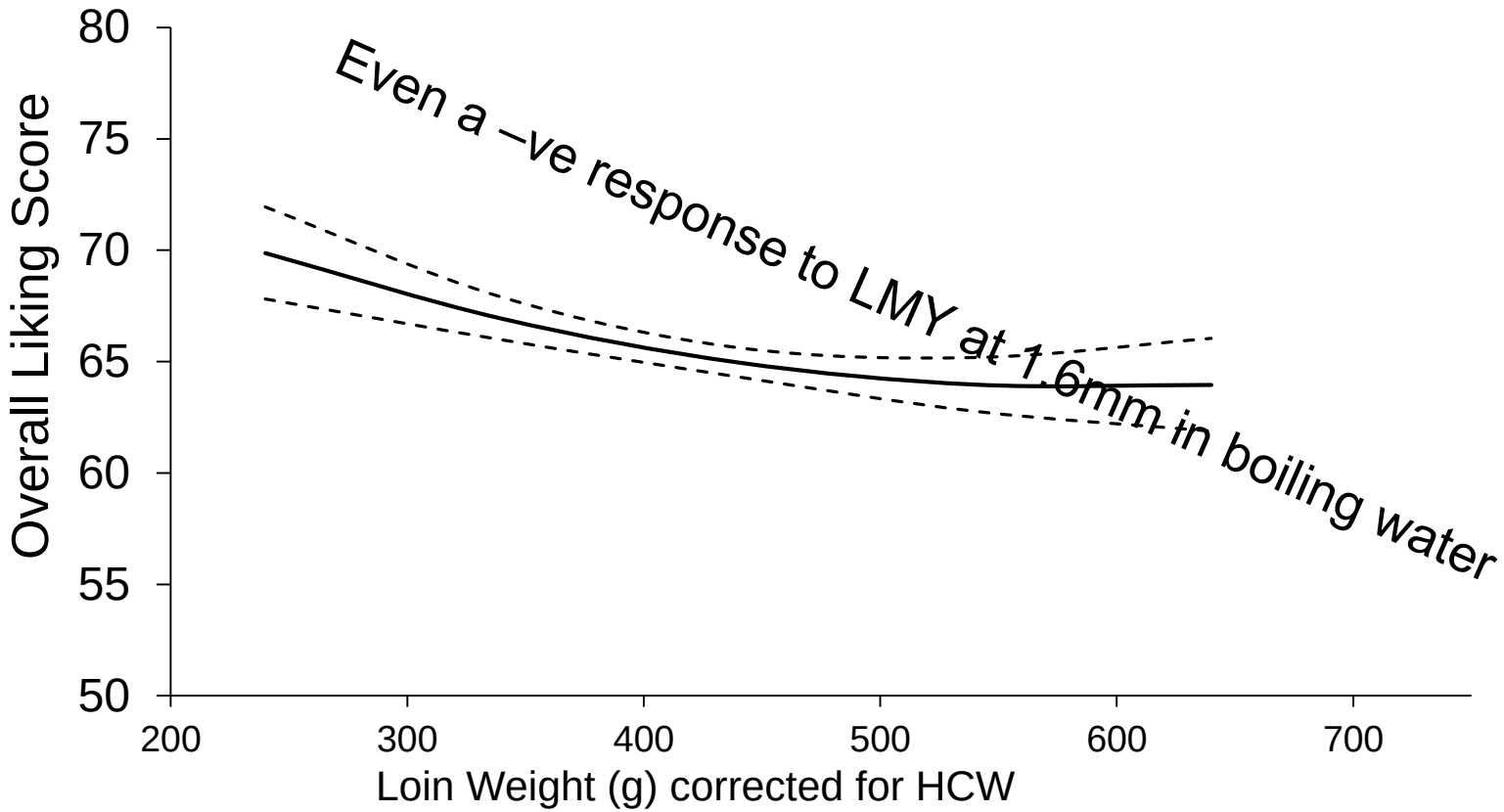


International hot pot (China)



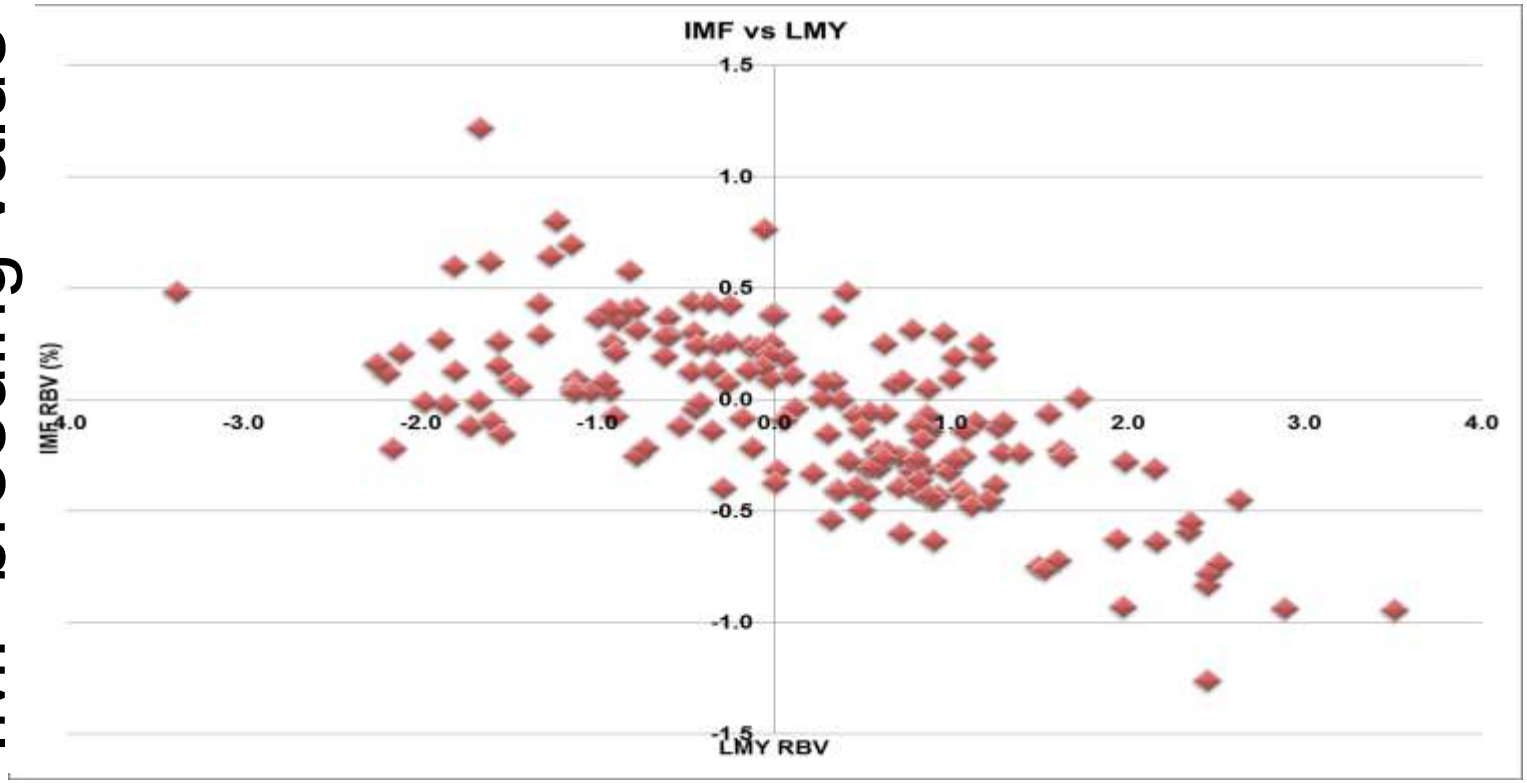
Muscularity = -ve (6-8 points)

International hot pot (China)



e.g Lean Meat Yield vs IMF

IMF breeding value



LMY breeding value

So can we capture all this in a commercial system ?

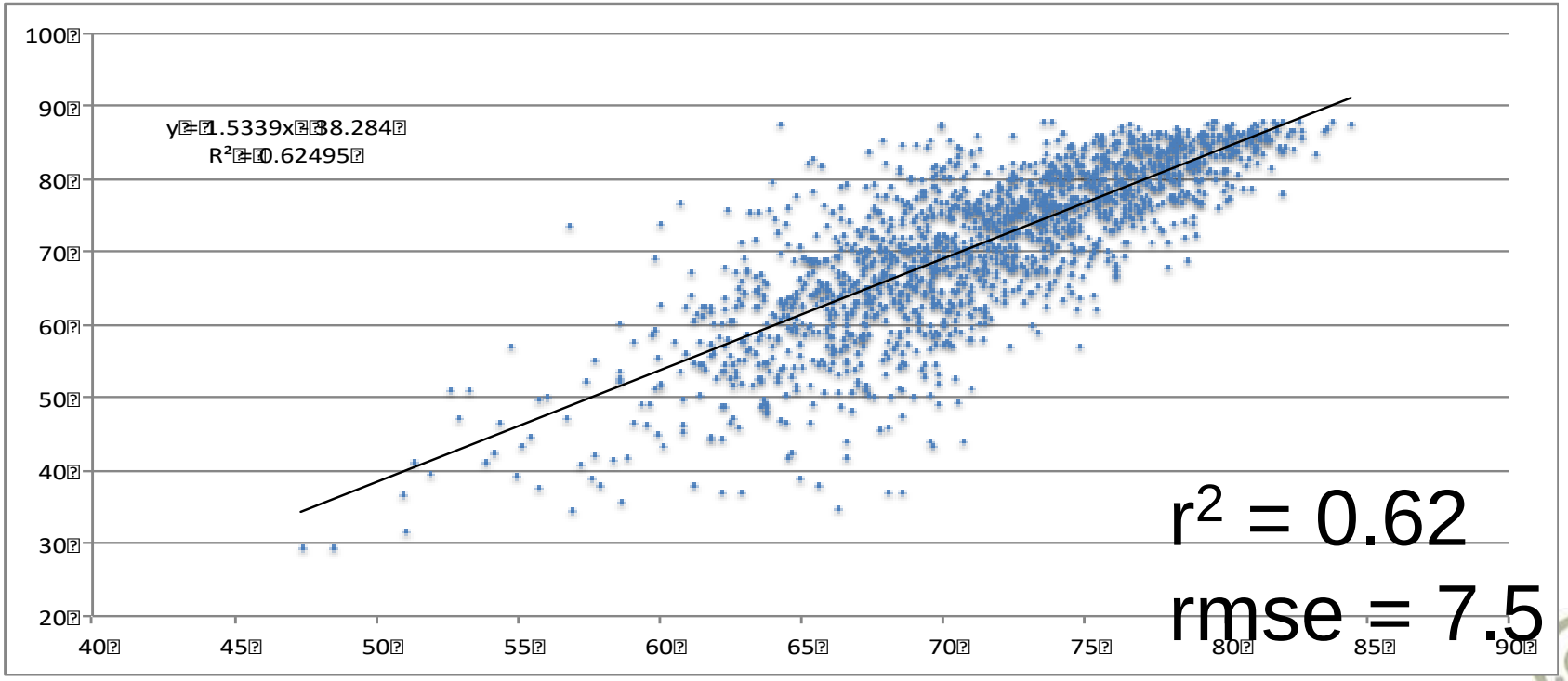
New MSA grading model

If we know for each carcase

- HCW
- LMY
- IMF
- Sire type

MSA modeling

Grilled Lamb Loin



$r^2 = 0.62$

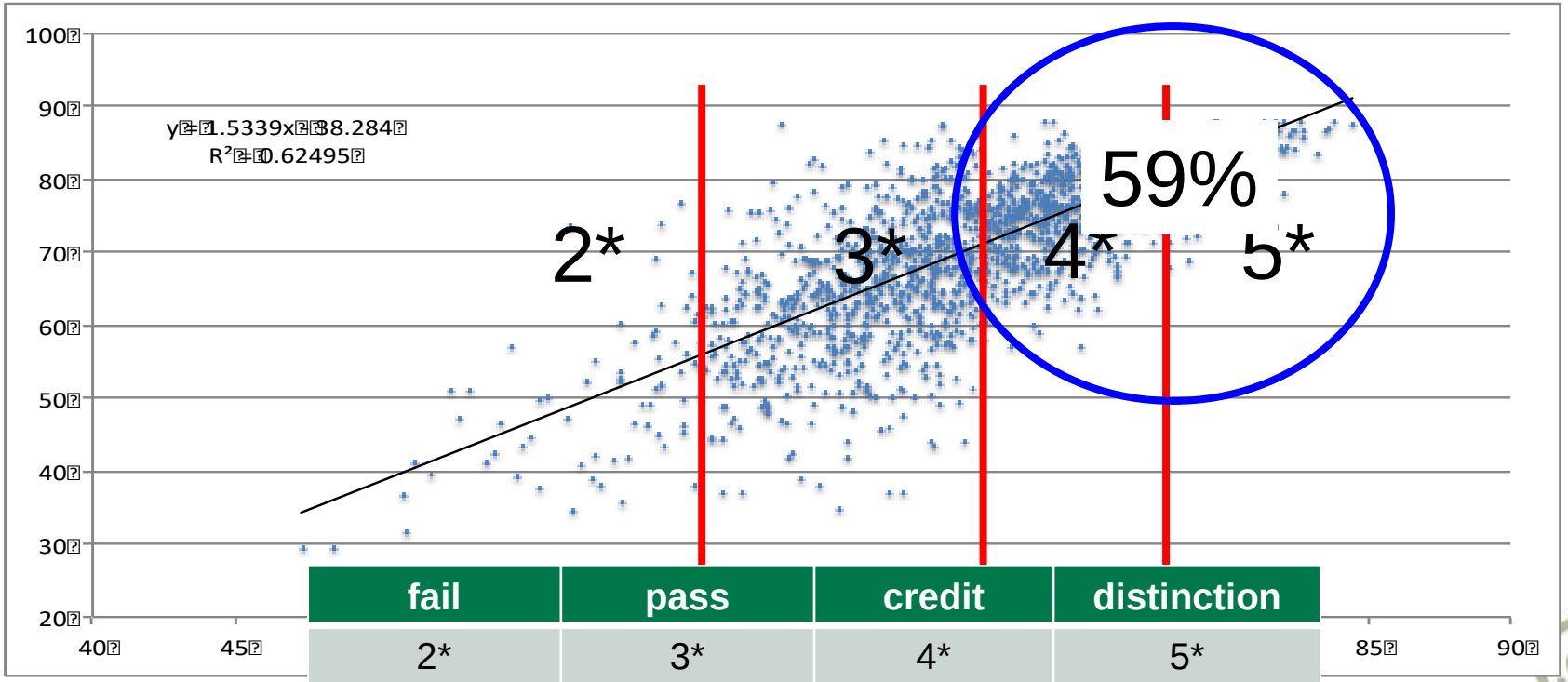
rmse = 7.5

n=1,702 lambs

SHEEP CRC

MSA modeling

Grilled Lamb Loin

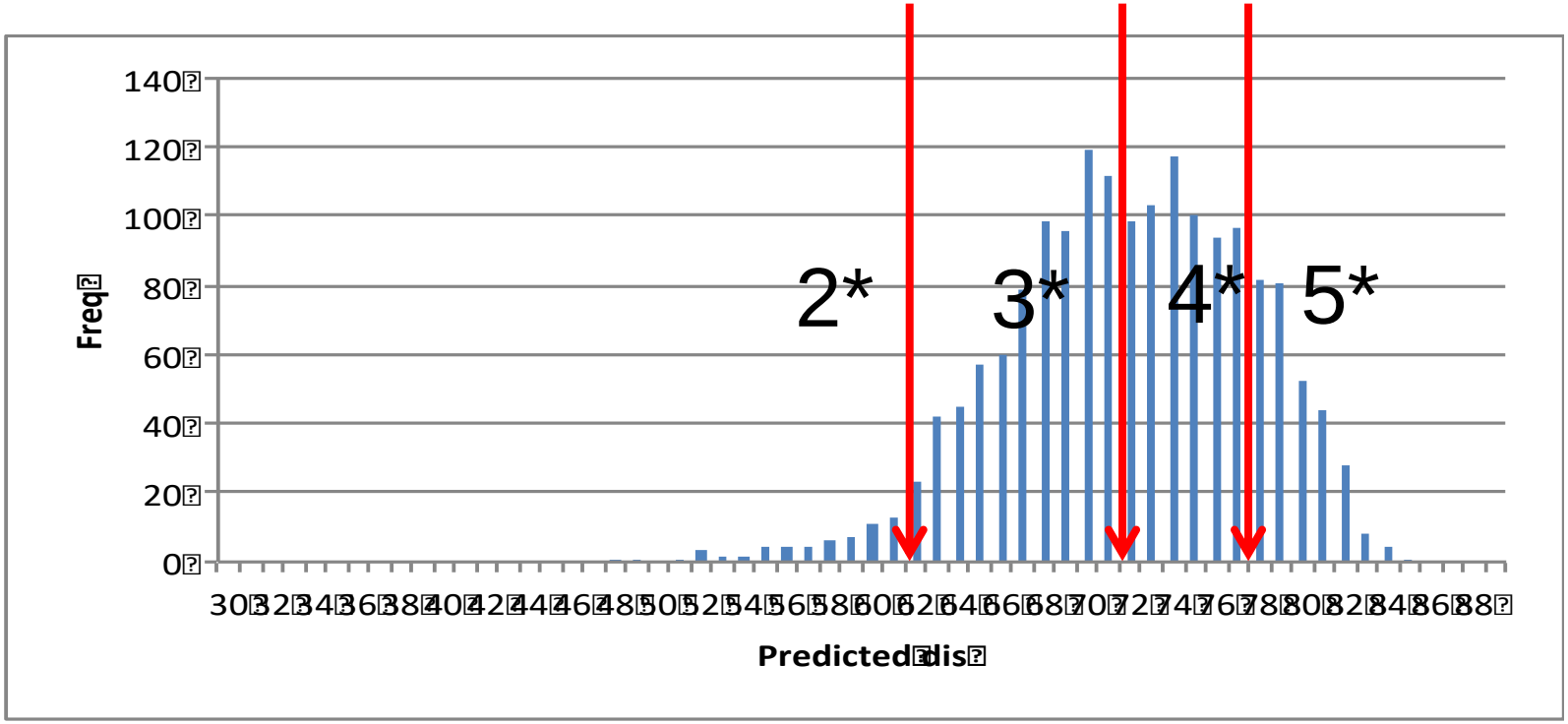


fail	pass	credit	distinction
2*	3*	4*	5*
7%	**34%**	**35%**	**24%**

n=1,702 lambs

SHEEP CRC

MSA loin prediction = MSA index ??



Conception

Critical Control Points

Pre-slaughter control

Genetics

Sheep age

Growth path (feed type & finishing)

Intramuscular fat

Selling method

Pre-slaughter stress

Carcase measures

= GRADING

Post-slaughter control

Hang

Chillers

Ageing of meat

Retail display

Cut/ primal

Value adding

Cooking method

Consumer

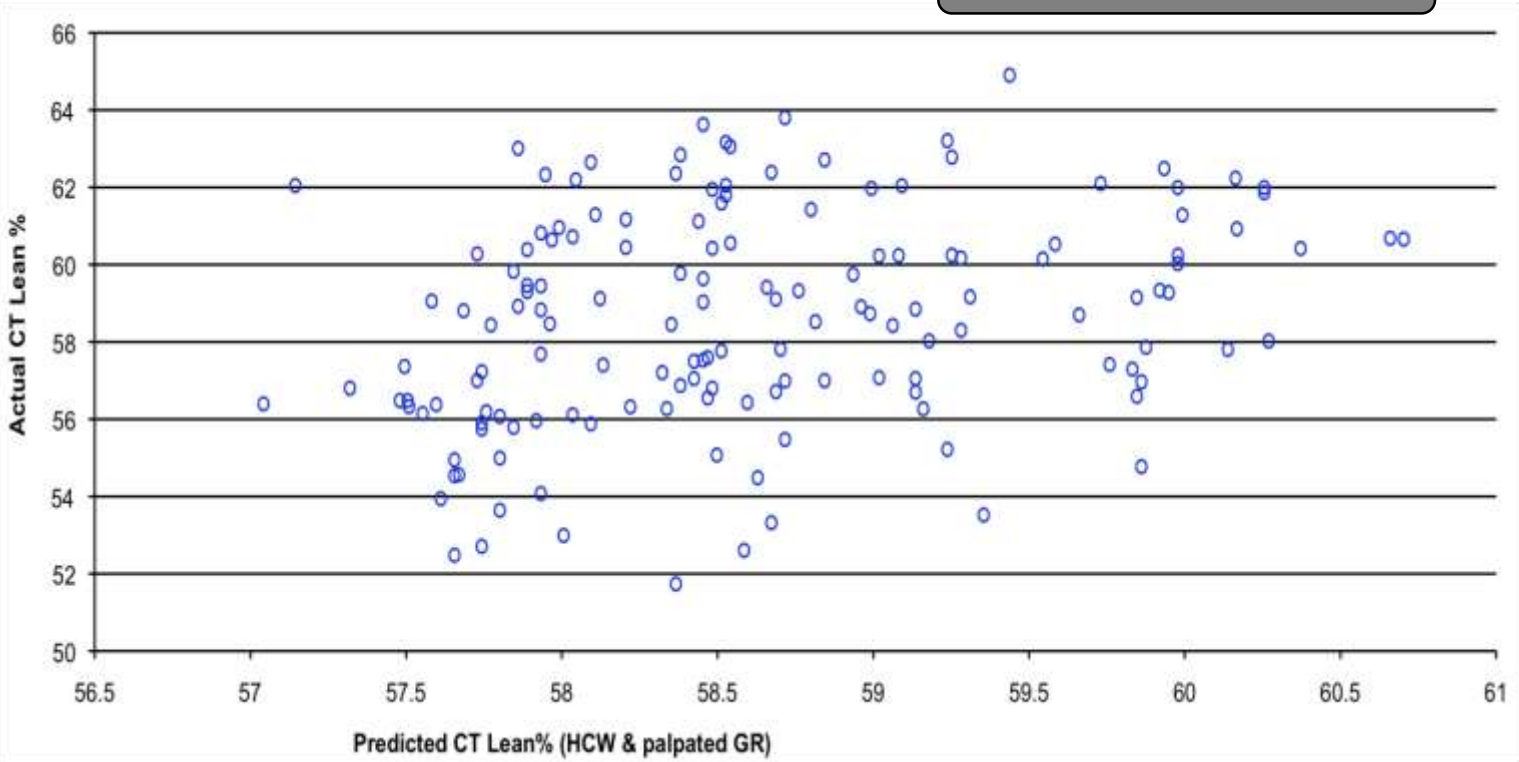
Tenderness Juiciness Flavour Overall Liking

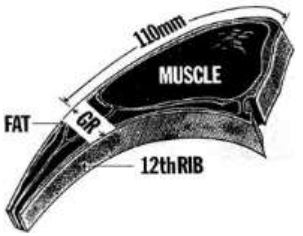
Carcase grading – how easy is it ??

- HCW
- Lean Meat Yield
- Intamuscular fat

Palpated GR – its rubbish as LMY predictor

R^2=0.1-0.2; RMSE=3.0

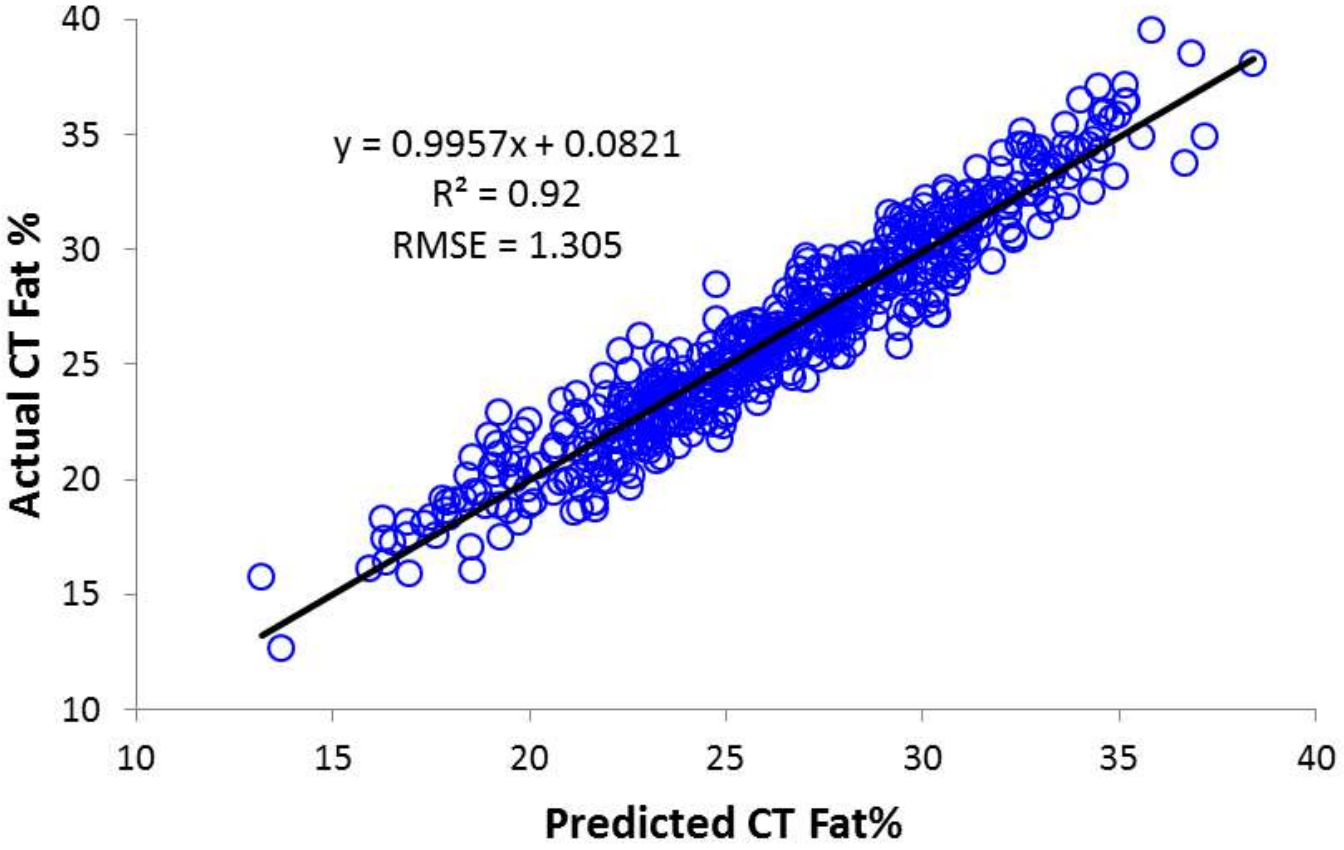




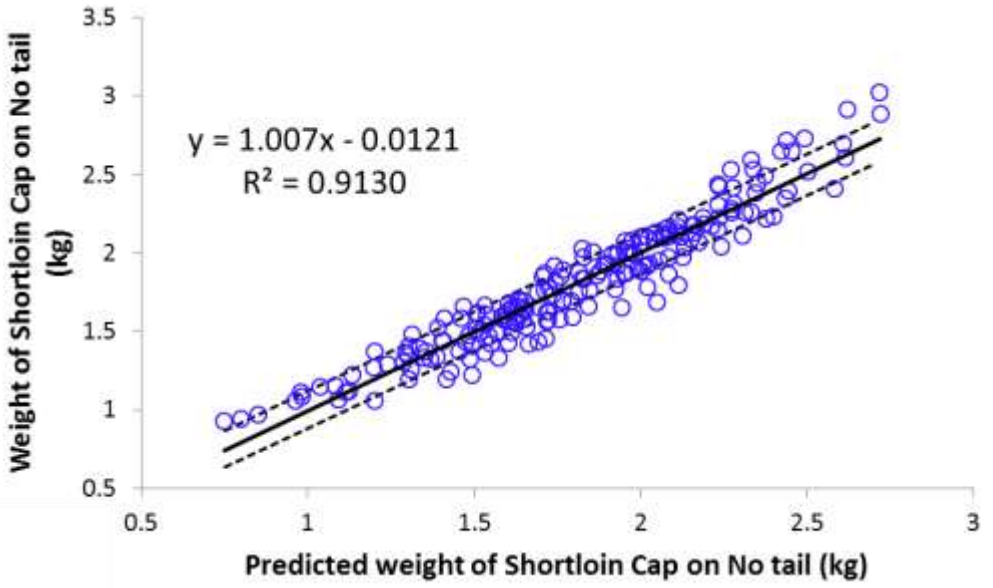
X-Ray ➙Precision cutting ➙DEXA ➙LMY

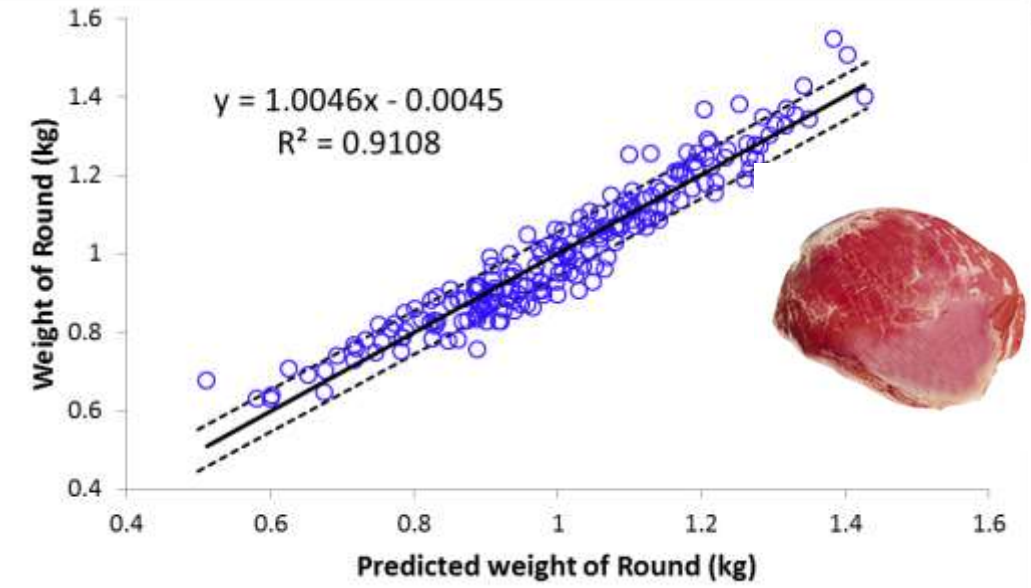
DEXA = dual energy X ray imaging

DEXA predicting CT Fat%

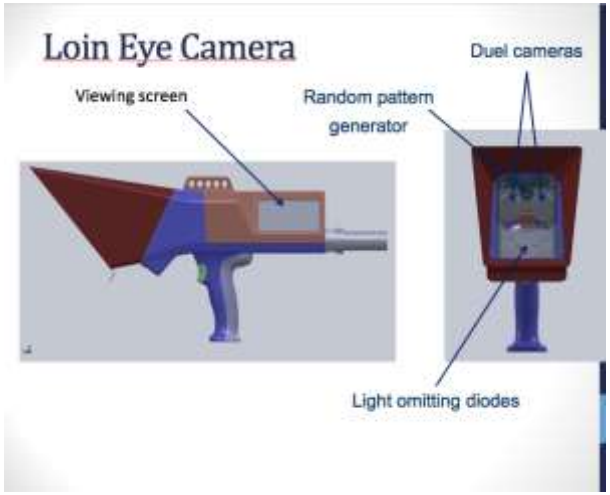


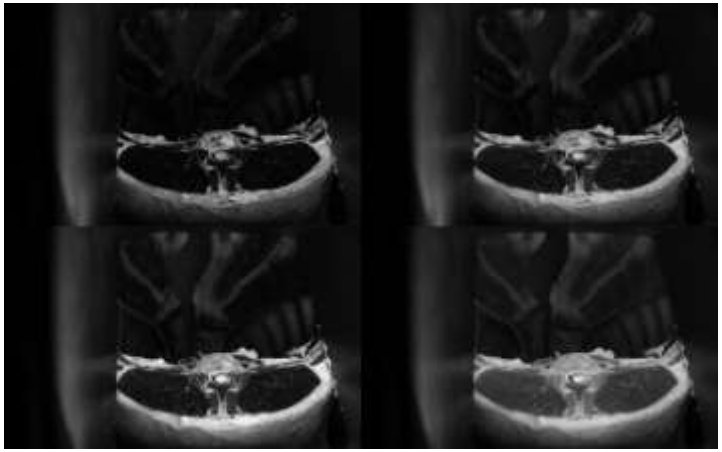
Use to predict weight of cuts





Abattoir measures of IMF being developed





Frontmatec Hyperspectral Camera

True value of the carcase

Carcase value ($)

=

Wt retail cuts (kg)

X

Value of the cuts ($/kg)

LMY

MSA 3*4*5*

Summary

- Merino carcase is underrated
  - Slower growth (of course) – genetics & nutrition can fix that
- Eating Quality
  - Merino lamb can eat very well indeed
  - Opportunity for 2-4 tooth yearling product
  - Both need need volume/coordination
  - Finish really important for Merinos (glycogen and intramuscular fat)

Summary

- Eating quality prediction
  - Intramuscular fat (breeding values)
  - Lean Meat Yield (breeding values)
  - Genomic prediction for sire in future
- Carcase grading
  - Will favour well grown and finished Merino lambs
  - The technology is advancing fast

I don’t care what breed you are

Carcase value ($)

=

Wt retail cuts (kg)

X

Value of the cuts ($/kg)

LMY

MSA 3*4*5*

True value of the carcase

Lamb (including Merino) premier meat on the Planet !