

# Lamb Meat Quality



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**Meat Quality Executive**

# Summary

- PhD

“Incorporating carcass, meat and nutritional quality parameters into a lamb genetic programme”

- Welsh Lamb Meat Quality project

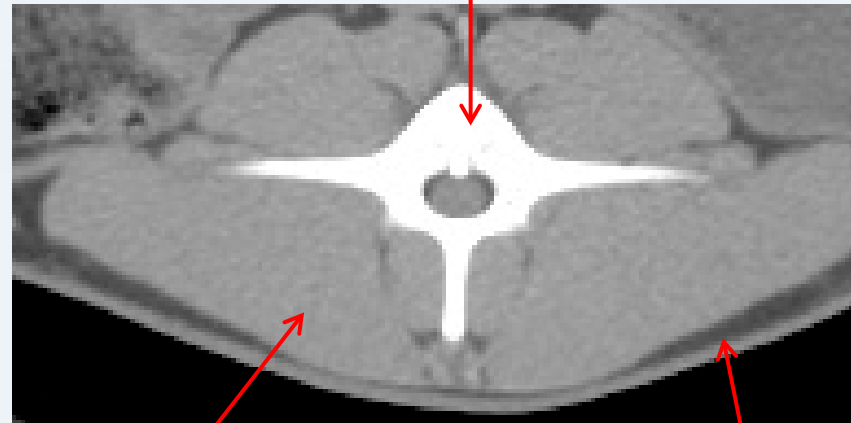
# Recording

- Charollais X Texel
- Pedigree
- Performance recorded
  - Birth traits
  - 8 week weight
  - Wean weight (15 week)
  - Ultrasonic backfat scanning
  - 21 week weight/CT scan

# CT Image – Muscle density



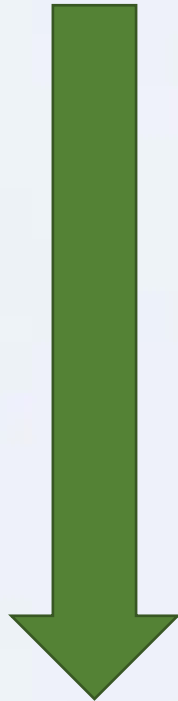
**Bone**



**Muscle**

**Fat**

High muscle density  
(Average 45.07 HU)



Low muscle density  
(Average 38.28HU)

Tag	Sire	MD (HU)	Weight (kg)
00722HV	A	45.56	46.2
00683HV	B	45.13	42.0
00660HV	C	45.02	45.2
00665HV	C	44.92	50.8
00592HV	A	44.72	46.0

00652HV	B	38.84	49.0
00624HV	A	38.67	46.0
00677HV	D	38.28	43.0
00711HV	E	37.83	47.0
00692HV	D	37.79	47.0

# Progeny Crossbred lamb Pedigree Performance Recorded





**Sensory**



**Shear force**



**Colour**

# Meat quality

Trait	n	Low muscle density	High muscle density	SED	P-Value
Ultimate pH (LV4)	205	5.71	5.69	0.011	0.162
Shear Force (N)	200	29.7	31.08	0.981	0.217
Colour saturation (C)	184	17.76	17.12	0.204	<b>0.012</b>
Colour lightness (L*)	184	43.45	43.20	0.003	0.290
Colour redness (a*)	184	16.22	15.70	0.005	<b>0.012</b>
Total IMF (mg/g)	197	2551	2338	32.5	0.193
<b>Bold represents significance at P&lt;0.05.</b>					



# Meat quality

Trait	n	Low muscle density	High muscle density	SED	P-Value
Texture	184	5.8	5.6	0.109	0.218
Juiciness	184	5.1	5.0	0.080	0.230
Flavour liking	184	5.6	5.6	0.054	0.714
Overall Liking	184	5.2	5.2	0.088	0.570

‡ higher values denote more favourable response.

Many meat quality traits were significant when analysed using sire muscle density EBV including sensory traits and fatty acids

i.e. for every unit decrease in muscle density EBV there was a significant  
Increase in loin IMF (1.69mg per 100g fresh weight)  
Increase topside IMF (0.03mg per 100g fresh weight).

# PhD Results

High MD lamb /  
Low Intramuscular fat

- ↑ Carcase weight
- ↑ Killing out %
- ↑ Conformation
- ↑ Loin and leg wt
- ↑ Saleable meat

Low MD lamb /  
High Intramuscular fat

- ↑ Growth rates
- ↑ Intramuscular fat
- ↑ Tenderness
- ↑ Eating quality
- ↑ Colour (red, sat)

# Impact from this research

Intramuscular fat EBV

Innovis breeding line  
Abervale

Product on the shelves at  
Waitrose

Scientific knowledge



ELSEVIER

Animal



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## Meat eating and nutritional quality of lambs sired by high and low muscle density rams

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# Welsh Lamb Meat Quality project Red Meat Development Programme



# Investigating on farm & processing factors

## Meat quality assessed by consumer taste panel:

Tenderness  
Juiciness  
Flavour  
Aroma  
Overall Liking



- 66 Farms
- 720 Lambs tested
- 2,000 Consumer taste panellists
- 14,000 Meat samples

## Fatty acid and mineral

Total IMF  
Omega-3  
Zinc  
Iron  
Protein content



## Farm assessments

Soil, feed and forage  
Lamb performance data – weights



Shear force  
and colour

# Welsh Lamb Meat Quality project



## Trial 1

- *Breed type (hill, crossbred & terminal)*
- *Gender (ram vs castrate)*
- *Muscle cut (loin, chump & topside)*



## Trial 2

- *Diet (indoor, grass, grass + concentrates & root/brassica)*
- *Ageing (7, 14 or 21 days)*



## Trial 3

- *Season (early, mid x2 & late)*
- *Gender (ewe, castrate & rams)*

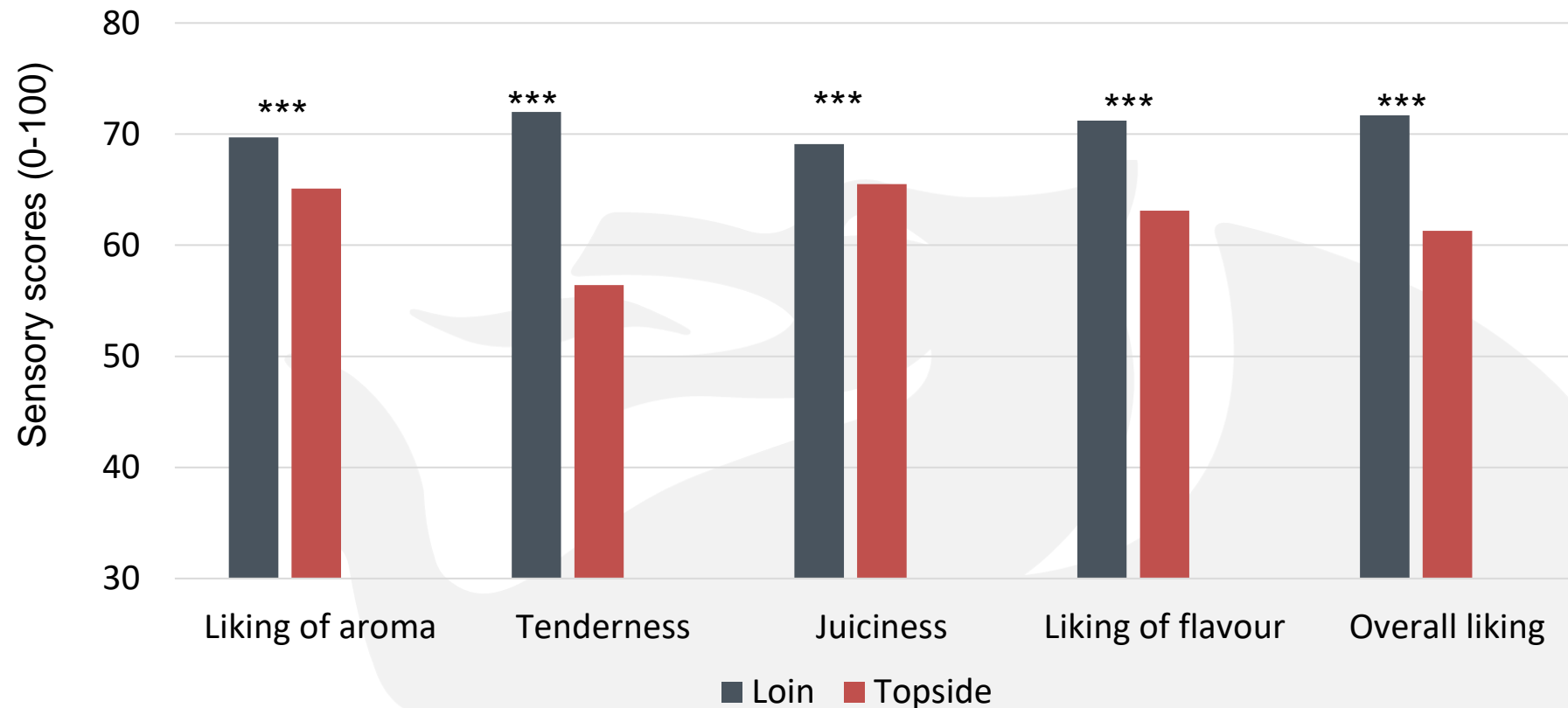


## Trial 4

- *Hanging method (achilles, crossed leg)*
- *Muscle cut (loin, chump & topside)*
- *Packaging (vacuum or MAP)*

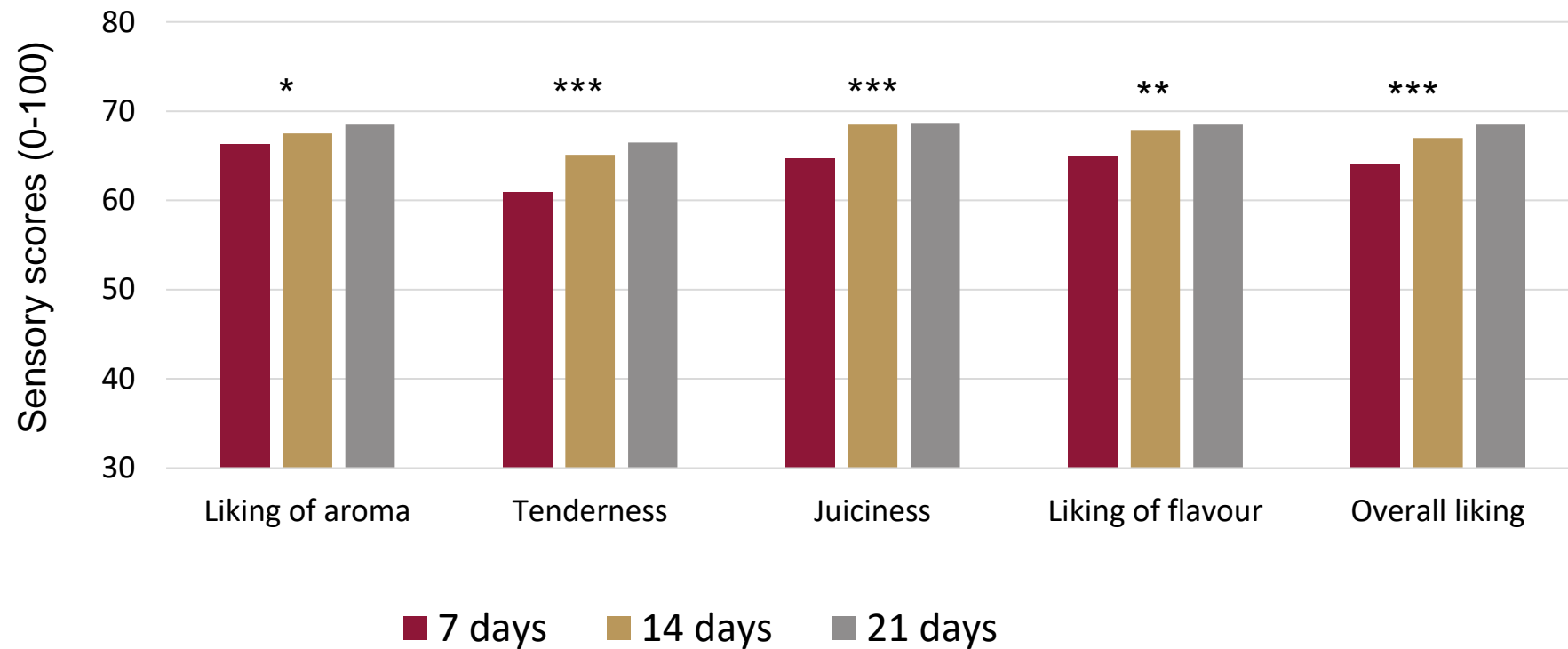
# Welsh Lamb Meat Quality Trial 2

Mean attribute score for each muscle cut



# Welsh Lamb Meat Quality Trial 2

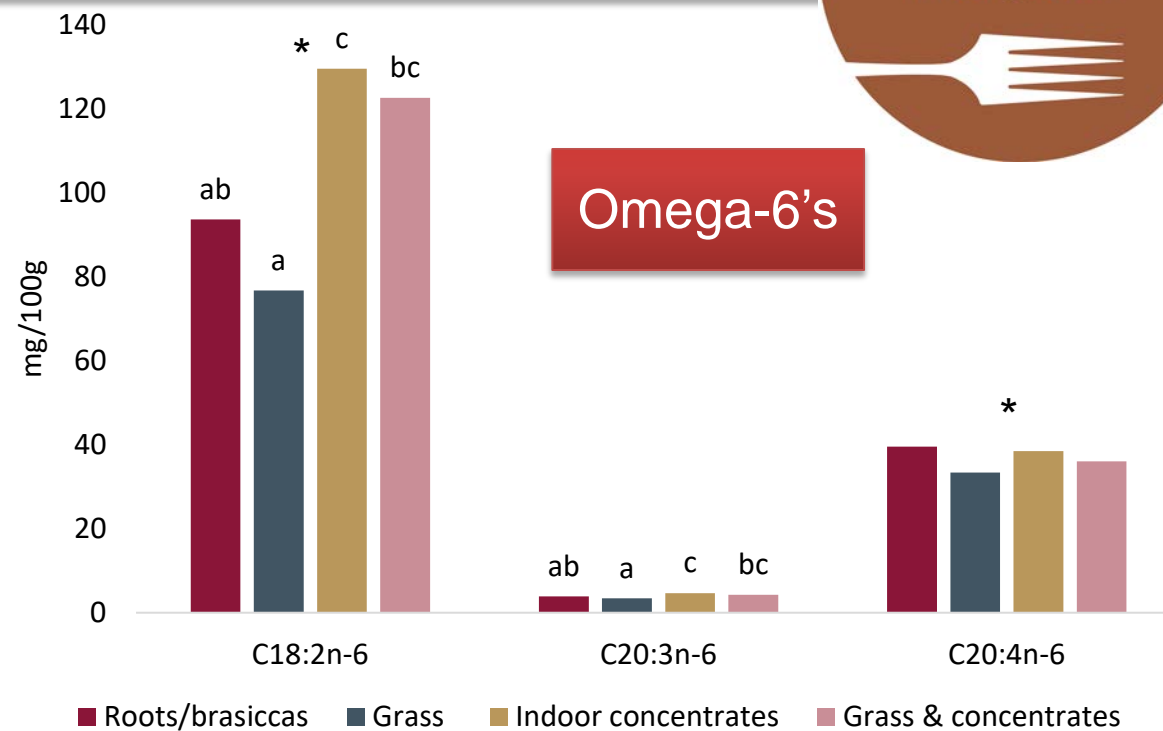
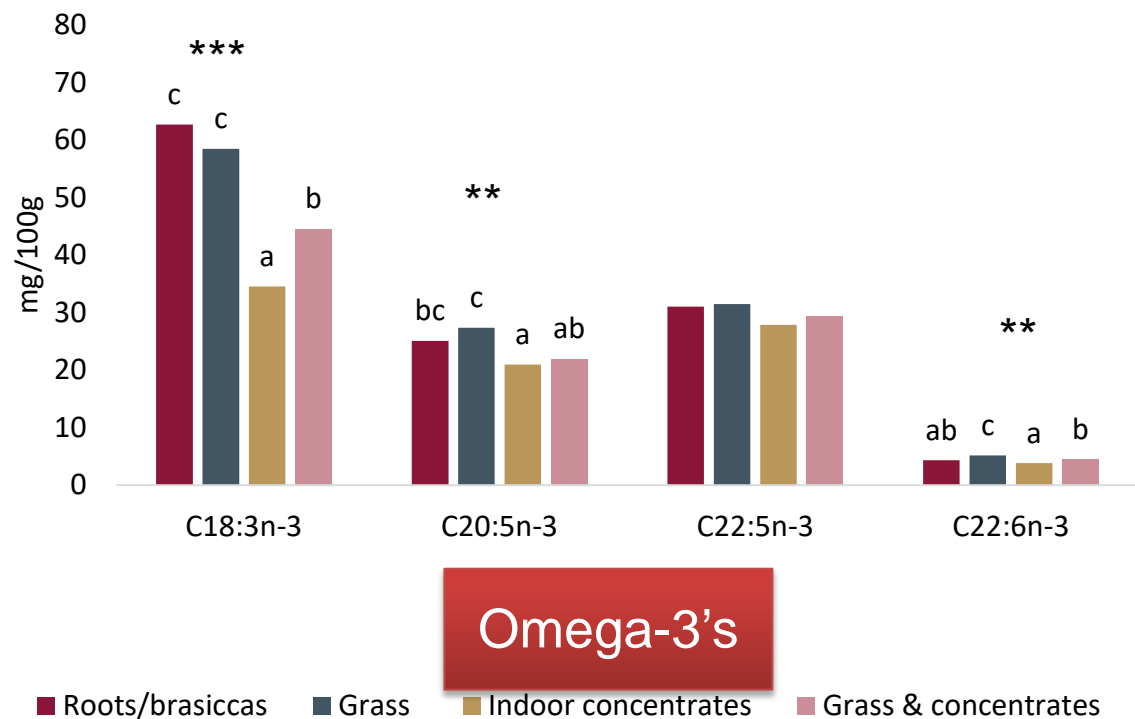
Mean attribute scores for each ageing period





# Welsh Lamb Meat Quality Trial 2

No effect of diet was observed for IMF, SFA, MUFA and PUFA

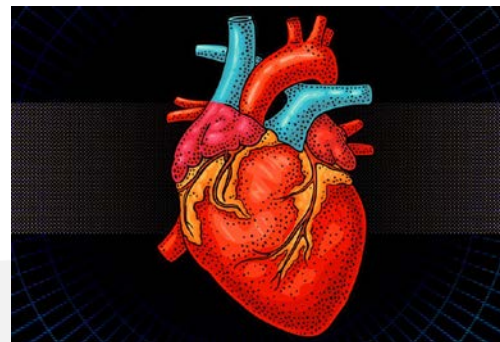


Ageing of meat had no effect on fatty acid groups

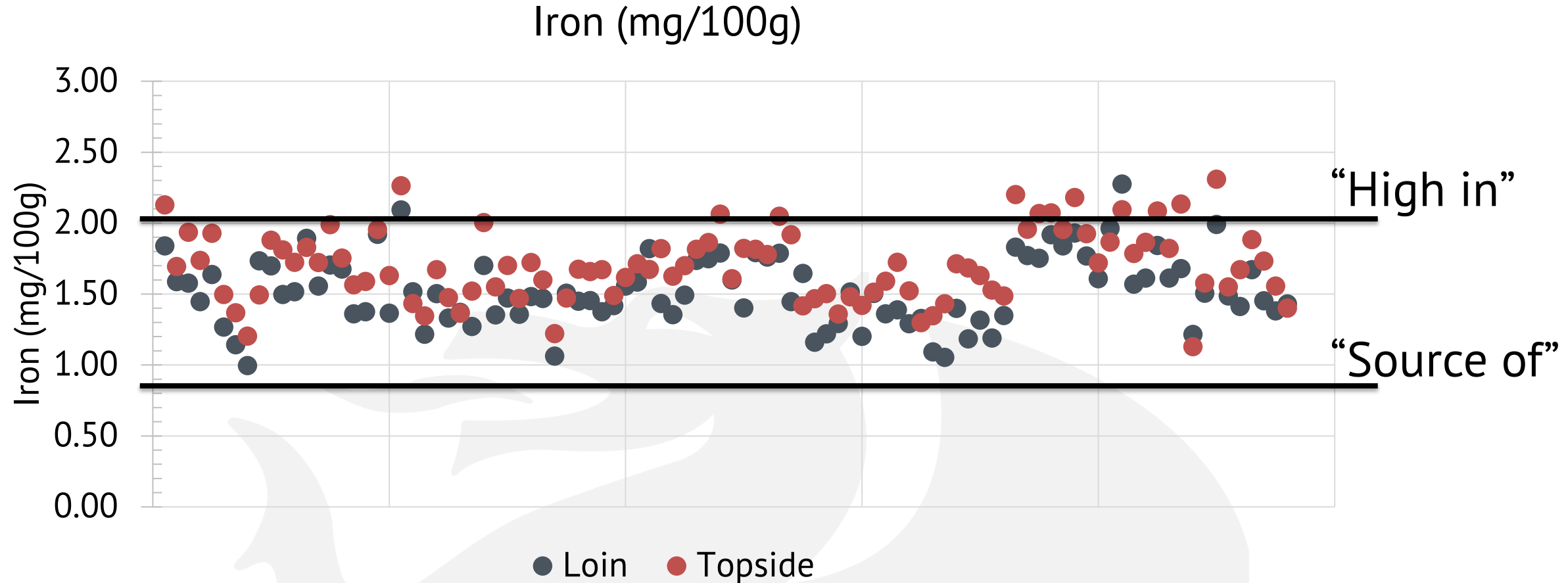
# Trial 2 – Diet Trial

Proteins are made of Amino acids  
Essential amino acids needed from the diet

**Grass fed =  
Leucine, Lysine, Threonine  
Tyrosine, Valine**

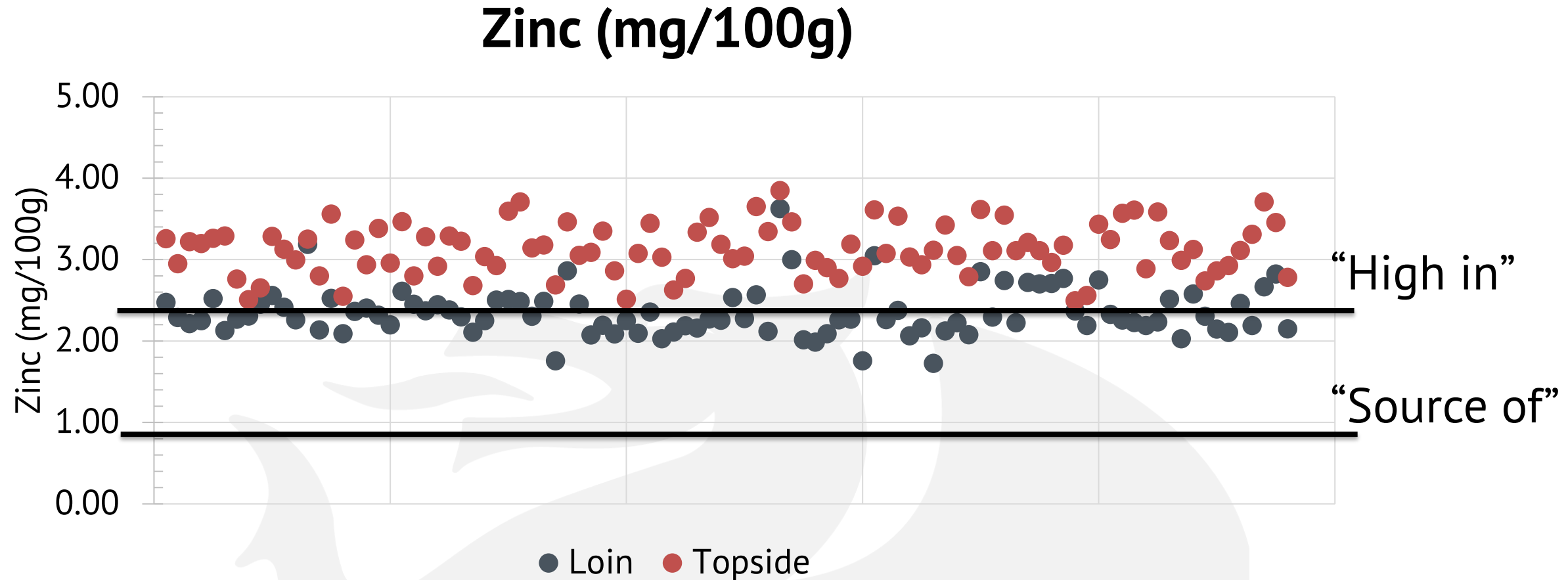


# Trial 2 – Cut effect on Iron \*\*\*



Ageing had a decreasing effect on iron content

# Trial 2 – Cut effect on Zinc \*\*\*



Ageing had no effect on zinc content

**Diolch**  
**Thank You**



Any questions?  
Unrhyw gwestiynau?