Red Meat Eating Quality

What producers need to know to satisfy consumers of tomorrow!

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Outline

- Value of Yield & Quality
- Maturity patterns
- Genetic selection for ↑ carcass value
- Prevalence of dark cutting
- Major causes in SA & Vic
- Take home messages

Breeding Profitable Cattle & Sheep

A. Fit for ***your*** farm

B. Suitable for market

Value of a carcase

=

Quantity of saleable meat

X

Quality of the meat

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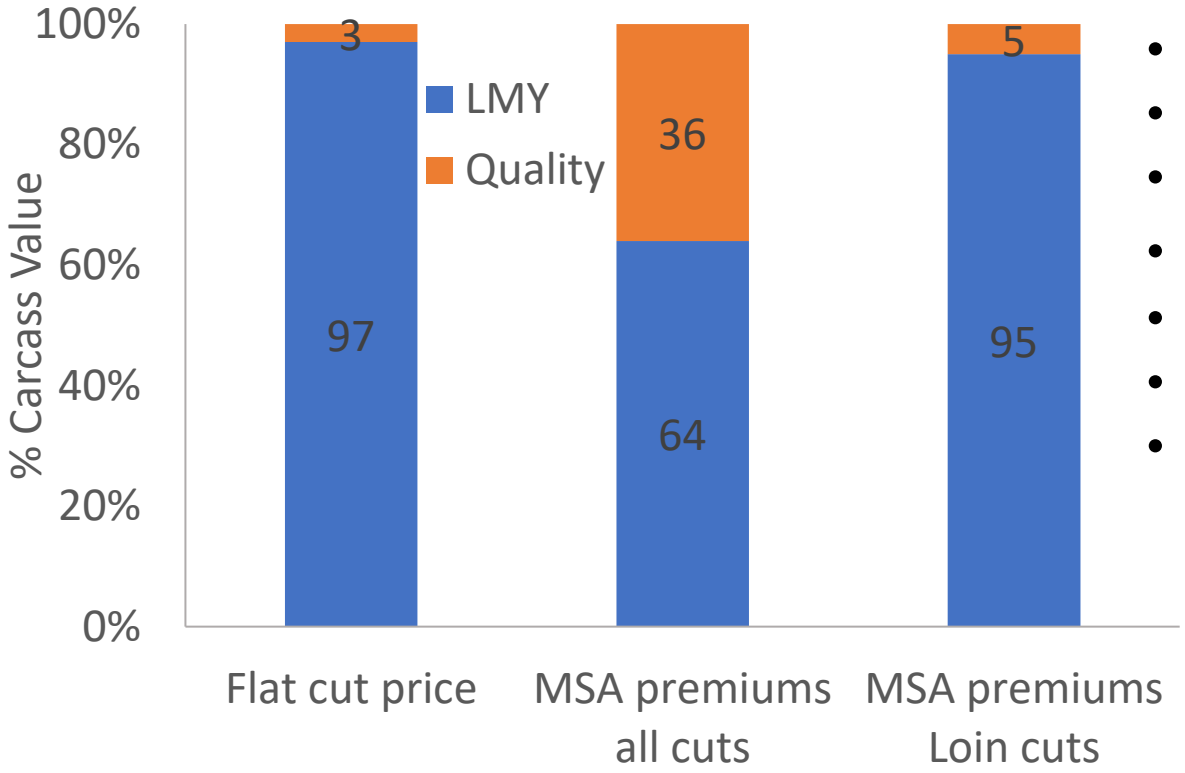
Value of a carcase

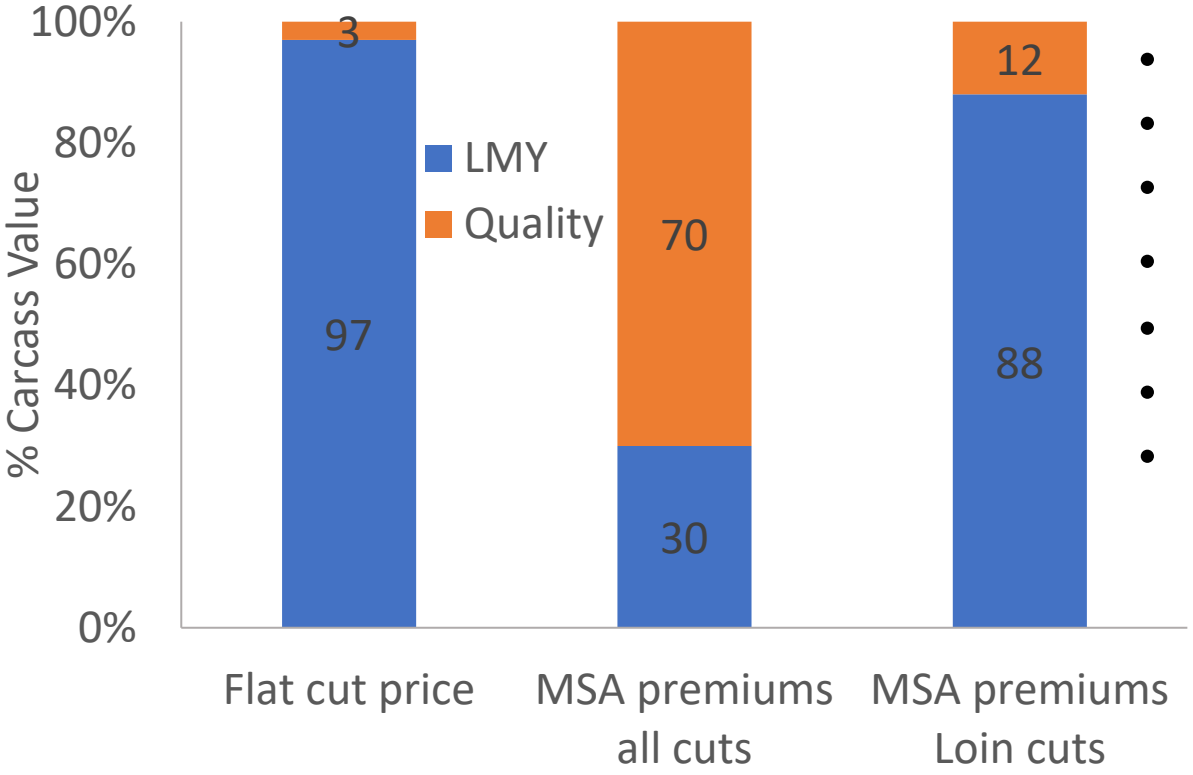


- 112 steers boned out
- 100 DOF
- All HGP treated
- Ave MSA Index = **57.22** ± 1.59
- 45th Percentile nationally
- Min MSA Index = 54.08
- Max MSA Index = 61.71

Yield is worth more $ in lower quality cattle

McGilchrist et al. 2022

Value of a carcase



- 112 steers boned out
- 100 DOF
- No HGPs
- Ave MSA Index = **62.05** ± 1.59
- Top 20th Percentile nationally
- Min MSA Index = 58.92
- Max MSA Index = 66.54

Quality is worth more $ in high quality cattle **IF** all cuts on quality

McGilchrist et al. 2022

Value of Carcase YIELD?

- Faster weight gain on-farm
- 6X more grass/feed to deposit a Kg of fat
- ↑ efficiency of production – CN30
- ↑ Dressing %
- ↑ Value chain profits

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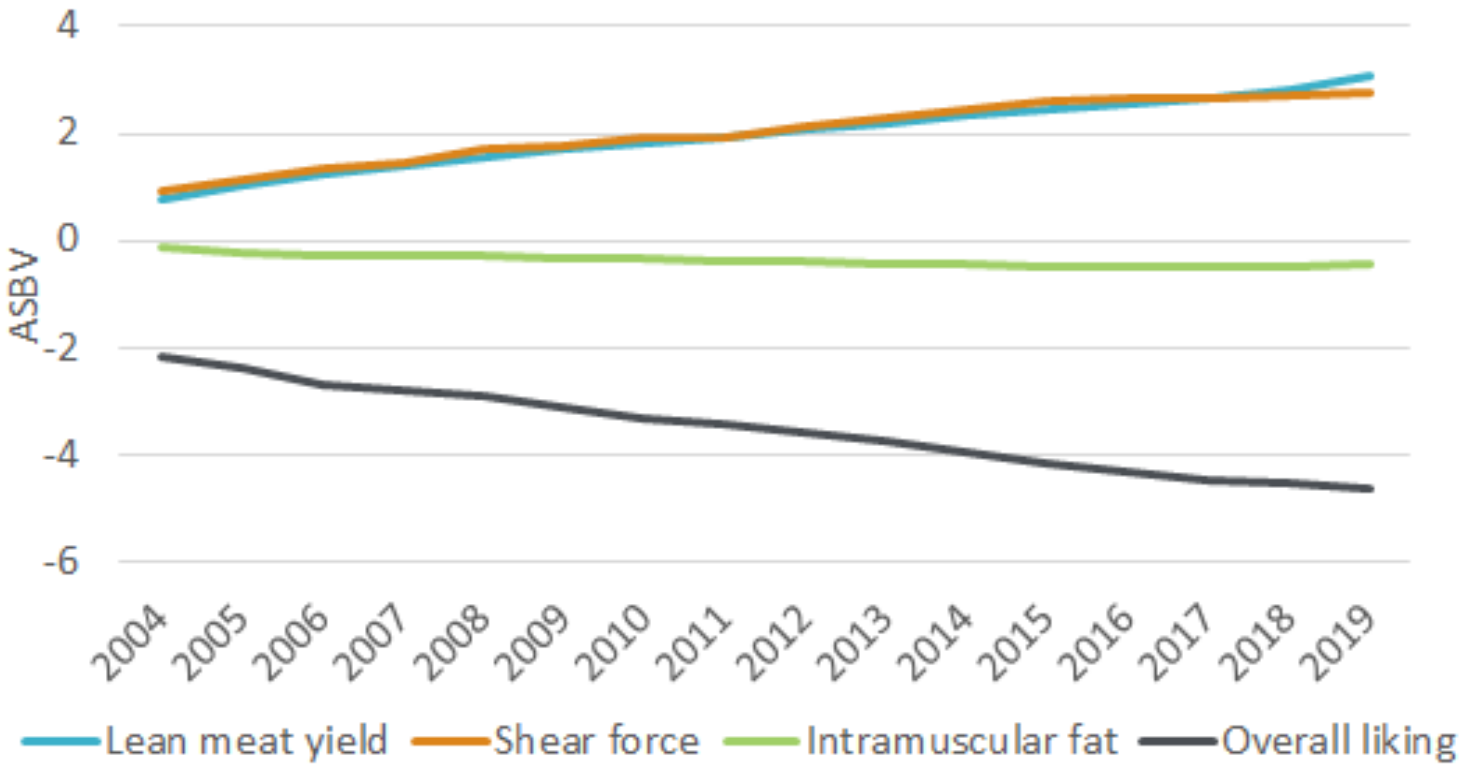
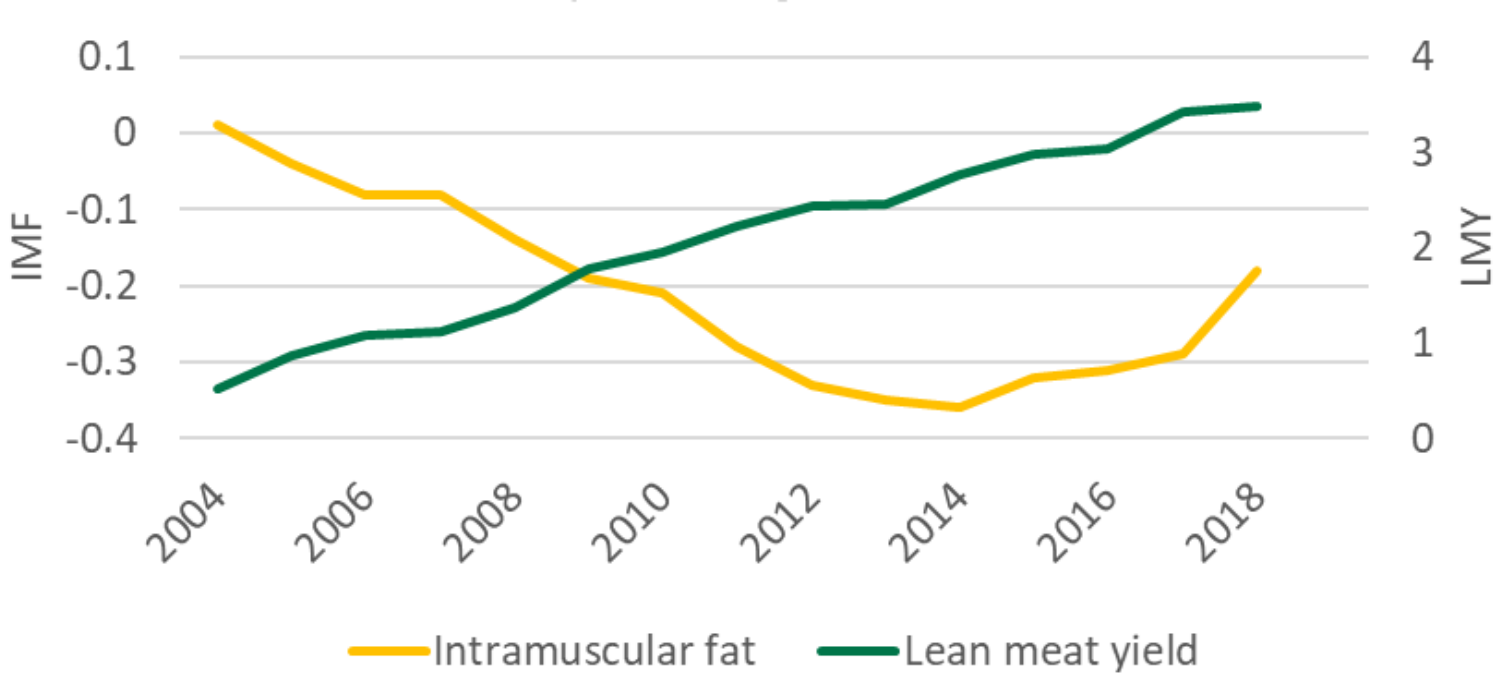
Terminal lamb genetic trends for carcase traits



Can **NOT** sacrifice Meat Quality in the pursuit of Yield

Genetic selection for LMY & quality



Breeding Values allow for selection of Yield & Eating Quality

How to measure Carcase YIELD?

How to measure Carcase YIELD?

- Currently use P8 fat and carcass weight R^2 ~ 0.2

- Other systems available or undergoing development
  1. Dual X-Ray Absorptiometry (DEXA)
  2. Frontmatec BCC-3 yield camera
  3. E+V carcass yield camera
  4. Video Image Analysis (VIA) scan
  5. UTS Carcass yield camera

- Need ongoing investment & development

How to measure carcass QUALITY?

Traits to measure

Rib fat depth

Eye Muscle Area

Marbling or IMF%

Fat Colour

Meat Colour & pH

The MSA Index

A **single number** to indicate the overall quality of a carcass

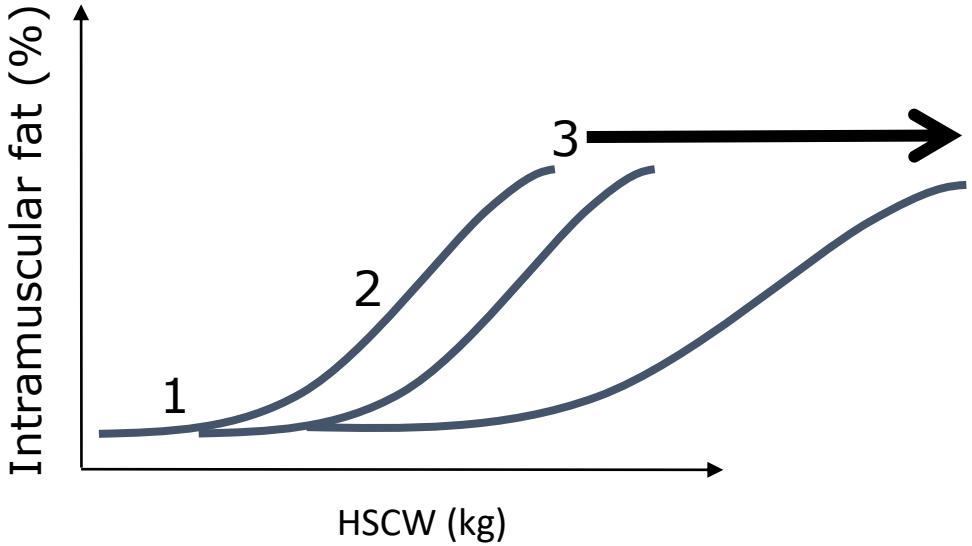
A weighted average of 39 eating quality scores

What are the key genetic drivers of QUALITY?

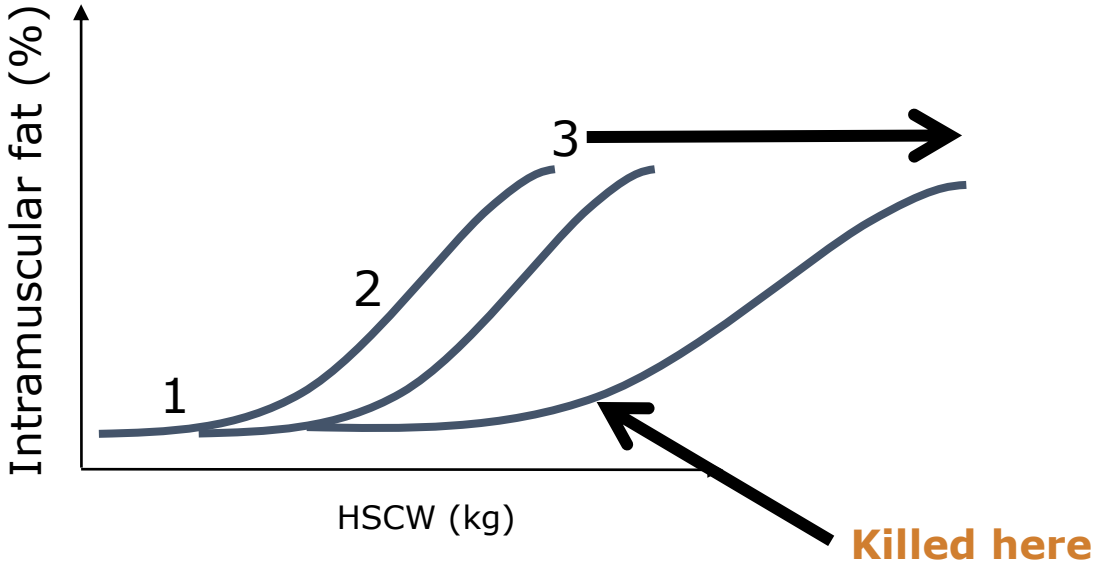
- IMF = ↑ Marbling
- Growth = ↓ Ossification

What do we have to be careful of?

Very big &/or heavily muscled animals may never enter the linear increase phase



Modern Pig & high MCW cattle may never enter linear increase phase



Breeding Profitable animals

A. Fit for ***your*** farm

B. Suitable for market

The ultimate balancing act

Breeding Profitable animals

A. Fit for ***your*** farm

B. Suitable for market

↑Yield

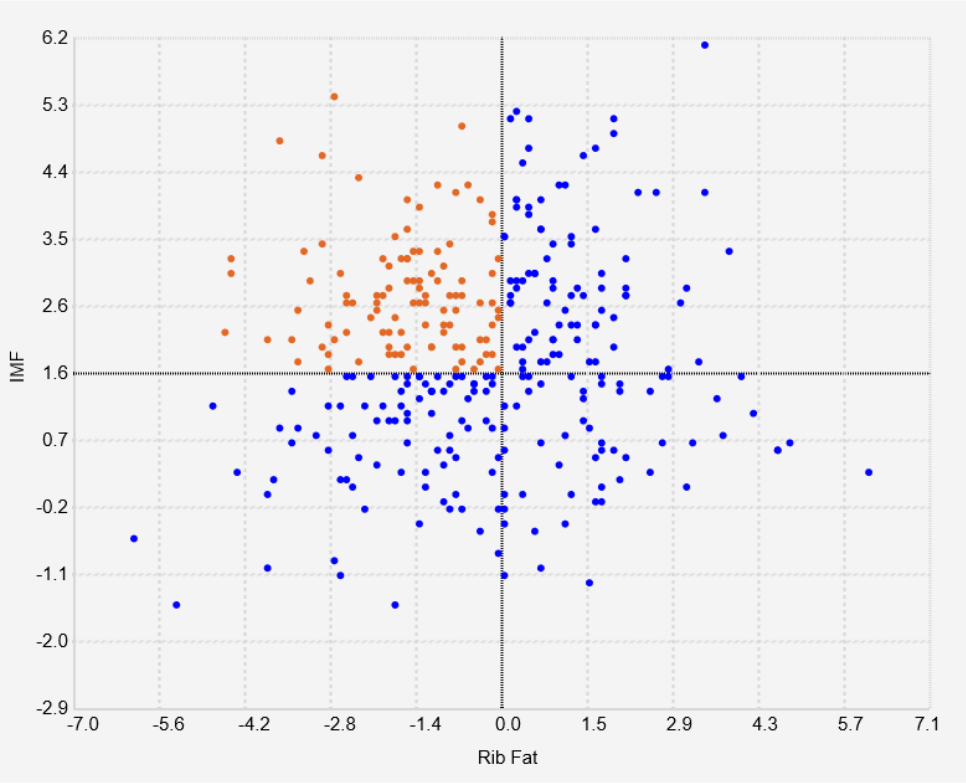
↑Quality

Same age, Same Environment! Different genes

Same age, Same Environment! Different genes

↑ IMF drives ↑ Quality
↓ Subcutaneous ↑ Yield

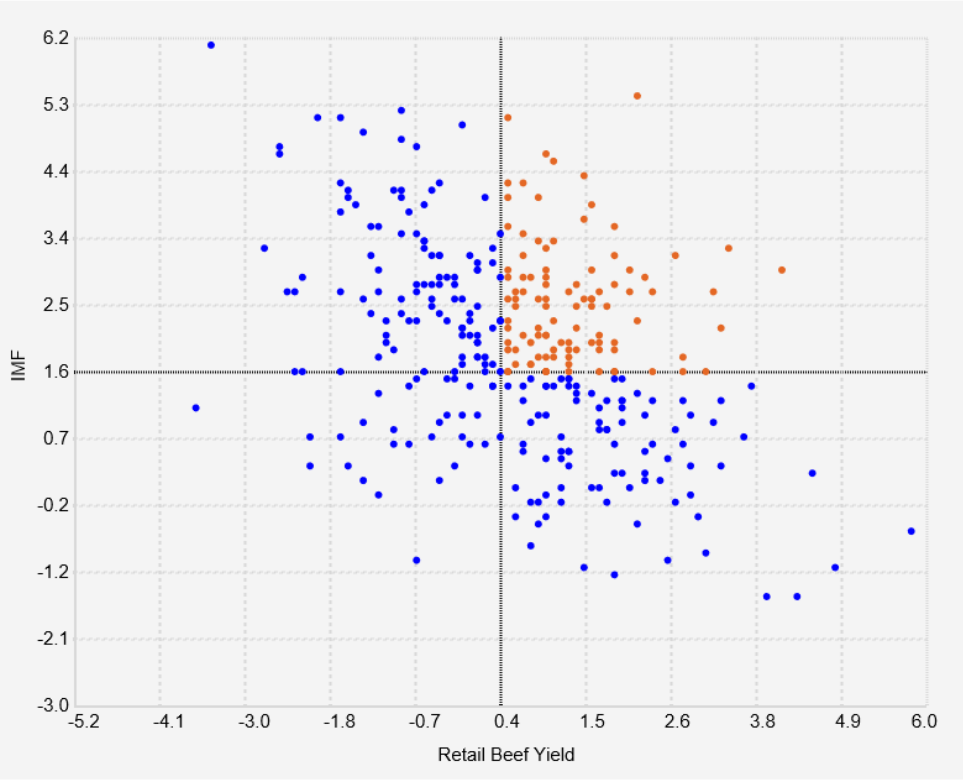
↑Quantity & Quality Genetically



Take fat off outside of meat & put it inside

- ASBP sires n=322
- 102 sires in ideal quadrant = 32%

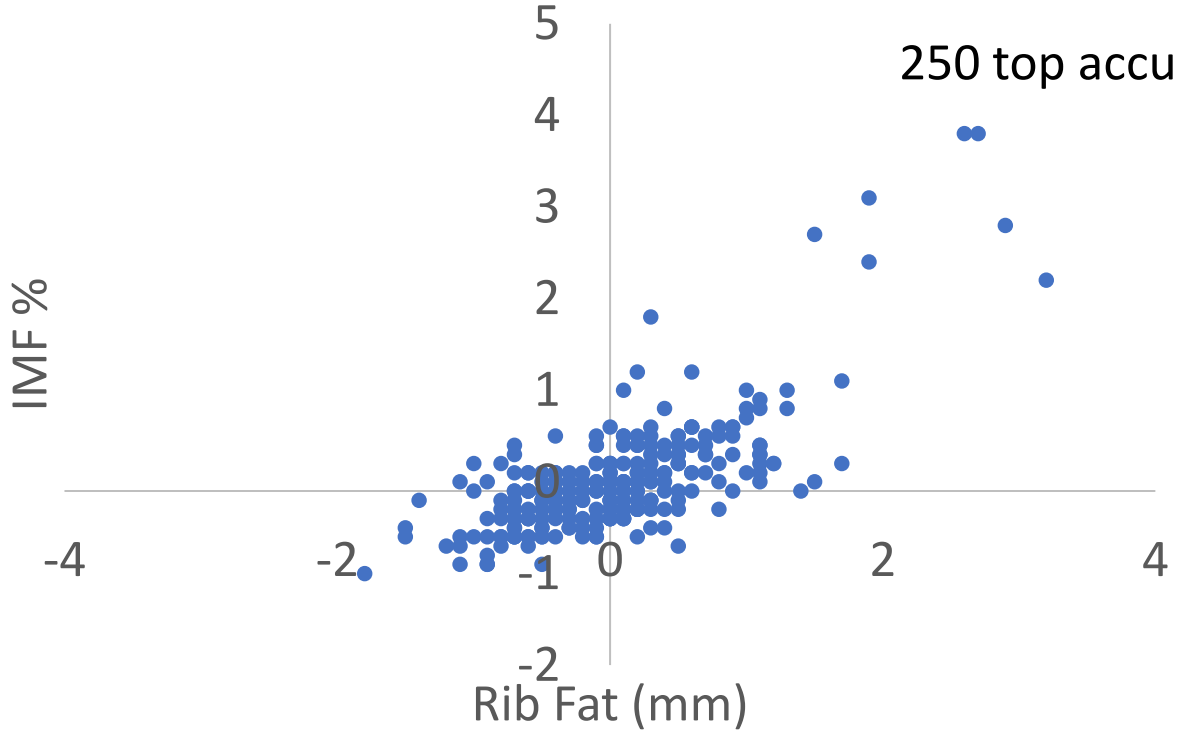
IMF V's Retail Beef Yield % EBV



Same Sires?

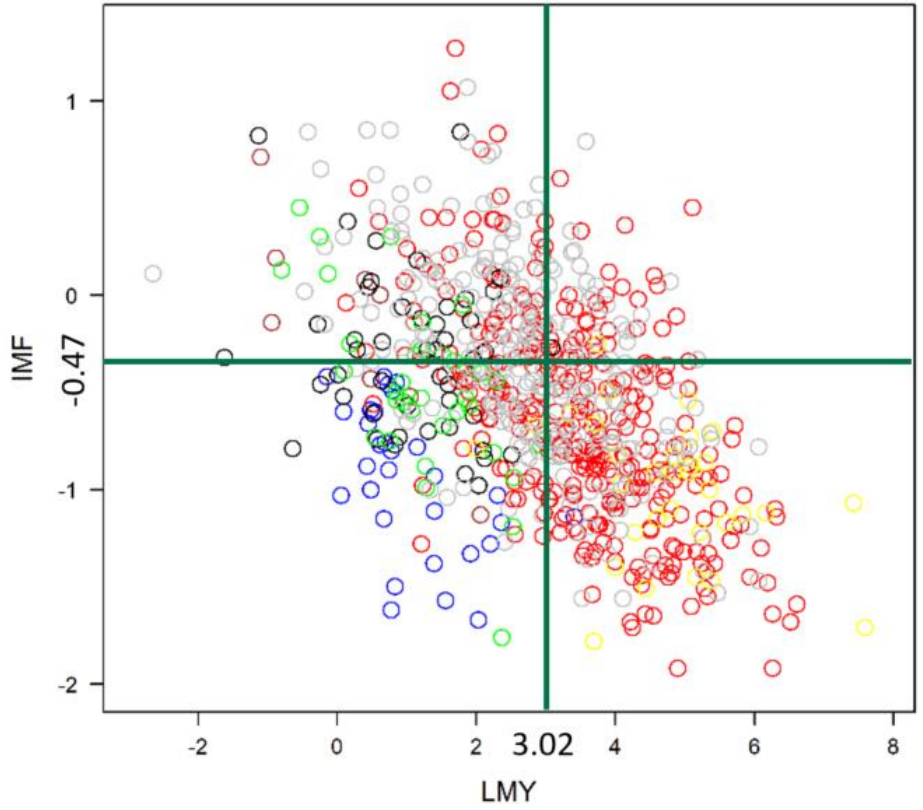
- ASBP sires n=322
- 100 sires in ideal quadrant = 31%

↑Quantity & Quality Genetically



Take fat off outside of meat & put it inside

Resource Flock Sire LMY & IMF ASBVs by breed

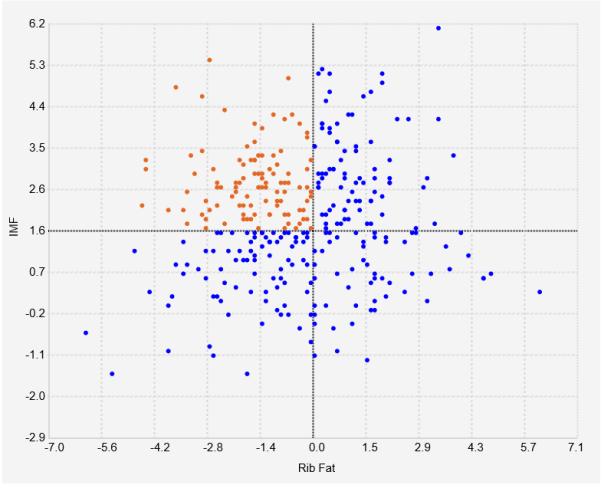


Take fat off outside of meat & put it inside

Females of the future – How much fat?

Meat:

- Flavour
- Tenderness
- Juiciness



Females:

- Age of puberty
- Reproductive capacity
- ↓ Post Partum Anoestrus Interval
- Seasonal resilience

The balancing act with muscle %

…what is ‘dark cutting’?

Ultimate pH>5.7

Meat Colour ≥4 (company spec)

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What's wrong with high pH meat?

- Darker colour
- Variable tenderness
- V. difficult to cook right
- Bacterial growth more rapid

Causes of Dark Cutting

$pH_u = 5.5$

$pH_u = 5.9$

⇩ glycogen at slaughter

Glycogen Concentration

Adelaide

pH = 7

Naracoorte

< 5.7 pH_u

> 5.7 pH

Muscle Glycogen at Slaughter

=

muscle glycogen on-farm

minus

pre-slaughter losses

Nutrition
Nutrition
Nutrition

↓Stress
↓Exercise

Prevalence of Dark Cutting

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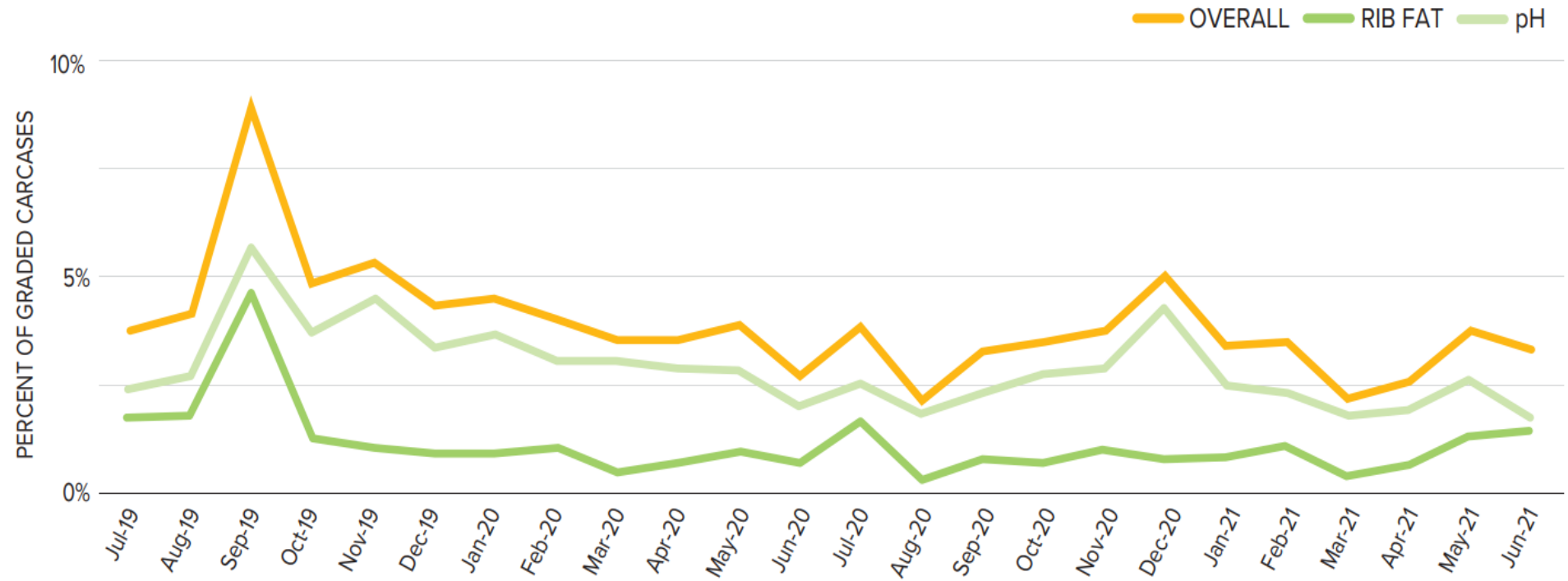
Compliance to MSA requirements: SA/NT

South Australia – 96.1% compliance to MSA specifications

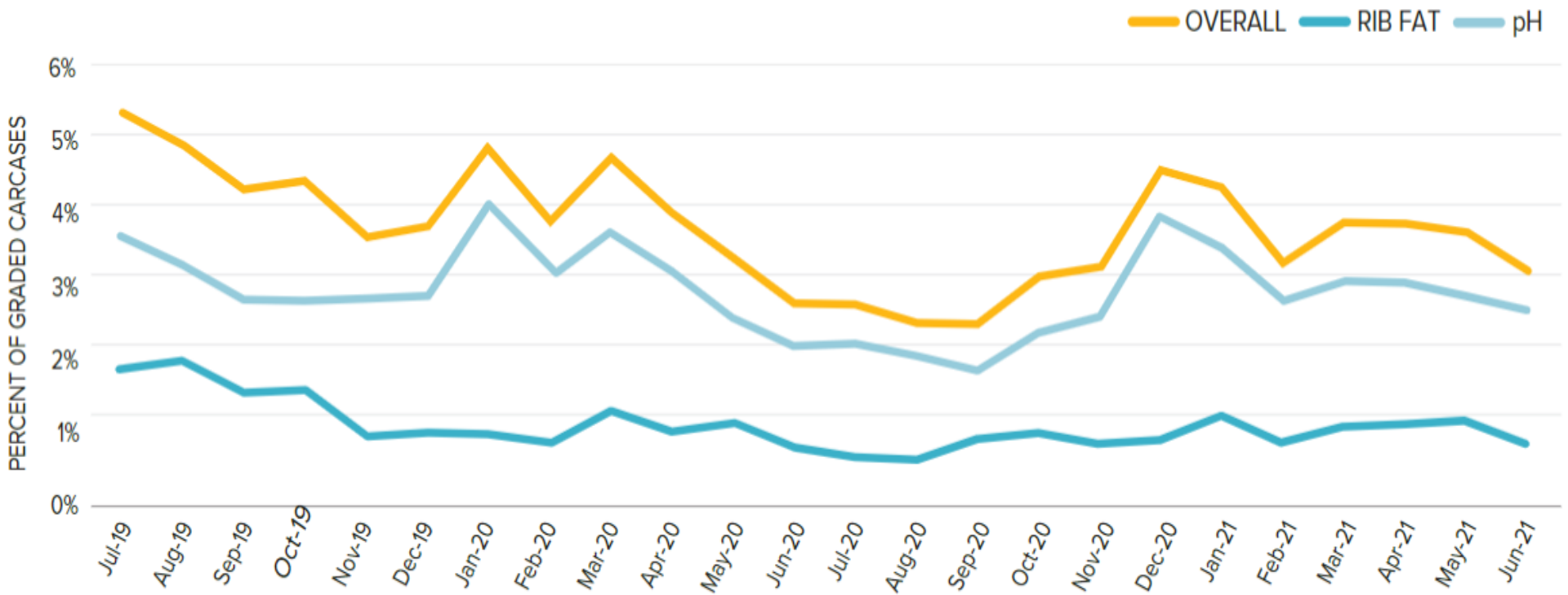
(Nationally 94.9% carcases met MSA minimum requirements)



Compliance to MSA requirements: VIC

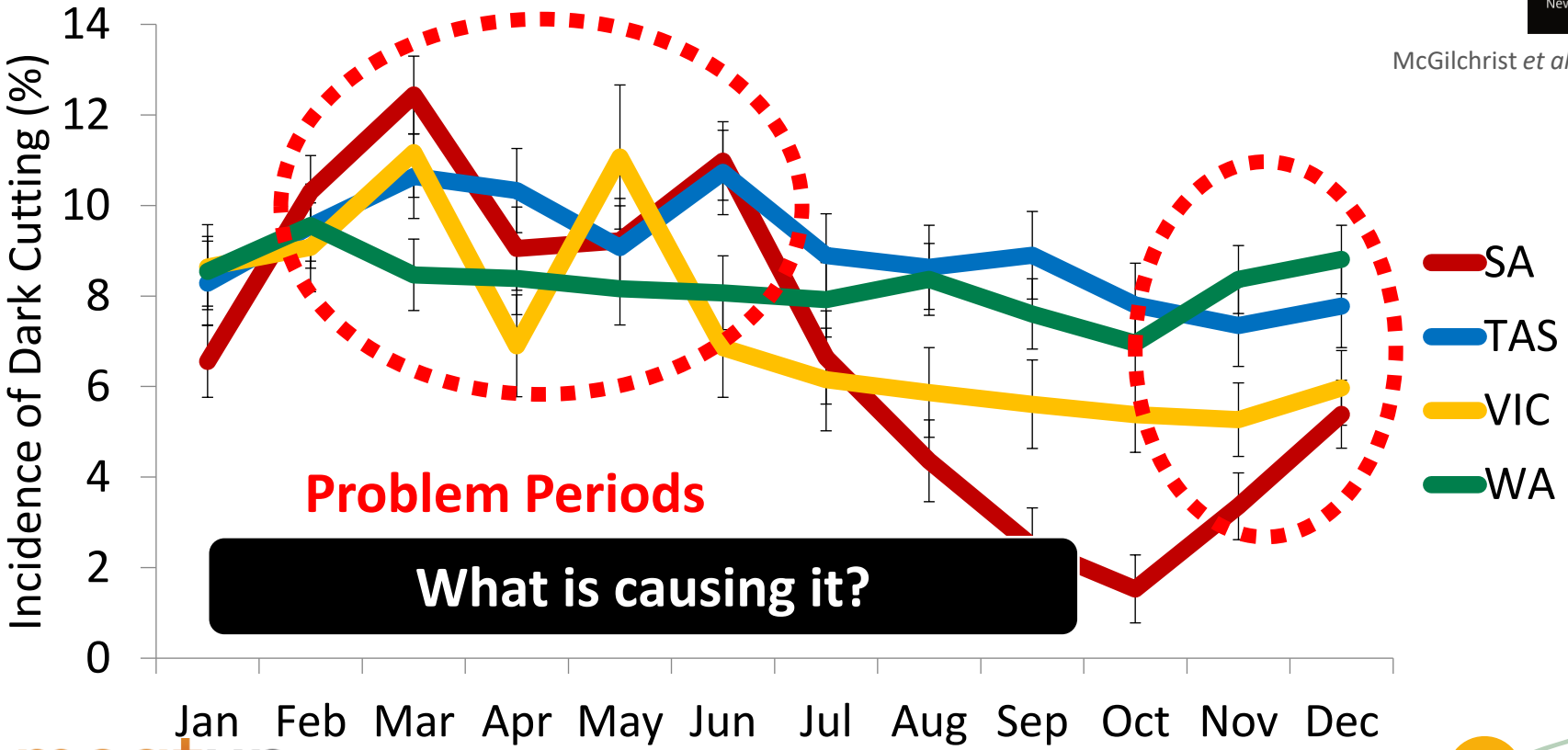
Victoria – 96.3% compliance to MSA specifications

(Nationally 94.9% carcases met MSA minimum requirements)



Impact of season in grass fed cattle – 5 years data

McGilchrist *et al.* 2014

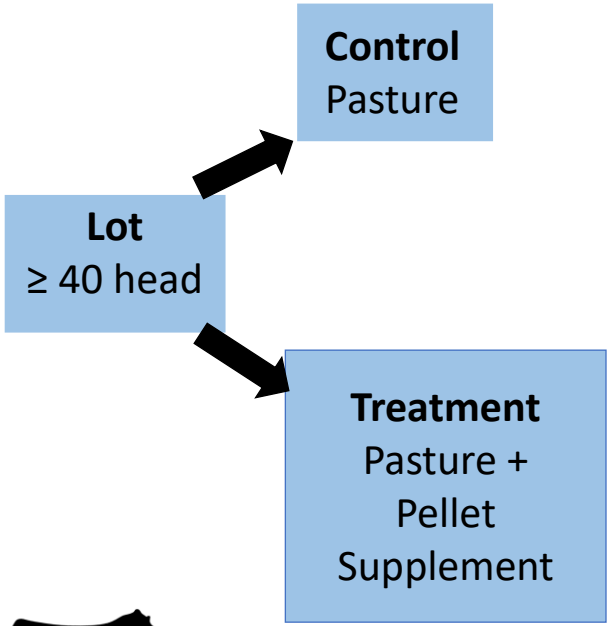


Southern Situation

Season -> Season transition

Can’t all consign cattle at same time!

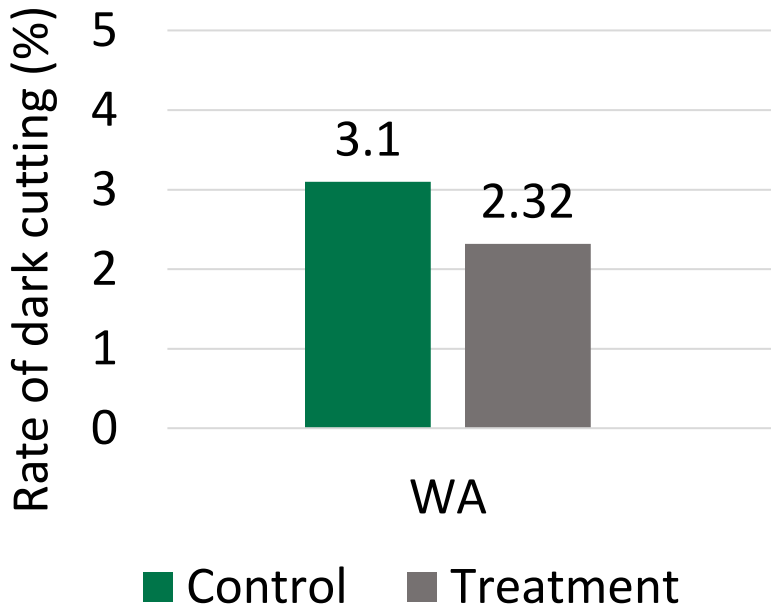
Experimental Design

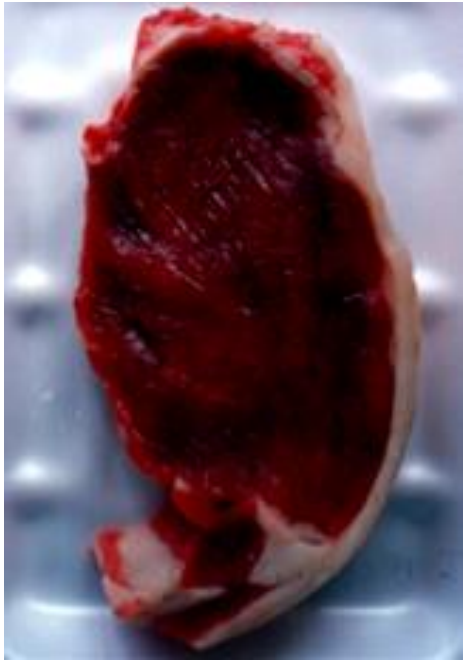


- 959 cattle
- 2.5kg Grain based pellet/day
- 13.3 MJ ME/kg
- 14.4% Crude Protein

Rates of Dark Cutting

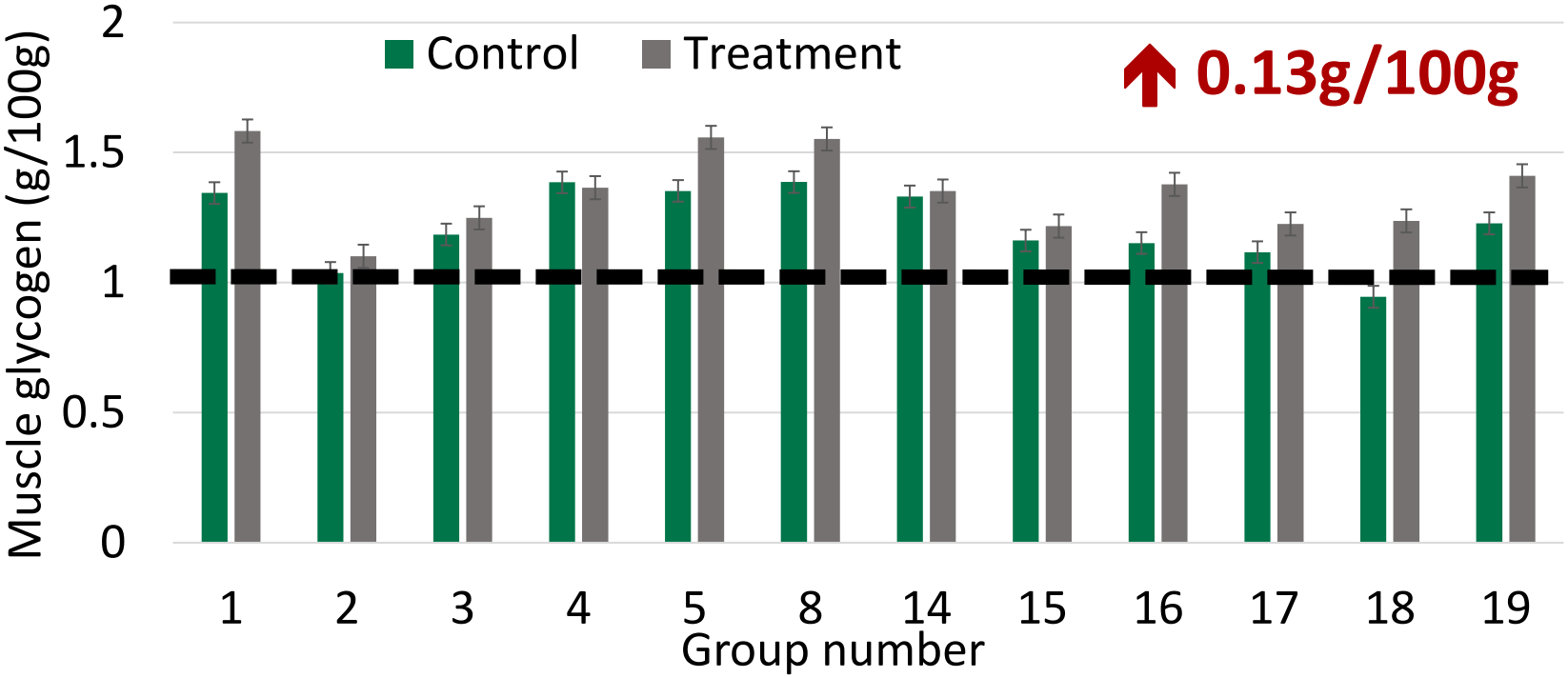
Very low incidence of dark cutters





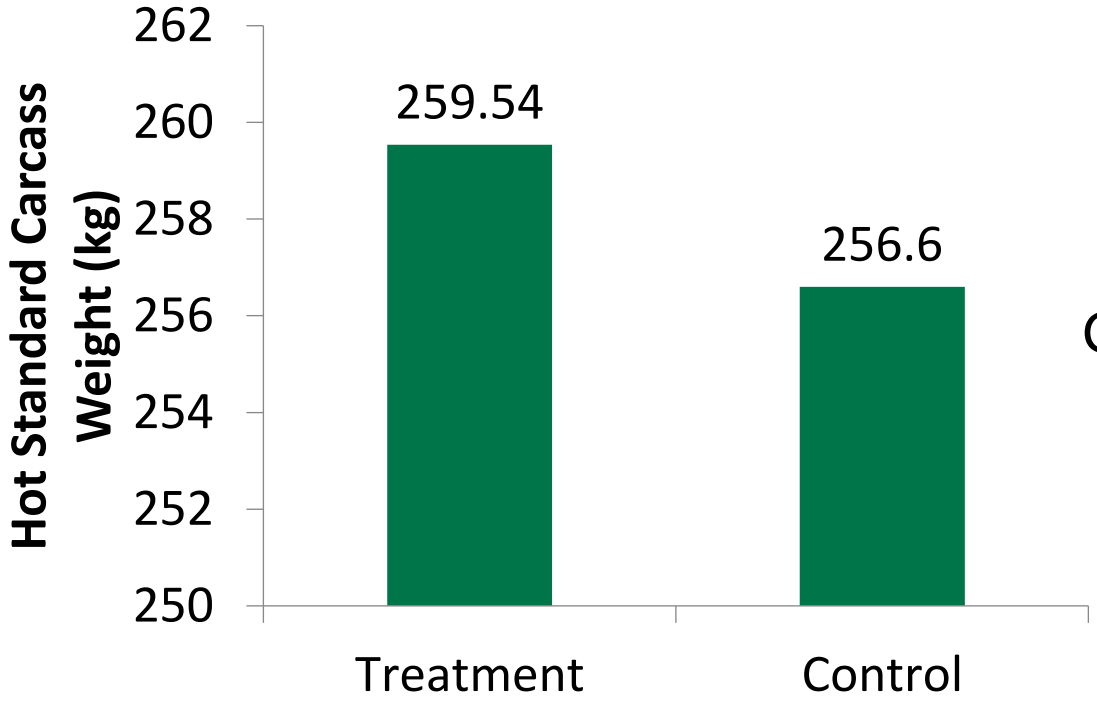
BUT Had a positive effect on glycogen at slaughter

Muscle Glycogen at Slaughter – Grain pellets



P <0.001

HSCW advantage



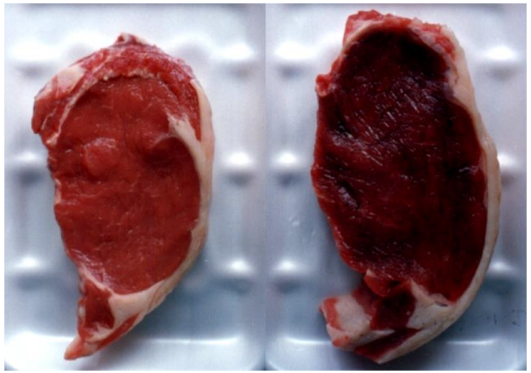
↑ 2.94 kg HSCW

Growth paid for feed costs

P <0.001

Supplementation summary

- Supplementation with **30 MJ ME** extra per day works
  - ↑ Carcass weights
  - ↑ Glycogen
  - ↓ risk of dark cutting
- Prepare your cattle for market
- Know sale date – ***have a strategy!***
- Need high ME feed – moderate protein ~14%



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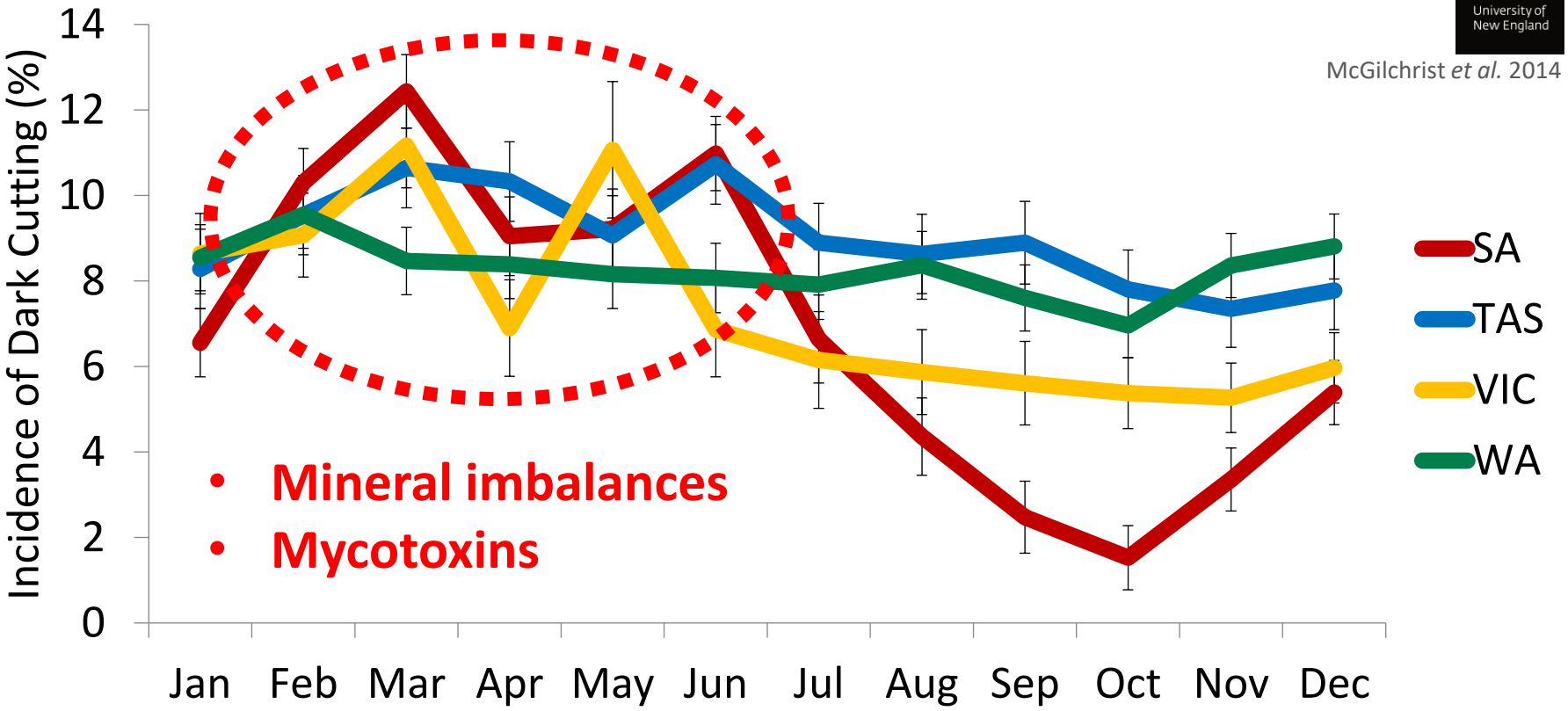

McGilchrist *et al.* 2014

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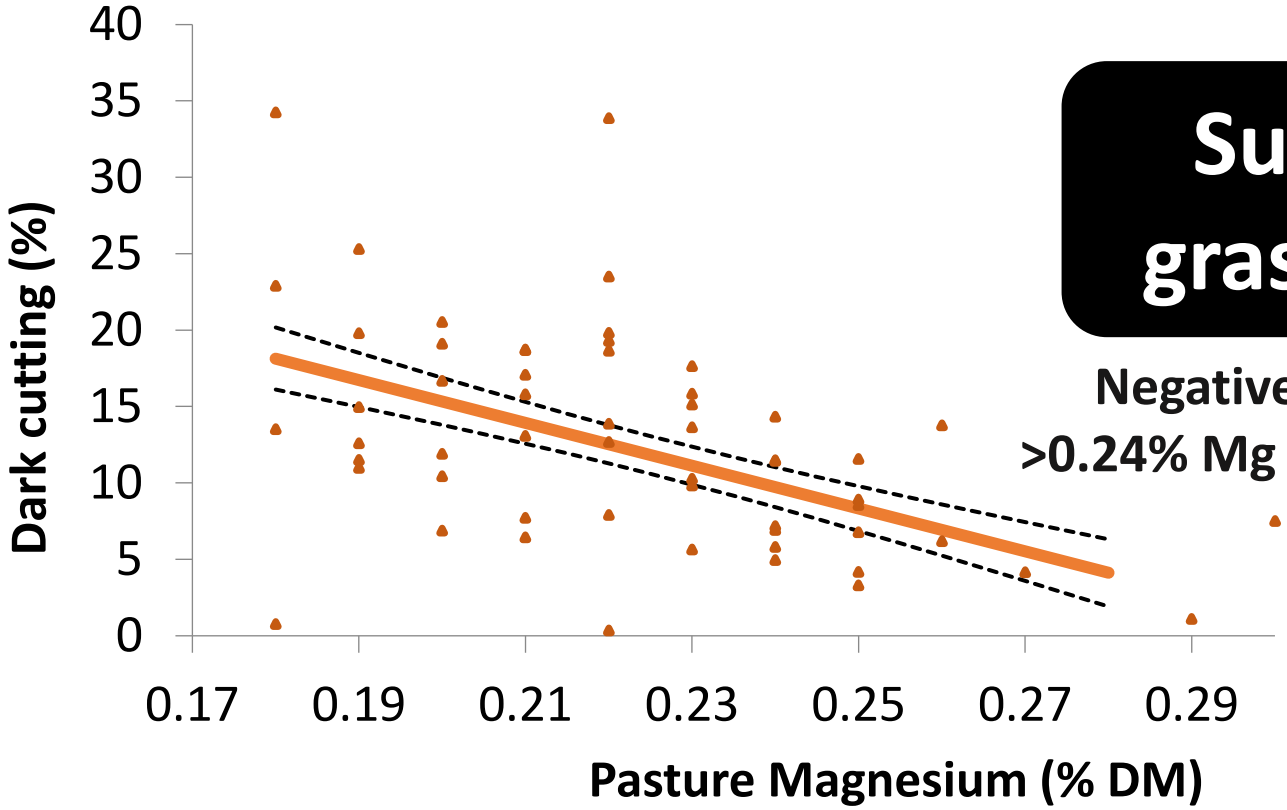
Pasture Magnesium – King Island (P<0.05)

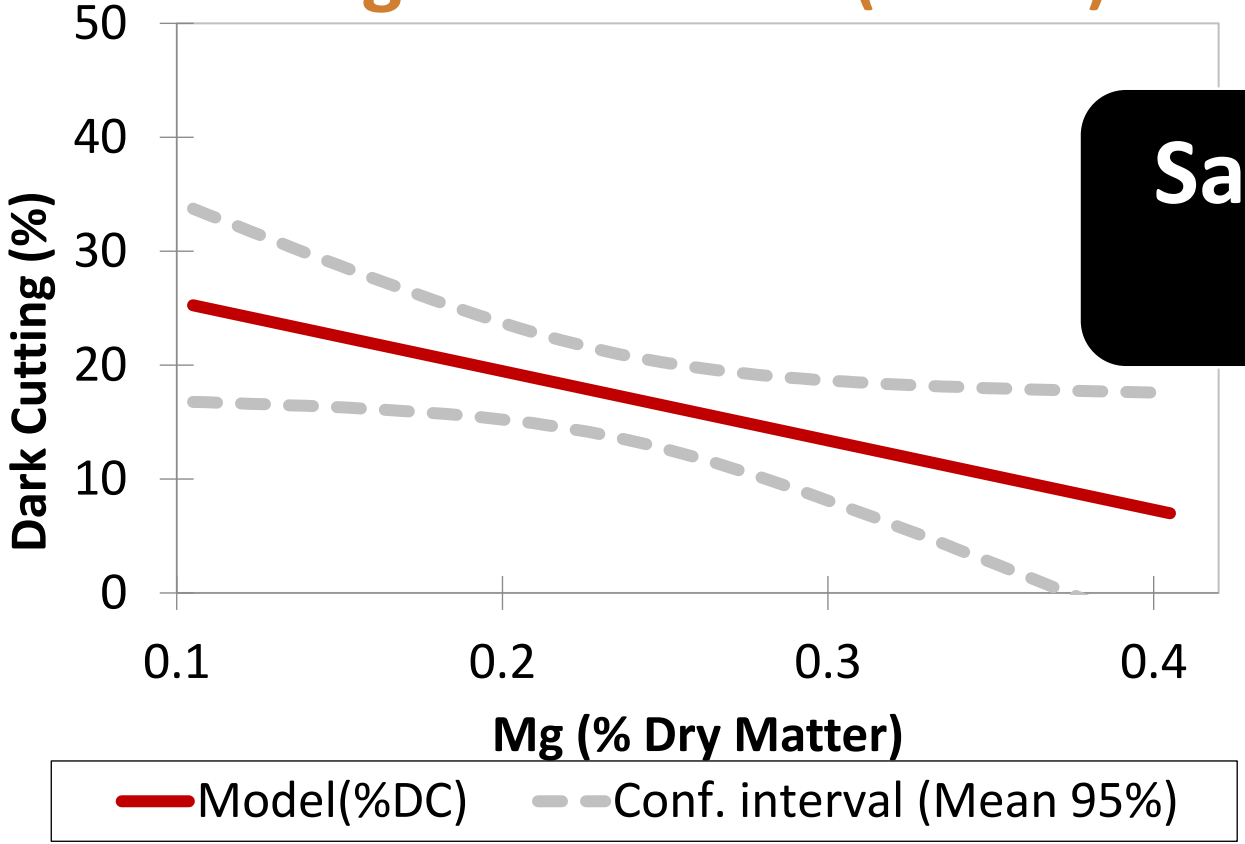


Subclinical grass tetany?

Negative binomial analysis
>0.24% Mg = 26% ↓ relative risk

Loudon *et al.* 2018

Pasture Magnesium – SA (P<0.05)



Same result – 2 states!

Wilkes *et al.* Unpublished

Low Magnesium = 'Subclinical Grass Tetany'

- ↓ voluntary feed intake
- ↓ insulin sensitivity

↓ Glycogen storage

- ↑Muscular hyperexcitability / convulsions
- ↑ adrenaline release
- ↑ stress responsive

↑ Glycogen usage pre-slaughter

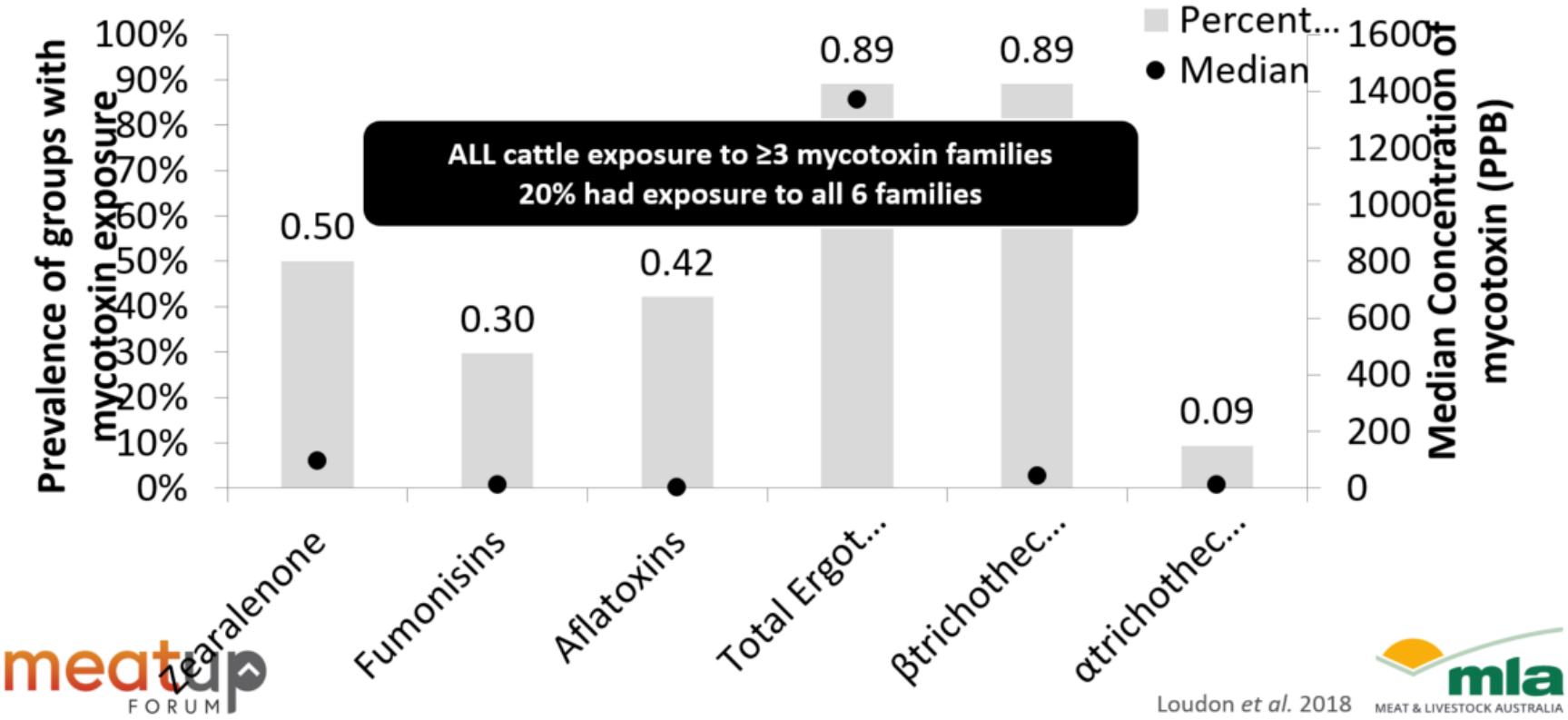
Solutions

1. **Mg Concentration in pasture – need >0.24% Mg**
2. **Pasture intake rates – need minimum 1500kg DM/Ha**
3. **↑ Mg absorption – hindered by high K, fast rumen passage rates etc**

MYCOTOXINS

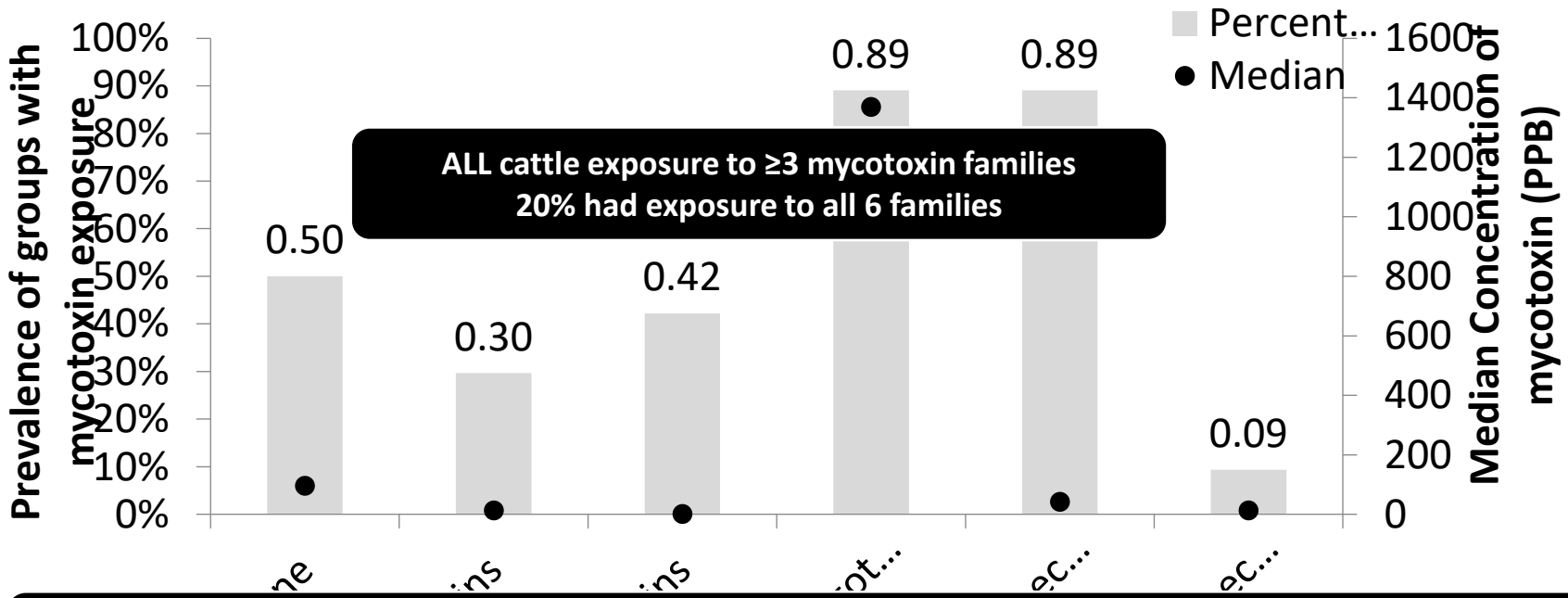
Rye Grass Staggers

Pasture mycotoxin prevalence – 66 pastures



Loudon *et al.* 2018

Pasture mycotoxin prevalence – 66 pastures

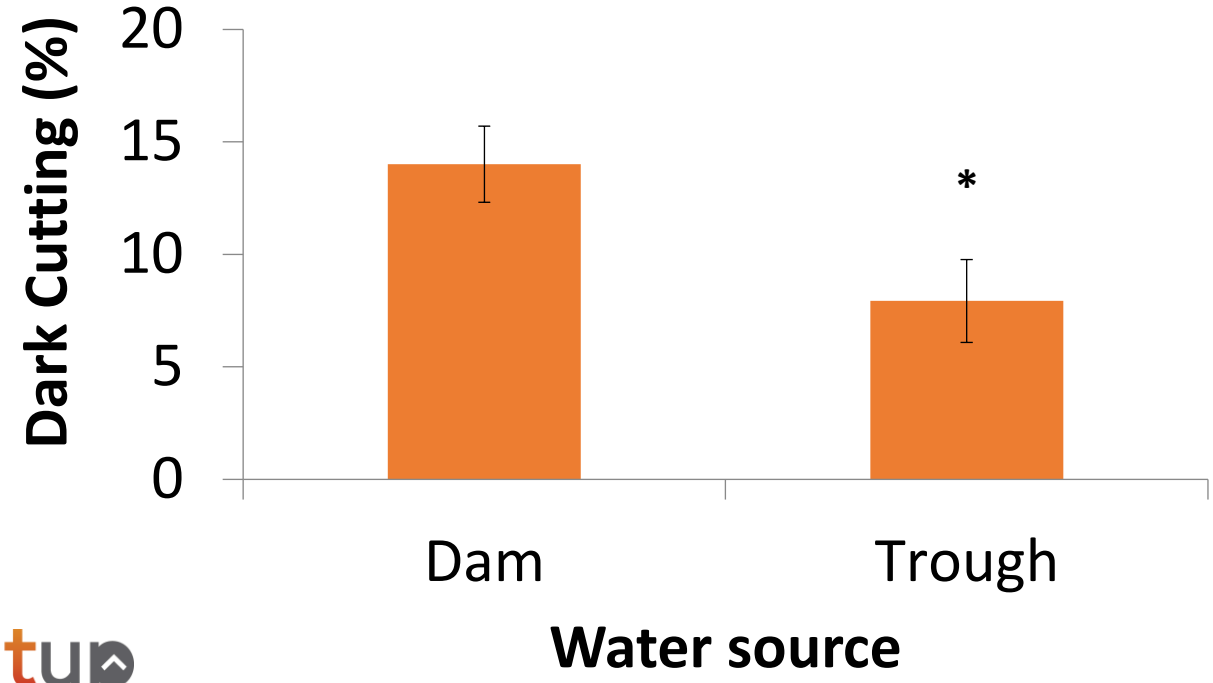


Pastures with 'wild type' endophytes NOT GOOD

Loudon *et al.* 2018

Water source impact

50% increased risk dark cutting on mobs drinking **dam water**



Loudon *et al.* 2018

Water source impact

50% increased risk dark cutting
on mobs drinking **dam water**

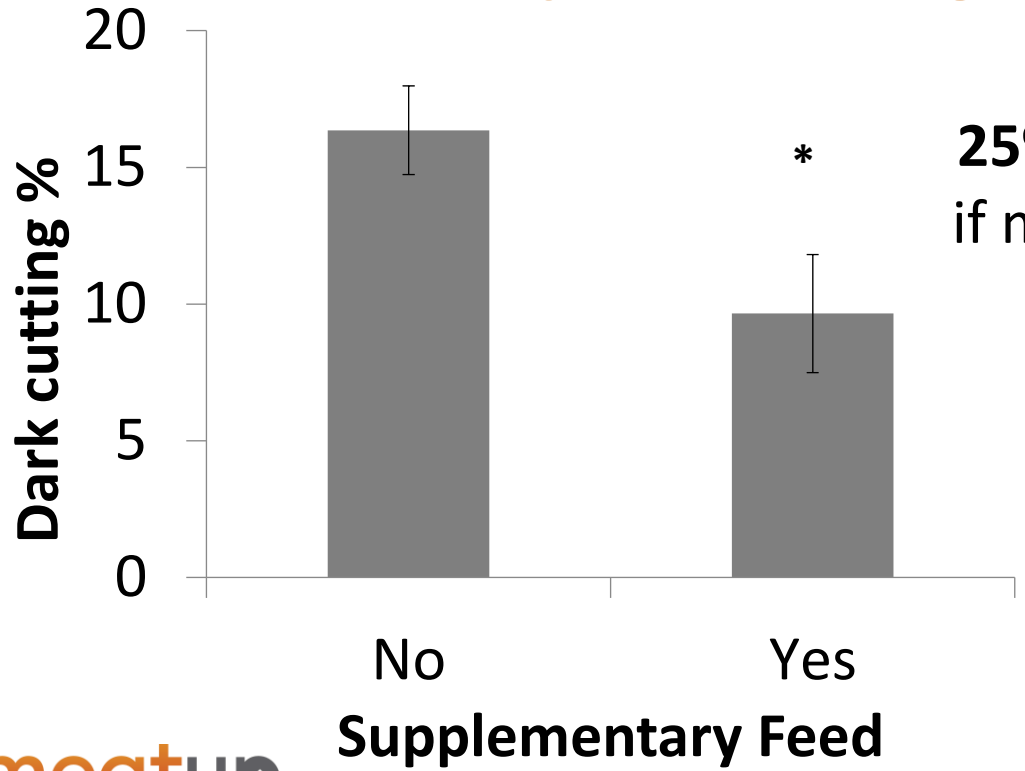
↑ **water palatability**
= ↑ water intake
= ↑ **feed intake**
= ↑ glycogen storage

Dam pumped straight into Trough:
- 10-16% ↑ **growth rate**

Hyder et al, 1968
Willms et al, 2002

Supplementary feed impact

In the last week prior to slaughter

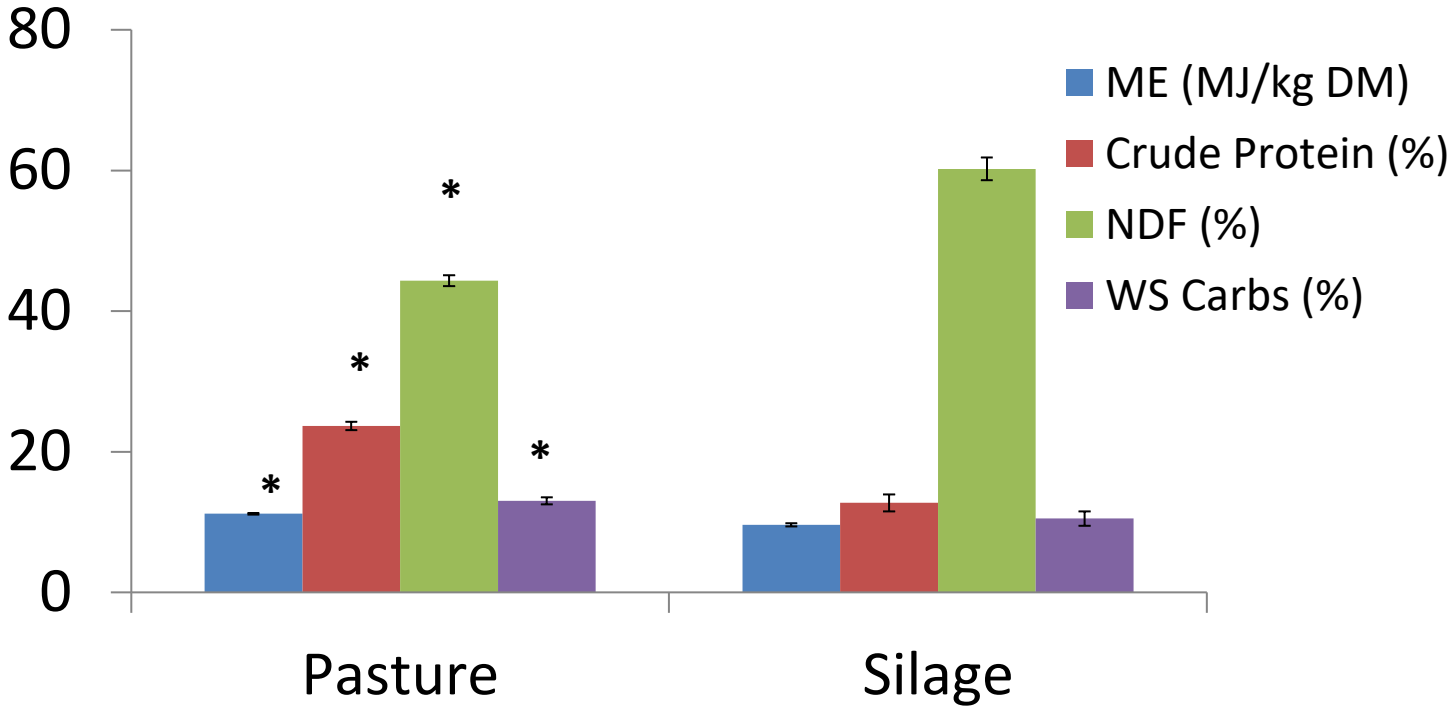


25% decreased risk dark cutting if mobs fed **supplementary feed**

Loudon *et al.* 2018

Supplementary feed impact

In the last week prior to slaughter



Silage is WORSE Quality

Loudon *et al.* 2018

Supplementary feed impact

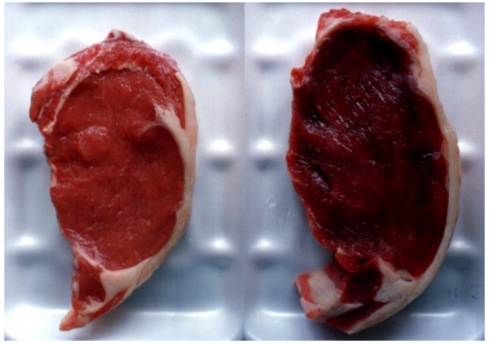
In the last week prior to slaughter

30% decreased risk dark cutting
if mobs fed **supplementary feed**

POSSIBLE MECHANISMS:

- ↑ Human habituation & resilience of cattle ?
- ↑ Fermentation heat & gut fill during transit ?
- ↑ Effective fibre = slower rumen transit rate ?

Summary



- Knowledge from historic data critical
- Relative risk of dark cutting is ↓ by:
  - ↑ pasture Mg concentrations
  - ↓ mycotoxins
  - ↑ trough water & supplementary feeding
- Feed rye grass at 3 leaf stage – provide minerals on brassica & cereal crops
- Reduce time between paddock/pen & knocking box
- Maximise time to grading

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Take home messages

- Pursue high quality & high yield
- Utilise EBVs & ASBVs to select sires with the desired traits
- Get fat in the right depots
- Know your incidence of dark cutting
- Maximise growth rates
- Minimise time between mustering & knocking box = communication
- Review each consignment → Make necessary changes next time

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