



# 2017

## MSA Excellence in

## Eating Quality

## Awards





# Seasonal variation in Dark Cutting & solutions

**Dr Peter McGilchrist – University of New England**





# Research Team

- Dr Kate Loudon
- Dr Cameron Jose
- Dr Michael Wilkes
- Prof Dave Pethick
- Prof Ian Lean
- Assoc. Prof. Graham Gardner
- Dr Stephen Lee
- Prof. Wayne Pitchford
- Laura Grubb
- Ashleigh Evans
- Boyd & Robyn Hoare
- JBS, Teys & Harvey Beef Producers
- Lisa McLerie
- Naomi Leahy
- Farrah Preston
- Nick van den Berg



THE UNIVERSITY  
*of* ADELAIDE





# Outline

- Dark cutting
- Seasonal quality compliance
- Energy supplementation
- Mineral deficiencies?
- Mycotoxins?
- Strategies to combat issues





# ...what is 'dark cutting'?



**Ultimate  
pH > 5.7**

**Meat Colour > 3  
(company spec)**



# Causes of Dark Cutting





# Causes of Dark Cutting

$\text{pH}_u = 5.5$



$\text{pH}_u = 5.9$

↓ glycogen at slaughter

# Muscle Glycogen at Slaughter

=

Nutrition  
Nutrition  
Nutrition

muscle glycogen on-farm

minus

pre-slaughter losses

↓ Stress  
↓ Exercise

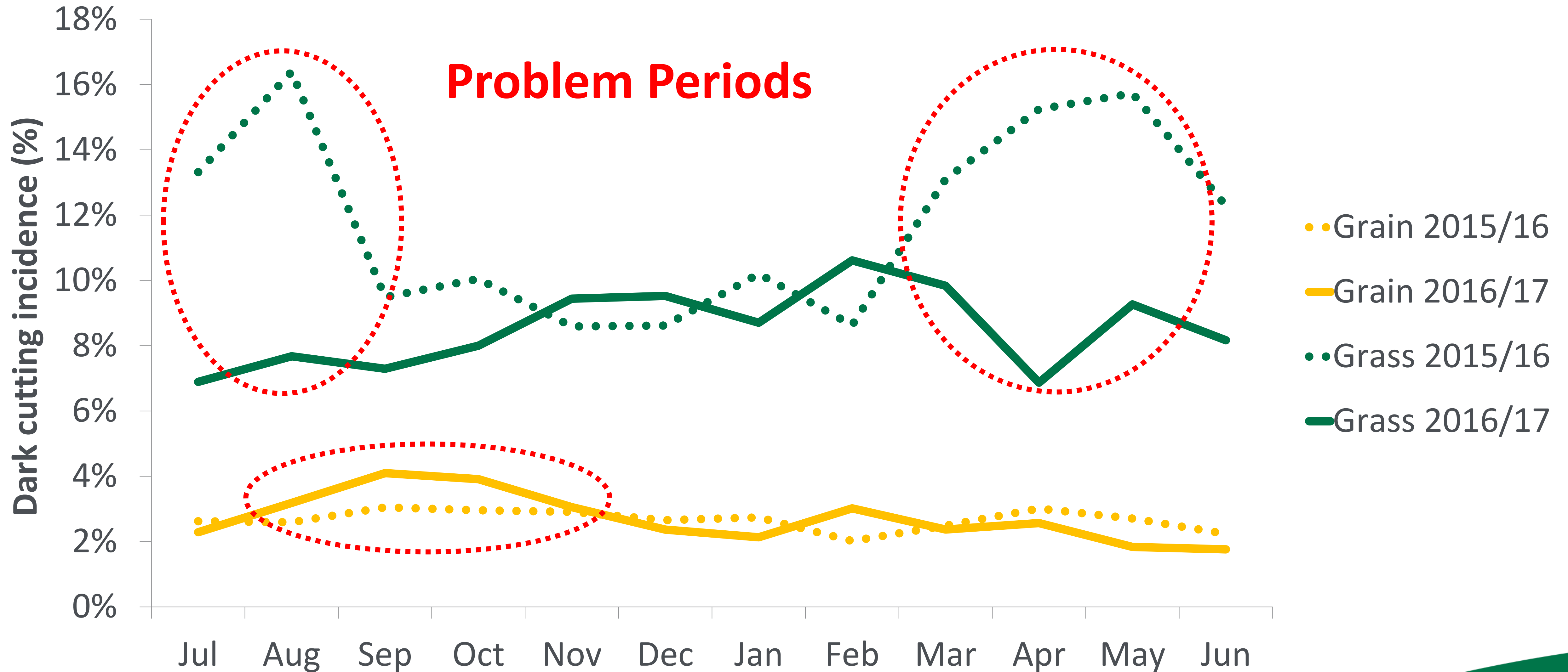


# Prevalence of Dark Cutting





# Feed type effects on MSA performance 2015-17 - NSW

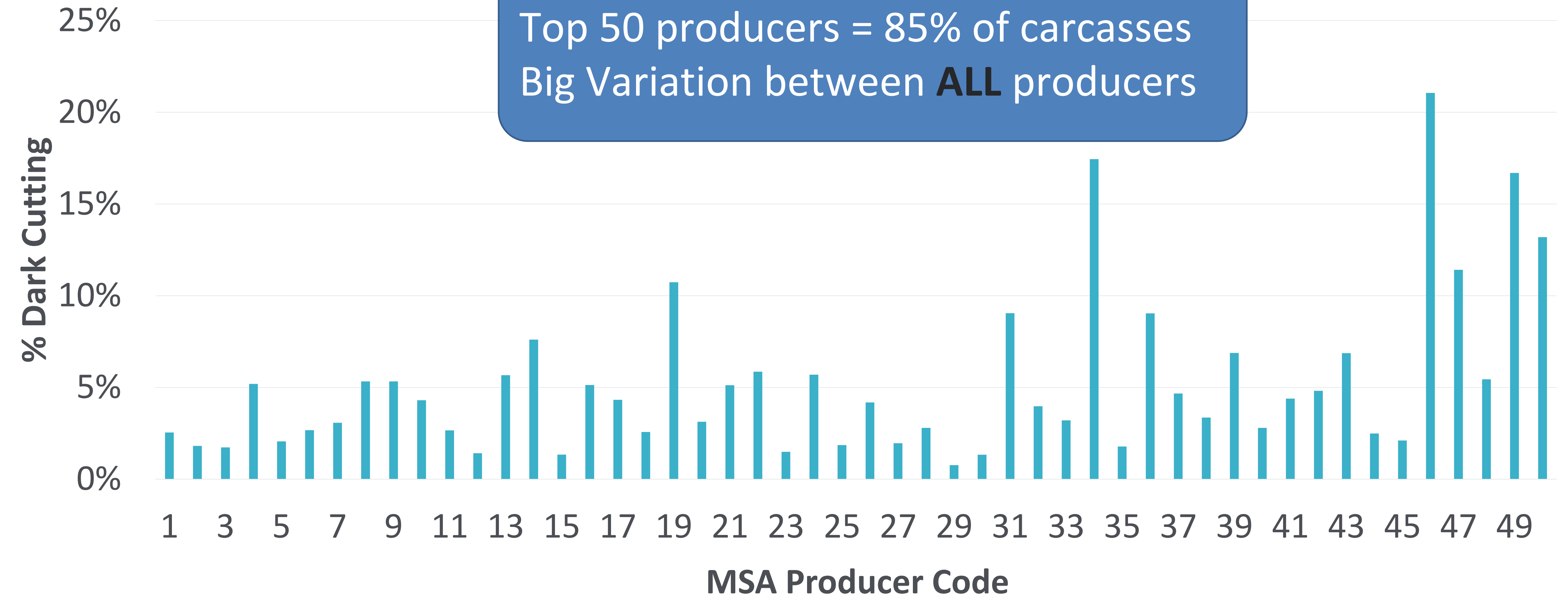


**What is causing it?**



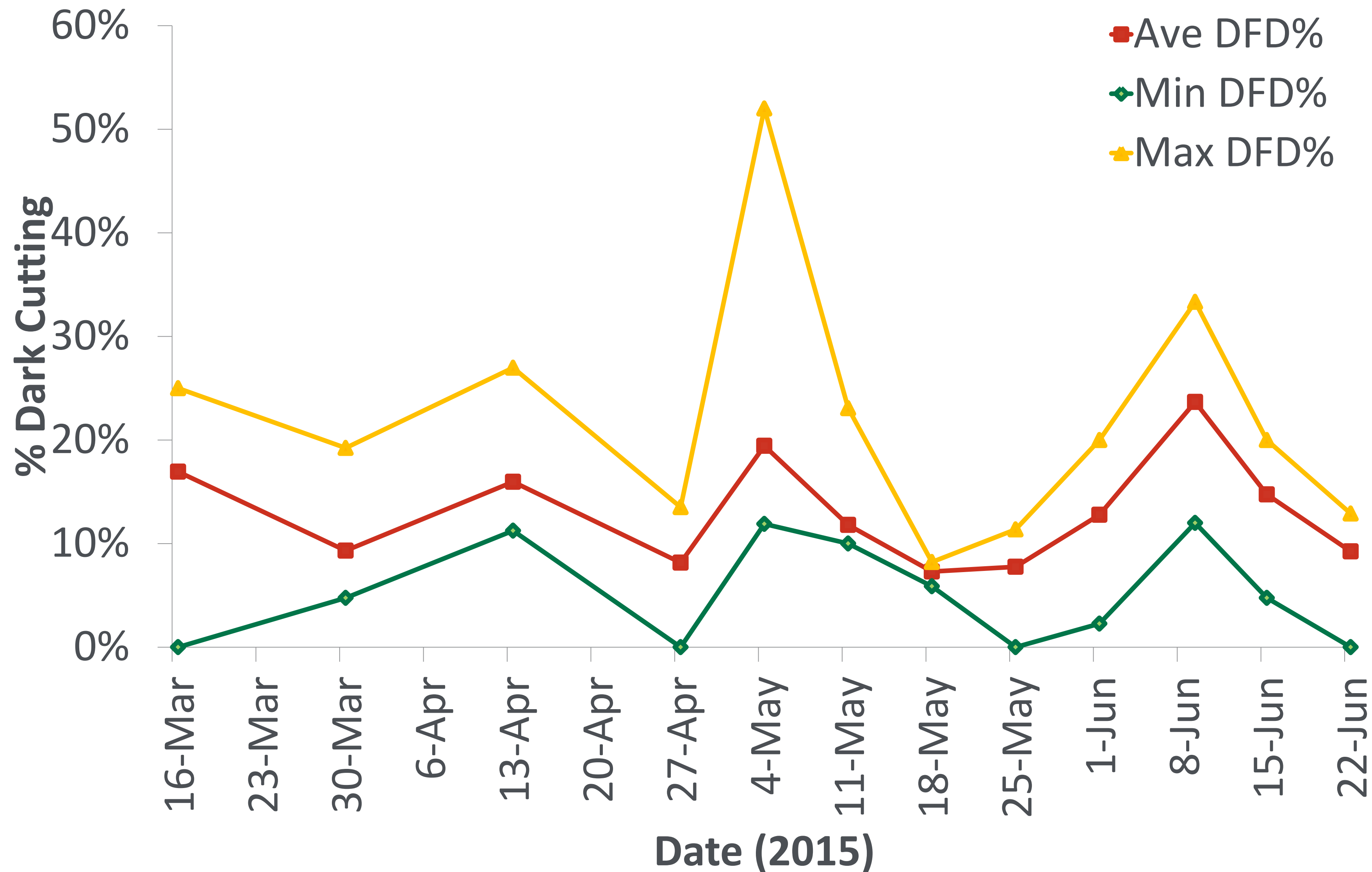
# Variation between Producers

Top 50 producers = 85% of carcasses  
Big Variation between **ALL** producers





# Variation in Dark Cutting in a season – King Island



Same day  
Same conditions

**VERY  
different  
results**



# How much preparation?





# NSW Situation

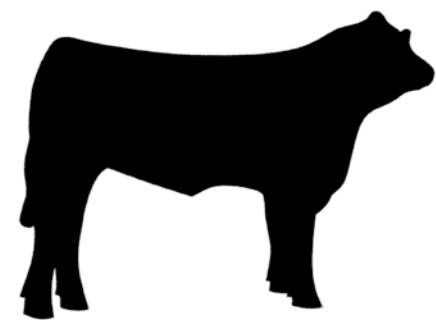
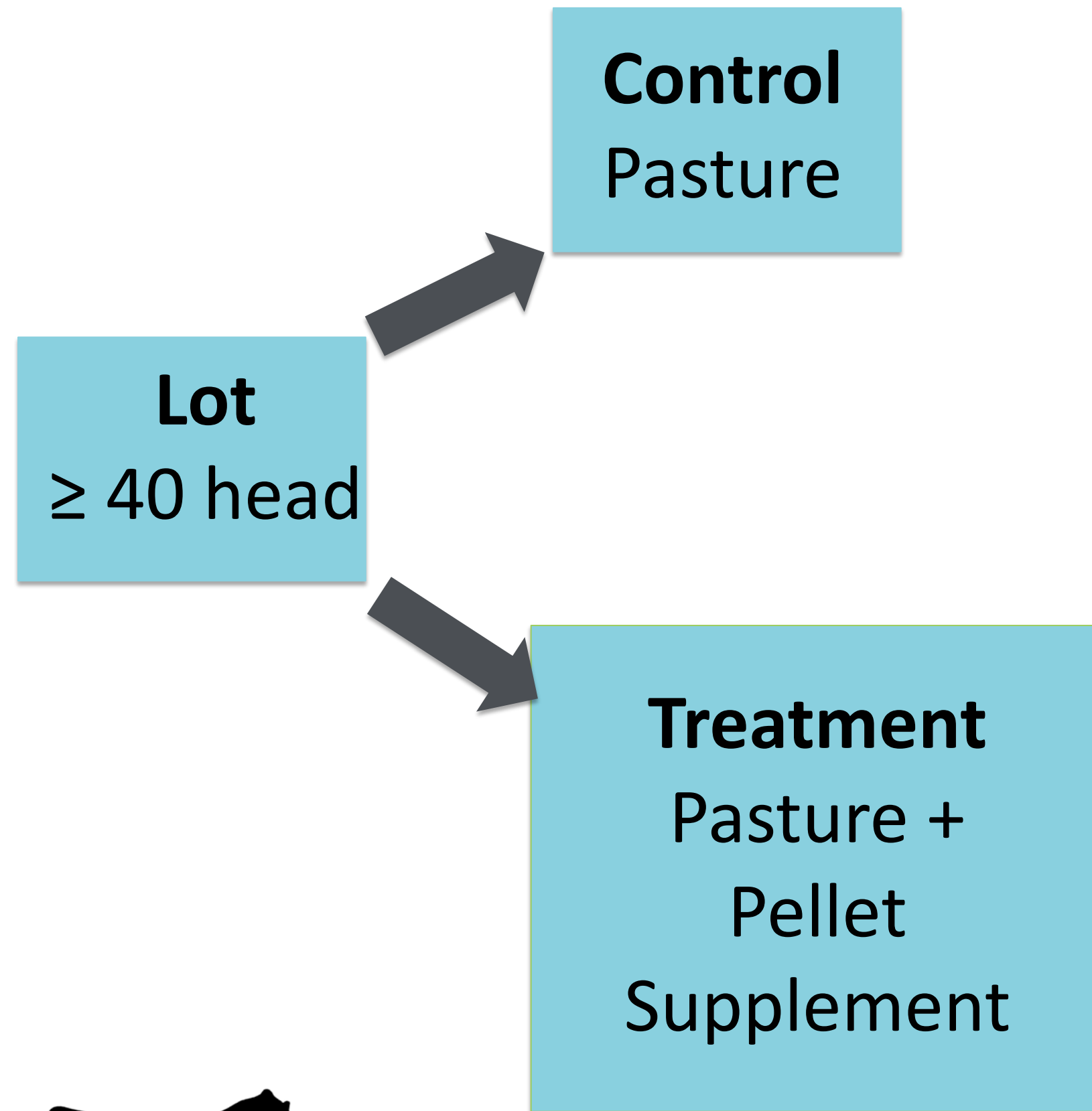
Season -> Season transition anytime



**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



**\$1.08/day**



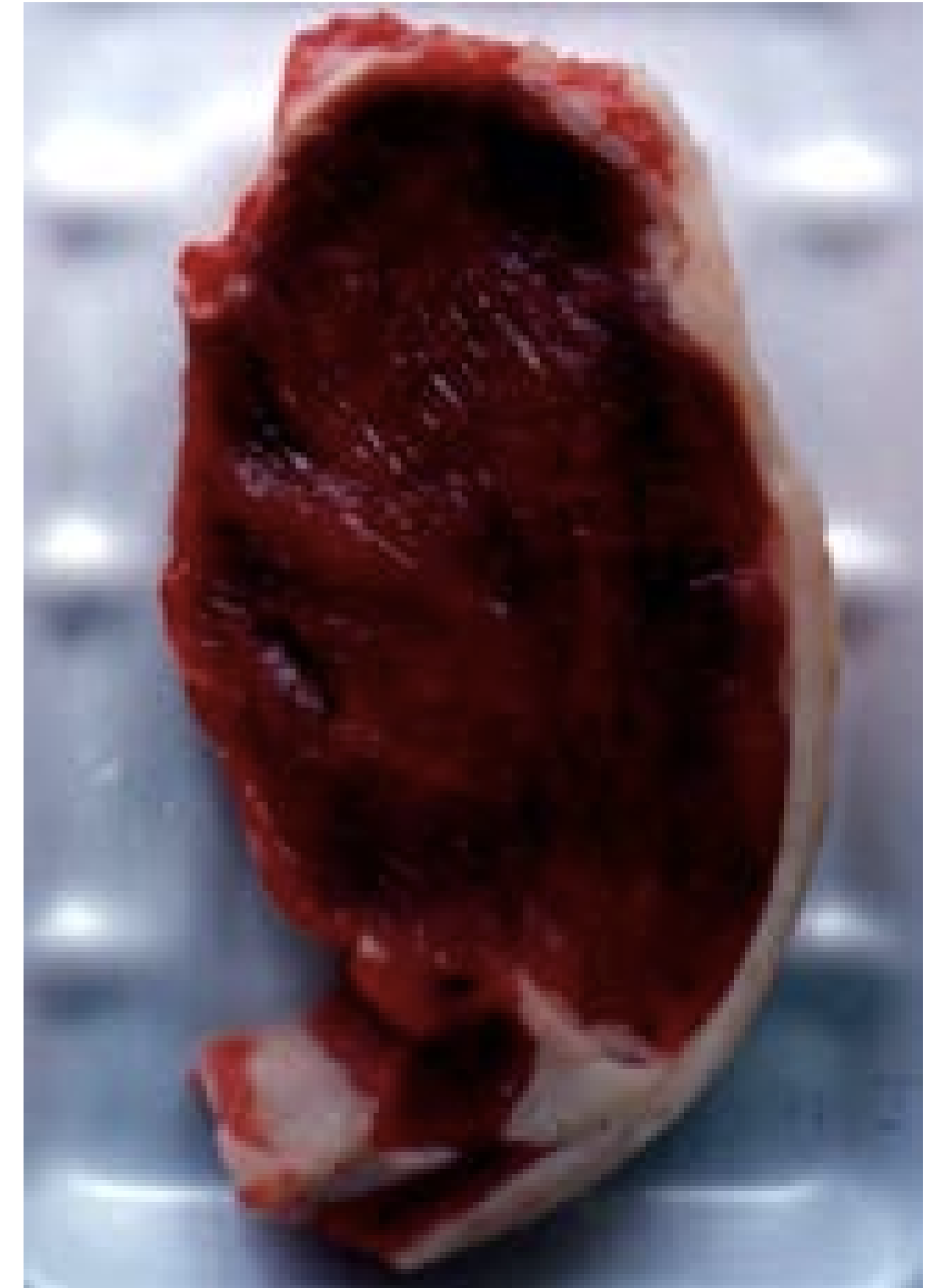
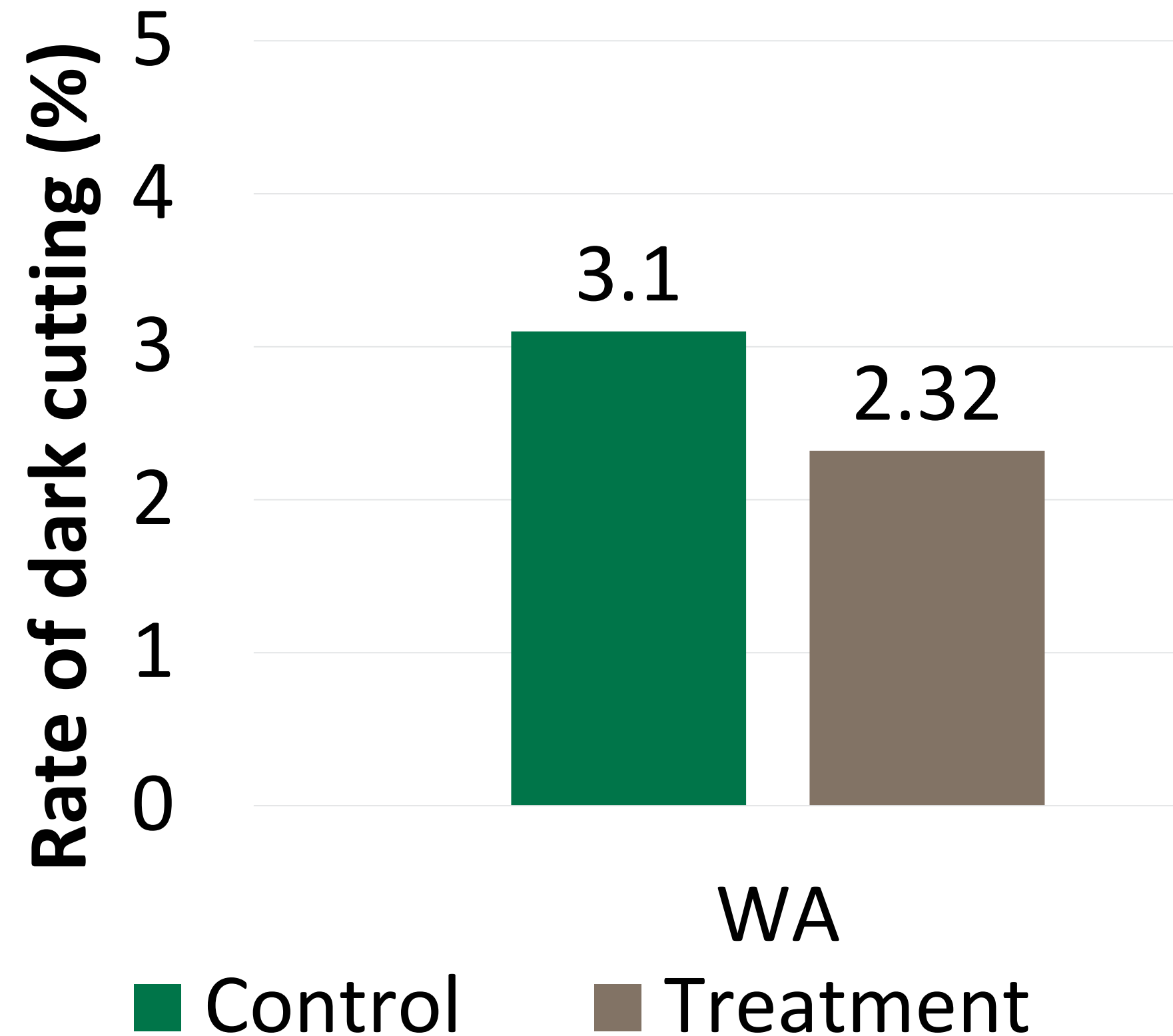
# Results





# Rates of Dark Cutting

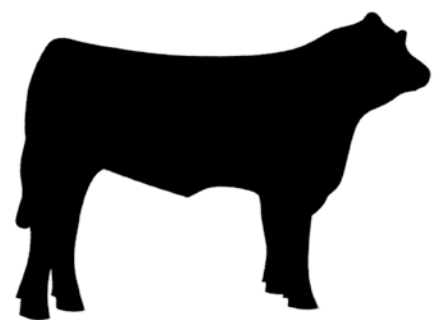
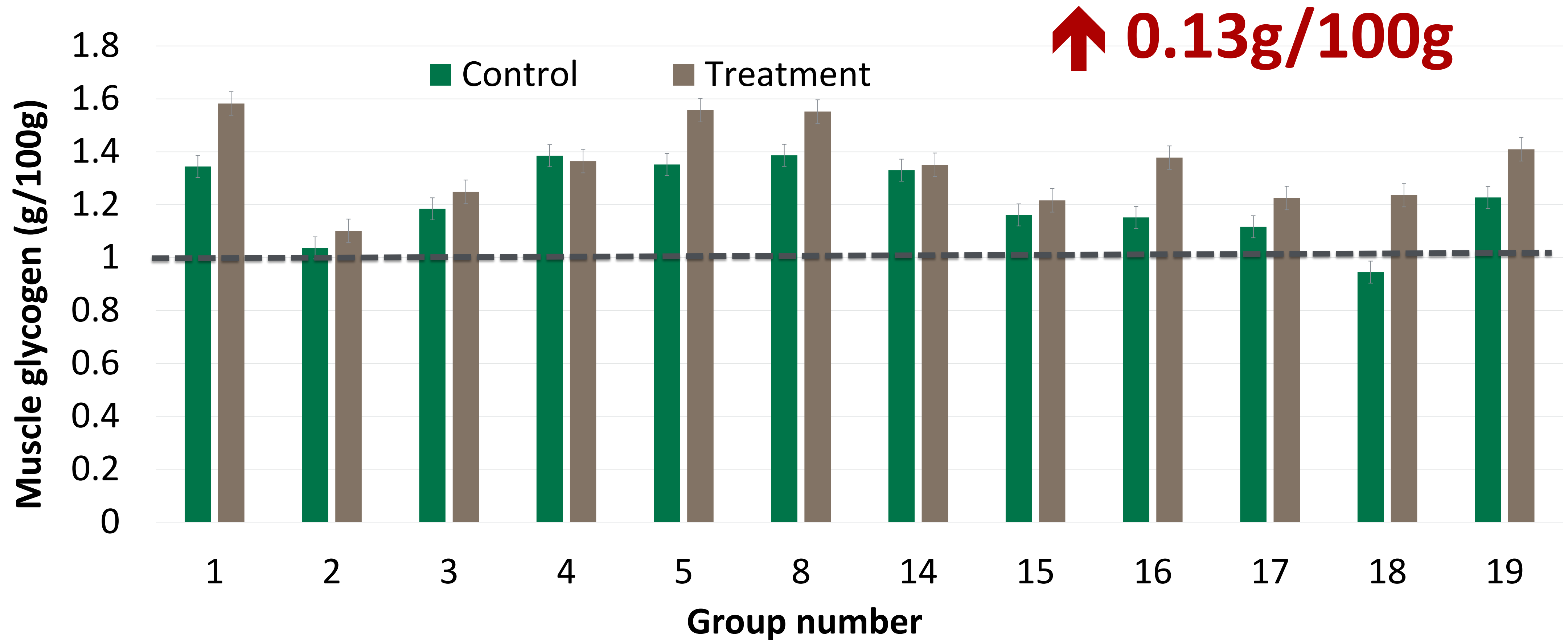
Very low incidence of dark cutters



**BUT**  
Had a positive effect on **glycogen** at slaughter



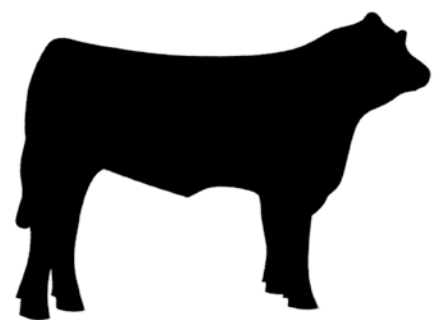
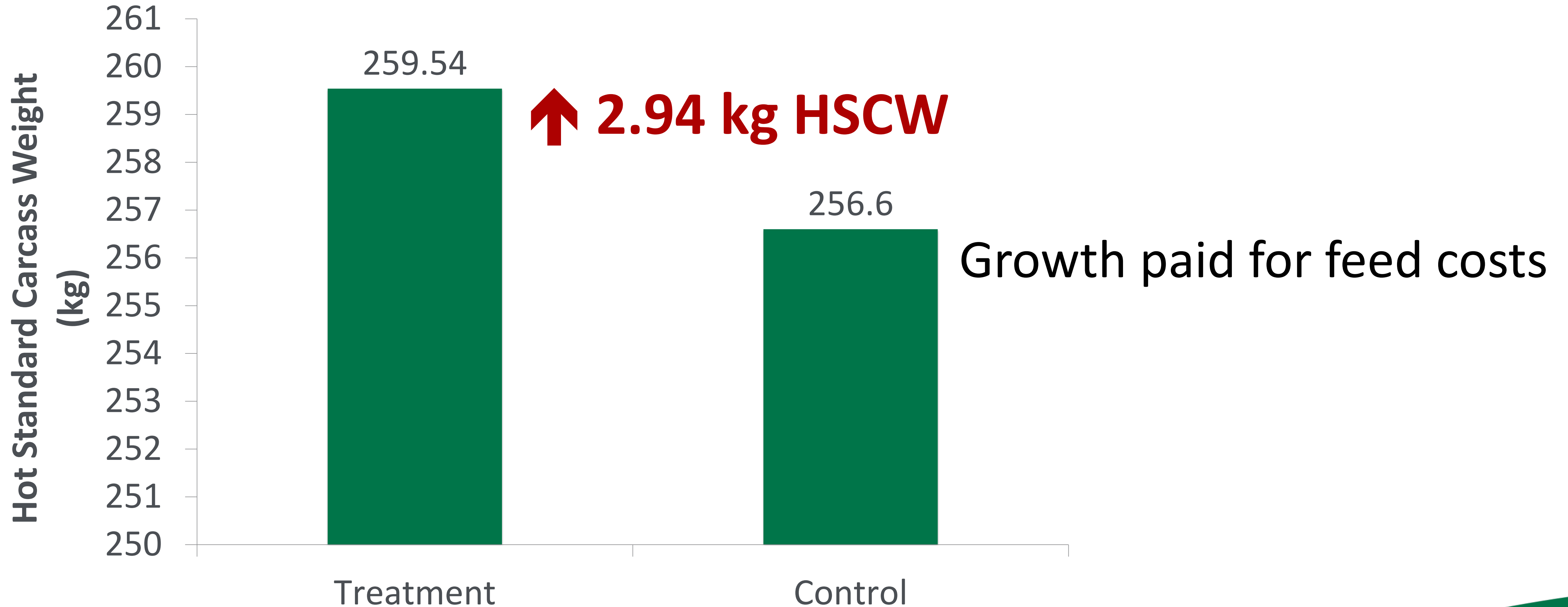
# Muscle Glycogen at Slaughter – Grain pellets



**P < 0.001**



# HSCW advantage in Western Australia



**P < 0.001**



# Summary

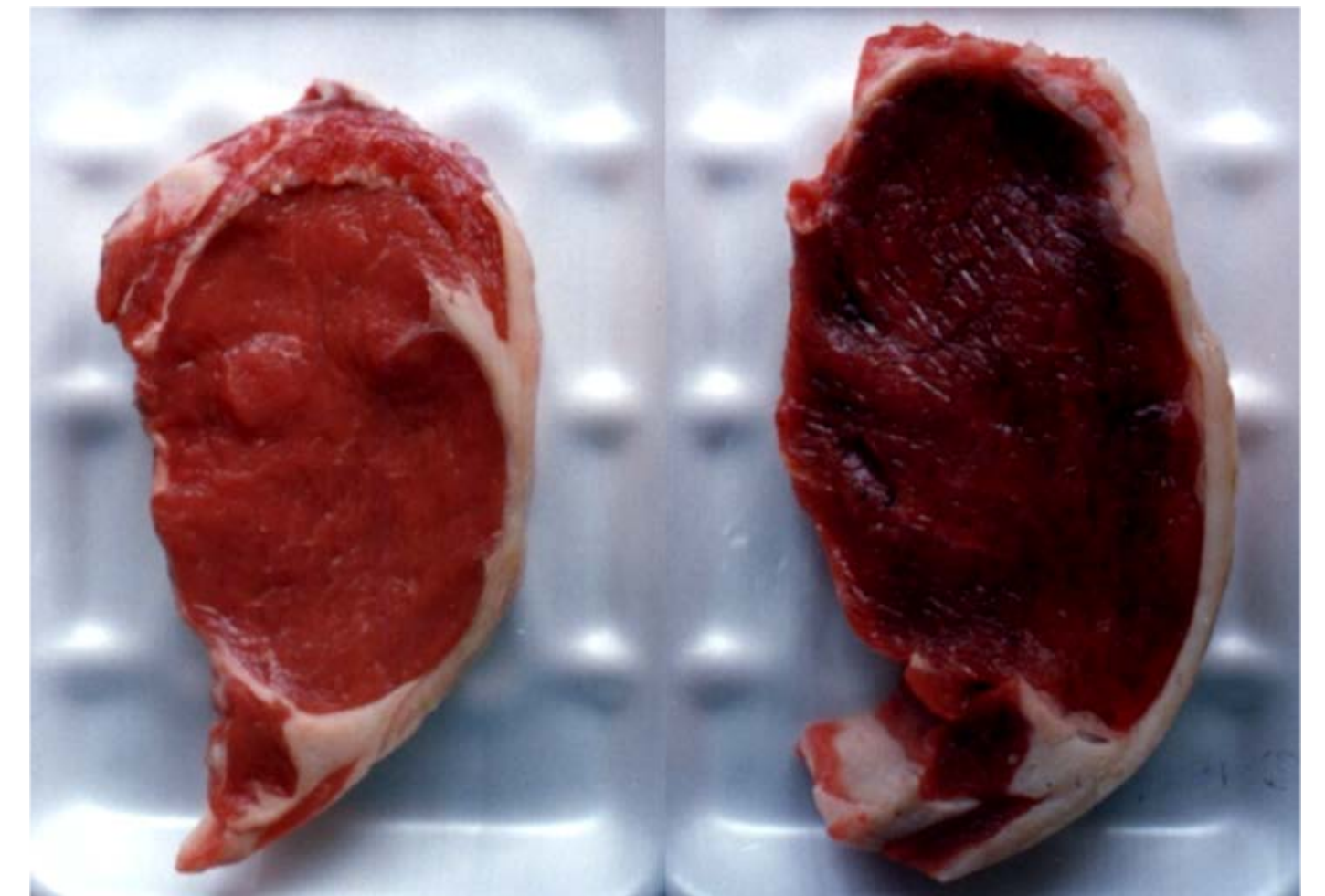
Supplementation with **30 MJ ME** extra per day works

- ↑ Carcass weights
- ↑ Glycogen
- ↓ risk of dark cutting

Prepare your cattle for market

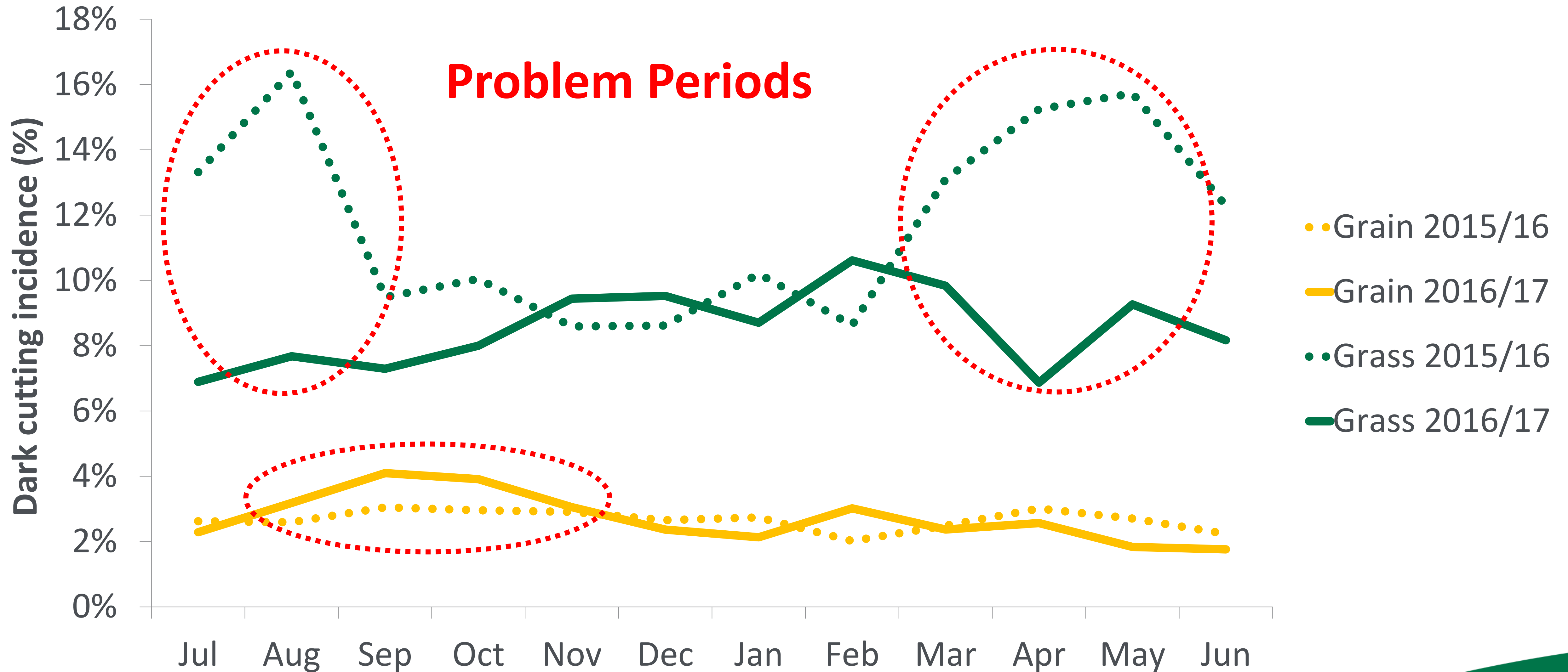
Know sale date – *have a strategy!*

Need high ME feed – moderate protein ~15%





# Feed type effects on MSA performance 2015-17 - NSW



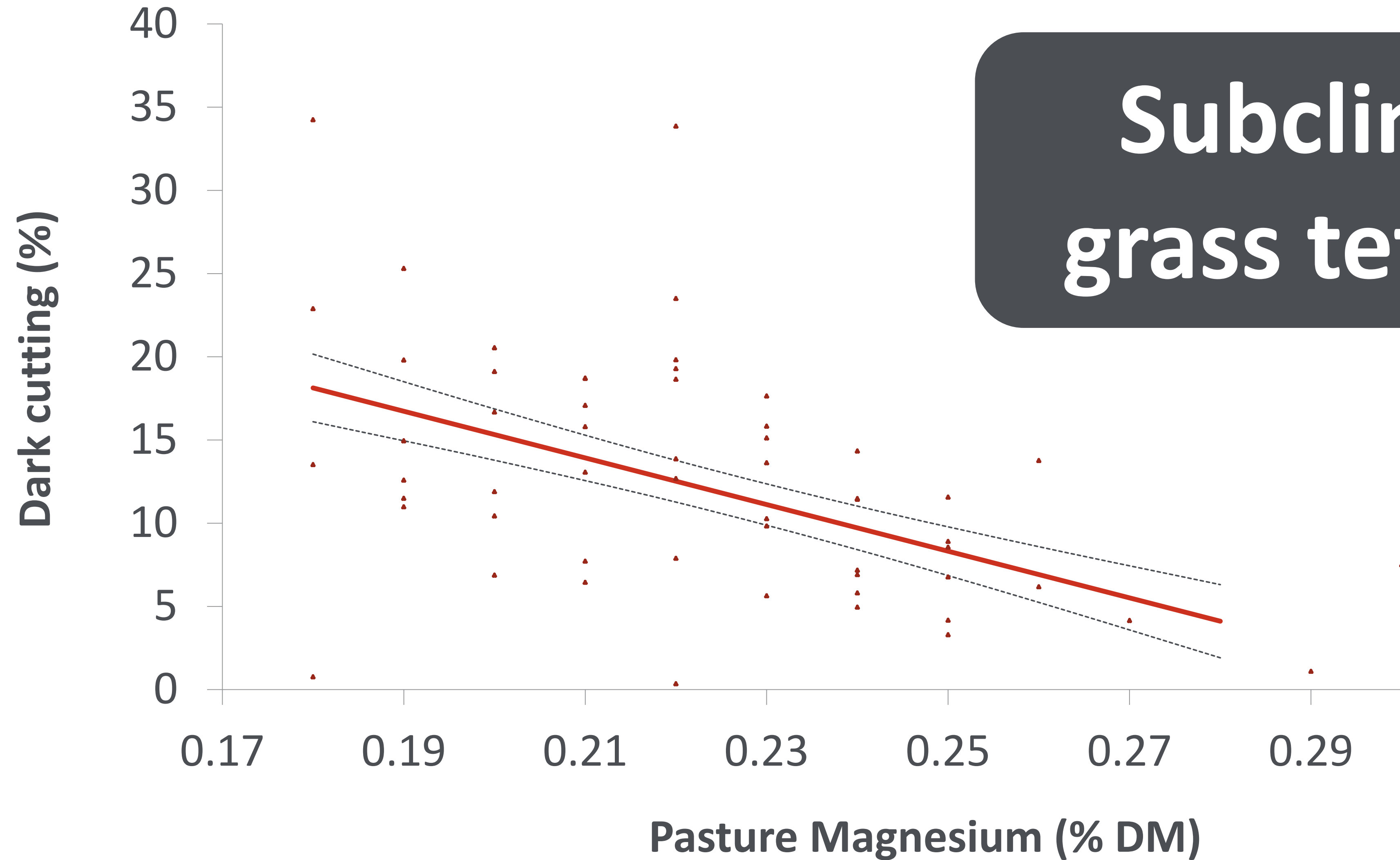
Lush pasture effect or mycotoxins?



# Mineral Deficiencies



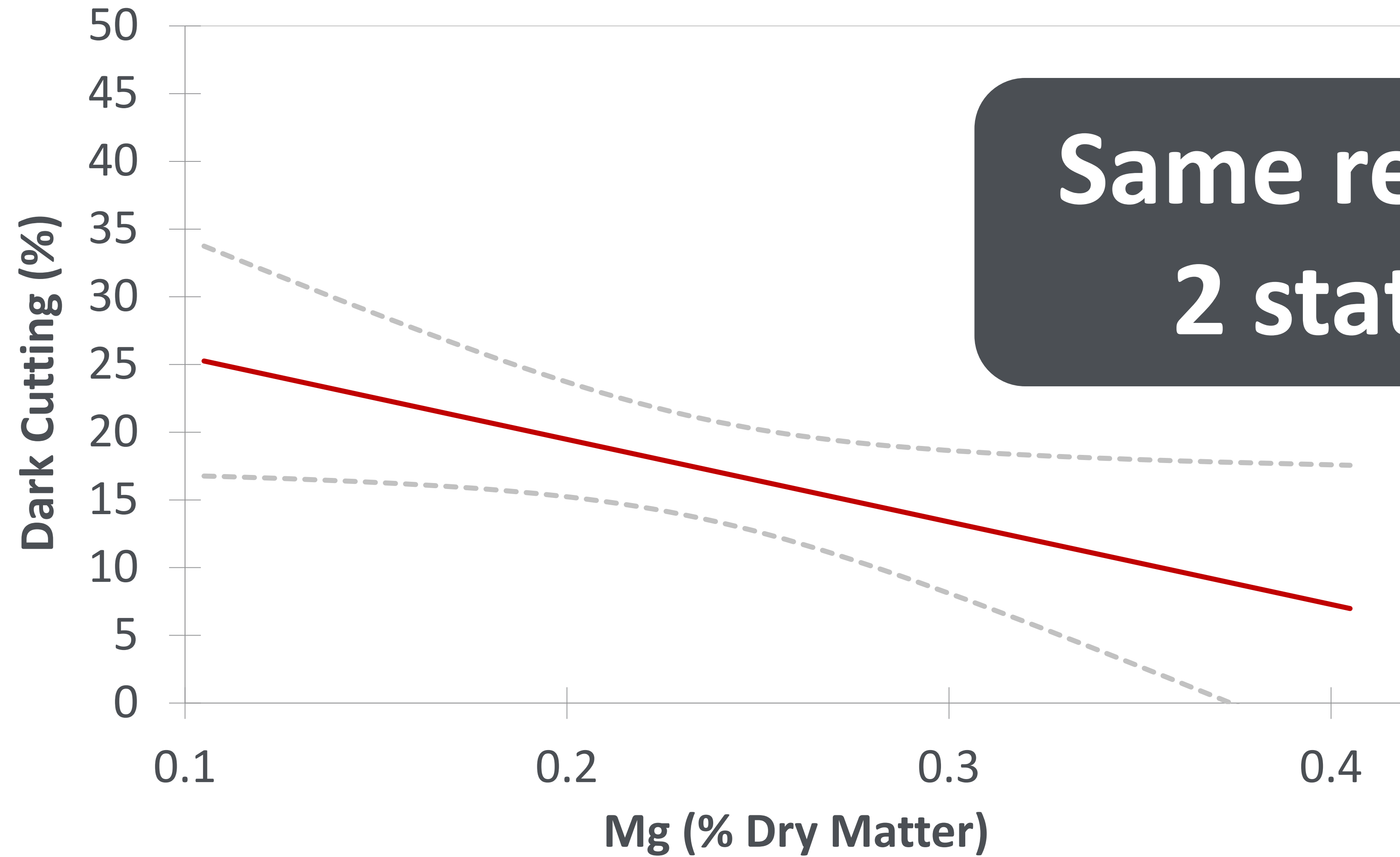
# Pasture Magnesium – King Island (P<0.05)



Subclinical  
grass tetany?



# Pasture Magnesium – SA ( $P < 0.05$ )



Same result –  
2 states!

— Model(%DC)    -- Conf. interval (Mean 95%)

# Low Magnesium = 'Subclinical Grass Tetany'

- ↓ voluntary feed intake
- ↓ rumen fermentation

↓ Glycogen storage

- Muscular & nerve dysfunction = hyperexcitability / convulsions
- ↑ adrenaline release
- ↑ stress responsive

↑ Glycogen usage pre-slaughter

## Issues

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



# Current Exp: Magnesium supplementation

Short term  $Mg^{2+}$  supplementation prior to consignment

- 5 day Mg supplementation
- Pasture certified suitable pellets
- **46g** of  $MgSO_4$  + **9.5g**  $MgO$  / 1kg pellets per head per day = **BIG DOSE**



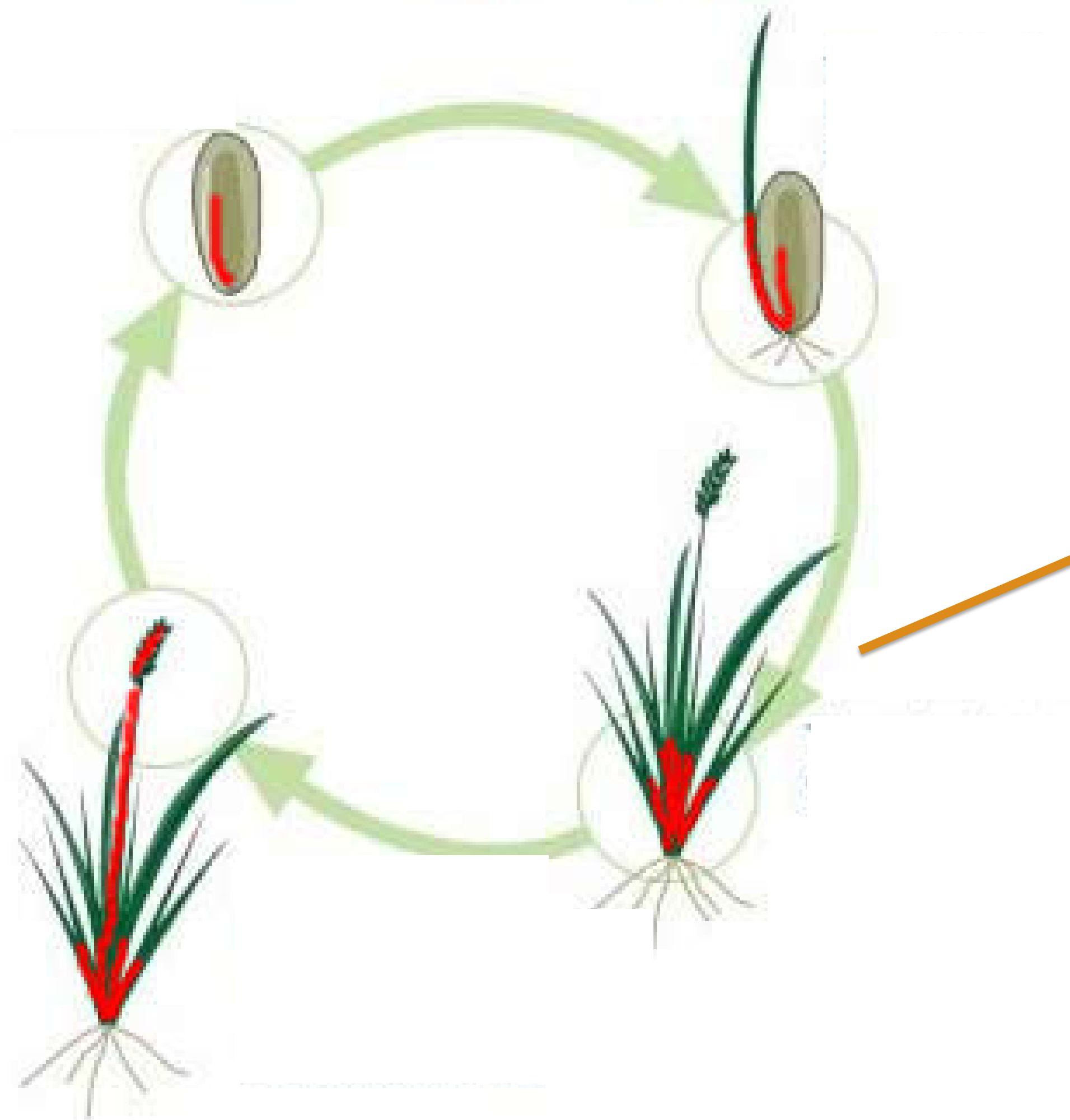


# MYCOTOXINS

**What's the impact?**



# Endophyte (fungi) produce Mycotoxins



**Found in Grass and Grain**

**Mycotoxins (good for plant)**

- drought tolerance
- disease resistance
- pest resistance

**Not good for cattle**

# Impact of mycotoxins on production

Across numerous species studies have shown:

**Reduced** feed intake (Bond *et al.*, 1984; Galey *et al.*, 1991; Oswald *et al.*, 2005)

**Reduced** weight gain (Schmidt and Osborn, 1993; Porter, 1995; Reed *et al.*, 2005)

**Reduced** growth rates (Porter, 1995; Oswald *et al.*, 2005)

**Increased** heat stress (Howard *et al.*, 1992; Miles *et al.*, 1992; Schmidt and Osborn, 1993; Osweiler, 2000; Kadzere *et al.*, 2002)

**Increased** anxiety & stress responsiveness

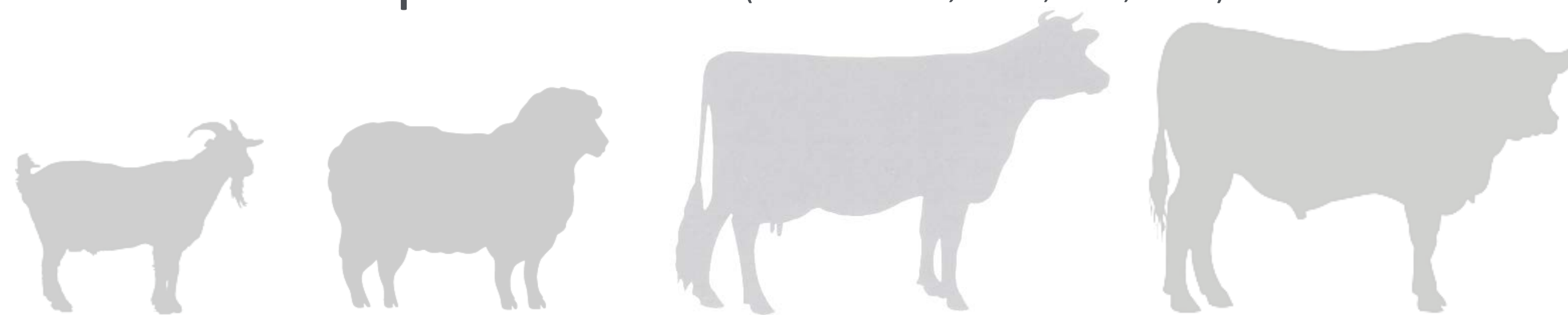
**Reduced** pregnancy rates (Schmidt and Osborn, 1993; Osweiler, 2000)

**Reduced** milk production and quality (Schmidt and Osborn, 1993; ; Lean, 2001; Lean *et al.*, 2013)

**Reduced** wool production (Camara *et al.*, 2009; Zain, 2011)

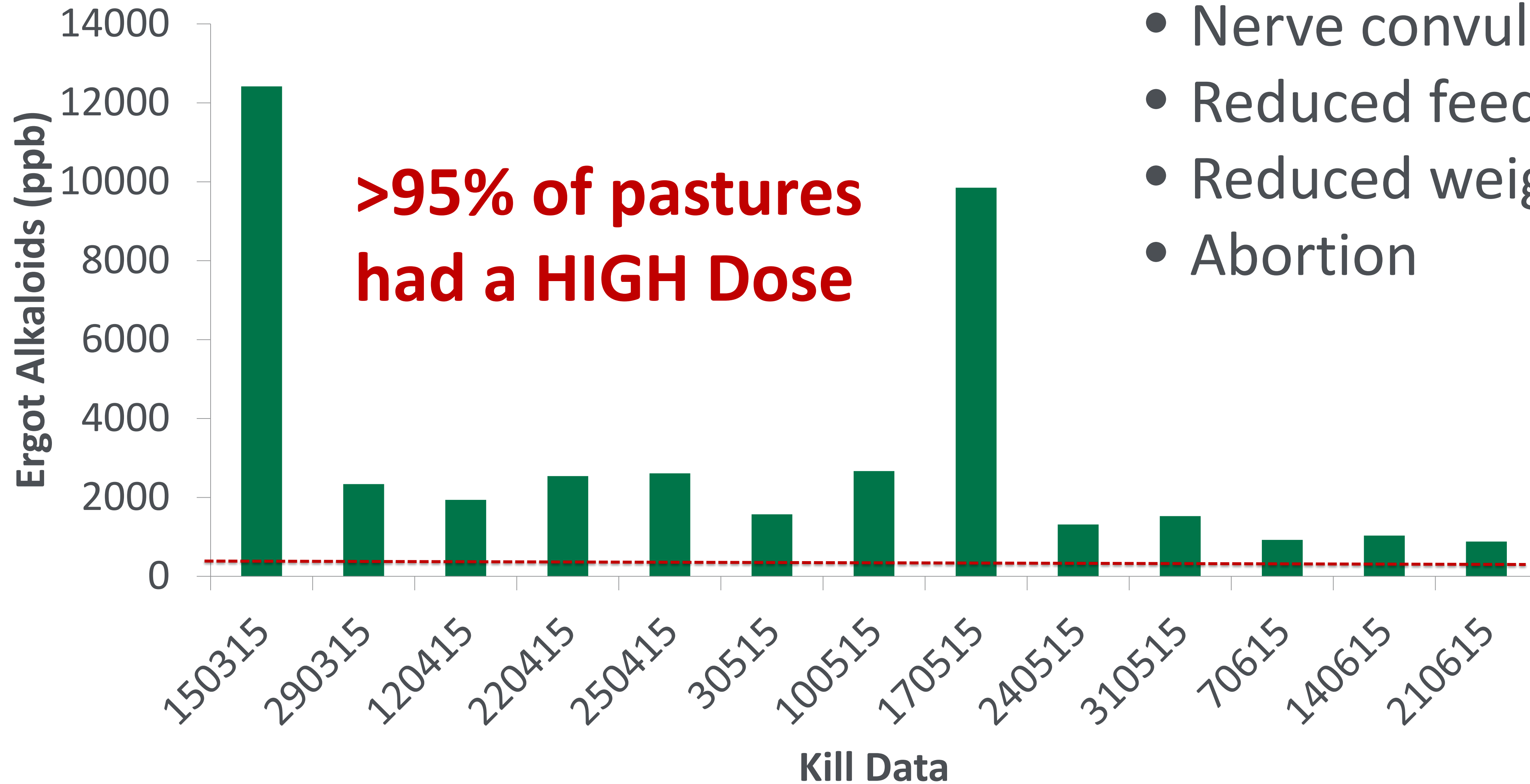
↓ Glycogen  
synthesis

↑ Glycogen  
breakdown



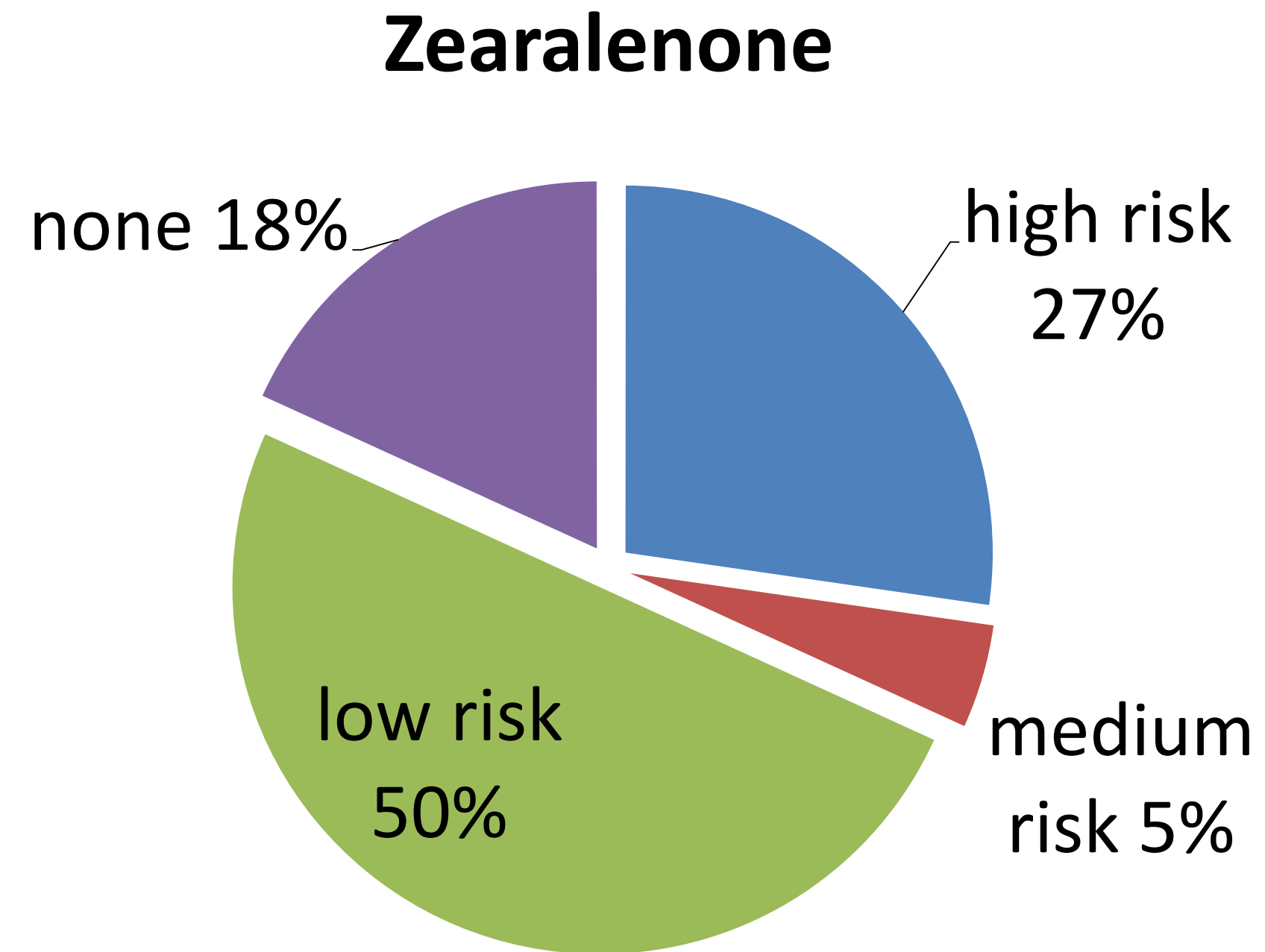


# Ergot Alkaloids



- Nerve convulsions
- Reduced feed intakes
- Reduced weight gain
- Abortion

# Mycotoxins



Mycotoxins are increasing dark cutting rates

Common in old perennial ryegrasses & fescues PLUS grain

**SUBCLINICAL EFFECT IS THE GREATEST RISK**

Hundreds of different types mycotoxins: may not show obvious clinical signs



# MYCOTOXINS – how to fix it

- Know which endophyte is in YOUR pasture species
- Pasture renovation – kill out old variety 1<sup>st</sup>
- Use mycotoxin binders – validation expt 2018



# Take home messages

- Know your incidence levels
- Nutrition is king (*other than the consumer*)
- Prepare cattle like athletes
- Know your feed base – do some feed tests
- Check ratios between minerals in pasture
- There is no 1 silver bullet – check entire pathway
- High performance genetics need high performance feed & grazing management





# Pete's 2020 Dream!

- >90% of producers know their compliance rates
- <1.5% dark cutting in Grain finished cattle
- <5% dark cutting in Pasture finished cattle
- Images provided in feedback...

