



FAST FACTS

- **Dark cutting beef costs Australian beef producers in excess of \$35 million annually**
- **Dark cutting is caused by low muscle sugar (glycogen) at the time of slaughter**
- **Dark cutting can be reduced by having high energy intakes for more than 2 weeks pre-slaughter**
- **Reducing time in lairage, increasing lot size, ensuring no mixing of mobs of cattle and calm handling will reduce dark cutting**
- **Minimising stress and exercise is paramount for preserving muscle glycogen pre-slaughter**
- **Select for more muscular animals as they have a reduced incidence of dark cutting**

High pH, dark cutting meat can be prevented – and it's worth it for producers! Discounts of up to \$0.60/kg can be applied for each carcass determined to be a dark cutter. This equates to a \$150 discount for a 250kg carcass. Research conducted by the Beef CRC has identified steps producers can take to reduce the incidence of dark cutting.

Dark cutting reduces meat quality

Dark cutting beef, also called dark, firm, dry beef has a negative impact on meat quality. Dark cutting beef is of poor quality because it has:

- Reduced tenderness
- An increased water holding capacity, resulting in water being absorbed during chewing, generating a perception of dryness
- Increased rate of microbial spoilage due to the high pH creating conditions conducive to spoilage
- A variable rate of cooking relative to normal beef and as a result generally undercooked
- Course texture

Consumers use meat colour as the primary indicator of meat quality, which is why they prefer bright cherry-red coloured beef.

Cause of 'Dark Cutting'

Dark cutting beef is defined by Meat Standards Australia (MSA) as meat with an ultimate pH (pHu) greater than 5.7 or an AUSmeat meat colour greater than 3. The major determinant of pHu is the concentration of muscle glycogen (muscle sugar) at slaughter. In the muscle post-mortem, glycogen forms lactic acid. Lactic acid lowers

the pH of the muscle from a pH of around 7, which is standard in a living animal, down to a pHu of around 5.4- 5.7 within 24 hours. However, if there is an insufficient muscle glycogen at slaughter, there is limited formation of lactic acid, resulting in a high pHu and dark meat.



Minimising dark cutting is simple – fill the glycogen bucket through good nutrition and minimise losses (leaks from the bucket) by reducing stress and exercise.

Strategies to ensure adequate nutrition prior to shipment

Cattle need to be gaining more than 0.8kg per day to absolutely ensure muscle glycogen concentration is maximised before leaving the paddock. This can be done by:

- Grazing high quality green vegetative pasture with an energy level around 10.5MJ/kg dry matter or higher and 10 to 20cm in length

- Feed lotting cattle which ensures the consumption of high energy grain-based diets
- Supplementary feed cattle in the weeks prior to slaughter with grain-based pellets or similar to complement available dry pastures but be sure to avoid acidosis (grain poisoning)
- Locking away a consignment paddock which cattle can graze in the week prior to slaughter



Risk factors for dark cutting

- Cattle with poor growth rates in weeks prior to slaughter
- Long times in lairage
- Mixing or isolation
- Poor yard and race design
- Poor handling, the use of electric prodders and dogs
- Pre-slaughter washing or clipping to remove dags from dirty cattle
- Excessive physical activity such as mounting behaviour, running, fighting, slipping and falling
- Grass fed and vealer type animals are more susceptible to dark cutting

Preparing cattle correctly for sale

Don't decide to sell cattle the day before. Correct preparation minimises the risk of dark cutting. It is recommended that cattle are:

- Gaining more than 0.8kg per day in the weeks prior to slaughter
- Directly consigned to minimise the number of 'new' environments prior to slaughter
- Drafted for slaughter 2 or 3 weeks prior to trucking to allow the re-establishment of pecking order
- Yard weaned or feedlot finished so cattle are well adapted to human contact and changes in environment
- Mustered carefully with no vigorous exercise or use of electric prodders, minimal stress and minimal use of dogs
- Avoid heifers in oestrus and cattle with HGPs which are still within the 'pay-out' period to avoid changes in behaviour
- Consigned in mobs greater than 60 head where possible to reduce individual animal stress
- More muscular as they have higher concentrations of glycogen and a lower susceptibility to stress
- Fed magnesium oxide powder at a rate of 1% for four days prior to marketing where possible as this reduces the impact of stress on muscle glycogen. Ensure all cattle have adequate magnesium levels.
- Not transported during very hot, very cold or stormy weather
- Provided access to clean fresh water as thirst and dehydration exacerbate the impacts of stress

Impact of season

Season has a large effect on the rate of dark cutting. Dark cutting is worst in 'grass fed' cattle at the end of the green flush when the feed 'hays off' and contains reduced amounts of metabolisable energy. Even though cattle may look finished, low pasture-energy levels in the weeks before slaughter reduce glycogen levels in muscle, increasing the rate of dark cutting. It is important to note that fat cover does not necessarily indicate high muscle glycogen.

How do your cattle perform?

To make changes to a system, producers must know what the current incidence of dark cutting is in their cattle. Changes can then be

implemented to reduce dark cutting.

STEP 1: Review the performance of cattle sent to slaughter in the past. All carcasses graded by Meat Standards Australia (MSA) will have a pH and meat colour measurement recorded on the MSA feedback and bench marking system that producers can access on-line. For non-MSA processors check feedback reports for details. Identify what percentage of your cattle were dark cutters in a year, month and/or in each lot.

STEP 2: Calculate the financial losses incurred due to dark cutting in each year, month and lot. Financial losses = % dark cutters x number of cattle in the group x average HSCW of the group x penalty per kg for a dark cutter. For example a 10% dark cutting rate in a 100 head group with an average carcass weight of 250kg at a discount of 60c/kg = \$1500 less income!

STEP 3: Assess your current on-farm management and handling practices plus the nutrition of all slaughter cattle. Identify which of the above points need some work. Prioritise the practices that are having the biggest impact in your system and correct them first, then work through the rest following a carefully constructed action plan.

STEP 4: Monitor your improvements by comparing new feedback sheets with historical ones, plus evaluate the improvements to your bottom line.

Further reading

<http://www.redmeatinnovation.com.au/innovation-areas/eating-quality/preventing-dark-cutting-in-livestock>

http://www.agric.wa.gov.au/objtwr/imported_assets/content/aap/bc/m/f06100.pdf

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