



FAST FACTS

- **Dark cutting beef costs the Australian beef industry in excess of \$35 million annually**
- **Dark cutting is caused by low muscle sugar (glycogen) at the time of slaughter**
- **Incidence of dark cutting can be reduced through good on-farm pre-slaughter nutrition and pre-slaughter management**
- **At the abattoir long times in lairage, small lot sizes, mixing cattle mobs and poor handling are all associated with increased incidence dark cutting**

Dark cutting beef, also called dark, firm, dry beef has a substantial negative impact on meat quality. High pH, dark cutting meat can be prevented – and it's worth it! Research conducted by the Beef CRC has identified the steps processors can take to reduce incidence of dark cutting.

Dark cutting reduces meat quality

Dark cutting beef is of poor quality because it has:

- Variable 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 that creates conditions conducive to spoilage
- Variable degree of doneness i.e. it does not cook at the same rate as normal meat

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. If there is an insufficient muscle glycogen concentration at slaughter, there is limited formation of lactic acid, resulting in a high pHu and dark meat. It is therefore essential to maintain high levels of muscle glycogen at slaughter. Minimising dark cutting is simple – ensure muscle glycogen on-farm is high (good nutrition) and minimise the

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By improving the management, handling and care of cattle, other benefits like reduced bruising, improved welfare, reduced weight loss and carcass shrink also accrue.

Steps to reducing 'Dark Cutting' carcasses

There are five steps to reduce the incidence of dark cutting:

- Purchase cattle that have been gaining rather than maintaining or losing weight
- Ensure truck drivers and all livestock handlers handle cattle quietly and calmly
- Reduce stress and exposure to new environments
- Never mix lots – even if they are from the same property
- Minimise the time in lairage

Procure the correct cattle

To minimise the risk of 'Dark Cutting', abattoirs can purchase cattle which 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 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, no use of electric prodders and minimal stress
- Avoid heifers in oestrus and cattle with HGPs 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 animals as they have higher concentrations of glycogen



Risk factors for dark cutting

- Cattle with poor growth rates in previous weeks
 - Long time in lairage
 - Mixing or isolation
 - Poor lairage pen and race design
 - Poor handling and use of electric prodders
 - Pre-slaughter washing
 - Excessive physical activity such as mounting behaviour, running, fighting, slipping and falling
 - Grass fed and vealer type animals are more susceptible to dark cutting
- **Assembly for slaughter** – use well designed yards; eliminate all unnecessary procedures (weighing, clipping, washing and hosing) unless codes of practice necessitate their use; ensure cattle are not left in the forcing pen or race for excessive amounts of time
 - **Livestock handling** – all handling from paddock to slaughter should be undertaken by skilled stockmen and cattle handled as quietly as possible. Cattle should be handled with noise making or flag devices only, not electric prodders.

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' (summer and autumn in the south) as the pasture contains reduced amounts of metabolisable energy. Even though cattle may look finished, low pasture-energy levels in the weeks prior to slaughter will reduce glycogen levels in muscle, increasing the rate of dark cutting.

Factors causing glycogen loss

While lairage and pre-slaughter practices vary across abattoirs, the principles of good management remain the same. The following guidelines should be actively adopted in plant quality systems and operational procedures:

- **Sound Transport Management** – use accredited companies with trained and skilled livestock drivers; use recommended trucking densities; minimise stoppages; unload in the shortest possible time and never transport cattle during extreme weather events.
- **Lairage Management** – assign cattle to a lairage pen and don't move them again until they are required for slaughter; NEVER mix groups of unfamiliar cattle; supply clean, fresh drinking water; preferably assign pens which are far from the unloading area and busy laneways to expensive yearling cattle; provide non-slip, well drained surfaces with access to shelter; provide feed (good quality hay) to cattle in lairage for long periods (>24hrs). Minimising time in lairage is desirable to minimise total time from dispatch to slaughter.

Summary

Minimising dark cutting is simple – ensure muscle glycogen on-farm is high (good nutrition) and minimise glycogen losses pre-slaughter (reduce stress and exercise). By procuring cattle with adequate energy reserves and appropriate management from paddock to slaughter, the risk of low muscle glycogen at slaughter and subsequent dark cutting can be minimised.

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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