

tips & tools



MSA07

MEAT STANDARDS AUSTRALIA

The effect of marbling on beef eating quality

What is marbling and why does it vary between carcasses?

Marbling is assessed from the 5th to 13th rib on the carcase, and seen as intramuscular deposits of fat within the muscle. It is deposited unevenly throughout the body, increasing through the carcase towards the neck and decreasing towards the tail. It is the last fat to be deposited and the first to be utilised by the animal as an energy source. Therefore, to maximise marbling, cattle must be on a high nutritional plane. Stress or fasting pre-slaughter can quickly reduce the marbling score. Beef CRC research indicates that marbling potential can also be adversely affected by growth restriction much earlier in life. Marbling is also affected by genetics. There are strong individual animal differences within each breed and breed type. Breeds such as the Wagyu, for example, are known for their extensive marbling. It should be remembered that there are strong individual animal differences within each breed and breed type.

Does marbling ensure eating quality?

Marbling has a very positive effect on the eating quality of some cuts but it is only one of the many factors affecting eating quality. High quality cuts from young cattle that have low marbling can have good eating quality, however cuts from high marbling carcasses can fail to grade if other factors are poorly managed. All factors that interact to determine eating quality need to be managed together. However, where all else is equal, enhanced marbling will improve eating quality.

The effect of marbling on eating quality

MSA research has related increased marbling to higher eating quality scores for many cuts. The effect is greatest in the high value loin cuts. It is not clear to what extent this relationship is caused by improved tenderness versus juiciness.

Key points

- The term marbling refers to the small flecks of fat scattered throughout the muscle.
- Marbling has a positive effect on eating quality in many high-value cuts.
- Marbling is affected by genetics and nutritional management.
- It is possible to achieve good eating quality without marbling.

The table below shows MSA eating quality scores for three cuts from a carcase at a range of marbling scores. As can be seen, the marbling effect for each cut is different.

MSA marbling	Blade		Striploin		Outside flat	
	MSA score	MSA grade	MSA score	MSA grade	MSA score	MSA grade
200	56	3	50	3	41	Ungrade
400	59	3	58	3	44	Ungrade
600	62	3	64	4	46	3

The above data is taken from a standard MSA carcase with the following specifications: HSCW 240kg; male; 75mm hump; AT (achilles tendon) hang; ossification 150; rib fat 7mm; pH 5.55; loin temp 7.0°C; ageing 5 days; cooking method roast and non HGP-treated.

Assessing marbling

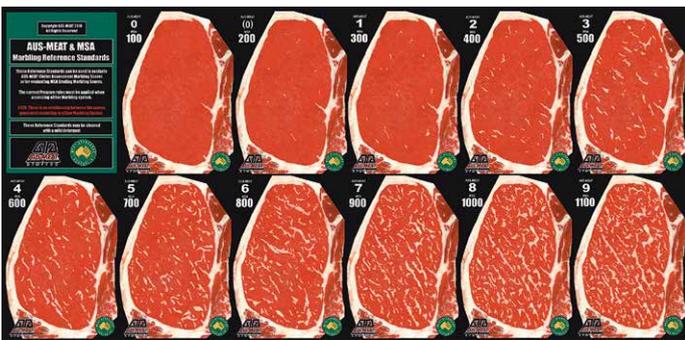
Marbling is assessed from the 5th to 13th rib on the carcase. The exposed rib eye is the assessment site used by the MSA accredited grader for marbling, pH, rib fat and meat colour measurement.

MSA-specific marbling scores are used to provide a finer scale than the AUS-MEAT scores. Each MSA marbling score is divided into tenths for grading, creating a score range from 100 to 1,190 in increments of 10. MSA



accredited graders carry visual standards for MSA and AUS-MEAT marbling and determine each score independently. Both the MSA and AUS-MEAT scores are provided on the carcass feedback. However, there is no formula to compare MSA marbling scores to AUS-MEAT marbling scores as the assessment criteria are different. The picture below shows an MSA accredited grader measuring marbling.

Marbling is assessed according to the AUS-MEAT requirements for chiller assessment when the rib eye temperature is below 12°C. However, the lower the temperature the more solid the marbling fat will be, which may marginally improve the visual assessment.



Marbling and genetic improvement

Marbling can be improved by genetic selection. Many breeds now publish Estimated Breeding Values (EBV's) for IMF (intramuscular fat %) which can assist selection. Data from carcass feedback is also very helpful to identify genetic trends. The myMSA feedback system at www.mymasa.com.au, can assist in analysing marbling feedback.

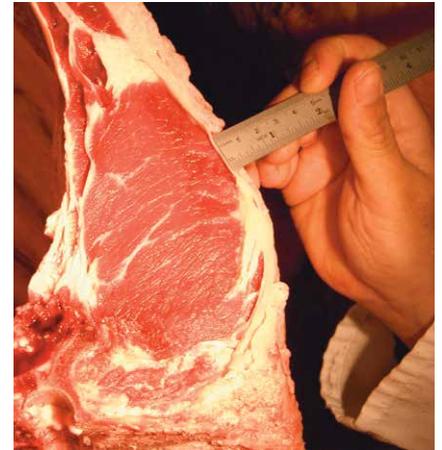
On farm management

Detailed knowledge of farm management effects on marbling is lacking at present, although there is an indication that adequate and consistent growth in the phases from birth to weaning and weaning to feedlot entry is important. Suggested target growth rates for these periods are 0.9kg/day from birth to weaning and 0.6kg/day from weaning to feedlot entry. As stress is believed to have a negative impact on marbling, good temperament and management should also be considered. Marbling generally increases as an animal matures and lays down fat. While each individual animal will have more rib fat with increased marbling, the relationship is different between animals, ranging from virtually zero marbling

at excessive rib and P8 fat depth to heavy marbling with moderate external fat. This creates huge differences in profitability for feedlots and others utilising long feeding regimes to target markets which desire heavy marbling.

Is rib fat important?

Rib fat is used in MSA grading as both a minimum requirement for grading and as a prediction input. The 3mm minimum standard aims at reducing temperature variation through the carcass muscles during chilling. Even chilling throughout the muscle produces more consistent and predictable eating quality as well as improved visual appearance.



A small eating quality improvement also occurs as rib fat increases from 3mm–18mm. This is in addition to the much larger effect of marbling.

Marbling in the feedlot

Accurate knowledge regarding the marbling potential of purchased feeder cattle will add considerable value when available. Rations, days on feed, HGP use, targeted growth rates and stress minimisation can all impact on marbling potential. Whereas most feedlot practices – including high energy intake, higher fat scores at exit and longer days on feed – improve marbling scores; HGP use will reduce them. Most feedlots will target their feed and management programs to maximise the marbling for the target market specifications.

For more information

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