



TIPS & TOOLS

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 carcass, and seen as intramuscular deposits of fat within the muscle. It is deposited unevenly throughout the body, increasing through the carcass 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.

Does marbling ensure eating quality?

Marbling has a large 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

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.

in the high value loin cuts. Marbling improves eating quality by having an effect on the flavour, tenderness and juiciness of meat. Fat plays an important role in holding flavour as well as increasing salivation, so perceived juiciness can be increased. The deposition of fat between muscle fibers can also improve the tenderness of the meat.

The table below shows MSA eating quality scores for three cuts from a carcass at a range of marbling scores.

Assessing marbling

Marbling is assessed from the 5th to 13th rib on the carcass. 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. The AUS-MEAT Marbling score describes the amount of intramuscular fat (IMF) within the rib eye, while MSA marble score describes

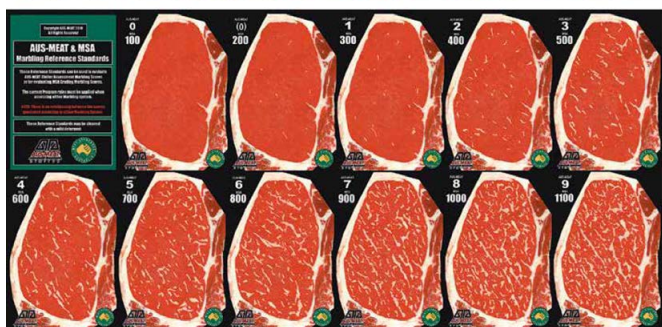
	MSA Marble 200		MSA Marble 400		MSA Marble 600		MSA Marble 800	
	MQ4	MSA Index	MQ4	MSA Index	MQ4	MSA Index	MQ4	MSA Index
Tenderloin	75	58.6	79	61.29	81	64.28	83	66.01
Cube Roll	57		64		69		73	
Striploin	52		60		66		70	
Rump	51		54		57		58	

The above data is taken from a standard MSA carcass with the following specifications: 290kg HSCW; male; no HGP-treatment; 150 ossification; 60mm hump height; 6mm rib fat; 5.60 pH; 7.1°C loin temp, AT (Achilles tendon) hang; and aged 5-days.

Meat eating score (MQ4) is the predicted eating quality score of the individual cuts in the carcass, based on consumer ratings of tenderness, juiciness, flavour, and overall liking. Each cut is allocated an MQ4 out of 100, and a beef cut must achieve a minimum of 46 points to be allocated an MSA star rating.

not only the amount, but also the evenness of distribution and fineness of the intramuscular fat. Whilst we say this, there is a relationship to compare MSA marbling scores to AUS-MEAT marbling scores as the assessment criteria are different. Each MSA marbling score is divided into tenths for grading, creating a score range from 100 to 1190 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. 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.



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.

On farm management

Adequate and consistent growth in the phases between birth and weaning and weaning to feedlot entry is important to ensure that animals are in optimum condition to allow for maximum potential expression of marbling during the finishing phase. 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 intramuscular fat is the first energy store used, stressful events can have an impact on marbling and therefore, 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 with excessive rib fat 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.

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. While feedlot practices such as high energy intake, higher fat scores at exit and longer days on feed can improve marbling scores, HGP use negatively affects an animals' ability to lay down intramuscular fat. Most feedlots will target their feed and management programs to maximise the marbling for the target market specifications.

Marbling and genetic improvement

Marbling is a highly heritable trait and 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 mymsa.com.au, can assist in analysing marbling feedback.

As the MSA Index provides an overall eating quality measure of a carcass, taking into account factors that can be influenced or managed on farm, marbling score will impact the MSA Index a carcass receives. Marbling has a high relative importance when considering the traits that influence the MSA Index and as MSA Marble score increases by 10, the MSA Index increases by around 0.15 units. To find out more about the MSA Index see *MSA Tips & Tools: Using the MSA Index to optimise beef eating*.

Further information

Visit mla.com.au/msa or contact MSA 1800 111 672



Level 1, 40 Mount Street,
North Sydney NSW 2060
P: 1800 023 100
mla.com.au

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