Intramuscular fat and eating quality

What is IMF?

Intramuscular fat (IMF), often known as marbling, is the distribution of fat within muscle. In lamb carcases IMF measurements are currently taken from the loin and expressed as a percentage.

Intramuscular fat is a key driver of eating quality in sheepmeat. Despite being measured in the loin, IMF has a positive impact on eating across all cuts in the carcase and contributes to all factors of eating quality, including flavour and overall liking. IMF can be influenced by genetics and management, such as nutrition leading up to slaughter. It is the last fat to be deposited in the animal, with its greatest deposition evident in later stages of the growth process when nutrition supplied to the animal is above maintenance levels. It is also the first energy source to be utilised, making nutrition leading up to slaughter very important.

How does IMF affect eating quality?

Intramuscular fat has a strong influence on eating quality as indicated by consumer sensory scores of sheepmeat, when using the Meat Standards Australia (MSA) consumer sensory score protocols. It has a significant impact on the tenderness, juiciness, flavour and overall liking of the product, which ultimately determines if the product meets or fails consumer expectations. The results of untrained consumer sensory tests show that as IMF increases, so too do the predicted consumer meat quality (MQ4) scores.

Research data also shows that the average IMF of the Australian flock is approximately 4%. This average IMF percentage, when paired with a 26kg hot carcase weight and LMY above 60 results in a good everyday eating quality outcome. However, if IMF% is increased then this results in a better than everyday or premium product, as can be seen in Table 1 and Table 2 below.

What influences IMF?

IMF is predominantly influenced by management and genetics. Good management, such as ensuring a rising plane of nutrition and minimal stress leading up to slaughter, has a positive influence on IMF. In regard to genetics, Australian Sheep Breeding Values (ASBVs) are available for a range of eating quality traits and indexes. These ASBVs are available to assist in making decisions when buying ewes or rams to improve IMF and overall eating quality of the end product.

There is an IMF ASBV that can be selected, however it is important that other traits and indexes are considered in any breeding objective when making purchasing and breeding decisions.

Figure 1: Higher (top) versus lower (bottom) marbling loin

Utilising ASBVs and eating quality indexes to select rams will assist in improving the eating quality of the progeny.

Click the below links for further genetics resources or visit genetics.mla.com.au or sheepgenetics.org.au:

Eating Quality ASBVs

Terminal Indexes for buying rams

Terminal Indexes for breeding rams

Figure 2: Relationship between the lean meat yield (LMY) and intramuscular fat (IMF) ASBVs in the Australian flock.

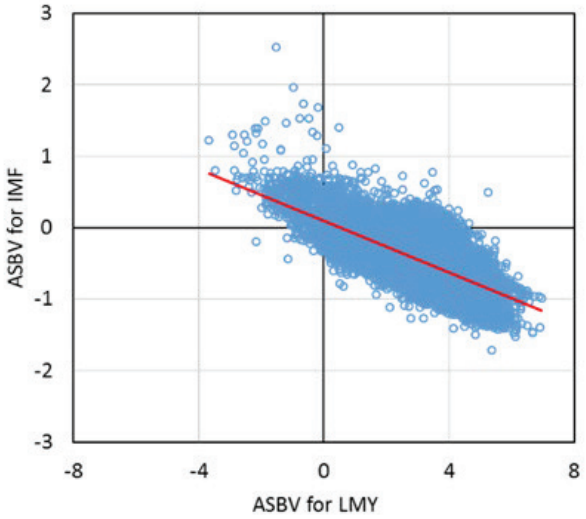
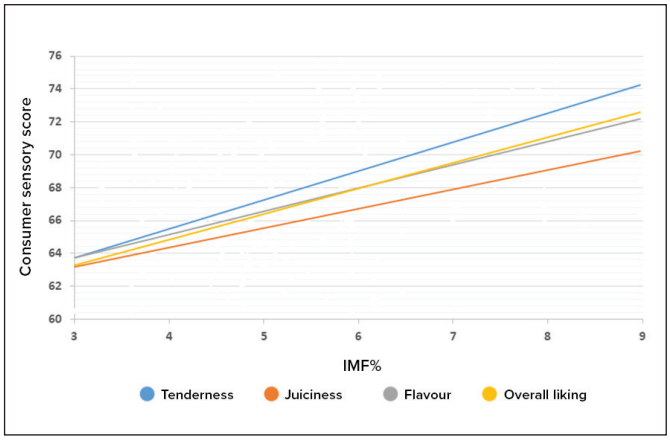


Figure 3: The relationship between instramuscular fat (IMF) and consumer sensory scores.



Consumer meat quality scores (MQ4) are a combined score of tenderness, juiciness, flavour and overall liking, and are a score out of 100. As part of the MSA program, this score is used to classify the product as fail, good everyday (3 star), better than everyday (4 star) or premium (5 star). The below tables illustrate the different consumer quality scores based on a 26kg carcase with a range of IMF and LMY values for both the loin and the topside.

Table 1: Consumer meat quality scores and MSA star rating for the loin across a range of intramuscular fat (IMF) and lean meat yield (LMY) percentages, for a 26kg carcase.

	IMF (%)							
	3	4	5	6	7	8	9	10
LMY (%)	**Loin**							
50	61.9	64.6	67.2	69.9	72.5	75.2	77.8	80.5
55	61.4	64.0	66.7	69.3	72.0	74.6	77.3	79.9
60	60.9	63.5	66.2	68.8	71.5	74.1	76.7	79.4
65	60.3	63.0	65.6	68.3	70.9	73.6	76.2	78.9

● 3 star (good everyday) ● 4 star (better than everyday) ● 5 star (premium)

Table 2: Consumer meat quality scores and MSA star rating for the topside across a range of intramuscular fat (IMF) and lean meat yield (LMY) percentages, for a 26kg carcase.

	IMF (%)							
	3	4	5	6	7	8	9	10
LMY (%)	**Topside**							
50	49.9	51.1	52.3	53.4	54.6	55.8	57.0	58.2
55	49.4	50.5	51.7	52.9	54.1	55.3	56.5	57.6
60	48.8	50.0	51.2	52.4	53.6	54.7	55.9	57.1
65	48.3	49.5	50.7	51.8	53.0	54.2	55.4	56.6

● 3 star (good everyday)

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For more information 1800 111 672 msaenquiries@mla.com.au mla.com.au