MEAT & LIVESTOCK AUSTRALIA

A cuts-based MSA sheepmeat model

A new frontier in eating quality

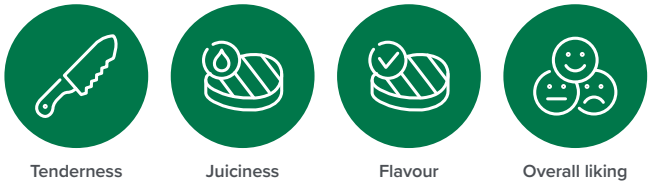
The Meat Standards Australia (MSA) program has been conducting eating quality research and development (R&D) for a number of decades. This includes laboratory assessment and untrained consumer sensory assessment using the world leading MSA protocols. This information has also been used to underpin Australian Sheep Breeding Values (ASBVs) and Sheep Genetics (SG) Indexes.

The MSA program launched the MSA Sheepmeat Pathways program in 2007, which identified critical control points along the supply chain that influenced eating quality. This included on-farm practices to minimise stress, ensuring animals have adequate nutrition and are finished (e.g. Girth Rib (GR) Fat ≥6mm, Fat Score (FS) 2), and processing interventions, such as electrical stimulation to prevent cold shortening. However, the MSA Sheepmeat Pathways program did not segregate individual cuts and carcases based on variation in eating quality, primarily due to the absence of technologies to capture key traits that influence eating quality.

Variation in consumer eating quality

For over a decade, eating quality traits have been measured through MLA sheepmeat research that included MLA Resource Flock and MSA consumer sensory. Despite the introduction of the MSA Sheepmeat Pathways program, there is still significant eating quality variation in the Australian sheep flock when assessed by untrained consumers (Figure 3). The MSA consumer sensory protocols have participants rate cooked sheepmeat samples for tenderness, juiciness, flavour and overall liking, scoring each attribute out of 100.

Figure 1: The MSA consumer sensory protocol attributes



These scores are combined to form a single Meat Quality Score (MQ4). This score also results in an overall grade allocation of 'ungrade' or 'fail', 'good everyday' (3 star), 'better than everyday' (4 star) or 'premium' (5 star). A consumer can detect a difference in eating quality of 4–5 MQ4 points.

Figure 2: Consumer Meat Quality (MQ4) scores and MSA star ratings

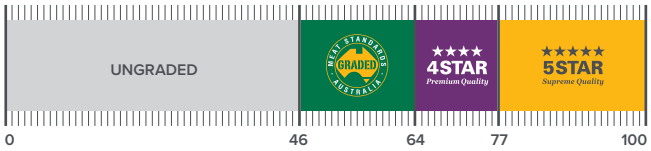
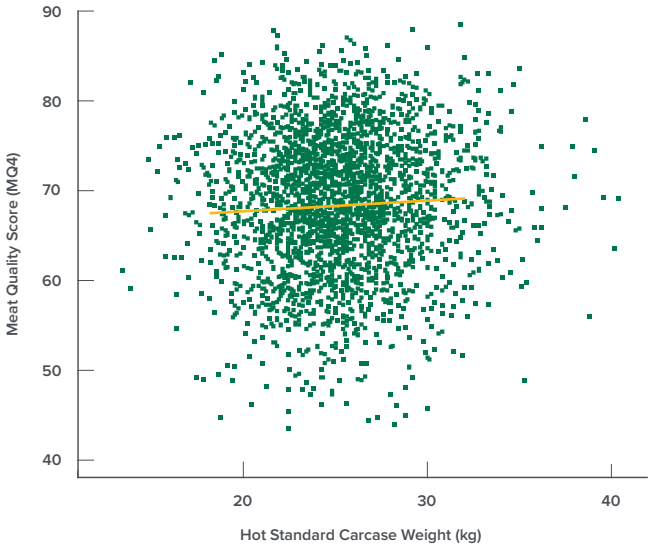


Figure 3: Distribution of consumer Meat Quality Score (MQ4) of the loin when grilled by Hot Standard Carcase Weight (HSCW) for the 2017–18 MLA Resource Flock lamb drop

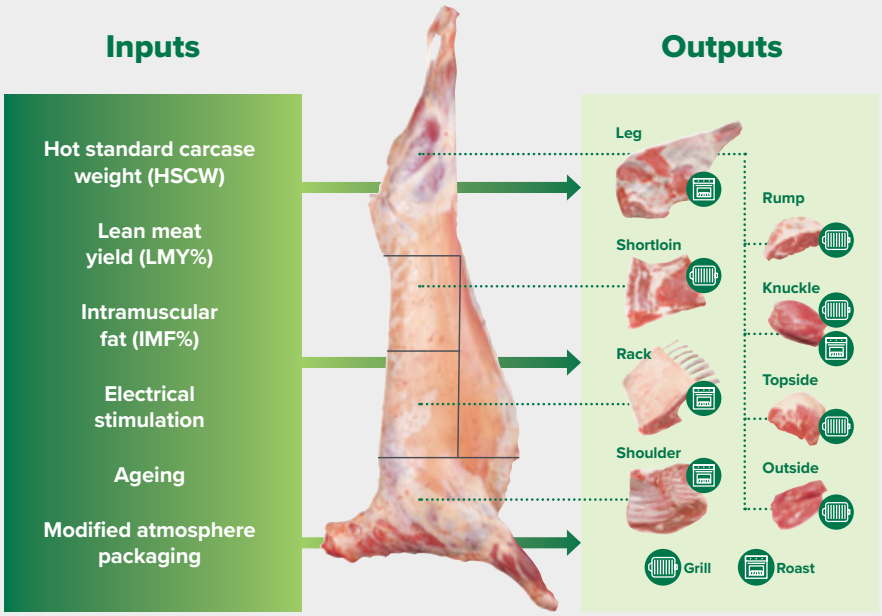


Technology enabling cuts-based grading for sheepmeat

Through focused industry R&D partnerships and initiatives such as the Advanced Livestock Measurement Technology program, technologies to measure sheepmeat carcase traits that explain eating quality variation have been commercialised. This includes technologies to measure both intramuscular fat percentage (IMF%) and lean meat yield percentage (LMY%), along with technology to identify and track individual carcases.

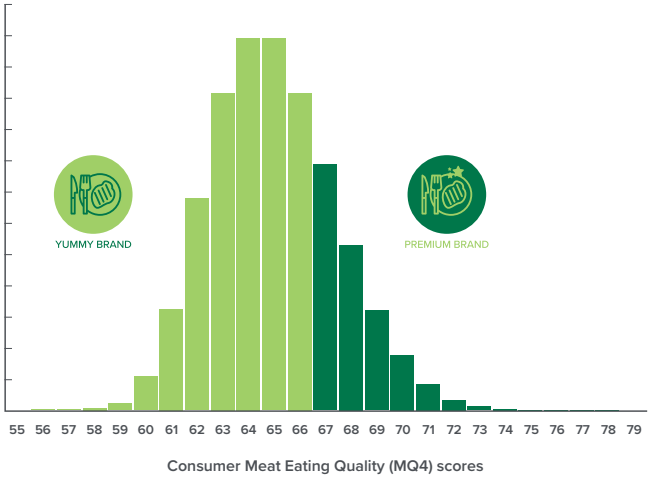
Having the ability to measure traits on individual carcases has enabled the world's first cut-based predictive eating quality model, the MSA sheepmeat cuts-based model (Figure 4).

Figure 4: The MSA sheepmeat cuts-based model



The MSA sheepmeat cuts-based model will allow processors to sort cuts from carcases based on eating quality. This enables significant value to be captured from customers then shared along the supply chain. Eating quality specifications can be customised to underpin brands to ensure consistent eating quality to consumers (Figure 5).

Figure 5: An example of loin eating quality variation within a supply chain and eating quality segregation to underpin brands



The first version of the MSA sheepmeat cuts-based model predicts the eating quality of nine cut by cook (grill or roast) outcomes for directly consigned lambs. Ongoing research will enable the expansion of the model to account for further cooking methods, cuts, saleyard pathway sheep, categories other than lamb and further traits that explain eating quality variation.

What does it mean for producers?

The MSA sheepmeat cuts-based model will enable important feedback to producers, which can be used to identify on-farm improvements. This will include a MSA Sheepmeat Index for each carcase as well as carcase traits such as hot standard carcase weight (HSCW), LMY% and IMF%. The MSA Sheepmeat Index is a single number and standard national measure of the overall eating quality of a carcase. It is a weighted average of the predicted MQ4 scores of the MSA-graded cuts in a carcase for the most common cook method.

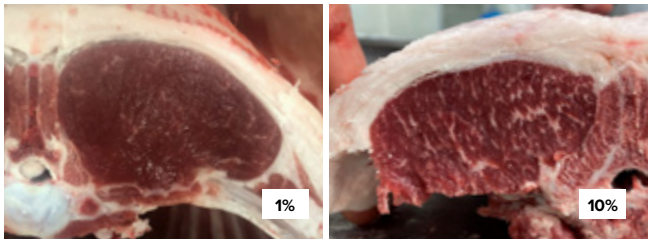
The MSA Sheepmeat Index is a tool that producers can use to benchmark the impact of genetic and management interventions on eating quality. Producers will also be able to benchmark their overall performance compared to regional, state and/or national levels.

What traits influence eating quality?

The MSA sheepmeat cuts-based model includes important inputs (expressed as percentages) that have impact on eating quality. They are:

- Intramuscular fat (IMF%) – the distribution of fat within within the loin and has a has a positive influence on eating quality
- Lean meat yield (LMY%) – the proportion of lean meat tissue to bone and fat in a carcase and has a negative impact on eating quality.

Figure 6: Comparison of a loin with low IMF% vs. a loin with high IMF%



LMY% can be measured using technology such as dual energy x-ray (DEXA) or can be calculated using measured GR fat and HSCW.

IMF% measurements are taken from the loin. IMF% can be measured by a range of commercialised objective carcase measurement technologies.

Improving eating quality outcomes

Genetic selection

LMY% and IMF% are antagonistic genetic traits, though selection for both eating quality (IMF% and Shear Force (SF5) ASBVs) and LMY% is possible. Historically, market signals have driven genetic selection for growth and higher yields, which has resulted in an increase in the LMY% and weight ASBVs. However, selection for yield and growth has resulted in a decline in eating quality. Conscious genetic selection decisions by stud breeders and the introduction of SG Indexes that include eating quality traits have resulted in improvement of eating quality trends whilst continuing to improve LMY% (Figure 7).

A SG Index combines the number of traits into a single dollar value. There are a number of SG Indexes that account for eating quality improvement in balance with other important traits including LMY%, post-weaning weight and lambing ease. To find out more about Sheep Genetics Indexes sheepgenetics.org.au/getting-started/asbvs-and-indexes

It is important producers set a breeding objective that aligns with their production and market targets. A clear breeding objective will aid in determining the ASBVs and SG Indexes suitable for their production system when making ram purchasing and breeding decisions. Accounting for eating quality as part of a breeding objective now, will ensure genetics are suitable for future markets and incentives.

Figure 7: Terminal lamb genetic trends for Shear Force (SF5), Lean Meat Yield (LMY) and Intramuscular Fat (IMF) and Australian Sheep Breeding Values (2001–2023)

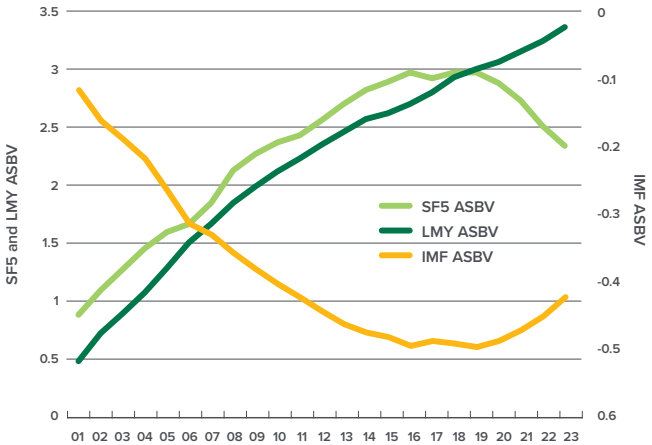
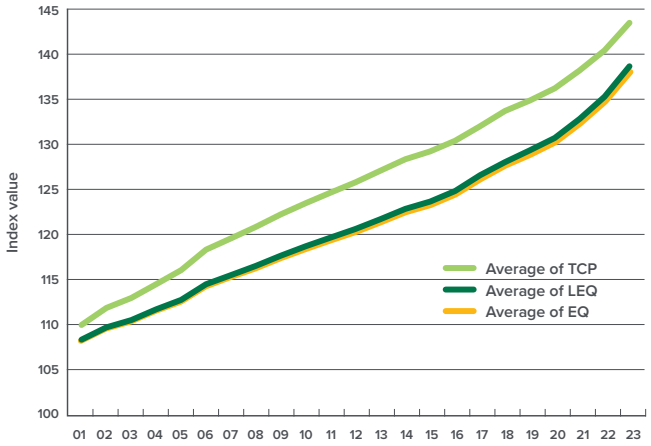


Figure 8: Terminal analysis of Sheep Genetics Indexes Terminal Carcase Production (TCP), Lamb Eating Quality (LEQ) and Eating Quality (EQ) (2001–2023)



On farm management influencing eating quality outcomes

On farm management, such as ensuring a rising plane of nutrition and minimal stress leading up to slaughter, has a positive influence on eating quality outcomes. It also provides the opportunity for the animals to express their genetic potential for other carcase value drivers and meet carcase specifications sooner. Poor handling in the weeks, days and hours prior to slaughter can compromise the eating quality of even the best finished animals. Producers should also aim to reduce the time between muster and slaughter where practical.

MSA sheepmeat resources

Visit mla.com.au/msa-how-to-supply-sheep and mla.com.au/msa-handling-sheep for requirements for consigning MSA sheep and tips for improving management towards improved eating quality.

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

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