



# Comment les professionnels de la viande en Australie ont valorisé les résultats de R&D

**Compte-rendu du Workshop qui s'est tenu à Melbourne en Août 2018 célébrant les 20 ans de recherche-développement sur la viande et les produits carnés en Australie**

**Mots-clés :** viande bovine, consommateurs, qualité en bouche

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**Cet article résume les interventions au workshop qui s'est tenu le 13 Août 2018 à Melbourne pour célébrer le 20<sup>ème</sup> anniversaire du « Meat Standards Australia (MSA) », système moderne de prédiction de la qualité en bouche des viandes.**

## Résumé :

À l'occasion du 20<sup>ème</sup> anniversaire du « Meat Standards Australia (MSA) », le 64<sup>ème</sup> Congrès international sur la science et la technologie de la viande (ICoMST) a organisé une session spéciale le lundi 13 août 2018 à Melbourne pour décrire les activités de recherche à l'origine du développement du MSA. Le programme du workshop a permis de présenter le développement du MSA jusqu'à son rôle dans le marché d'aujourd'hui, et ce que l'avenir nous réserve pour ce système de classement des viandes le plus utilisé au monde. Les présentations de chercheurs et de professionnels du secteur sont résumées dans cet article.

## Abstract: How Australia's red meat industries have adopted eating quality science

In celebration of Meat Standards Australia's (MSA) 20<sup>th</sup> anniversary, the 64<sup>th</sup> International Congress of Meat Science and Technology (ICoMST) ran a special MSA session on Monday August 13<sup>th</sup> in Melbourne. The program covered the development of MSA through to its role in the modern marketplace and what the future holds for the world's leading eating quality grading system. Leading researchers and industry practitioners presented a series of short papers, which are summarised below.

## INTRODUCTION

Michael Crowley from the Meat and Livestock Australia ([mcrowley@mla.com.au](mailto:mcrowley@mla.com.au)) introduced this workshop by giving an overview of MSA

The key message was that consumers are prepared to pay for an appropriate level of beef or lamb quality, which is consistent across 12 countries studied so far. The MSA system is specifically designed to deliver a range of quality levels across 39 beef muscle x cooking methods. It was made clear that if beef and lamb products fail to deliver the meal performance matched to the occasion, then consumers will turn to other meat or protein sources.

## I. THE MSA PRINCIPLES IN BEEF AND LAMB

Rod Polkinghorne (Birkenwood International Pty Ltd: [rod.polkinghorne@gmail.com](mailto:rod.polkinghorne@gmail.com)) presented the principles of MSA in beef, which are based on sensory evaluation using untrained consumers

The guiding principle of developing the MSA system was to focus on the consumer and customer as this is where all the financial returns to the value chain comes from. Twenty years ago, it was a brave but crucial decision was that consumer outcomes would drive ALL grading decisions. The next important step was to use untrained consumers in sensory panels – at the time, this was thought impossible since traditionally meat had been assessed using objective measures (shear force) or trained sensory panels – the later often trained against objective measures like shear force. However, it became clear that if MSA was to predict the true population mean for eating quality preference, untrained consumer were the key. Variability when using untrained consumers can be an issue but this was controlled by using strictly controlled protocols (e.g. same griller, same thickness, same cutting lines), a latin square design to control for steak order/quality and finally using large numbers of consumers (10 consumers per cut/muscle). The current model is based on 16,771 cattle, 92,827 cuts, 120,040 consumers.

The early work asked consumers to rate beef using 13 different variables – dryness, ease of first bite, tenderness, texture and so on. The final parameters showing consistent significance were tenderness, juiciness, liking of flavour and overall liking, which were then statistically combined to form an MQ4 score (e.g. a score of global eating quality). This was then used to determine grading boundaries for the final consumer rating of unsatisfactory, good every day, better than every day and premium.

## II. THE DEVELOPMENT OF MSA

### 2.1 The early days

John Webster (AgStrat Assoc. Pty Ltd: [jpwebster@hotmail.com](mailto:jpwebster@hotmail.com)) described the key elements of success of MSA.

The history and foundation of the MSA were laid in the early 1990's with the recognition that beef was not satisfying consumer needs. The peak council committees agreed a beef grading scheme was needed, and that it would be consumer focused. The R&D, which continues today, required considerable financial support over a continuing period. To achieve this, Meat & Livestock Australia undertook a 'Program funding' and NOT 'Project funding' which was vital as it delivered a continuous research effort

The next steps are a continued focus on the consumer and meeting the needs of sensory quality, but also animal raising claims, product origin to the level of farm, environmental footprint and human health attributes.

The MSA system currently grades 43% of adult cattle slaughtered or about 60% of yearling cattle given few older animals such as cows are graded. The overall cost benefit of the investment by beef and lamb producers through Meat & Livestock Australia is 12.5:1 over 2010-2015 period reinforcing the benefits of a consumer focused outcome (MLA, 2016, 2018).

Next came the process of predicting the consumer scorer/rating. The first approach was a 'pathways' method, which is commonly used across the world. While this was effective, it could not cover off on numerous cuts, and also there was a lot of meat of good every day quality that was rejected. Then came the crucial 'light bulb' moment – use the carcass grading parameters to predict the MQ4 score using an interactive cuts based system.

The second speaker was David Pethick (Murdoch University: [d.pethick@murdoch.edu](mailto:d.pethick@murdoch.edu)) described lamb grading

Currently the MSA lamb and Sheepmeats system is a best practice pathways approach with rules and guidelines for producers, abattoirs and retail including parameters such as sheep age category, low stress handling, chiller pH/temperature management and aging with some cut x cook recommendations. More recently, modelling across a large data set of lamb cuts tested by 7,000 consumers has shown the importance of lean meat yield and intramuscular fat as additional predictors of eating quality. Lean meat yield as a negative and intramuscular fat a positive predictor. These traits are under both genetic and nutritional control. Accordingly, new breeding values have been commercially released by Sheep Genetics to allow producers to now select for progress in both traits. Finally, there is now an active research program to measure lean meat yield and intramuscular fat of lamb carcass on line in commercial abattoirs so as to facilitate a new cuts based grading scheme for lamb (Bonny *et al.*, 2018).

over the 20 years. The research became global with the first international workshop to help shape the program undertaken in 1997. In conclusion, change is challenging for any long established industry and only a concerted effort across the value chain can deliver new systems.

### 2.2 An international perspective

Jean-François Hocquette (INRA, [jean-francois.hocquette@inra.fr](mailto:jean-francois.hocquette@inra.fr)) gave a talk entitled "towards a global assessment of beef eating quality".

Europe currently has similar problems of variable beef quality, which Australia began to address in the late 1990's. That is beef is not meeting consumer expectations and price

is not a reliable indicator. However, a number of studies have now confirmed a consumer driven prediction model of beef eating quality would be highly relevant in Europe.

A combined data set of beef sensory scores collected using MSA sensory protocols derived from untrained consumers from Poland, Nth Ireland, France and Ireland (reviewed by Hocquette *et al.*, 2014) have shown the relevant MSA predictors where appropriate (ossification, marbling, cut, aging, hang, pHu) with some minor adjustments for small differences in consumer preference (Bonny *et al.*, 2018).

Indeed, a new French brand has been created utilizing many aspects of the MSA system. As a follow on the International Meat Research 3G Foundation has been established (managed by Poland) is likely to promote an international beef eating quality grading system in collaboration with the United Nations Economic Commission for Europe (UNECE) (Pethick *et al.*, 2018).

### III. INDUSTRY PERSPECTIVES

Trent Osborne and Ian McCamley (Hurstdale Pastoral: Trent Osborne [trentoz2001@yahoo.com](mailto:trentoz2001@yahoo.com) ; MCC Pastoral Pty Ltd: Ian McCamley [ikmccamley@bigpond.com](mailto:ikmccamley@bigpond.com)) described the producer perspectives.

The beef producers have supported and indeed paid for the R&D and adoption of the MSA system since its inception. The use of MSA feedback data was highlighted as a breakthrough for beef producers to have a consumer focus by improving (i) compliance to specification and (ii) the sensory scores of their beef. The MSA index has allowed beef producers to understand where their cattle rank in terms of National eating quality scores, and also allowed science and economic based decisions for changes on farm. Key breakthroughs have also been the rise of grass fed brands further benefiting the farm sector given much of Australia's beef is grass fed. The training programs for beef and lamb producers has hugely lifted the knowledge of the livestock farming sector and especially improved the handling and nutrition of cattle close to slaughter to minimise the incidence of high pHu or dark cutting beef. Beef and lamb producers are now changing their business from commodity to producing for a brand.

Tom Maguire (Teys Australia Pty Ltd: [tomm@teysaust.com.au](mailto:tomm@teysaust.com.au)) presented his view about the processor perspectives.

The long-term success of the processing (abattoir) sector is driven by (i) customers and a consumer focus and (ii) slaughter livestock supply and quality. In the early days of MSA, the Australian processing industry was not always united in support of MSA. Many in the sector were convinced that beef trading was all about price and that customers would not pay for quality. Moreover, it was assumed that beef was just variable and this was impossible to change. Now, there is total support for MSA, and it is considered fundamental to underpin successful beef brands. Eating quality language is now mainstream in the processing sector, and the MSA system has shown that value will in the end overhaul price. The next goal is value based trading being a combination of weight of cuts harvested from a carcass x the value of those cuts, the later heavily driven by MSA quality grade.

### 2.3 The MSA index

Peter McGilchrist (University of New England: [peter.mcgilchrist@une.edu.au](mailto:peter.mcgilchrist@une.edu.au)) explained the recent development of the MSA index (with allows feedback to producers and is a bench marking tool).

The MSA index is a single number to indicate the overall eating quality of a carcass. It is the weighted (by muscle weight) average of eating quality scores of 39 muscles cooked at 5 days aging using the most common cooking method for that muscle. It represents a single score rather than a series of individual traits and was designed to simplify the feedback systems to beef producers (McGilchrist *et al.*, 2019). Producers can readily understand the generic eating quality of their cattle and adopt genetic/management practices to improve the index relative to National percentile bands (MLA, 2018).

Mark Inglis (JBS Australia: [mark.inglis@jbsa.com.au](mailto:mark.inglis@jbsa.com.au)) also described the processor perspective.

Indeed, Mark described the use of the MSA index to formulate the JBS Southern branding strategy for beef. It's based around beef (and lamb) producers joining the JBS Farm Assurance program with independent auditing of some 4,500 beef and lamb producers. The Great Southern brand is derived from grass fed beef, with no hormones and antibiotics. The MSA index thresholds were explained for the overarching brand Great Southern and then tiers within Great Southern such as the elite Pinnacle and Little Joe brands. The MSA index is used to manage cuts of beef into like eating quality categories within the brands – this delivers both the appropriate level of quality, and also consistent product. Using the MSA index as an in house sorting tool within the abattoir has facilitated simple and transparent communication of the performance and requirements of the company brands across the value chain from producers through to customers.

Ian Smith (Coles: [ian.smith@coles.com.au](mailto:ian.smith@coles.com.au)) indicated the retail (Supermarket) perspective.

Coles supermarket accepts the science and best practice developed by MSA over the past 20 years. Coles has adopted the MSA's approach to assist in developing a range of domestic and export beef brands ranging from a good every day offer to premium grain and grass fed brands. It provides a clear rationale for consistent eating quality backed up by years of scientific assessment, which challenges the subjectiveness of eating quality attributes.

Sarah Strachan (Meat and Livestock Australia: [sstrachan@mla.com.au](mailto:sstrachan@mla.com.au)) presented the supporting commercial implementation of MSA.

An important part of the MSA model development was geared to assure its commercial relevance and ease of operation across the value chain. Essentially, a complex grading model connected to cut x cook eating quality prediction had to be made 'usable'. This required training across the value chain. Grader training connected to continuous quality assurance assessment was established such there are now 550 trained graders in 60 abattoirs across Australia with a further 3,000 abattoirs staff trained in the principals and application of MSA. A one-week MSA

focused meat science course has further trained 400 business decision influencers. In addition, hands on training exists for wholesalers, butchers and retailers on cutting, value adding and primal breakdown to optimize cut x cook outcomes. Finally and most importantly, 53,317 beef and lamb producers have been registered as suppliers of MSA eligible animals supported by on-line learning modules and 20,000 producers participating in MSA training workshops.

## CONCLUSIONS

Rod Polkinghorne concluded this workshop by giving his thoughts about MSA in the next 20 years

A key theme was changing the industry meat description to a meal cooked result outcome based language. Carcass (e.g. dentition, age, sex) and cut description would be superseded by terms like eating quality graded (into meal results). To facilitate better carcass utilisation individual muscle identification through the boning room at line speed will be developed to sort cuts to uniform eating quality portions, with these grouped and marketed by consumer meal outcomes.

Beef cattle will deliver cuts of higher eating quality as genetics, assisted by genomics, focus more on eating quality outcomes, rather than just lean meat yield. We know already that part of the Bos indicus effect to reduce the palatability of certain cuts is genetically based around the calpain/calpastatin system and in the future, the status of this will be determined on farm or at slaughter so as to allow incorporation into the model.

### Références :

Bonny S.P.F., O'Reilly R.A., Pethick D.W., Gardner G.E., Hocquette J.-F., Pannier L. (2018). Update of Meat Standards Australia and the cuts based grading scheme for beef and sheepmeat. *Journal of Integrative Agriculture*, 17 (7), 1641-1654.

Hocquette J.F., Van Wezemael L., Chriki S., Legrand I., Verbeke W., Farmer L., Scollan N.D., Polkinghorne R., Rødbotten R., Allen P., Pethick D.W. (2014). Modelling of beef sensory quality for a better prediction of palatability. *Meat Science*, 97, 316-322.

McGilchrist P., Polkinghorne R.J., Ball A.J., Thompson J.M. (2019) The Meat Standards Australia index indicates beef carcass quality, *Animal* <https://doi.org/10.1017/S1751731118003713>

Meat and Livestock Australia (2016). Impact assessment of MLA Expenditure 2010-11 to 2014-15. Economic quantification of benefits. Project No. F.EVA.1601. Eating Quality pp111-128. Meat and Livestock Australia, North Sydney, Australia.: <https://www.mla.com.au/globalassets/mla-corporate/generic/about-mla/mla-impact-assessment-final-report-2010-11-to-2014-15.pdf>

Meat and Livestock Australia (2018). Meat Standards Australia. Annual Outcomes Report. Delivering consumer confidence in eating quality. Meat and Livestock Australia, North Sydney [https://www.mla.com.au/globalassets/mla-corporate/marketing-beef-and-lamb/documents/meat-standards-australia/mla\\_msa-annual-outcomes-report-2017-18-1.pdf](https://www.mla.com.au/globalassets/mla-corporate/marketing-beef-and-lamb/documents/meat-standards-australia/mla_msa-annual-outcomes-report-2017-18-1.pdf)

Pethick D., McGilchrist P., Polkinghorne R., Warner R., Tarr G., Garmyn A., Thompson J., Hocquette J.-F. (2018). Travaux de recherche internationaux sur la qualité sensorielle de la viande ovine et bovine. *Viandes Produits Carnés*, VPC-2018-34-1-2. <https://www.viandesetproduitscarnes.fr/index.php/fr/894-travaux-de-recherche-internationaux-sur-la-qualite-sensorielle-de-la-viande-ovine-et-bovine>

This all supports 172 MSA underpinned brands and 3,681 end users. The next phase of International recognition via MSA branded product is underway.

Feedback to beef and lamb producers has been a feature with the development of the myMSA feedback portal where producers can access the MSA grading data and MSA carcass index. This portal is constructed to allow producers to bench mark against National and local standards.

Assessment of both lean meat yield and eating quality will advance as objective carcass measurement technologies become available. This will allow value based trading across the value chain giving incentive to beef producers to improve their cattle and lambs.

Further development of value added industrial cooking options will allow for greater utilisation of poorer quality cuts underpinned by MSA rather than unproven claims. In addition, the important area of flavour will be understood in a manner that will allow the MSA model, and so the value chain, to capture the value of flavour.

The International Meat Research 3G Foundation data bank initiative will be fully mature as a framework for facilitating collaborative eating quality R&D across the world, but also as the route to deliver MSA like consumer focused grading models in many countries.