

HOW TO PREDICT BEEF EATING QUALITY IN EUROPE THROUGH THE ADAPTATION OF THE AUSTRALIAN SYSTEM MSA?

Jean-François Hocquette¹, Isabelle Legrand^{2*}, Rod J. Polkinghorne³, Jerzy Wierzbicki⁴

¹Inra-VetAgro Sup, Unité Mixte de Recherches sur les Herbivores, Theix, 63122 Saint-Genès-Champanelle, France

²Institut de l'Elevage, MRAL, Boulevard des Arcades, 87060 Limoges Cedex 2, France

³Polkinghorne Pty Ltd, 431 Timor Road, Murrurundi, NSW 2338, Australie

⁴Polish Beef Association, ul. Smulikowskiego 4, 00-389 Warsaw, Pologne

*Corresponding author email: isabelle.legrand@idele.fr

Abstract – Six hundred French and 600 Polish consumers evaluated the eating quality of grilled steaks from six muscles sampled from 30 French cows and 30 Polish young bulls, according to 4 criteria (tenderness, flavour liking, juiciness, overall liking). The global quality index combining the 4 sensory criteria predicted through the Australian model from animals and their carcasses' characteristics seemed to slightly underestimate meat quality, especially when tasted by French consumers. However, the prediction of the quality rating (according to 4 grades) using this global quality index was judged on average very good. The great consistency of the results showed that the Australian MSA meat grading system principle with appropriate adjustment might be relevant in Europe.

Key Words – meat, consumer acceptability, prediction, France, Poland

I. INTRODUCTION

Beef is characterized by a high variability of its palatability, which may induce consumer dissatisfaction. To solve this problem, Australia has developed the Meat Standards Australia (MSA) grading scheme to predict beef eating quality [1]. It is based on the development and the use of a large research database with a vast amount of data, especially the use of a large-scale consumer testing system with cuts cooked in different ways, combined with information on the corresponding animals, carcasses and meats. Based on statistical analyses carried out on this database, the MSA system has identified the critical control points of beef palatability for each cut x cooking method combination. This experiment aimed to test the relevance of a system for predicting beef quality based on the MSA approach in Europe, with meat from different animal types used in Europe and more specifically with French and Polish consumers.

II. MATERIALS AND METHODS

This experiment was carried out with 30 French cows and 30 Polish young bulls from different breeds. All animals were slaughtered under EU requirements in commercial abattoirs. The carcasses were weighed and graded according to the EU classification and by a qualified MSA grader for ossification, marbling score, meat colour, rib fat, ultimate pH and muscle temperature [1]. Six muscles (*biceps femoris*, *rectus femoris*, *semimembranosus*, *gluteus medius*, *longissimus thoracis* and *psoas major*) were sampled and aged 10 days except *psoas major* which was aged 5 days.

Consumer assessment of eating quality was done according to protocols for MSA [1]. Briefly, grilled 2.5 cm thick steaks were cooked on a Silex clamshell grill (Silex, Hamburg, Germany) set to 220°C for 4.75 min. Every consumer received a first or link sample and a further six steaks, one from each of the six studied muscles either from French cattle or Polish cattle. The order of product presentation to consumers was controlled by a 6x6 Latin square.

Thus, in total, 600 French consumers and 600 Polish consumers took part in the cooking test, with each consumer eating three Polish beef samples and three French beef samples. Consumers scored portions for tenderness (tn), juiciness (ju), flavour liking (fl) and overall liking (ov), and for this purpose they made a mark on a 100 mm line scale. In addition, they were asked to assign a quality rating to each sample: 'unsatisfactory', 'good everyday' (equivalent to 3*), 'better than everyday quality' (equivalent to 4*) or 'premium quality' (equivalent to 5*). Before the taste panel, data were obtained on the demographic profile of the consumers and their families.

The relationship of the satisfaction grade to the four sensory scores was determined using discriminant analysis [1]. The four consumer scores (tn, ju, fl and ov) were combined into a single score (called MQ4 for Meat Quality based on the 4 criteria) that was used to predict the four satisfaction grades. A linear discriminant analysis was used with the satisfaction grade as the criterion to be predicted by tn, ju, fl and ov using the MQ4 score.

III. RESULTS AND DISCUSSION

Regardless of beef origin and consumer nationality, samples of each muscle were distributed in the different grades ('unsatisfactory', 'good everyday' (3*), 'better than everyday quality' (4*) or 'premium quality' (5*), with high proportions of 4* and 5* beef for the *psaos major* and a high proportion of unsatisfactory beef for the *biceps femoris*. The optimal weightings of the four sensory parameters (tn, ju, fl and ov) to predict the final rating ('unsatisfactory', 3*, 4* and 5*) from the MQ4 score were not far from those in Australia, so that the Australian $MQ4=0.3tn+0.1ju+0.3fl+0.3ov$ could be used.

Moreover, these weightings predicted the actual rating given by Polish and French consumers for about 65% and 70% respectively of the total number of samples, indicating that a high level of prediction is possible in both countries.

The MSA boundaries for French consumers between 'unsatisfactory', 3*, 4* and 5* were found to be ca. 38.1, 60.8 and 79.4, respectively, but 42.5, 59.5 and 73.4 respectively for Polish consumers. The differences between extreme classes were therefore slightly more important in France than in Poland. It was previously shown that they were also slightly more important in France than in Australia [2].

The Australian MSA model provides a predicted MQ4 score for each muscle from the factors recorded for each carcass. One important point of interest was the differences between the MQ4 predicted from the MSA model and the MQ4 score determined either by French or Polish consumers based on real consumer scores and calculated from the above equation ($MQ4=0.3tn+0.1ju+0.3fl+0.3ov$). Figure 1 below (for all muscles and two extreme examples in terms of eating quality) indicates that beef (especially Polish beef) tended to be slightly underestimated by the Australian model, especially when consumed by French people.

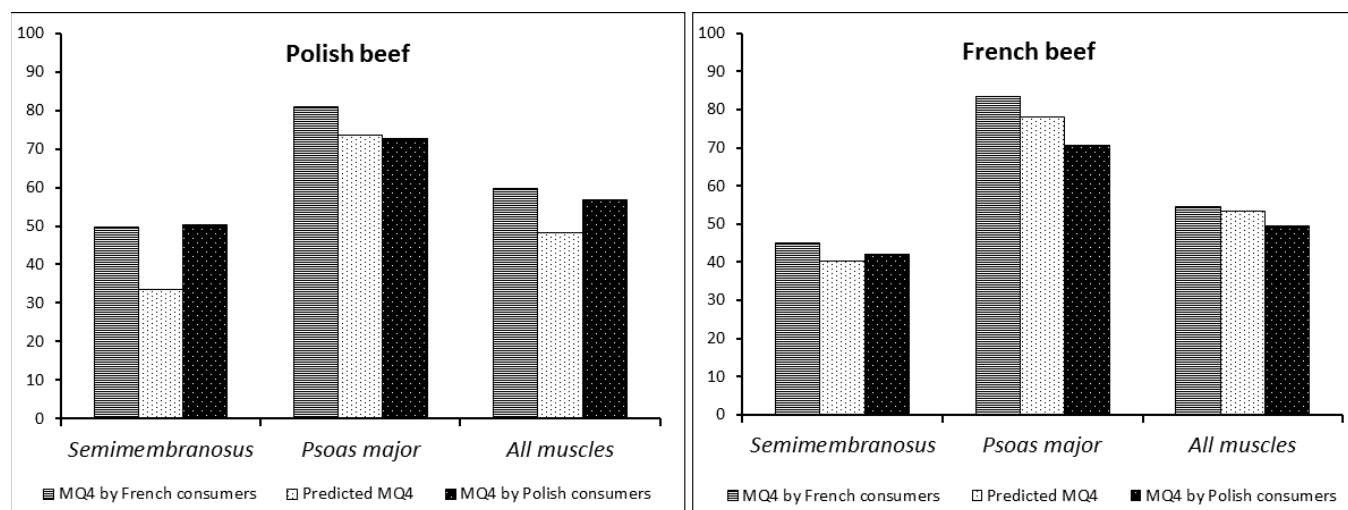


Figure1. MQ4 values for Polish or French beef determined by French or Polish consumers, or predicted by the MSA model.

IV. CONCLUSION

Overall, the data indicate that it would be possible to manage a grading system similar to the MSA system in two European countries (Poland and France) as there is high agreement and consistency across consumers. However, the slight differences between Polish and French results suggest that some country-specific adjustments might be required.

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