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## The challenge of the beef industry: moving from carcass grading systems to the prediction of beef quality for consumers and citizens

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***THE CHALLENGE OF THE BEEF INDUSTRY:***

***MOVING FROM CARCASS GRADING SYSTEMS***

***TO THE PREDICTION OF BEEF QUALITY FOR CONSUMERS AND CITIZENS***

Beef quality consists of expected and experienced quality dimensions. The match or mismatch between expectations and experience leads to consumer satisfaction or dissatisfaction, and thus willingness to purchase beef again in the future. Despite efforts, there is still a high level of variability in palatability even for expensive cuts, which is one reason for consumer dissatisfaction. In Europe, there is still no reliable tool to predict beef quality and deliver consistent quality beef to consumers, who now find beef too expensive. Therefore, predicting eating quality (such as tenderness and flavour) at the consumer level is of paramount importance for the industry in order to remain competitive in the market. In addition, the relative

importance of the different quality traits varies according to the country, with also a general trend towards an increasing contribution of healthiness, safety and extrinsic quality traits such as productions systems, environmental issues and animal welfare.

Early grading systems only described carcasses with various traits such as carcass weight, age or maturity of the animal, sex, fatness, fat colour, carcass conformation and sometimes marbling and lean colour and eventually saleable meat yield usually predicted by measurements of fatness and/or muscling. In North American and Asian countries, emphasis has been put on maturity and marbling. The European system to describe carcasses (the EUROP grid) is mainly based on yield estimation. Its declared objective is to pay producers, but it does not predict eating quality at the consumer level. A consumer driven modelling tool was developed in Australia: the Meat Standards Australia (MSA) grading scheme predicts beef quality for each individual muscle × specific cooking method combination using various information on the corresponding animal and post-slaughter processing factors. The MSA system proved to be effective in predicting beef palatability not only in Australia but also in many other countries. The results of the work conducted within the ProSafeBeef project indicate that it would be possible to manage a grading system in Europe similar to the MSA system.

Some genetic markers are available to improve beef quality. In addition, gene and protein expression profiling of the bovine muscle revealed that the expression level of many genes and the abundance of many proteins may be potential indicators of muscle mass, tenderness, flavour or marbling of meat. These markers are related to the heat shock protein family, muscle fiber characteristics, metabolic enzymes,

connective tissue or proteases involved in ageing of beef. However, these markers are often specific to muscle type, animal type, livestock practices or environmental conditions. Despite these limitations, predictive tests of beef quality based on genomic tools are currently in development.

The combination of the different modelling approaches (namely muscle biochemistry, genomic results and a MSA-like meat grading system adapted to the European market) is a proven area of research to improve the prediction of beef quality. We also speculate that the combination of indicators related to sensory and nutritional quality, social and environmental considerations (carbon footprint, animal welfare, biodiversity of pasture, rural development, etc.) and economic efficiency (incomes of farmers and of other players along the supply chain, etc.) will provide an assessment of the overall quality of beef not only for the mass market but also to support official quality labels of niche markets which are so far mainly associated with the geographical origins of the products.