

## Indicators of Beef Quality for Consumers: a Systematic Review

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### Introduction

Quality is a subjective term and means different things to different people. However there is general agreement that beef quality needs to be consistent, and needs to be improved. Furthermore, there is agreement that it will become an increasingly important factor in consumer decision making (Henchion *et al.*, 2014). Informed by quality theory, this paper seeks to determine the relative importance of quality attributes from a consumer perspective through undertaking a systematic review of the literature on consumer attitudes to different beef quality attributes.

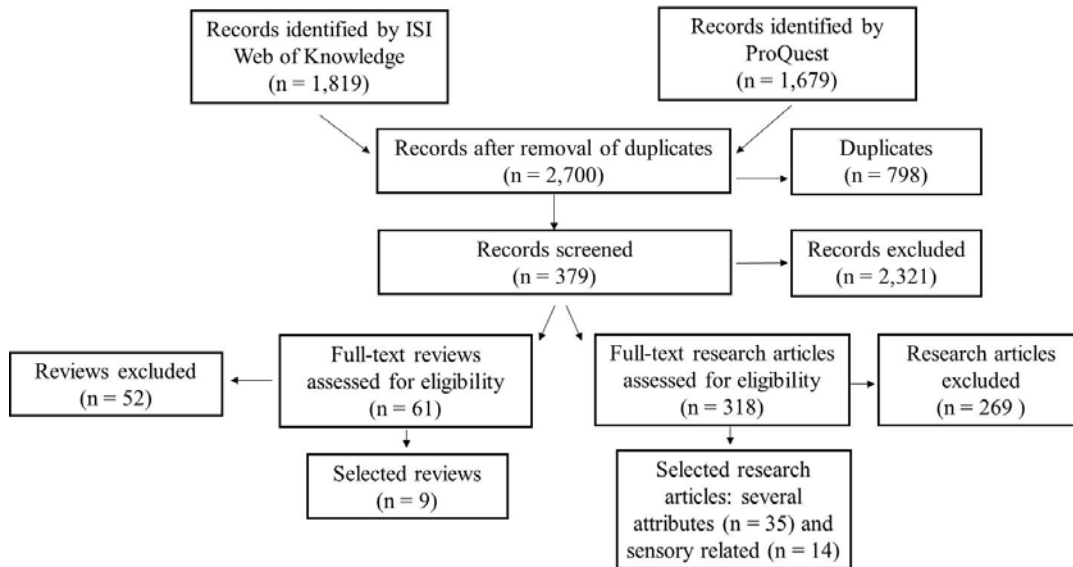
### Methodology

The systematic review followed the five steps described in Khan *et al.* (2003), i.e. 1) framing the question; 2) identifying relevant publication; 3) assessing study quality; 4) summarising the evidence; and 5) interpreting the findings. The question posed in undertaking the review was: what indicators are used by consumers to determine beef quality and what is the relative importance of each? Figure 1 presents details of the number of papers screened and assessed. The database platforms used were *ISI Web of Knowledge* and *ProQuest* (FSTA<sup>®</sup> and CAP ABSTRACTS databases). Only peer reviewed published journal articles were used. Articles not listed in the Journal of Citations Report, with an H index less than 20 or with less than three citations in Google scholar were automatically excluded. The final nine review papers were used to identify the quality attributes of importance. Thirty five papers were initially identified as providing some information on the relative importance of different quality attributes from a consumer perspective. However for methodical reasons, (e.g. the methodology was not clear, attributes were not ranked individually), only 15 papers remained on which to be able to quantifiably determine the relative ranking of identified attributes.

As papers examined a different number of attributes (ranging from 2 to 21), the importance of individual attributes within each study was rescaled on a scale from 1 to 3 as follows: 1) establishment of the ranking of attributes within

articles, from 1 for the least important attribute, to the maximum level given in the article; 2) rescaling from 1 (least important) to 3 (more important) according to: re-scaled value, importance factor (IF) =  $1 + [(3 - 1) / (\text{max level} - 1)] * (\text{given level} - 1)$ ; 3) applying an arbitrary factor according to the number of attributes considered within the paper, in order to give a stronger weight to the attributes coming from papers that considered more attributes (a factor of one was given for the minimum 2 attributes and 3 to the maximum, 24 attributes, by applying the following formula:  $[1 + 0.10526 * (\text{number of attributes} - 2)] * \text{IF}$ ).

**Figure 1** Search results (diagram based on van der Kruk et al., 2013).



**Results**

Table 1 presents the total ranking of quality attributes identified from the eligible research papers, the relative ranking of attributes under each of the headings of search, experience and credence attributes, the number of papers that were used to determine the ranking as well as the total number of papers that considered such attributes.

Twenty four different types of quality attributes were identified for ranking; 7 search, 6 experience and 11 credence attributes. Price and “certificates, labels and brands” and visible fat were ranked as the three most important search attributes. Flavour, tenderness and juiciness are all important experience attributes and are ranked in this order. Origin, animal welfare, production system/feeding are the three most important credence attributes. Environmental issues are relatively unimportant.

**Discussion and conclusions**

The results show that research on consumers attitudes towards meat quality encompassed a large number of attributes (ranking was performed on 24 attributes), which span search, experience and credence domains.

Amongst the search attributes, the top two are extrinsic attributes whilst the next three are intrinsic attributes. The fact that price is the most important in terms of relative rankings, and also is the most considered attributes from a research perspective (as measured by no. of papers) reinforces a view that price may be considered the “ultimate attribute”. It represents the financial trade that consumers must make to experience promised product benefits while also supporting consumer in making inferences on experience and oftentimes credence attributes.

The experience attributes identified and ranked are in line with what would be expected; flavour, tenderness, juiciness and overall eating quality were used as the main assessment criteria. Increased focus by industry on beef flavour may however be warranted in the future; lessons may be available from previous successful efforts of some meat supply chains to improve tenderness.

The wide range of credence attributes presented is interesting and reflects the complexity inherent in such attributes. Many are interrelated, e.g. animal welfare may be used as an indicator of food safety and “healthiness”.

**Table: 1: Ranking of Search, Experience and Credence Quality Attributes, including information on data sources**

	Total ranking	Relative ranking (N=15)	No of papers (N=15)	No of papers (N=33)
<b>Search attributes</b>	2	1	11	20
<i>Price, labels, brands, information</i>	3	2	8	14
<i>Trans fat</i>	4	3	7	17
<i>Colour</i>	12	4	4	8
<i>Protein</i>	17	5	2	5
<i>Place of purchase</i>	19	6	2	8
<i>Origin</i>	20	7	3	7
<b>Experience attributes</b>				
<i>Price</i>	5	1	6	9
<i>Quality/wholesomeness/shelf life</i>	8	2	4	8
<i>Consistency</i>	10	3	4	12
<i>Protein</i>	13	4	5	8
<i>Trans fat</i>	18	5	3	5
<i>Quality</i>	.	.	.	13
<b>Credence attributes</b>				
<i>Animal welfare</i>	1	1	6	17
<i>Production system/feeding</i>	6	2	6	9
<i>Genetic (GM feed, hormones)/Organic</i>	7	3	6	10
<i>Genetic (GM feed, hormones)/Organic</i>	9	4	5	10
<i>Health, nutrition, body weight</i>	11	5	4	15
<i>Contaminants (residues, health, risk, etc)</i>	14	6	2	11
<i>Processing technologies (ageing, irradiation, kosher)</i>	15	7	3	6
<i>Environmental issues</i>	16	8	4	4
<i>Availability</i>	18	9	4	5
<i>Religion/symbolic</i>	23	10	3	4
<i>Religion/symbolic</i>	.	.	.	5

While significant media attention, and public policy debate, surrounds the role of meat in the diet, “health, nutrition, body weight” is lower in importance than other credence attributes such as origin and animal welfare. The relative importance of “health, nutrition and body weight” is somewhat surprising given recent public health policy initiatives. Such initiatives in the past generally focused on increasing meat consumption however some governmental dietary guidelines are now designed to decrease meat consumption (Kanerva, 2013) and some civil society movements are promoting initiatives such as meat-free days (Henchion et al, 2016, forthcoming). The recent World Bank report on meat consumption highlighted both the positive and negative health implications associated with meat consumption. While overconsumption of meat is associated with cardiovascular disease, some cancers, diabetes mellitus and other chronic non-communicable diseases (Tilman and Clark, 2014; Walker et al., 2005), the positive health benefits of beef consumption in terms of providing nutrients that can only be obtained from animal sources, are more easily obtained or are more bioavailable than nutrients from plant sources (e.g. lysine, zinc and iron) are highlighted by several authors (e.g. Walker et al, 2005; Scollan et al, 2015). Furthermore, improving access to meat, as a nutrient rich food, is a relative easy way to improve the nutritional status of malnourished individuals (Garnett, 2011).

The results presented here, relating to research published between January 2000 and September 2013, are static. Whilst little change is anticipated in the ranking of search and experience attributes, movement is expected in terms of the relative ranking within the credence attribute category and also in terms of the relative ranking of credence attributes overall. For example, concern with ethical and sustainable aspects of meat consumption will continue to evolve. The extent to which this will result in differentiation opportunities is not clear as some issues will have to be dealt with from a regulatory rather than market perspective (Henchion et al, 2014). Thus industry needs to continue to monitor the macro-environment to anticipate new credence attributes of relevance to the meat sector and to consider how they may impact search and experience attributes/credence quality. Researchers need to consider how and what new credence attributes should be measured and in particular the interplay between new and existing salient attributes in the ultimate determination of quality.

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