Consumers use of quality cues for meat purchase: Research trends and future pathways

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Consumers use of quality cues for meat purchase: Research trends and future pathways

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ABSTRACT

This paper aims to explore the trends in the research design used for assessing important quality cues in the meat industry and determine the most important quality cues that consumers use in their purchasing decisions. A Journal Article Network Analysis and non-parametric comparative analyses were used to collate the studies and analyse their findings respectively. Results indicate a predominate use of point-of-purchase surveys to collect data and consumers' stated preference to evaluate the important quality cues. At an aggregated analytical level, the five most important quality cues (*country of origin, food safety certification, price, production system and quality certification labels*) are extrinsic and relate to credence attributes. However, different rankings of important quality cues are obtained at a disaggregated analytical level based on meat type. The paper proposes that exploring the interconnection between meat quality cues and how they influence consumers in different market segments based on the value proposition of the retailer as a foreseeable future research pathway.

1. Introduction

Meat consumption has been part of human culture for millennia and historically has been driven by the pleasurable experience of eating meat and its high nutritional value. However, animal production is now faced with increasing ethical concerns regarding animal rights and welfare (Miranda-de La Lama et al., 2017; Nocella, Hubbard, & Scarpa, 2010). Furthermore, animal production systems, particularly confined animal feeding operations, are identified as critical environment impactors (Lusk, Nilsson, & Foster, 2007), and there is increasing research linking red meat consumption to negative health impacts (Wolk, 2017).

Consequently, consumers, nowadays, make purchase decisions based on quality cues they identify as being correlated to both experience and credence attributes. Experience quality cues such as taste and tenderness can be confirmed at the time of consumption whereas credence attributes related to animal production, and health concerns cannot be verified by the consumer even after the product is consumed (Loureiro & Umberger, 2007).

Consumers use quality cues, both intrinsic and extrinsic, to aid in their purchasing decisions. These quality cues act as informational stimuli, and they can be predetermined by the consumer (Steenkamp, 1990). Cues linked with meat are important in the communication with consumers (Nocella et al., 2010), and serve as signals for consumers to aid in their search for food products (Van Loo, Caputo, Nayga, Meullenet, & Ricke, 2011). A diversity of quality cues has been identified to influence meat consumers' purchasing decisions via different research designs.

The present paper aims to explore the trends in the research designs that have been used to assess important quality cues in the meat industry and to determine the most important quality cues that consumers use in their meat purchasing decisions at aggregated and disaggregated analytical levels. To achieve these objectives, this paper seeks to answer these research questions: (i) how are the studies that examine important quality cues for meat purchases designed? (ii) which are the most important meat quality cues (both intrinsic and extrinsic) reported in the literature? (iii) Does the perceived importance of quality cues differ across meat type?

2. Materials and methods

This paper adopts a network analysis of journal articles (i.e. Journal Article Network Analysis) to collate relevant literature for comparative analyses. Data on research design, meat quality attributes, findings on important quality cues that consumers use in their meat purchasing decisions are extracted from the collated journal articles. The retrieved data are the bases for the non-parametric comparative analyses to identify the most important meat quality cues. The Journal Article Network Analysis (JANA) procedures and the non-parametric

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comparative analyses are discussed in the following subsections.

2.1. Article selection process

The JANA was used to select closely linked journal articles for the systematic literature review. Journal Article Network Analysis enhances replicability of systematic literature review and prevents the loss of essential data, pre-determination and exclusion of journal articles (Aboah, Wilson, Rich, & Lyne, 2019; van Eck & Waltman, 2014). The approach improves the timeliness in article selection for the literature review process. The approach involves four steps for the article selection process.

First, two databases permissible to the Vosviewer® software: Scopus and Web of Science were selected as the repository of articles. Second, two sets of Boolean search strings were used to find articles in the databases: ((*i*) [*("credence" AND meat) OR ("experience" AND meat)*], *and (ii)* [*("meat" AND "intrinsic") OR ("meat" AND "extrinsic") OR ("meat" AND "quality cue")*]. The searches targeted the title, abstract and keywords sections for the Scopus database, and the topic section for the Web of Science database. The search was limited to peer-reviewed articles published in the English language; no timeline restrictions were set for the initial search.

The first category of the Boolean search string (i.e. *("credence" AND meat) OR ("experience" AND meat))* resulted in a total of 2310 peer-reviewed articles; 1371 articles from the Web of Science database, and 939 articles from Scopus database. The publication years for the articles retrieved from the initial search using the first Boolean string ranged from 2003-2019 in the Scopus database, and 1987–2019 in the Web of Science database. The second search *("meat" AND "intrinsic") OR ("meat" AND "extrinsic") OR ("meat" AND "quality cue")* resulted in a total of 738 articles; 407 from the Web of Science database, and 331 articles from the Scopus database. The publication years for the articles retrieved from this search ranged 1971–2019 in the Scopus database and 1987–2019 in the Web of Science database.

The third step involves the use of information on the authors of an article, the title, keywords, DOI, abstract and citation links retrieved from all journal articles selected per the initial search to determine the link strength of interconnected articles. The Vosviewer® software uses two criteria for selecting closely connected articles. First, publication links are logically forward-looking because articles that are published later can be linked to earlier publications but not the reverse. Second, publication links in a network are acyclic (van Eck & Waltman, 2014). The minimum threshold for selecting an article was set at zero links because articles with recent publication dates have lesser link strengths. The JANA groups strongly linked articles into the same clusters based on the article' subject or theme; clusters are differentiated by colour. The minimum number of articles that comprise a cluster was set to five closely linked articles. The size of an article in the JANA represents the number of other articles that are connected to it; the larger the size, the more article connections.

The article selection ceiling for the Boolean search strings was set at 200 closely linked articles considering the relatively higher articles retrieved from the initial search. The refined search (for the first Boolean string) resulted in the selection of 77 closely linked articles for the Scopus, and 139 closely linked articles for Web of Science as shown in Fig. 1 and Fig. 2 respectively. The second search string yielded 47 closely linked articles in the Scopus database (Fig. 3), and 50 closely linked articles in the Web of Science database (Fig. 4). All journal articles retrieved using the Boolean search can be found on doi:10.25400/lincolnuninz.10298129.v1. A trend analysis of the articles retrieved for the JANA from the two Boolean search strings is shown in Fig. 5. The trend shows an increasing interest in the use of quality cues in meat consumer studies.

The fourth step involved merging duplicate articles (i.e. articles found in both databases) to estimate the total link strength ($Ls_{(total)}$) for closely linked articles selected from the JANA, as presented in eq. 1.

$$Ls_{(total)} = \sum [(L_{w(i)}\ X_{w(i)}) + (L_{s(i)}\ X_{(i)})] \quad (1)$$

L_w and L_s are the link strength in the JANA from the Web of Science and Scopus databases respectively. If a publication appeared in the JANA for the Web of Science for the first, second and third Boolean search strings, then $X_{w(i)} = 1$, else $X_{w(i)} = 0$. Likewise, if a publication appeared in the JANA for Scopus, then either $X_{s(i)} = 1$, else $X_{s(i)} = 0$. After merging duplicate articles, the refined JANA resulted in 59 strongly linked articles for the first Boolean search string and 67 strong linked articles for the second Boolean search string. A merger and removal of duplicates resulted in a pool of 96 closely connected articles for the comparative analyses.

2.2. Non-parametric comparative analyses

The 96 journal articles retrieved from the JANA were thoroughly reviewed. Based on their relevance to the research questions, 47 journal articles were selected for the non-parametric comparative analyses (*in the Appendix*). The non-parametric comparative analysis for examining the important quality cues is conducted in three steps. First, all the top three ranked quality cues from each journal article are collated to generate a ranking list. Second, the ranking of each quality cue is specified based on the findings in each journal article, where 1st, 2nd and 3rd ranks represent most important, more important and important respectively. The remaining attributes in the ranking list that fall below the top three ranks are specified as less important.

Third, the Kendall Coefficient of Concordance (Kendall & Smith, 1939) was used to re-rank the attributes and determine the degree of agreement among the conclusions reached in the articles included in the study. Kendall's Coefficient of Concordance ranges from 0 to 1, implying no agreement and complete agreement respectively. After establishing the most important quality cues, the Kruskal-Wallis H test (Chan & Walmsley, 1997) is used to determine whether a statistically significant difference exists in the rankings of important quality cues when the comparative analysis is conducted for meat type. The Mann Whitney *U* test (McKnight & Najab, 2010) was used to probe further and localise the pairwise comparisons of meat types that had a statistically significant difference in the ranking of important quality cues.

3. Results and discussions

Results are presented and discussed in this section based on the three research questions. The first subsection concerns the results of the research designs trends and the non-parametric comparative analyses of key findings on important quality attributes from the retrieved journal articles. Results on the commonality in existing research designs that have been used to examine meat quality cues are presented and discussed in the second subsection. Afterwards, the results on important quality cues that meat consumers use in their purchasing decisions are presented and discussed.

3.1. Research design trends

Sampling and data collection methods used, and how attributes are selected for each research study were examined. Researchers used a range of both probability and non-probability sampling methods. Probability methods included random, systematic and stratified samples. Convenience sampling was the most frequently used non-probability method. Consumer surveys were the predominant method for obtaining data. These were either administered in person at the point of purchase or sent by mail or email.

Consumer preference for quality cues were interpreted based on stated preference or a combination of stated preference and revealed (actual) preference. Results presented in Fig. 6 show that stated preference is the dominant framework used to derive consumers' preference for specific quality cues. This dominance can be explained by

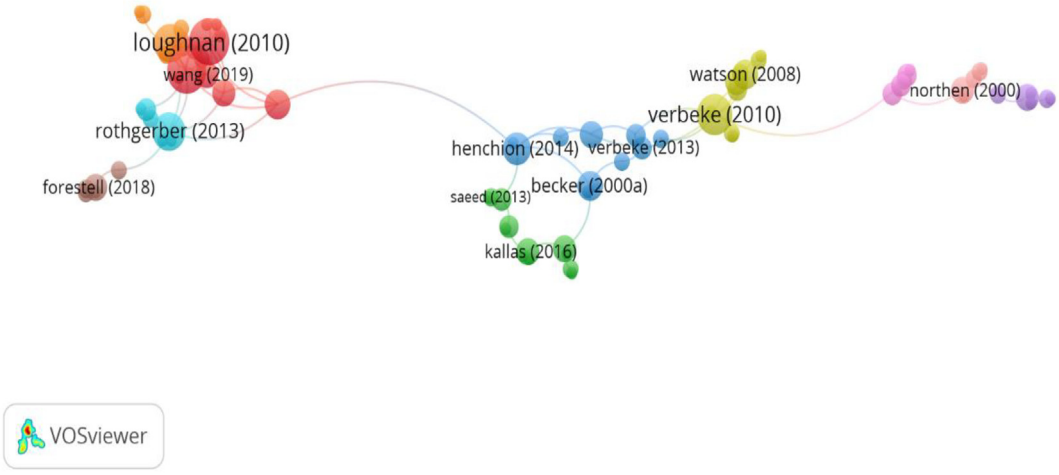

Fig. 1. A network of articles retrieved from the 1st Boolean search string ([*("credence" AND meat) OR ("experience" AND meat)*]) in the Scopus database.

the ease of data collection, the nature of products that are used in the research design, and how the attributes are presented to consumers (respondents).

Results on how attributes are communicated to consumers indicate that 73% of studies presented the attributes in only text format, 1% presented consumers with actual product samples, and 26% showed attributes in text and visual graphics *(of labels or products)*. Offering the quality cues in a text form to elicit consumers' evaluation is counter-intuitive to how attributes are presented on marketed products in the real-world. Data collection methods that were mostly used in the research designs tend to be amenable to stated preference. Although, researchers endeavoured to elicit quality cue evaluation from consumers available at point of purchase for meat *(*e.g. *butchery, supermarkets),* capturing consumers' intentions to purchase may lead to discrepancies and overestimation compared to evaluations emanating from actual purchases (Kirsten et al., 2017; Resano-Ezcaray, Sanjuán-López, & Albisu-Aguado, 2010).

Revealed preference uses actual consumer decisions and behaviour; however, capturing this data is costly (Van Loo et al., 2011), and are not amenable to new product development (Kirsten et al., 2017). Results show that the combination of stated and revealed preference can occur in experimental and real-world settings. As such, the progress in research lies in such a combination in a real-world setting. For this shift to materialise, researchers must surmount the hurdle of ethical concerns associated with the use of actual consumer data (Resano-Ezcaray et al., 2010); and this requires collaborative and multidisciplinary approach between academia, industries (notably, processors and retailers) and consumers.

3.1.1. How attributes are gathered in the research design

A substantial number of the studies included in this paper are designed with constricted theoretical underpinning explaining the process of how consumer develop perceptions of quality or why they choose specific quality cues. They predominantly rely on econometric analysis which is mostly based on a combination of Lancastrian consumer theory and random utility theory (Loureiro & Umberger, 2007; Nilsson, Foster, & Lusk, 2006; Ortega, Hong, Wang, & Wu, 2016; Van Loo et al., 2011). The Lancastrian consumer theory asserts that utilities for goods can be disintegrated into separate utilities for their component characteristics or attributes (Lancaster, 1966). The random utility theory assumes that in selecting from alternatives, individuals act rationally by choosing the option that yields the highest utility.

While these theories provide an economic foundation for evaluation and determination of important quality cues, they neglect the psychological dimensions involved in consumers' purchasing decisions. Banović, Grunert, Barreira, and Fontes (2009) observed that the

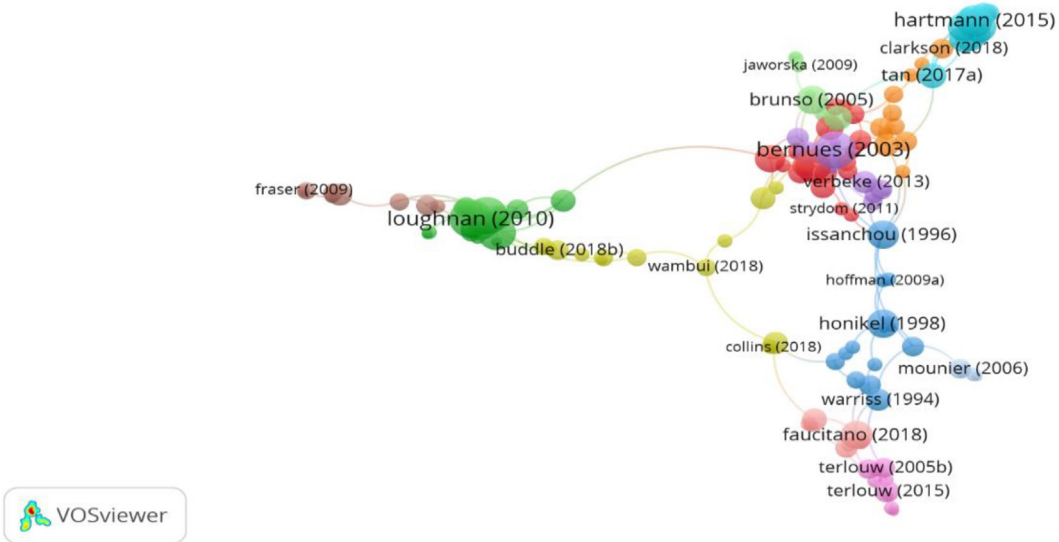

Fig. 2. A network of articles retrieved from the 1st Boolean search string ([*("credence" AND meat) OR ("experience" AND meat)*]) in the Web of Science database.

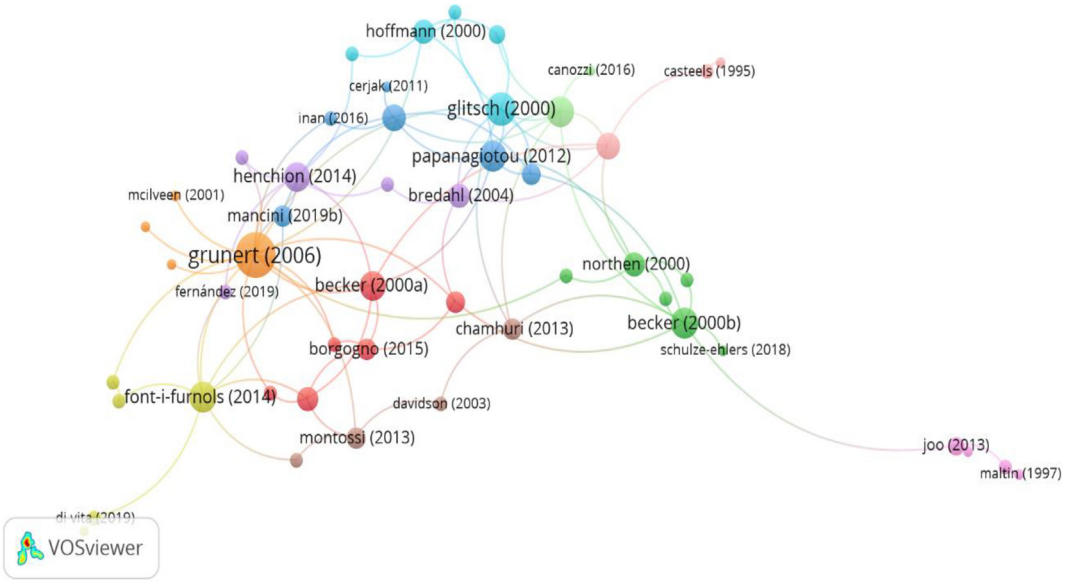

Fig. 3. A network of articles retrieved from the 2nd Boolean search string ([*("meat" AND "intrinsic") OR ("meat" AND "extrinsic") OR ("meat" AND "quality cue")*]) in the Scopus database.

repurchases of meat ultimately depends on the experience of quality. A relatively lower number of studies used theoretical groundings like the food-related lifestyle model (Argemí-Armengol, Villalba, Ripoll, Teixeira, & Álvarez-Rodríguez, 2019) and total quality model (Banović, Fontes, Barreira, & Grunert, 2012; Bernués, Olaizola, & Corcoran, 2003; Bredahl, 2004) that address the psychological aspects of purchasing decision as well as the quality perception process (Steenkamp, 1990).

The lack of explanatory theoretical frameworks means there is little theory testing or theory development. Furthermore, these studies tend to focus on quality cues that can be easily categorised and classified into different levels of attributes. This means they avoid quality cues for experience attributes such as taste, tenderness, juiciness, health and nutrition as these are complex phenomena and difficult to develop relative scales that can be incorporated into choice sets. This is of some concern, given that these are the most important quality aspects in consumers' choice of meat (Grunert, 2006).

Results on how meat quality attributes are gathered for the research design show a spectrum ranging from the use of literature review only to a triangulated method comprising literature review, focus group discussion, expert elicitation and pre-testing. From Fig. 7, the result shows that attributes are mostly gathered using literature review only. Limited research is designed based on inputs from stakeholders and

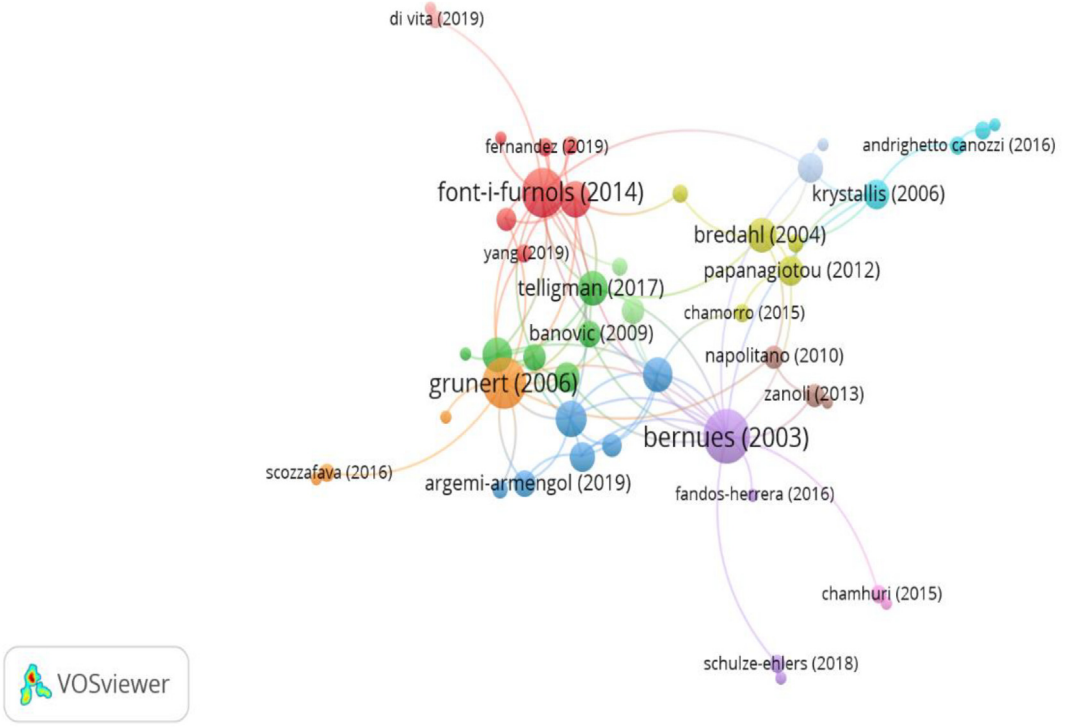

Fig. 4. A network of articles retrieved from the 2nd Boolean search string ([*("meat" AND "intrinsic") OR ("meat" AND "extrinsic") OR ("meat" AND "quality cue")*]) in the Web of Science database.

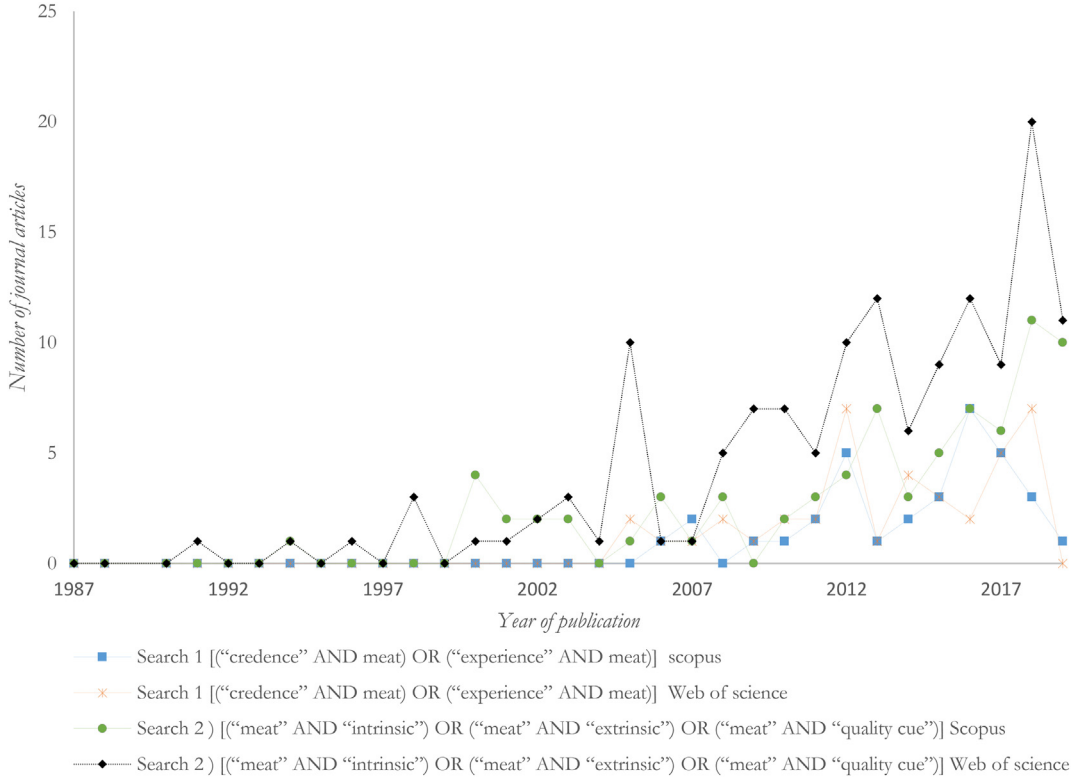

Fig. 5. A trend analysis of articles retrieved from the 1st and 2nd Boolean search strings.

industry experts or pretested. Since most of these studies depended on stated preference, a subject-object interaction is required to achieve the perceived quality of a product (Steenkamp, 1990). Although objective quality attributes influence the subjective quality perception, it is the consumer that ultimately determines what quality is (Brunsø, Bredahl, Grunert, & Scholderer, 2005). Hence, the balance of subjectivity and objectivity in the research design is critical for the quality cue evaluation.

In pursuit of parsimonious research design, researchers that provided pre-determined attributes tend to be more skewed towards objectivity. This restricts the attributes that consumers can select and limits the subjectivity in consumers' stated preferences. The dominant use of literature review as the sole source of quality attributes has its pros and cons. It is timely and relatively inexpensive. However, given that most of the products used in these researches are not available on the market, complete reliance on only literature review to generate attributes without considering opinions from stakeholders and industry can create a disconnection with reality.

3.2. Important quality cues used by meat consumers

Results of the aggregate ranking of important quality cues for all 47 journal articles show that there is statistically significant, yet a weak degree of concordance among the findings on the important quality cues (*Kendall's W = 0.120,* χ^2 = 141.562, *p-value = .000*). Results, presented in Table 1, indicate that the top five quality cues effective for

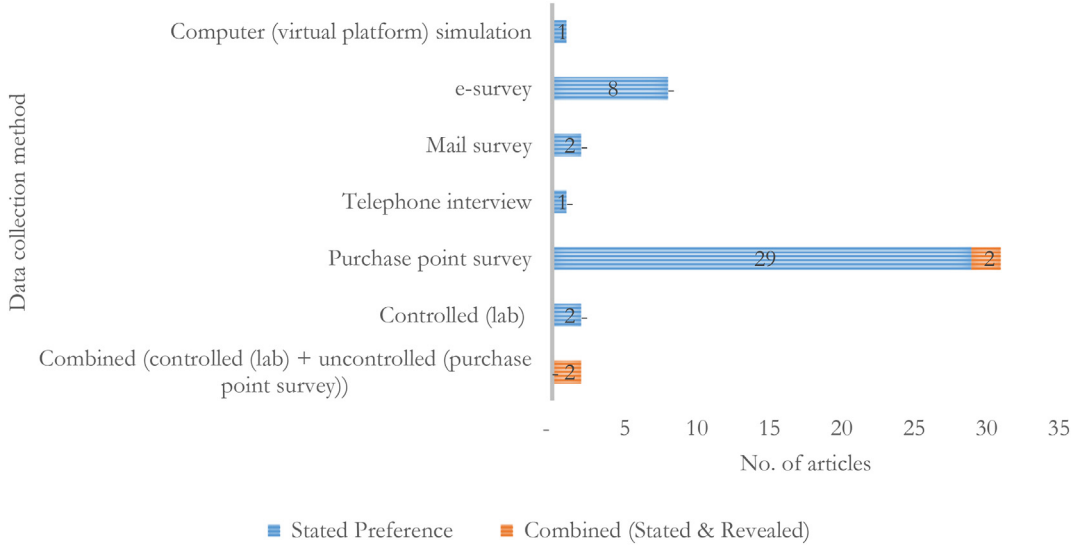

Fig. 6. Data collection methods and the type of consumer valuation data used.

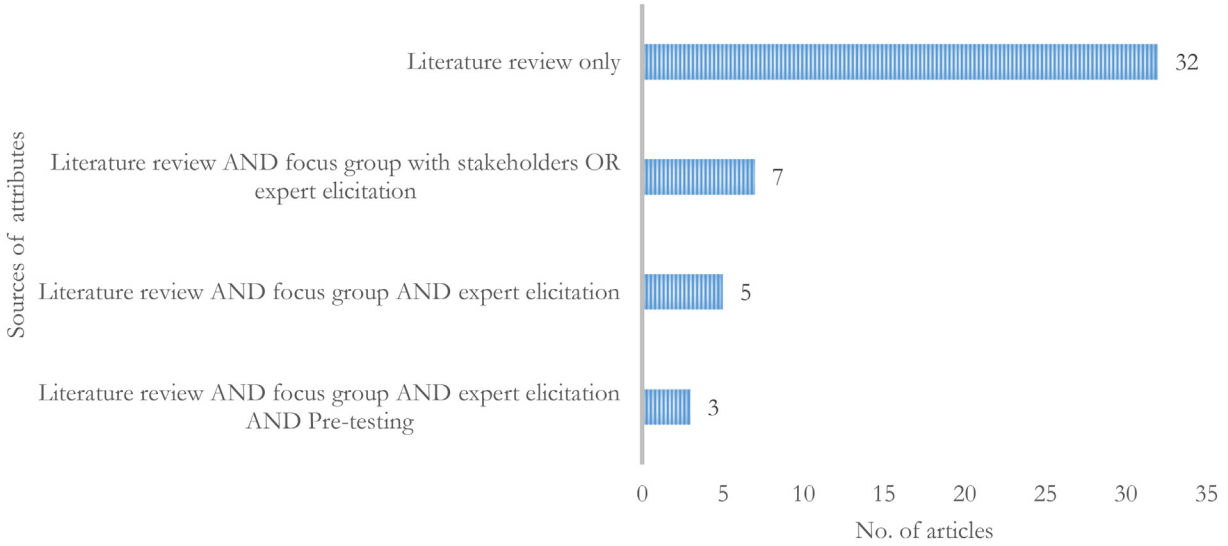

Fig. 7. Sources of product quality attributes used in research designs.

Table 1
Aggregate ranking of important quality cues.

Quality cue	Mean rank	Ranking
Country of origin	8.20	1st
Food safety certification	10.52	2nd
Price	11.54	3rd
Production system	12.54	4th
Quality certification	12.85	5th
Fat content	13.03	6th
Organic label	13.07	7th
Animal welfare	13.35	8th
Feed use	13.35	8th
Brand	13.65	9th
Product appearance	13.65	9th
Colour	13.71	10th
Type of breed	13.93	11th
Environmentally friendly label	13.97	12th
Slaughter date	13.97	12th
Freshness	14.20	13th
Veterinary certificate	14.22	14th
Traceability label	14.27	15th
Expiration date	14.44	16th
Halal label	14.48	17th
Place of purchase	14.48	17th
Best before date	14.49	18th
Meat cut	14.50	19th
Cutting date	14.78	20st
Taste	14.78	20st
Tenderness	15.03	21st

communicating to consumers are extrinsic in nature.

At an aggregated analytical level, the country of origin label is the most important cue, followed by food safety certification, price, production system and quality certification labels in descending order of importance. In most of these rankings, the findings show that consumers prefer meat that is locally produced within their country of abode. For studies that presented country and continental labels (Balcombe, Bradley, Fraser, & Hussein, 2016; Bernabéu, Tendero, & Olmeda, 2012; Scozzafava, Corsi, Casini, Contini, & Loose, 2016), consumers still preferred meat products from their countries first, followed by labels within their continent; exported meat products are the least preferred. However, in three of the studies (Barcellos, Abicht, Brandão, Canozzi, & Collares, 2012; Ma, Verkuil, Reinbach, & Meinert, 2017; Ortega et al., 2016), imported meat products were more preferred than those locally produced. These studies involved countries (China and Brazil) where local food safety standards were perceived to be of a lower standard than exporting countries.

The findings corroborate with conclusions drawn by Chamorro, Miranda, Rubio, and Valero (2012) regarding the potential increase in demand for meat with the designation of origin and protected geographic indication. The country of origin labels comprises of regional or county or protected geographic location labels. Results also show that credence attributes can translate into search cues via the communication of information (Van Loo et al., 2011; Sans & Sanjuán López, 2015).

At the aggregate analytical level, fat content is the highest-ranked intrinsic cue, followed by the appearance and colour of meat. Steenkamp (1990) hinted on potential differences in perceived quality that can arise due to consumers' prior knowledge of a product. Banović et al. (2012) observed that consumers' familiarity with the meat product influences what cues they tend to use to determine quality. Consumers who are highly familiar with the meat product tend to go with intrinsic cues like colour, while those with low familiarity rely on extrinsic cues like brand and labels. However, consumers' familiarity with brands also aids in purchase decisions. What is lacking in most of this research is the potential influence of actual experience on meat repurchasing decisions (Banović et al., 2012).

3.3. Importance of quality cue based on meat type

The Kruskal-Wallis test was used to determine whether a statistically significant difference exists in the mean rank of the quality cues based on the meat type. Results of the test based on the type of meat, shown in Table 2, indicate that there is no statistically significant difference in the ranking of 21 out of the pool of 26 quality cues. There was a statistically significant difference in the ranking country of origin label, organic label, slaughter dates, freshness, and halal label.

The Mann-Whitney U test was conducted to localise the difference in ranking using a pairwise comparison of meat types that have a statistically different ranking for the country of origin, freshness, halal label, slaughter date and organic labels because both are highly ranked cues. Among the quality cues that showed statistically significant difference, an initial pairwise comparison of meat type was conducted for the low ranked quality cues (i.e. freshness, halal label and slaughter date) at the aggregate analysis. The results showed statistically significant difference in the slaughter date for the pairwise comparison involving *beef-rabbit*, and *lamb-rabbit*. There was no significant difference in the freshness, halal label and slaughter dates for the remaining meat types. Only one article focused on rabbit meat (Kallas & Gil, 2012). Slaughter date is lowly ranked for beef, lamb and rabbit. Thus,

Table 2
Kruskal-Wallis test - based on meat type.

Quality cue	Chi-square	df	Asymp. Sig.
Country of origin	13.853	5	0.017*
Food safety certification	4.816	5	0.439
Price	7.991	5	0.085
Production system	7.351	5	0.196
Quality certification	4.546	5	0.474
Fat content	4.288	5	0.509
Organic label	13.99	5	0.016*
Animal welfare	2.514	5	0.774
Feed use	8.209	5	0.145
Brand	7.393	5	0.193
Product appearance	2.349	5	0.799
Colour	7.222	5	0.205
Type of breed	7.218	5	0.205
Environmentally friendly label	7.07	5	0.215
Slaughter date	13.417	5	0.020*
Freshness	17.899	5	0.003*
Veterinary certificate	9.139	5	0.104
Traceability label	0.887	5	0.917
Expiration date	3.389	5	0.640
Halal label	11.683	5	0.039*
Place of purchase	1.673	5	0.157
Best before date	1.686	5	0.891
Meat cut	1.876	5	0.866
Cutting date	2.91	5	0.713
Taste	5.714	5	0.335
Tenderness	0.000	5	1.000

the difference may be due to the low number of observations for rabbit compared with beef and lamb.

Results of the pairwise comparisons with a statistically significant difference are shown in Table 3. Results of the Mann-Whitney *U* test show a statistically significant difference in the pairwise comparisons involving *beef – chicken*, *chicken – lamb*, and *lamb – pork*. The organic label is highly regarded as an important quality cue in chicken compared with beef, pork and lamb. This implies that meat consumers are likely to use an organic label as a quality cue when purchasing chicken compared with when they are purchasing beef and lamb. The pairwise comparison involving *lamb – pork* and *beef – pork* show that the country of origin label is a more important quality cue for lamb and beef compared with pork.

A disaggregated analysis of the ranking of important quality cues for each meat type highlights differences in the rankings of the most important quality cues types. Results of Kendall's coefficient of concordance (in Table 4) show a moderate level of agreement in the ranking for the important quality cues for lamb and beef. There was no statistically significant degree of agreement in the ranking for pork. This implies that quality cues that are considered important for pork purchasing decisions are generally different across countries.

Results indicate a *moderate* degree of agreement for the ranking of quality cues based on lamb *($w = 0.372$, $\chi^2 = 102.398$, p-value = .000)* and a weak degree of agreement for beef *($w = 0.25$, $\chi^2 = 87.514$, p-value = .000)*.

While the country of origin label is ranked as the most important quality cue for lamb and beef, the organic label is the most important for chicken. Both lamb and beef require a geographic origin for at least the breeding stage of production, whereas industrial chicken production has no geographical constraints. This may explain why organic label becomes a more important quality cue compared with geographical origin.

Van Loo, Caputo, Nayga, and Verbeke (2014) reported on the preference for free ranged chicken, which is often linked to animal welfare concerns regarding the production system. Country of origin label sometimes provides credence and quality experience by combining geographically labeled foods and traceability documents (Loureiro & Umberger, 2007). The country of origin label for lamb and beef have served as competitive advantage for leading exporting countries like New Zealand and Australia.

4. Conclusions

This paper explored the trends in the research designs that have been employed to assess the important quality cues used by meat consumers in their purchasing decisions. Three trends are highlighted from the findings.

(i) There is a distinct bias towards econometric analysis utilising stated preference, and a limited exploration of meat consumers' cognitive decisions.
(ii) There is a predominant use of pre-selected attributes, especially from literature review only, which restricts consumers' expression of their intertwined use of cues in their purchasing decisions.
(iii) The extensive use of consumers' stated preference instead of revealed preference from actual purchases due to widespread use of hypothetical products in willingness to pay studies.

Two conclusions are also drawn from the findings on the most important quality cues:

(i) Consumers mostly use extrinsic quality cues (especially, country of origin, food safety certification and price) to inform their purchasing decisions.
(ii) The level of importance of these attributes differ based on the meat type.

Future research designs that enable a greater depth of understanding on how consumers evaluate meat quality using the complex

Table 3
Pairwise comparison of organic label and brand as a quality cue.

Quality cue	Pairwise comparison	Mean rank[a]	Mean rank[b]	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Organic label	Beef[a] & Chicken[b]	9.46	1.75	0.500	−2.820	0.005
	Beef[a] & Lamb[b]	12.75	13.32	73.5	−0.340	0.734
	Beef[a] & Pork[b]	13.75	13.21	80.5	−0.287	0.774
	Chicken[a] & Lamb[b]	1.75	7.95	0.500	−2.81	0.005
	Chicken[a] & Pork[b]	2.50	8.33	2.00	−2.295	0.022
	Lamb[a] & Pork[b]	12.5	11.54	60.5	−0.578	0.563
Country of origin label	Beef[a] & Chicken[b]	7.79	13.50	4.00	−1.712	0.087
	Beef[a] & Lamb[b]	14.71	10.82	53.00	−1.398	0.162
	Beef[a] & Pork[b]	10.89	16.54	47.5	−2.027	0.043
	Chicken[a] & Lamb[b]	11.00	6.27	3.00	−1.775	0.076
	Chicken[a] & Pork[b]	9.50	7.17	8.00	−0.916	0.359
	Lamb[a] & Pork[b]	8.68	15.04	29.5	−2.44	0.015

[a] 1st meat type in the pairwise comparison.
[b] 2nd meat type in the pairwise comparison.

Table 4
Disaggregate ranking of important quality cues for beef, chicken and lamb.

	Lamb	Beef	Pork	Chicken
1st rank	Country of Origin	Country of Origin	Food Safety certification	Organic label
2nd rank	Price	Food Safety certification/ Brand/Fat content	Country of Origin label	Production System
3rd rank	Feed use	Colour	Veterinary certificate	Food Safety certification
4th rank	Quality certification	Product appearance	Quality certification	Price/ Environmentally friendly label
5th rank	Type of breed	Price/Production System/Organic	Organic label/Price/ Fat content	Brand/Colour/Animal welfare
Kendall's W	0.372	0.250	0.084	0.637
Chi-square	102.398	87.514	25.136	31.853
df	25	25	25	25
Asymp. Sig.	0.000	0.000	0.455	0.162

interactions between intrinsic and extrinsic attributes will be valuable to industry, policy makers and academics. Four future pathways elicited from the findings include:

- Research designs that develop conceptual frameworks that allow hypothesis testing and theory development on the process of consumers' quality perception and choice is a foreseeable pathway.
- The use of controlled laboratory and sensory research to compliment the econometric analysis of consumer willingness to pay is another pathway that can be further explored.
- Increased use of revealed (actual) preferences to provide greater validation of consumer choice.
- Exploration of the interconnection between meat quality cues and how they influence consumers in different market segments based on the value proposition of the retailer or butchery.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Appendix

Reference	*1st rank*	*2nd rank*	*3rd rank*
Argemí-Armengol et al., 2019	Expiration date	Food Safety Certification	Product appearance
Balcombe et al., 2016	Country of origin	Production System	Product quality
	1st COO– UK (Local)	1st Organic	1st Premium
	2nd COO –Out EU	2nd Conventional	2nd Choice
	3rd COO - EU		3rd Basic
Balogh, Békési, Gorton, Popp, & Lengyel, 2016	Certification	Place of purchase	Production System
	1st Yes	1st Farmer's market	1st 100% Mangalitza
	2nd No	2nd Butcher/small store	2nd 75% Mangalitza
		3rd Hyper-/Supermarket	3rd 50% Mangalitza
Banović et al., 2012	Colour	Brand	Fat content
Barcellos et al., 2012	Food Safety	Country of origin	Product quality
		1st EU (Imported)	
		2nd Local (Brazil)	
Becker, Benner, & Glitsch, 2000	Country of origin	Place of purchase	Colour
	Not stated	1st Butcher	
		2nd Supermarket	
		3rd Direct from farmer	
Bernabéu & Tendero, 2005	Type of breed	Country of origin	Certification
	1st Suckling	1st Castilla-Mancha	
	2nd Ternasco	2nd Rest of Spain	
	3rd Feeder	3rd Imported	
Bernabéu et al., 2012	Country of origin	Type of breed	Price
	1st Castilla-Mancha	1st Suckling	
	2nd Rest of Spain	2nd Ternasco	
	3rd Imported	3rd Feeder	
Bernabéua, Rabadána, El Orchea, & Díazb, 2018	Country of origin	Type of breed	PGI certification
	1st National	1st Suckling	1st Yes
	2nd Imported	2nd Ternasco	2nd No
Bernués et al., 2003	Animal feeding (Feed use)	Animal welfare label	Environmentally friendly label
Bredahl, 2004	Brand	Fat content	Colour
Chen, Wang, Chen, Huang, & Wang, 2012	Food safety	Cutting date	Slaughter date
Colella & Ortega, 2017	Country of Origin	Organic label	Brand
	1st Buenois Aires	1st present	
	2nd San Luis	2nd absent	Name of farm
	3rd Imported (Uruguay)		
Fernández, Melo, Larraín, & Fernández, 2019	Fat content	Country of origin	Type of breed
		1st Argentina (imported)	1st Angus
		2nd USA (imported)	2nd Wagyu
		3rd Chile	
Giacomazzi, Talamini, & Kindlein, 2017	Product appearance	Price	Production system
Imami, Chan-Halbrendt, Zhang, & Zhllima, 2011	Country of origin	Food safety certification	Price
	1st Domestic	1st Veterinary stamp	
	2nd Imported	2nd No stamp	

Kirsten et al., 2017	Price	Food safety certification 1st yes 2nd no	Traceability (to farm level)
Krystallis, Chryssochoidis, & Scholderer, 2007	Fat content	Production system	Freshness
Liu, Tian, Huang, & Yang, 2018	Veterinary certificate (animal health)	Slaughter date	Feed use
Loureiro & Umberger, 2007	Food safety certification (USDA certification)	Country of origin (generic country name)	Traceability to farm
Lu, Wu, Wang, & Xu, 2016	Food safety certification	Product appearance	Traceability
Maza, Gracia, & Saied, 2018	Product quality	Meat cut	Price
Meixner, Friedl, & Hartl, 2018	Price	Halal label	Slaughter date
Miranda-de La Lama et al., 2017	Animal welfare	Food safety certification	Country of origin 1st local
Nilsson et al., 2006	Animal welfare	Environmentally friendly label	Food safety certification
Nocella et al., 2010	Production system	Feed use	Animal welfare
Ortega et al., 2016	Food safety certification	Country of Origin 1st Australia (imported) 2nd USA (imported) 3rd China (Local)	Organic certification
Owusu-Sekyere, Owusu, & Jordaan, 2014	Animal (health) welfare	Quality certification	Food Safety certification
Resano-Ezcaray et al., 2010	Quality certification	Country of Origin 1st Teruel (PDO) 2nd Spain (generic)	Brand
Scozzafava et al., 2016	Country of Origin 1st PGI Italy 2nd Region based label 3rd EU label	Production system 1st Conventional 2nd Organic 3rd GMO	Meat cut
Kallas & Gil, 2012	Country of origin	Food safety certification	Price
Van Loo et al., 2011	Organic food label	Food Safety Certification	Price
Van Loo et al., 2014	Production system 1st Total free range 2nd Traditional free range	Organic label	Environmentally friendly label
Verbeke, Rutsaert, Bonne, & Vermeir, 2013	Food safety certification	Freshness	Taste
Wang, Ge, & Ma, 2018[a]	Country of Origin 1st Yes 2nd No	Organic label	Veterinary certificate
Wang, Shen, & Gao, 2018[b]	Organic label	Environmentally friendly label	Veterinary certificate
Wongprawmas, Canavari, Imami, Gjonbalaj, & Gjokaj, 2018	Expiration date	Food Safety Certification	Country of origin 1st Kosovo (Local) 2nd EU (imported)
Wu, Wang, Zhu, Hu, & Wang, 2016	Food Safety Certification	Production system	Slaughter date
Banović et al., 2009	Brand	Origin (no dissagregation)	Price
Grunert, 2006	Price	Country of Origin - Local (Germany) - Import (Denmark)	Animal health
Papanagiotou, Tzimitra-Kalogianni, & Melfou, 2012	Fat (marbling)	Price	Colour
Font et al., 2011	Country of Origin - Local 1st - Imported 2nd	Feeding system - Grass feeding 1st	Price
	Country of Origin - Local 1st - Imported 2nd	Feeding system - Grass feeding 1st	Price
	Country of Origin - Local 1st - Imported 2nd	Feeding system - Grass feeding 1st	Price
	Fat cover (appearance)	Drip	Marbling (fat content)
Borgogno, Favotto, Corazzin, Cardello, & Piasentier, 2015	Appearance	Country of origin & Expiration date	Food safety
Chamhuri & Batt, 2013	Freshness	Halal label	Cleanliness
Ma et al., 2017	Processing -	Fat content	Country of origin - 1st imported -2nd local
Davidson, Schröder, & Bower, 2003	Leanness appearance	Country of origin 1st –Local (Scotland/Britain) 2nd - Imported	Colour

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