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Preliminary study on consumers' and meat traders' perceptions of beef quality and how the beef quality is affected by animal welfare practices

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A study was conducted to determine the perceptions of rural meat consumers and traders on meat quality and how the welfare of slaughter cattle affects beef quality. The study focused on three stages: Prior to purchase, at point of purchase and at point of consumption. A total of 102 rural consumers and 31 meat traders were conveniently sampled and used in the study. Principal component analysis with varimax rotation (PCA) were conducted in order to identify the underlying structure of the items used for measuring evaluations of animal welfare issues, expected eating quality and determinants of purchasing decisions, while the CALIS procedure was used to analyze the structural relationships. With regards to consumers, estimated relationships showed significant association between the visual quality items and the perceived beef quality with regards to the meat traders; weak and negative relationships existed between visual quality indicators and perceived beef quality. This means that product quality can be accurately inferred from the consumers who are the purchasers and end users of the meat products. Significant negative realationships existed between the cattle rearing methods component and the items covered by the animal handling at abattoir component, meaning that the meat traders believe that cattle handling at the abattoir are at variance with the way the cattle are reared at the farm, and therefore this could have an effect on meat quality. Principal component analysis also showed that quality of beef and purchase motives followed a one-dimensional concept for both the consumers and meat, meaning that they perceived quality of beef is associated with price, packaging, place of slaughter and butcher reputation. It was conluded that consumers and meat traders have convergent perceptions on the animal welfare issues and meat qiality aspects of beef.

Key words: Eating quality, beef cattle, animal stress, rural meat consumers, meat traders, meat quality cues, purchasing decision.

INTRODUCTION

As people become increasingly more concerned about nutrition, food safety and environmental issues determining their acceptance of meat, quality of the meat is becoming a critically important aspect of human life (de

Carlos et al., 2005). Meat quality can be described by, but not limited to wholesomeness, freshness, nutritional value, texture, smell, color, fragrance, and flavor. In addition to the intrinsic characteristics of the product, meat quality can be evaluated by the brand, shopping environment, price, origin and production processes (Grunert, 1997; Grunert et al., 2004). Perceptions by any individual are influenced by opinions about the way things are and the ideal situation (Te Velde et al., 2002).

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Knowledge gained from experience, facts, stories, impressions and the interests an individual has, can also influence perceptions (Te Velde et al., 2002; Vimiso, 2010). It therefore is imperative for the meat industry to have knowledge on what quality cues consumers use when purchasing meat, and how they can use this information to remain competitive.

In the developed world, the meat sector, fundamentally the fresh meat sector, has been one of the most analyzed food sectors; where diverse studies have been undertaken in order to establish the underlying characteristics of different groups of consumers, their perception of food quality and those aspects that concerns them more (for example, animal pre-slaughter handling and other welfare issues) (Bello and Calvo, 2000; Bredahl et al., 1998; Brunso et al., 2002; Gil et al., 2002). However, in the African perspective, more critically among the rural consumers and meat traders, their perceptions of meat quality and the effects of the animal production process (pre-slaughter handling and other animal welfare issues) on meat quality have received very little attention. The main objective of this research was therefore to establish consumer and meat trader perceptions on quality and animal welfare issues of beef. This is the first study to jointly determine the perceptions of rural meat consumers and traders on animal welfare and its effects on meat quality in the developing world. Unlike in many studies, the consumers in this study were of a rural background, and their perceptions on how animal welfare affects meat quality have not been previously explored. It will be important for the meat industry to know the quality cues used by such consumers in purchasing beef. In Europe, where information on meat is readily available, consumers select meat using characteristics such as tenderness, juiciness and the anticipated taste (Becker et al., 2000; Glitsch, 2000). These characteristics are related by consumers to meat freshness, leanness and bright red colour (Krystallis and Arvanitoyannis, 2006).

The current study focuses on the one hand, the perspectives of consumers with regards to subjective quality measured through the perceptions and the preferences of the consumer, and on the other hand, the perspectives of the meat traders. This integration of consumer and meat traders in the same approach enabled a one dimension approach in the analyses of the quality that is, from the point of view of the consumer or meat trader, a technique used in other studies (de Carlos et al., 2005). Information on these two groups is quite critical for the meat industry, particularly in the smallholder sector of South Africa where more than 50% of meat consumed is from small scale abattoirs. The Eastern Cape Province of South Africa, where the research was conducted, has got 88 red meat abattoirs with 48 of them as smallholder abattoirs (low throughputs), which supply meat to the local butcheries and rural consumers. Although there are numerous and diverse approaches that have been developed to analyze consumers' perception of meat quality, the present study adopted the total food quality model proposed by Grunert et al. (1996) as the framework for the research.

The total food quality model

The Total food quality model (TFQM), originally proposed by Grunert et al. (1996), is an attempt to integrate a number of approaches to analysing consumer quality perception and decision-making. The approach integrates a number of models such as, *means-end chain theory* (Gutman, 1982), *multi-attribute theory* (Fishbein and Ajzen, 1975), *economics information approach* (Darby and Karni, 1973), and the philosophy related to the explanation of purchase intention and consumer satisfaction as a discrepancy between expected and experienced quality (Oliver, 1980, 1993). It can therefore serve as an integrative framework for adequately analysing issues related to consumer food choice and quality perception, their influence on the intention to buy and for developing new food products by the food industry, in order to satisfy the demands and expectations of consumers (de Carlos et al., 2005). The model, shown in Figure 1, distinguishes between 'before' (quality expectation) and 'after' purchase (quality experience) evaluations. The relationship between quality expectation and quality experience is commonly often indicated by product satisfaction, with the level of satisfaction explained as the discrepancy between expected and experienced quality (Ragaert et al., 2004), and consequently the probability of re-purchasing the product (Brunso et al., 2005). The current research is focused more on the quality expectations (extrinsic cues particularly pre-slaughter handing) and quality experience after purchase (intrinsic cues, mainly colour, marbling and fat content.

MATERIALS AND METHODS

Study site

The study was conducted in the rural towns of Adelaide, Alice and Fort Beaufort in the Amatole District Municipality in the Eastern Cape Province of South Africa. The province has a total of 88 red meat abattoirs that supply butcheries and supermarkets with fresh meat across the province. Of these, 48 are small scale abattoirs.

Selection of respondents

A total of 11 meat retail outlets (3 supermarkets and 8 butcheries) were used in the study, three in Adelaide, three in Fort Beaufort and five in Alice. Across the 11 meat retail outlets, a total of 133 respondents were interviewed. The respondents were divided into two major categories: meat traders (31 respondents) and consumers (102 respondents). The selection of consumers was limited to those who were directly purchasing beef from the
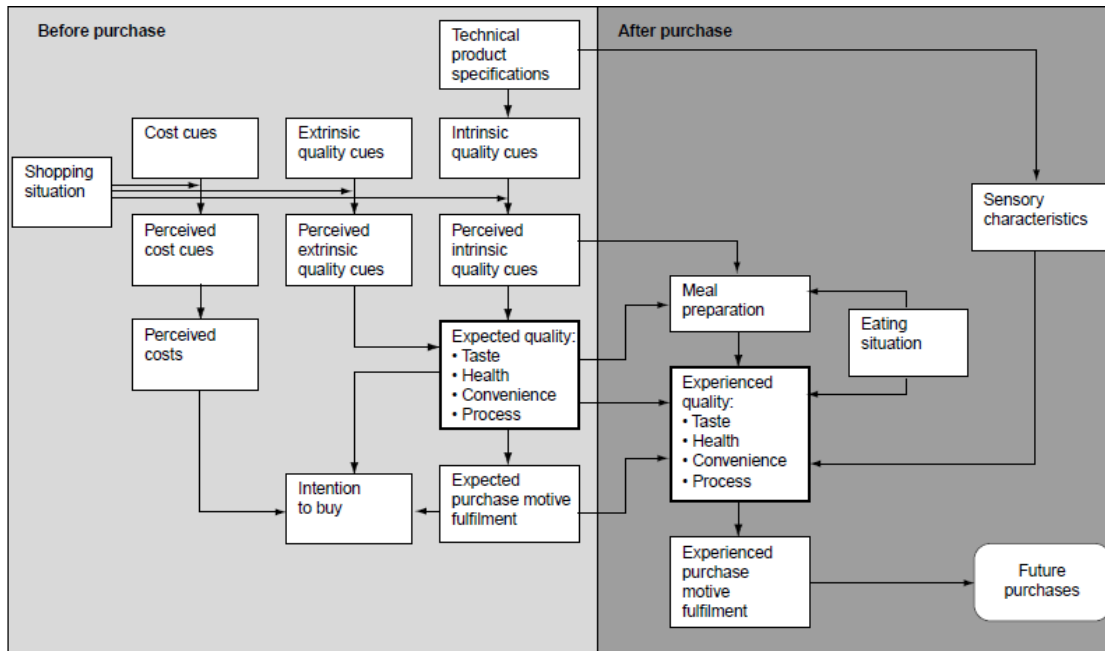
Figure 1. The total food quality model.

selected meat retails outlets, while the meat traders interviewed included the meat retail outlet owner, manager and sales supervisors or assistants. All consumers who came to purchase beef were initially targeted and subjected to screening questions. The screening questions were given to select respondents on the basis that they were the major buyers of beef, or frequently bought beef at the outlets, consume beef, had beef as their preferred meat product, and could predict beef quality by looking at it. A structured questionnaire was used to interview both traders and consumers. Trained enumerators administered the questionnaires. Data from the consumers was collected by butchery intercepts, with the consumers being interviewed at the point of purchase, or as they left the butchery. The traders were interviewed in the butcheries during working hours.

Demographics of respondents

Data collected included demographic information such as gender and age, employment status, education and race of the respondents. The education categories had grade 12 as the lowest qualification below which one was considered as uneducated. Grade 12 is taken as the highest pre-tertiary qualification, since it gives learners the entry to tertiary education and is the only certified examination between primary and tertiary education. Professional qualification meant being certified to do one's respective job such teaching, nursing or certified meat cutters. The consumers also answered questions pertaining to meat purchasing decisions, preferred meat products, meat product most consumed at home and their ability to tell the quality of beef by visual assessment.

Data collection

Data were collected by means of personal interviews with buyers of beef steaks in selected supermarkets using standardized structured questionnaires. Respondents were interviewed at the point of

purchase with respect to perceived quality cues and expected quality. As observed in other studies, this method enables results based on 'real life' purchase behaviour with measurements of a wide range of available cues.

Measures

Perceived intrinsic quality cues

In the present study, both the descriptive and evaluative scales were used to perception of the intrinsic quality cues. For the evaluation of visual appearance, respondents were asked to rate the importance of the following two intrinsic cues: colour and fat marbling in determining beef quality. In addition, five parameters were used to measure the expected quality, namely smell, juiciness (after cooking), freshness (at point of sale), tenderness (after cooking) and leanness, on a 5-point scale. The perceptions of all the intrinsic cues were measured on descriptive scales (for example, meat colour: ''is colour of beef, an important indicator of quality''. Totally unimportant 1-2-3-4-5 Very important). These intrinsic cues were derived from, and used in earlier studies on meat quality (Bredahl, 2003a; Bredahl et al., 1998; Grunert, 1997).

Perceived extrinsic quality cues

Extrinsic quality cues were selected based on previous research, and based on the established marketing environment. The respondents were asked to rate the following extrinsic quality cues: price, beef class, place of slaughter and label, also on a 5 point Likert-type scales (for example, label: ''Information on the packaging/label is an indicator of quality?'' Totally unimportant 1-2-3-4-5 Very important). Both the consumers and meat traders were interviewed on the aspects of welfare of slaughter cattle from the farm to the abattoir, and how they affected meat quality. The animal welfare issues under consideration are, cattle rearing methods

Table 1. Characteristics of consumers and meat traders interviewed on their perceptions of meat quality and how animal welfare affects meat quality.

Variable	Category	Frequency (consumers) (%)	Frequency (meat traders) (%)
Age	<30	50	16.2
	30-50	45.1	70.9
	>50	4.9	12.9
Gender	Male	49	64.5
	Female	51	35.5
Race	Black	43.2	45.2
	Coloured	28.4	35.5
	White	28.4	19.3
Educational background	<Grade 12	3.9	0
	Grade 12	15.7	22.6
	Professional training	52.9	74.2
	University degrees	27.5	3.2
Employment status	Employed	52	100
	Not employed	48	0

(feeding management, handling methods and breed types), cattle handling at the markets (loading, handling and penning), transportation (loading and driving management) and cattle handling at the abattoir (humane treatment, slaughter methods and lairage management). On a 5 point scale, the respondents were asked to rate each of the above animal welfare profiles with regards to whether they think that the profiles affect beef quality or not (for example, "Routine handling of cattle before slaughter affect beef quality?" Absolutely agree 1-2-3-4-5 Absolutely disagree).

Statistical analysis

Data on demographics of respondents was summarized as frequencies (PROC FREQ, SAS, 2006) and statistical differences were analyzed using the chi-square statistical test (χ^2) when appropriate. Associations were tested between either respondent, gender, race, age, education and all the factors and attributes. Principal component analysis with varimax rotation (PCA) were conducted in order to identify the underlying structure of the items used for measuring evaluations of the perceived intrinsic and extrinsic factors affecting beef quality explained in earlier. Based on the PCA of the items measuring expected eating quality, a two-factor solution was chosen, where both factors had eigenvalues N1. The first factor, expected quality, covered five items: smell, juiciness, freshness, tenderness and leanness, while the second factor, visual appearance, covered two items: colour and fat marbling. For the evaluation of extrinsic factors, a two-factor solution was also chosen. The first factor M-source covered four items: price, beef class, place of slaughter and label, while the second factor, M-production, covered the four animal welfare factors: cattle rearing methods (CRM), cattle handling at markets (CHM), transportation (TRANS) and cattle handling at the abattoir (CHA). The relationship between evaluation of visual appearance and expected quality was estimated by means of structural equation modelling that enables the estimation of a causal model, based on the factors from the PCA analysis described above. For the equation modelling, the CALIS procedure (PROC CALIS, SAS, 2006) was used. The root mean square error of approximation

(RMSEA) was used as the primary fit measure. It is generally agreed that values below 0.05 indicate a close fit, while values of up to 0.08 are also acceptable (Browne and Cudeck, 1993). In addition, the goodness of fit index (GFI) and the normed chi-square (w2/df; chi-square divided by degrees of freedom) were used. Generally, GFI should have values as close to 1 as possible, while the normed chi-square, as a rule-of-thumb, should be below 3 (Carmines and McIver, 1981).

RESULTS

Sample demographics

The socio-demographic descriptions of the 102 consumers interviewed on slaughter animal welfare, and its effects on meat quality, are shown in Table 1. Most of the consumers in the study were relatively young (80.39%), aged between 26 and 31 years. The majority of the traders (74.19%) had a professional qualification, with the least qualification being grade 12 (Table 1). The majority of the consumers preferred to consume beef, while other meat products, such as chicken and mutton were less preferred (Figure 1). About 50% of the consumers interviewed actually consume beef at home. Meat types, such as mutton and chicken, were also consumed (Figure 2). Of all the consumers and meat traders interviewed, 96.24% indicated that they were able to predict beef quality by just looking at it. Price influenced 70% of the consumers' purchasing decision, while quality influenced the remaining 30% and all of them were not concerned with health. Quality was found to be the main factor and influenced 75% of the traders, while price influenced 25% and all were not concerned about health (Figure 3).
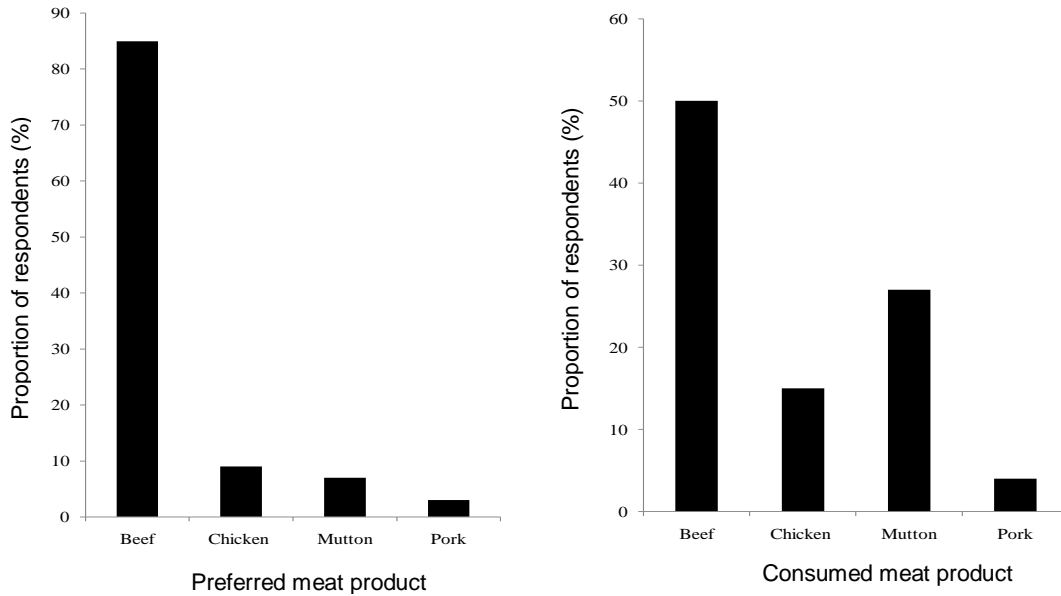
Figure 2. Meat types preferred and meat products actually consumed at home in towns under study.
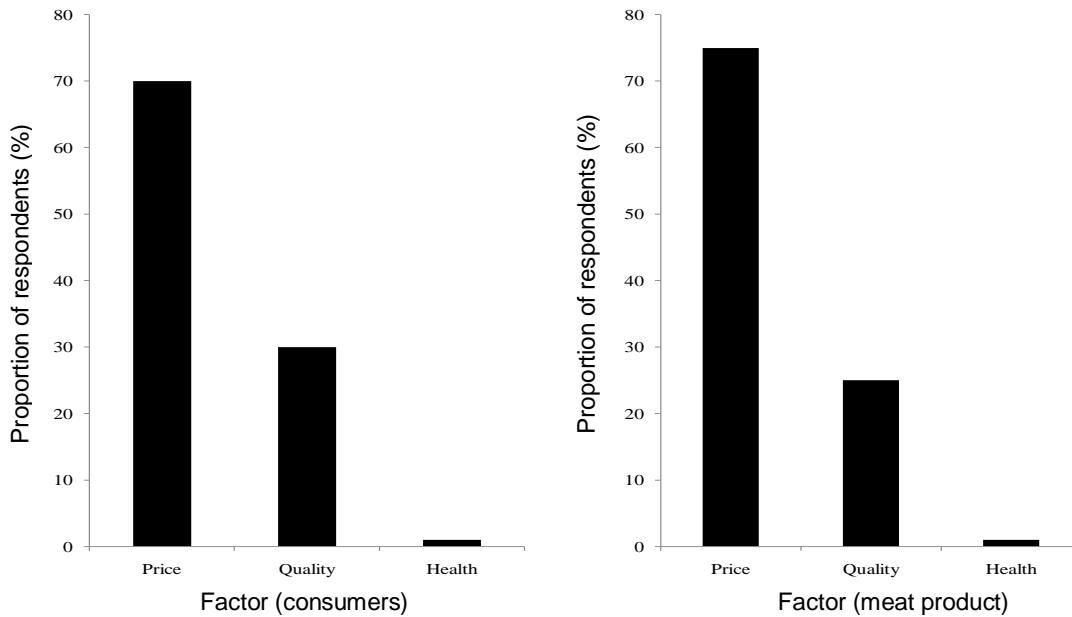

Figure 3. Primary factors in beef purchasing decision for consumers and meat traders.

Consumers' and traders' perceptions of intrinsic and extrinsic quality cues

Results of the principal components analysis for perceived visual appearance and expected quality aspects is shown in Table 2. As can be seen, all quality aspect items are loaded on one common factor for both the consumers and meat dealers. Therefore, it can be concluded that quality of beef is a one-dimensional concept for both the consumers and meat traders in the

towns under study. In the visual quality factor, meat colour loaded well and was positively related to favourable evaluation of expected visual quality of meat. In the purchasing decison component, meat colour and tenderness were negatively linked to purchasing decision for the consumers. With regards to the meat traders, negative relationships existed between expected meat quality and purchasing decision items, meaning that perceived poor packaging, labelling, place of slaughter and butcher reputation were perceived to be associated

Table 2. Identification of latent constructs-results of principal components analysis[a] of quality aspects and purchasing decisions of consumers and meat traders.

Item	Consumer		Meat trader	
	Factor 1	Factor 2	Factor 1	Factor 2
Intrinsic cues				
Meat colour	0.31	0.06	0.09	0.99
Fat marbling	0.91	0.07	0.67	0.08
Leanness	0.14	0.11	0.46	0.17
Freshness	0.54	0.32	0.67	0.26
Smell	0.34	0.17	0.56	0.09
Juiciness	0.40	0.04	0.43	0.26
Tenderness	0.28	0.10	0.32	0.17
Variance explained (%)	0.64	0.36	0.69	0.30
Extrinsic cues				
beef class	0.40	0.29	0.34	0.06
Place of slaughter	0.02	0.02	0.09	0.62
Package label	0.17	0.87	0.22	0.01
Price	0.04	0.15	0.18	0.04
Variance explained (%)	73	74	73	59

[a], Varimax-rotated solutions. Loadings p<0.5 excluded.

with poor quality meat. Higher prices were found to be negatively associated with quality expectations. Across the two respondents groups, the quality of beef was found to be associated with colour, tenderness, juiciness and leanness, combined in a uni-dimensional quality concept.

The relationships between evaluation of visual appearance and expected quality were also estimated by means of structural equation modelling (CALIS procedure) that enables the estimation of a causal model based on the factors from the PCA analysis. The resulting measurement models are shown in Table 3. The models had satisfactory fit measures: consumers (RMSEA = 0.00, GFI = 0.99, χ^2 = 1.98) and meat traders (RMSEA = 0.31, GFI = 0.91, χ^2 = 7.87), and the analysis supported the elicited dimensional structure. As for the consumers, the estimation showed significant relationships between the visual qaulity items and the perceived beef quality. With regards to the meat traders, weak and negative relationships existed between visual quality indicators and perceived beef quality. This means that product quality can be accurately inferred from the consumers who are the purchasers and end users of the meat products. Weak and negative relationships were observed between place of slaughter, butcher putation and perceived source quality for the consumers while the relationships were strong and positive for the meat traders. With regards to the price effects, carcass class was strongly related to perceived favourable price by both the consumers and meat traders. However, beef price was negatively realated to perceived favourable

price for the meat traders. The models for purchasing decision also had satisfactory fit measures (Table 3).

Consumers' and traders' perceptions of animal welfare

Results of the principal components analysis for perceived animal welfare issues are given in Table 4. While all items relating to the animal welfare aspects loaded on the four common factors for the consumers, a similar pattern was not observed with regards to meat dealers in transport and cattle handling items components, some of the animal welfare aspects were not significant although they were loading on a single common factor. With regards to the consumers, the animal welfare items covered by the cattle rearing component were negatively related to cattle handling at the market components and transport component. This means that consumer perceived that while cattle rearing methods may be approriate, this did not translate to approriate handling of the animals during transportation and handling of animals at the market. A similar pattern was observed with regards to the meat traders. In addition, significant negative relationships existed between the cattle rearing methods component and the items covered by the animal handling at abattoir component, meaning that the meat traders believe that cattle handling at abattoir is at variance with the way the cattle are reared at the farm, and therefore this could have an effect on meat quality. The relationships between

Table 3. Structural equation coefficients for evaluation of visual cues and expected quality for beef.

Latent variable	Indicator	Consumers		Meat traders	
		Coefficient	*t*-value	Coefficient	*t*-value
Visual quality	Colour	0.219	1.904	0.277	1.259
	Fat marbling	0.314	9.398	0.308	1.335
Expected quality	Juiciness	0.509	5.091	-0.012	-0.089
	Tenderness	0.595	6.015	-0.218	-1.899
	Freshness	0.601	4.308	0.342	1.623
	Leanness	0.402	5.678	0.542	3.456
Perceived source effect	Place of slaughter	-0.003	-0.832	4.679	0.071
	Packaging	0.003	0.760	0.066	0.035
	Carcass class	0.589	4.044	0.643	3.086
	Beef price	0.325	1.452	-0.454	-1.975
Fitness measures		$\chi^2 = 1.98$; df = 2; p = 0.001; RMSEA = 0.00 p(RMSEA < 0.05) = GFI = 0.99 RMR = 0.009		$\chi^2 = 7.87$; df = 2; p = 0.001 RMSEA = 0.31; p(RMSEA < 0.05) =GFI = 0.91 RMR = 0.05	

Table 4. Identification of latent constructs-results of principal components analysis[a] on animal welfare issues and meat quality.

Item	Consumer				Meat dealer			
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 1	Factor 2	Factor 3	Factor 4
Production system	0.04	0.01	0.02	0.11	0.09	0.18	0.47	0.05
Feeding management	0.63	0.03	0.14	0.08	0.06	0.06	0.40	0.06
Handling frequency	0.22	0.05	0.01	0.02	0.17	0.04	0.01	0.01
Cattle behaviour	0.17	0.03	0.05	0.02	0.27	0.16	0.05	0.06
Overstocking	0.02	0.09	0.06	0.07	0.30	0.08	0.13	0.11
Breed quality	0.03	0.13	0.02	0.21	0.21	0.03	0.03	
Handling at markets	0.06	0.02	0.02	0.25	0.22	0.06	0.01	
Mixing at transportation	0.02	0.13	0.03	0.36	0.12	0.08	0.29	
Penning at markets	0.04	0.02	0.30	0.08	0.05	0.20		0.03
Cattle loading	0.02	0.15	0.30	0.13	0.06	0.01		0.10
Loading density	0.02	0.02	0.08	0.07	0.04	0.35	0.01	0.06
Long distances	0.20	0.38	0.04	0.18	0.03	0.13	0.03	0.01
Slaughter method	0.10	0.06	0.17	0.04	0.07	0.03	0.13	0.71
Lairage duration	0.15	0.05	0.47	0.14	0.01	0.09	0.04	0.07
Variance explained (%)	14	90	70	51	17	60	69	76

[a], Varimax-rotated solutions. Loadings p<0.5 excluded.

cattle rearing, transportation, cattle handling at markets and cattle handling at slaughter items were estimated by means of structural equation modelling (CALIS procedure) that enables the estimation of a causal model based on the factors from the PCA analysis. The resulting measurement models are shown in Table 5. The models had satisfactory fit measures: consumers (RMSEA = 0.08, GFI = 0.78, χ^2 = 186.2) and meat traders (RMSEA = 0.15, GFI = 0.65, χ^2 = 195.8), and the analysis supported the elicited dimensional structure. The estimation showed significant relationships between the animal welfare indicators and perceived animal welfare components. Notably, for both the consumers and meat traders, cattle management had a negative effect perceived on farm cattle rearing, meaning that poor cattle management methods are likely to change the perceptions of both consumers and meat traders with regards to cattle rearing, and ultimately meat quality. In addition, as for the consumers, long distance transportation of cattle to the markets and abattoir, and

Table 5. Structural equation coefficients for evaluation of extrinsic cues.

Latent variables	Indicators	Consumers		Meat traders	
		Coefficient	t-value	Coefficient	t-value
Perceived on farm handling effects	General management	-0.023	-0.193	-0.056	-0.169
	Feeding frequency	0.611	0.729	0.099	0.193
	Frequency of handling	0.793	0.733	0.795	0.278
	Overstocking	0.245	0.697	0.834	0.207
	Breed quality	0.115	0.595	0.415	0.206
Perceived market handling effects	General handling	0.521	4.589	0.449	2.666
	Mixing of different animals	0.404	3.731	0.618	3.948
	Cattle penning	0.429	4.339	0.984	5.125
Perceived transportation effects	Handling at loading	0.799	0.776	0.118	0.202
	Loading density	0.303	0.742	0.867	0.214
	Long distance travel	-0.046	-0.349	0.458	0.214
Perceived handling at Abattoir	Handling before slaughter	0.261	0.726	0.082	0.157
	Lairage duration	-0.570	-0.749	-0.100	-0.163
Fitness measures		$\chi^2 = 186.2$, df = 114 p = 0.001 RMSEA = 0.08 p(RMSEA < 0.05) = GFI = 0.78 RMR = 0.04		$\chi^2 = 195.8$ df = 114 p = 0.001 RMSEA = 0.15 p(RMSEA < 0.05) = GFI = 0.65 RMR = 0.05	

bad driving were negatively related to the perceived transportation, meaning that consumer will normally question the quality of meat from animals travelling long distance to the abattoir.

DISCUSSION

The present study showed that generally, the consumers preferred beef over any other type of meat. As observed in other studies (Brunso et al., 2002), consumers perceive beef as meat with superior quality. Nevertheless, in the present study, the number that actually consumed beef at home was less, due to its price relative to other meat types, such as chicken. The fact that mutton is consumed more than chicken may be due to the fact that some of the respondents interviewed keep sheep at their rural homes, and mutton is a delicacy and a popular source of protein for them (Mapiliyao et al., 2012). Contrary to the observations in developed countries (for example, in Europe), where health issues, branding and expected quality of meat are considered as critical by consumers (Grunert et al., 2004; Brunso et al., 2005), the current study showed that price was regarded as the primary factor affecting purchasing decision, largely due to the fact that the respondents were from a rural and poor background where most purchases are determined by the amount of disposable cash available, and hence quality of a product is secondary as observed by Ballantine et al. (2008). The perceptions of

the consumers and meat traders on the beef they purchase were important because it gave an evaluation of the beef from the cattle the farmers supply, and were slaughtered at the smallholder abattoir. The observed significant positive association between visual quality cues and expected beef quality suggests that, with rural consumers, colour and fat content, together with price, are the more perceived characteristics to infer quality as observed in other studies (Muchenje et al., 2009b). It is therefore critical to consider this in meat marketing, since meat colour is the first quality attribute that a consumer uses to predict freshness and wholesomeness. The presentation of beef with the correct colour is the most important aspect in the marketing of beef, since consumers tend to discriminate negatively against beef that is discoloured (Troy and Kerry, 2010). Our results concur with findings by Carpenter et al. (2001) who observed that consumer preference for beef colour was sufficient to influence their likelihood to purchase. Although the colour of fresh meat does not always mean good eating quality, the consumer still expects to purchase beef that is bright cherry red in colour (Taylor, 1996). The bright cherry-red colour of beef is due to oxymyoglobin which forms after exposure of the muscle pigment myoglobin to oxygen. In beef, oxymyoglobin is responsible for the colour that consumers associate with freshness (Faustman and Cassens, 1990). These findings tend to differ from those by Becker et al. (2000) who found country of origin and place of purchase as the most important attributes for quality in the shop.

Jocumsen (2005), using Australian consumers, showed freshness as the most important attribute at point of sale. While fat marbling was observed to be positively associated with perceived visual quality in the current study, it has been observed in other studies that its relationship to relevant quality dimensions like tenderness and taste is the opposite of what consumers experience (Bredahl, 2003). According to Verbeke et al. (2005), one requires good knowledge and a good background to appreciate marbling. Marbling, defined as the visible fat present in the interfascicular spaces of a muscle (Kauffman and Marsh, 1987), affects flavour, juiciness and tenderness of meat, and hence increases its palatability (Miller et al., 2001). Even in those countries where consumers are regarded as knowledgeable in meat quality, marbling is not appreciated. In Germany for example, consumers ranked it third in its importance as a quality in the shop attribute (Becker et al., 2000) and in Belgium, consumers face difficulties when evaluating it (Verbeke et al., 2005). The fact that the respondents showed lack of knowledge in interpreting the importance of marbling in meat quality could have been as a result of their rural background. With consumers, the visual quality cues were positively associated with expected meat quality measured by juiciness, freshness, tenderness and leanness. On the contrary, the observations were opposite with the meat traders. This means that beef quality can be accurately inferred from the consumers who are the purchasers and end users of the meat products, than the meat traders. However, due to the fact that in most instances, in supermarkets, consumers have been observed to use visual cues to infer expected beef quality (Brunso et al., 2005), their inferences may be misleading, as the consumers often experience a low degree of correspondence between expected and experienced quality. It is therefore to provide more information to the consumers on the various aspects of quality of the beef they are inclined to purchase, through labels. However, for a label to be effective, the information on the label must be read, understood and accepted. Labels play only a minor role in signaling quality in some studies, (Becker et al., 2000); labeling can improve consumers' ability to evaluate the quality at the point of purchase, and hence benefiting not only the consumers but the manufacturers who are selling their products (Brunso et al., 2005; Verbeke et al., 2006).

Regarding the extrinsic cues, direct associations were observed between the source indicators and expected quality items.The fact that the meat traders indicated price as the most important quality in the shop attribute is not surprising, since they are in business; for consumers price was second in importance for predicting meat quality. This is not surprising, as most of the ordinary consumer will associate an expensive item with good quality. This perception contradicts findings by Becker et al. (2000) who found that Germany consumers considered price to be of least importance as an indicator of quality because in some instance, beef production is subsidised. Price can be a cost factor, as well as a quality indicator. As an indicator of quality, a beef buyer can have two price limits in mind, an upper limit, beyond which she/he would find the beef too expensive and indicating high quality, and a lower price limit below which the quality would be suspected (Issanchou, 1996). The finding that source or place of slaughter was important to the traders, yet unimportant to the consumers was not surprising. This might be attributed to the fact that most consumers are not worried about place of slaughter at point of purchase, except those consumers that only eat Halaal certified meat (Heiman et al., 2001). To the consumers, their source of meat is the trader. The finding that the class of beef as a quality in the shop attribute was not important to the consumer, yet important to the trader might be due to the fact that, most consumers are not concerned about class of beef at point of purchase. However, class of beef is a good indicator of eating quality. Meat that is classified as Class A is tender and from a young animal, meat classified as Class B is less tender and from an adult animal, while meat classified as Class C is least tender and from an old animal (The Afrikaner Cattle Breeders' Society of South Africa, 2008). These classes are important to the trader, as they use them for purchasing wholesale beef and pricing beef in the shop.

While consumers' perceptions on welfare of slaughter cattle are becoming important, it is difficult to get an accurate assessment of their perceptions on animal welfare issues, due to their dissociation from farming practices, as a result of their rural background and hence their knowledge of the circumstances in which meat livestock is produced are limited (Frewer et al., 2005; Verbeke, 2005; Maria, 2006). The observed perception by both consumers and meat traders that while cattle rearing methods may be approriate, which did not translate to approriate transportation and handling of animals at the market, seems to suggest that the consumers has some knowledge of how poor handling methods at the markets can affect meat quality. Similar observations were reported in literature (Boissy and Bouissou, 1988; Boivin et al., 1994). It is generally accepted that early handling of cattle at the farm brings long lasting experiences when cattle are handled in future (Muchenje et al., 2009a). Cattle with previous experiences of gentle handling are calmer and easier to handle in future, than cattle that have been handled roughly or were less handled when growing up (Boissy and Bouissou, 1988; Boivin et al., 1994; Ndou et al., 2011). The significant negative realationships existing between the cattle rearing methods component and the items covered by the animal handling at abattoir component seem to suggest that the meat traders perceive cattle handling at abattoir to be at variance with the way the cattle are reared at the farm, and therefore this could have an effect on meat quality. Breed, contrary

to consumer perception, influences beef quality. Certain breeds are difficult to handle and it is recommended that they be familiarized with handling procedures, as this makes it easier to manage during the pre-slaughter period (Minka and Ayo, 2007; Tompsett and Gregory, 2008). Breed type influences carcass and meat quality, including the properties and structure of muscle and meat physiology (Muchenje et al., 2009b).

The fact that consumers in the study perceived overstocking of cattle at the farm as having no effect on meat quality is contrary to findings by Muchenje et al. (2008) who said that overstocking or poor feeding at the farm is an animal welfare issue, and can affect meat yield and quality. Underfeeding at the farm can result in depletion of pre-loading glycogen levels in muscles of slaughter animals (Jacob et al., 2005). Pre-slaughter glycogen depletion in muscle may result in meat with high ultimate pH, which is dark in colour, has poor keeping quality and has poor palatability (Muchenje et al., 2009b). Contrary to consumer perception that feeding manage-ment does not affect beef quality, the quality of meat, including its composition can be affected by type of feed (Muchenje et al., 2008). Forage-fed beef contains higher levels of beneficial n-6 and n-3 fatty acids (Baublits et al., 2006; Muchenje et al., 2009c). Baublits et al. (2004) reported that beef from forage-fed cattle has less marbling, and is darker in colour compared to beef from grain-fed cattle. Beef from grass-fed cattle is perceived to have differences in tenderness, color, juiciness and flavor (Baardseth et al., 1988; Chrystall, 1994), while beef from concentrate-fed cattle is said to be more tender and better flavoured (Larick et al., 1987; Medeiros et al., 1987). The perception by the respondents that welfare of cattle at markets does not affect meat quality contradicts Murray et al. (2000) and Vimiso (2010) whose findings were that welfare of animals sold through markets is poor, compared with animals sent directly to abattoirs. Cattle that are put through markets are subjected to fatigue, fear and distress, fasting, dehydration and injuries. Cattle that are sold through markets are handled more than those delivered to the abattoir, and get more bruising as a result (Weeks et al., 2002; Vimiso, 2010).

Although the respondents perceived that transportation does not affect the welfare of slaughter cattle and meat quality, this is contrary to Grandin (2000) who found that transportation exposes cattle to stress from heat, cold, humidity, noise, motion and social regrouping, resulting in production of poor quality beef. Transport even for short distances, results in the following: reduced live weight, increased morbidity and mortality, poor meat and skin quality, decreased glycogen reserves and economic losses due to bruises, and rejected beef (Minka and Ayo, 2006; Agnes et al., 1990). The respondents felt that the loading/unloading process does not affect meat quality. This is contrary to findings by Broom (2000) who found that loading and unloading of cattle into and out of transport vehicles can lead to severe effects on the animals if not properly planned. Even in very good loading procedures, animals can be frightened by people, resulting in stress and even injuries. Loading density, especially overloading, increases the risk of animal injury and damage to carcass and meat quality (Tarrant, 1990). Although the respondents perceived that driving has no effect on animal welfare and meat quality, this contradicts other findings. Driving care and road conditions influences cattle welfare during transportation with most events where cattle are floored, caused by loss of balance during cornering (Tarrant, 1990). The complete set of transport events, especially loading and unloading phases are reported to determine stress and affect meat quality (Van de Water et al., 2003).

The results on abattoir practices and animal welfare are expected for the consumers but surprising for the traders. The backgrounds of the consumers play a major role in influencing their perception on abattoir practices. It is also common practice for rural people to slaughter their own livestock for meat, and often animal welfare is not a concern (Mapiliyao et al., 2012; Ndou et al., 2011). The way the rural people slaughter livestock may influence their perception of abattoir practices. Perceptions are often a result of knowledge on a subject (Te Velde et al., 2002; Ndou et al., 2011). Unless a consumer has visited an abattoir, knowledge of abattoir practices will be poor, leading to wrong perceptions. Consumers generally believe that animals are meant to serve humans, keeping and slaughtering them for meat is legitimate and that farmers are there to provide food for the population (Te Velde et al., 2002). Traders are expected to have some knowledge of abattoir practices and animal welfare at slaughter. This knowledge helps them to make informed decisions when selecting the source of their meat, since abattoir practices differ. Consumers depend on the trader for the provision of quality beef, while the trader depends on the source/abattoir for meat that appeal to the consumer.

CONCLUSION AND RECOMMENDATIONS

The rural traders and consumers have the same perception that animal welfare does not affect meat quality although they differ on how they perceive beef quality. Both the consumers and meat traders are not satisfied with the colour of beef from cattle slaughtered at the smallholder abattoir. The implication of this to the meat industry in rural South Africa is that the traders may never improve on service provision if the much needed critical input does not come from the consumers. There is need to train the rural traders and consumers on welfare of slaughter cattle and how it affects meat quality. This implies that the rural traders may never supply the correct quality of beef to the market. Educational promotions that better inform rural consumers about the determinants of quality are needed.

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