Research article

Comparison of the importance of beef price labelling aspects: An eye-tracking approach

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ABSTRACT

Self-reported approaches such as surveys are a common way in which consumers' preferences and needs can be assessed but this approach can provide incorrect results. Few studies combine data from cognitive psychology, cognitive neuroscience, and marketing. Among these techniques, eye-tracking can be used to elucidate how observers' overt visual attention is acted upon, and it can also be employed to evaluate and compare individuals' graphic search behaviour in a number of settings. Using eye-tracking technology, the purpose of this article is to identify how beef consumers pay attention to the information on price labels and to compare that to their self-reported attention ratings. The dataset used in this study consists of 307 participants. Kendall's W tests were used to identify and rank consumers' preferences from eye-tracking and post-test questionnaires. Pearson's correlations were used to correlate consumers' demographic information against their eye-tracking data. Results from the eye-tracking test showed that the aspects that received the most attention from the participants were the price of the pack, butchery name, and classification of the meat. The price of the pack was looked at more times by the largest share of consumers, and for the most extended period of all labelling, aspects presented. Results also showed that the butchery's name was the labelling aspect consumers mostly paid attention to first. Fewer consumers tended to look at the packaging date, sell-by date and cut name. A difference was found between the aspects that the participants indicated were the most important when buying red meat and what aspects they actually paid attention to when looking at packs of beef. Correlation results suggest that younger consumers are more likely to pay attention to the price labelling aspects and for a longer period. However, it will be at a later stage than older consumers. Also, price label information seems to be more important to higher educated beef consumers. The vital role that eye-tracking can play in improving the accuracy of research has been highlighted in the study. Marketing agents will also be able to use eye-tracking to ensure that products meet the demands of their customers. Future studies must be performed to confirm the results of this study before they can be generalised. It would be worthwhile to also test consumers' understanding of beef price label information.

1. Introduction

A clear change has been noticed where the meat industry is becoming a consumers driven model rather than being production-driven (Issanchou, 1996). Meat and meat products are among the primary protein sources in the diets of people (Font I Furnols and Guerrero, 2014). Globally, protein is enjoying consumers' attention as people across the world are following diets that are richer in protein (New Nutrition Business, 2017). Consumption increases have been seen for meat where it has increased from 23.09 kg in 1961 to 43.22 kg in 2013 in global terms (Ritchie and Roser, 2017). The per capita consumption of beef has risen from 16.71 kilograms (kg) in 2012 to 20.93 kg in 2017 in South Africa

(DAFF, 2016). BFAP (2016) highlighted that local beef and mutton/lamb consumption are predicted to increase by 6% and 10%, respectively, between 2015 and 2025 in South Africa. There has been an increase in the demand for meat among wealthy consumers and lower-income consumers (Euromonitor International, 2016). Red meat retailers should make sure to use this growth in demand to their benefit.

Satisfying consumers needs and outperforming competition should always be retailers and marketers focus. Consumers' attention is a key element for all involved in marketing (Milosavljevic and Cerf, 2008). Marketing research is the process of gathering data that gives decision-makers the ability to solve challenges in their businesses (Smith and Albaum, 2012). It is also well understood that capturing the attention

of customers is critical. Self-reported approaches such as surveys are a common way to assess attention to advertising, among other things (Milosavljevic and Cerf, 2008).

The power in the beef market now lies in the hands of consumers and their demands have changed (Labuschagne et al., 2011). Researchers have identified that South African consumers prefer to buy fresh beef rather than frozen beef and prefer to buy their beef from butcheries rather than supermarkets (Labuschagne et al., 2011; Mabhera, 2014). Consumers' purchasing behaviour is influenced by the suppliers of the meat, packaging, quality of the meat farming practices and convenience (Uys and Bisschoff, 2016). The different preferences of red meat consumers from other income groups have also been studied (Vermeulen et al., 2015). It was determined that price was the most important aspect considered by low-income households with the importance of price ranked slightly lower as the level of household income increased. Middle income households ranked aspects such as the expiry date more important than price with wealthy households being more considered with food safety, expiry date, quality, taste and appearance that the price of the beef (Vermeulen et al., 2015). Self-reporting techniques have also been used in other South African red meat studies, where aspects such as consumer preferences concerning traceability, animal welfare aspects, and fat and fat colour preferences have been investigated (Du Plessis and Du Rand, 2012; Vimiso et al., 2012; Maré et al., 2013). Consumers do not always voice their concerns in their beef purchase decisions, according to Mabhera (2014), and further research on the elements that influence their behaviour is required.

Memory-based measurements, on the other hand, can be inaccurate indications of what drew customers' attention (Rosbergen et al., 1997). Where consumers are presented the opportunity to provide their own answers, they will likely give "the right" answer for the situation as opposed to what they are really feeling (Samant and Seo, 2016). The foundation of marketing research is not a new notion; nonetheless, technological developments have enabled a wider range of studies to be conducted (Smith and Albaum, 2012). Eye-tracking is one such technology where consumers' interests can implicitly be measured rather than explicitly questioned where this sometimes disturbs the natural behaviour of interviewees (Jannach et al., 2018; Sulikowski and Zdziebko 2020). Different types of research applications have been found for eye-tracking research such as marketing, online shopping, in store advertisement, menu and menu label design and product packaging (Durr et al. (2015); Ekman (2016); Mitterer-Daltoé et al. (2014); Reale and Flint. (2016).

Besides measure an observer's overt visual attention eye-tracking can also analyse and compare individuals' graphic search habits in a variety of settings (Tonkin et al., 2011). An eye-tracker is a piece of equipment that measures eye movement. The scleral contact lens was placed on to the persons eye that was testes and is an one of the first examples of this technology that was invasive to users. Later non-invasive systems such as table- and head-mounted systems were developed that are currently still used. Video-based eye-trackers are significantly less obtrusive, monitoring the point of regard to detect eye movements (Duchowski, 2007). This is achieved by either holding the head still to assure that the point of view and the eye position in relation to the head are both the same, or by measuring ocular features such as corneal reflection and pupil centre in order to distinguish head movements from eye rotations Duchowski (2007) When corneal reflection is applied, light sources, such as infrared, can be shone into someone's eyes. According to Drewes and Schmidt (2007), infrared eye-trackers work by shining infrared light-emitting diodes (LEDs) onto the human eye and generating a static reflection spot independent of the direction the eye is facing. Video-based eye-trackers can be used to measure the Purkinje pictures captured when light falls on the curved cornea and is reflected back (Duchowski, 2007).

Graham et al. (2012); Mitterer-Daltoé et al. (2014). emphasized that eye tracking alone cannot determine the cognitive processes connected to eye movements, so a questionnaire must be administered together with eye-tracking. It will enable researchers to determine not only what

characteristics customers are interested in, but also why they are interested in these features (Graham et al., 2012; Mitterer-Daltoé et al., 2014). According to Milosavljevic and Cerf (2008), there are relatively few studies combining cognitive psychology, cognitive neuroscience, and marketing.

To the best of the author's knowledge, no study has used eye-tracking technology to measure red meat consumers' attention towards price label information under South African conditions. This could cause that much of the available research is not accurate but rather represent what consumers "think" they are paying attention to. Such results would ensure that accurate results are available from which future recommendations could then be made. The objective of this article was to investigate beef consumers' attention paid to price label information and compare that to their self-reported attention rating as well as to correlate the eye-tracking results against consumers' demographic characteristics.

This article consist of different sections; firstly, the data and methodology section presents the data collection process along with the methods used to analyse the data. This is followed by the results and discussion section and finally the conclusions and managerial implications are presented.

2. Data and methodology

In total 350 people were polled at eight different locations within the Mangaung Metropolitan Municipality. The Mangaung Metropolitan Municipality is located in South Africa's Free State province. Mangaung is the smallest metropolitan municipality in South Africa, with 747 431 people (Statistics South Africa, 2011). According to statistics, 11.4% of the households in the municipality have no average monthly household income. The largest income quintile that represents 20.2% of the population is R19 601 ($1 279)[1] to R38 200 ($2 493). To represent all the consumers in the metropolitan eight testing locations were chosen that were close to red meat retailers such as butcheries and supermarkets that sold red meat.

2.1. Data collection

The data collection process took place between May 22 and July 1, 2017. The majority of the locations were visited on Fridays and Saturdays, when red meat shoppers were out in force. A convenience sampling methodology was utilized to acquire data, with 350 red meat consumers being sampled using an interceptive survey. This number was set as the target due to the time provided and the funding available for the study. Interceptive surveys are a form of convenience sampling used in a mall scenario (Battaglia, 2011).

The eye-tracking device was transported and set up at the identified test locations throughout the Mangaung Metropolitan Municipality. Participants were approached as they moved past the eye-tracking station. Only individuals who indicated that they bought red meat products were tested. The respondents were first asked to participate in the eye-tracking tests where they had to look at the different packs of red meat shown to them. Each participant was calibrated on the device before the eye-tracking test commenced (Tobii, 2010).

Following the eye-tracking survey participants answered a questionnaire that included questions about the participants' monthly food budgets in their households, household income and meat consumption patterns, their preferred cut, and other open-ended topics. The post-test questionnaire also included questions about whatever aspects of the visuals could be remembered after the test, such as which beef brands were exhibited. The data collected from the eye-tracker and post-test questionnaire were used in a mixed-methods methodology to provide both qualitative and quantitative results.

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[1] US Dollar to South African Rand exchange rate $1 = R15.32, 14 January 2022.

The data from the post-test questionnaire were used to determine the red meat aspects that consumers reported as being important when buying red meat products. These aspects were then ranked to determine the importance of each among consumers in terms of what they indicated was important to them. To rate the aspects, Kendall's W test was used.

These ranks identified from the self-reported data were then compared against ranks for the same aspects identified from the eye-tracking data. Eye-tracking data, which allow more profound insight into the visual activity of consumers, were used to determine whether consumers paid attention to the tested aspects and which percentage of the consumers paid attention to each element. These aspects were also analysed similarly to the questionnaire aspects to determine whether consumers' actions (eye-tracking results) agreed with their words regarding what they reported to be paying attention to in red meat products.

2.2. Eye-tracking

The basis of research is not a new notion; nonetheless, technological developments have enabled a wider range of investigations to be conducted (Smith and Albaum, 2012). Eye-tracking is one such technology. In addition to evaluating visual attention, eye-tracking can also be used for comparing and analysing graphic search habits in varied situations (Tonkin et al., 2011).

It is necessary to recognize the overt position of visual attention through three kinds of eye movements: fixations, saccades, and smooth pursuits (Duchowski, 2007). When one observes or "sees" an object of interest by holding the eye relatively still it is called a fixation (Rayner, 1998). There is usually a brief moment of silence that lasts between 200 and 300 ms (Rayner, 1998). However, the human eye cannot be kept perfectly still, and errors like tremors, drifts, and micro-saccades are common during fixations (Martinez-Conde and Macknick, 2008). The movements between fixations are saccades or ballistic motions that are used to position the eye over an object (Gregory, 1966). Rayner (1998) indicates that during saccades visual sensitivity is reduced. Moving targets are tracked visually by movements known as smooth pursuit (Carpenter et al., 2000; Gregory, 1990; Leigh and Zee, 1991). As seen by the preceding sorts of eye movements, eye tracking can be utilized in a variety of ways to analyse consumers' activities and preferences while purchasing a product (Duchowski, 2007). In addition to saccades, the human eye may perform pursuit, vergence, and vestibular movements (Rayner, 1998). This study is uninterested in fixational motions. The alternating saccades and fixations enable the construction of a scan path, which shows the movement of the eye over a specific scene as well as where the eye was held motionless in order to see the object of interest.

Eye movements are required when individuals are thoroughly investigating visual stimulus. Once attention is being paid to a certain aspect in a scene, non-selected locations and objects are suppressed, while processing of the chosen spot is enhanced (Treisman, 1986; Durr et al., 2015). When an aspect "pops out" and is identified instantaneously on the initial eye fixation based on pre-attentive processes, it stands out in the picture due to a single perceptual attribute, such as how the brand shines out on the shelf among homogeneously competing brands. Shapes, colour, sizes, edges, and brightness of objects in a scene are examples of fundamental perceptual properties (Treisman, 1986; Durr et al., 2015).

A Tobii TX300 corneal reflection eye-tracker mounted on a table was used to collect data. The data recording rate of this eye tracker is 300 Hz (Duchowski, 2007). Participants were exposed to photos of different cuts of packaged red meat in the test. To avoid bias, the photographs were displayed to the participants for five seconds each and were counterbalanced. Table 1 shows the price label information that was shown to participants. This paper is part of a more extensive study, and only the information applicable to the price label information of beef products will be presented in this study.

Table 1. Price label aspects.

Labelling information	Variations presented
Meat packaging and price label information	
Classification (grade)	Age: A, B, and C and amount of fat: 0-6
Price per kg	Different per kg prices were used
Price per pack	Differed pack prices were shown
Weight of the pack	Different pack weights were shown on the price label
Freshness indicators	Packaging date and sell-by date

Tobii Studio® software was used to visualize data once the eye-tracking test was completed. The results of the eye-tracking test utilized in this study were shown using gaze plots and heat maps.

The sequence in which participant viewed the different aspect on tested images are captured in gaze plots with the fixations shown as circles and the saccades as lines between the circles. Aggregate gaze data of the tested images is presented in heatmaps to where warmer colours represent more fixations or areas where the gaze was kept for longer durations of time (Tobii, 2010). Areas of interest (AOIs) can be identified with the assistance heatmaps. Table 1 lists the AOIs that apply to this investigation. Tobii Studio® can extract metrics for each AOI and stimulation after the AOIs have been identified. These measurements are centred on fixations and observations. The period when and eye remains relatively stationary is a fixation. This while the total period of time the eye paid attention to the area inside identified and AOI is called and an observation and may contain numerous fixations (Tobii, 2016). The term visits could be used interchangeably with the term observations. In this study, the measures that were used are Tobii (2016):

- Time to first fixation: The time lapsed before a participant look at an aspect (AOI) for the first time.
- Fixations before: The number of times participants fixates on other area of image before focusing on the specific aspect or AOI.
- First fixation duration: The time spent on an aspects or AOI during the first fixation.
- Fixation duration: The duration of each individual fixation on a specific aspect or AOI.
- Total fixation duration: The duration of all fixations on the aspect or inside an AOI.
- Percentage fixated: The portion of participants who fixated on the specific aspect of AOI.
- Observation duration: The length of each individual observation inside an aspect or AOI.
- Total observation duration: The total duration of all observations within an AOI or AOI group.
- Observation count: Number of observations within an AOI.

These data were processed by the Tobii® software to determine which factors attracted and maintained consumers' attention when shown pictures of packs of red meat. Using measures such as the time to first fixation makes it possible to determine which aspects of the tested image, in a general sense, enjoyed attention first, second, third, etc., from red meat consumers.

2.3. Kendall's coefficient of concordance

The eye-tracking and post-test surveys were utilized to determine and rank customers' preferences using Kendall's W test (Anang et al., 2013). Kendall's W test is a nonparametric mathematical technique that was utilized in this study to rank a set of red meat aspect preferences from most to least relevant. Besides ranking the preferences, the test is also a measure of agreement between consumers regarding their preferences. The preferences were assigned values from 1 (not important) to 5 (very

important) in the case of the post-test questionnaire data. Individual preference scores were calculated, and preferences with the highest scores were ranked as most important and the lowest-scoring preference placed as least important.

In the eye-tracking data, a rating system of 1–5 was used to rate the degree to which consumers paid attention to the tested red meat aspects. Similar to the questionnaire ranking, the highest-scoring aspects would be ranked as the aspect that enjoyed the most significant amount of attention from consumers and seen as the most important preference when consumers looked at the packs of red meat.

The overall rank score was obtained and used to evaluate the degree of agreement amongst respondents in the ranking to compute Kendall's W. Kendall's coefficient of concordance (see Equation 1) can be represented as follows (Anang et al., 2013; Edwards, 1964):

$$W = \frac{12 \left[\Sigma P^2 - (\Sigma P)^2 / y \right]}{y x^2 (y^2 - 1)} \tag{1}$$

Where:

W = Kendall's coefficient of concordance.
P = sum of ranks for preferences being ranked
x = total number of respondents
y = total number of preferences being ranked.

The coefficient of concordance (W) was tested for significance in terms of the F-distribution. The F-distribution, according to Anang et al. (2013), as shown in Eq. (2) is represented as:

$$F = [(x-1)W / (1-W)] \tag{2}$$

Where the numerator degrees of freedom (Equation 3) are given as:

$$(y-1) - (2/x) \tag{3}$$

The denominator degrees of freedom, see Eq. (4), are given similarly as:

$$x - 1[(y-1) - 2/x] \tag{4}$$

Once these ranks were determined for both the questionnaire data and the eye-tracking data, the rankings could be compared against one another to determine whether the actions of consumers agree with their words.

The demographic data was summarized in a descriptive manner. Data obtained from the eye-tracking test was associated using Pearson's correlation coefficients against variables such as age, income group, level of education, and gender. Correlation was judged significant (2-tailed) at the 0.01 level (2-tailed) or the 0.05 level.

2.4. Descriptive statistics

The demographic information of the respondents show that men made up the majority of the responders (66.1 %). Men outnumber women in the metropolis. The most common age groups tested were 18–30 years old (29.6%), 31–40 years old (27.4%), and 41–50 years old (20.5%). Just more than 51 % of those polled had finished Grade 12 and 41.7 % had a college diploma or degree. According to household income data, the bulk of participants (45.3 %) belonged to the Living Standards Measure (LSM) 1 to 4 groups, 35.8% of the participants were from middleclass households[2] and wealthy households[3] participants represented 18.9% of the sample. Participants (43) who did not s complete the questionnaire were excluded from the sample. The results for this study were generated using the data collected from the remaining 307 participants.

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[2] LSM 5-7.
[3] LSM 8-10.

3. Results and discussion

3.1. Eye-tracking

The results from the eye-tracker for the tested image of a beef steak with only the price label (see Image 1) is shown in Table 2. Aspects included on the price labels were the butchery's name, price per kg, price of the pack, weight of the pack, packaging date, sell-by date, name of the cut, classification of the meat, and a bar code. Heatmap results are shown alongside the test image as displayed to consumers.

Image 1: Pricing label information as shown (left) along with heatmap results from the study (right).

The results for the tested image of a steak with only a price label (see Table 2) suggest that the aspects that received the most attention from the participants were the price of the pack (51%), butchery name (44%), and classification of the meat (42%). The labelling aspects that received lower amounts of attention included the bar code (7%), packaging date (16%), and sell-by date (21%). The price of the pack received the highest average fixation count (2.822) and the highest average total fixation duration (0.5733 s). The price of the pack was thus looked at more times than the other aspects and for the longest period of time. The longest average first fixation duration measure was the price per kg (0.2572 s), followed by packaging date (0.2561 s). This indicates that a lower percentage of participants paid attention to the price per kg (24%) than the price per pack (51%), but those who looked at the price per kg did so for a longer time when first fixating their attention on the price per kg. This could be due to the participant determining the relationship between the price per kg and the price of the pack. The average time to the first fixation could interpret which aspect the participants paid attention to first. These results show that, on average, the butchery's name was viewed first (1.505 s), followed by the price of the pack (1.856 s) and classification (1.880 s). The aspects that received attention later on during the test were the packaging date (3.118 s), sell-by date (2.655 s), and price per kg (2.518 s). These measurements can determine the sequence in which the participants looked at aspects of a pack of red meat.

The subcategory results show that regarding age, the participants between 31 and 40 years old tended to fixate on labelling aspects to a larger extent (percentage fixated) than the group average. All of the tested labelling aspects, except the bar code, were fixated on by a larger share of these participants than the group average. These participants also paid more attention to the bone in the pack on average (48% vs 40%). More participants between 18 and 30 years old used certain labelling aspects, but this was only applicable to a smaller number of the elements than the participants between the ages of 31 and 40. The participants between 41 and 50 years old showed greater concern about the price of the pack than what was found for the whole sample on average (57% vs 52%). Men seemed to be more concerned about the freshness of the meat and paid more attention to the packaging date (17% vs 14% for women) and sell-by date (25% vs 13% for women). A larger percentage of women focused their attention on all the other tested aspects. This could suggest that men are less price-sensitive than women but are more concerned about the freshness of the red meat than women. The middle-income group proved to have larger percentages of participants fixating their attention on most of the tested price labelling aspects (butchery's name, cut name, classification, sell-by date, weight of the pack and price of the pack). Low-income groups showed the largest fixation percentages of the three income groups for packaging date and price of the pack. The high-income group showed the highest percentage fixation for the bone in the pack (50% vs 39% for the group average). This would confirm the perception of a higher degree of price sensitivity amongst lower income consumers as opposed to higher income consumers. Where higher income consumers are more sensitive to other aspects such as the bone in the pack. Compared to the whole sample, on average, the higher educated participants (tertiary education) showed higher fixation percentages for the bone in the pack, pack price, the butchery's name, price per kg, and pack weight. The group of participants with a Grade 8 to 12

Table 2. Price labelling results from the eye-tracker.

	Fixations							Observation		
	Mean									
Aspect	Percentage	Count	Duration	Total duration	First duration	Time to first	Fixations before	Count	Duration	Total duration
Bar code	7%	1.6667	0.2010	0.3405	0.2176	2.4062	8.3333	1.1905	0.2981	0.3614
Bone in meat	39%	2.2645	0.2304	0.5045	0.2240	1.7930	6.0826	1.4545	0.3745	0.5608
Butcher name	44%	2.5259	0.1819	0.4508	0.1849	1.5056	4.9630	1.4370	0.3648	0.5195
Cut name	22%	2.0000	0.2327	0.4248	0.2388	2.0133	7.2388	1.3433	0.3645	0.4603
Classification	42%	2.0000	0.2068	0.3848	0.2063	1.8805	6.1385	1.3385	0.3147	0.4249
Packaging date	16%	1.6735	0.2543	0.4306	0.2561	3.1186	11.5918	1.1837	0.3718	0.4386
Price of pack	51%	2.8228	0.2037	0.5733	0.2065	1.8560	6.3987	1.6266	0.3931	0.6320
Price per kg	24%	2.0133	0.2396	0.4648	0.2572	2.5184	8.8933	1.2933	0.3887	0.4876
Sell-by date	21%	1.9063	0.2284	0.4298	0.2338	2.6555	9.5781	1.2188	0.4138	0.4666
Weight of pack	33%	1.8922	0.2475	0.4518	0.2479	2.0725	7.3529	1.4314	0.3442	0.4687

level of education showed slightly higher fixation percentages towards the cut's name, meat classification, packaging date, price per kg (the same percentage as the high-income group) and sell-by date. It seems that the participants who were better educated made use of these aspects to a greater extent than participants with lower education. Interestingly, the lower-educated participants (Grade 1 to 7) fixated on the bone in the pack and the butchery's name with percentages not much different from the other two groups. In contrast, the other aspects were fixated on at much lower rates than in the other income groups.

3.2. Kendall's W test

Kendall's W test results are shown in Table 3, where rankings from consumers' questionnaires were compared against consumers' eye-tracking results. These results can indicate to which extent the consumers' words matched their actions.

In the questionnaire, the price per kg was ranked as the most critical price label aspect, followed by the pack's price and weight. The classification of the meat and the freshness indicators were the lowest-ranked aspects. In light of the eye-tracker data, the price of the pack enjoyed the highest level of attention from the participants, followed by the pack's weight and classification. The price per kg and freshness indicators were the aspects that enjoyed the least amount of attention from the participants when viewing the meat. A difference was found between what the participants indicated that they looked at when buying red meat and what they actually paid attention to when looking at packs of red meat. While the participants said that price per kg was more important than the price per pack, the results showed the opposite – that price per kg enjoyed less attention from the participants than the pack price and the pack weight and the classification of the meat. This difference is

Table 3. Kendall's W test results for pricing label information.

Questionnaire ranks		Eye-tracking ranks	
Aspect	Mean rank	Aspect	Mean rank
Price per kg	3.44	Price per pack	3.76
Price per pack	3.31	Weight of pack	3.20
Weight of pack	3.17	Classification	2.83
Classification	2.92	Price per kg	2.66
Freshness indicators	2.15	Freshness indicators	2.55
Test statistics		**Test statistics**	
N	307	N	307
Kendall's W[a]	.169	Kendall's W[a]	.131
Chi-square	187.071	Chi-square	161.064
df	4	df	4
Asymp. Sig.	.000	Asymp. Sig.	.000

[a] Kendall's coefficient of concordance.

supported by Samant & Seo (2016) who mention that consumers are likely to give a self-reported answer that is different from what they are truly feeling. This then shows how eye-tracking could make valuable contributions to improve research.

The results from the price label information showed that the price of the pack enjoyed higher levels of attention than the price per kg and that consumers would buy the pack of meat that met their price per pack budget and not necessarily the pack that met their price per kg budget. Participants indicated that the freshness indicators on the pack were the least important aspects on the price label, and these also enjoyed the least amount of attention from the participants. Here the appearance of the meat could have assured consumers that the meat is still fresh, and no need is seen to make of the packaging of the sell-by date shown.

3.3. Correlation results

Pearson's correlation results revealed a number of significant relationships between the price label information and some consumer characteristics tested. The results are presented in Table 4.

Fixation on the price of the pack was negatively correlated with age (0.01) and positively correlated with consumers' level of education (0.05). These results suggest that the pack's price is of greater importance to younger consumers as well as better educated consumers. This is similar to what has been found by Lombard et al. (2020) where the same corelation relationships were identified towards less familiar beef brands. Time to first fixation on the pack's price showed a positive correlation to the level of consumers' level of education (0.01) and a negative correlation with the age of consumers (0.01). This implies that higher educated consumers looked at the price of the pack at a later stage. Also, the price of the pack is fixated on sooner by older consumers. These two categories of results indicate that highly educated as well as younger consumers more likely to pay attention to the pack price of a, albeit at a later stage. This could suggest that these consumers first paid attention to other aspects of the product shown but still regard price as very important. Consumers' age was negatively correlated with the time of first fixation on the price per kg (0.05). Price per kg total fixation durations proved to have a significant negative correlation with the age of consumers (0.05). These findings indicate that older consumers paid attention to the price per kilogram sooner and for a shorter amount of time. Age was negatively correlated (0.05) with fixation on the classification shown on the pack. Younger customers were consequently more inclined to pay attention to beef product classification. Time to first fixation results for the classification of beef was negatively correlated with age (0.05) and positively with consumers' level of education (0.05). This could suggest that older consumers and lower educated consumers fixated on beef classification labelling at an earlier stage. A significant negatively correlation (0.01) between fixation on the weight of the pack and consumers' age was found. This suggests that older consumers are

Table 4. Pearson correlation results for beef labelling aspects *(n = 307)*.

	Bar code				Pack date		
	FIX	TTFF	TFD		FIX	TTFF	TFD
LSM	-0.008	-0.026	0.010	LSM	-.130*	-0.088	-.117*
Gender	-0.106	-0.050	-0.065	Gender	0.030	0.018	0.058
Age	-0.063	-0.073	-0.087	Age	-.136*	-.156**	-.128*
Education	.122*	0.107	0.102	Education	0.001	0.010	0.014
	Bone on meat				Price of pack		
	FIX	TTFF	TFD		FIX	TTFF	TFD
LSM	0.070	0.092	.117*	LSM	-0.054	0.036	-0.024
Gender	-0.042	-0.062	-0.015	Gender	-0.034	-0.058	-0.012
Age	-0.004	0.017	-0.003	Age	-.154**	-.159**	-0.083
Education	0.101	0.070	0.106	Education	.144*	.149**	0.030
	Butcher name				Price per kg		
	FIX	TTFF	TFD		FIX	TTFF	TFD
LSM	0.023	0.038	-0.020	LSM	-0.052	-0.031	-0.056
Gender	-0.059	0.028	-0.040	Gender	-0.042	-0.054	0.003
Age	0.011	0.056	-0.018	Age	-.177**	-.139*	-.115*
Education	0.047	0.040	-0.038	Education	0.076	0.076	0.081
	Cut name				Sell date		
	FIX	TTFF	TFD		FIX	TTFF	TFD
LSM	-0.024	-0.028	-0.065	LSM	-0.001	-0.009	-0.067
Gender	-0.005	0.049	-0.093	Gender	.130*	.128*	.112*
Age	-0.045	0.008	-0.044	Age	-.157**	-0.088	-.139*
Education	0.037	0.025	0.010	Education	0.012	-0.014	-0.033
	Grade				Weight of pack		
	FIX	TTFF	TFD		FIX	TTFF	TFD
LSM	-0.058	-0.020	-0.065	LSM	-0.037	-0.001	-.113*
Gender	0.001	0.089	0.035	Gender	-0.065	-.125*	-0.022
Age	-.134*	-.113*	-0.065	Age	-.155**	-0.074	-.162**
Education	0.045	.132*	-0.034	Education	0.089	0.078	0.034

**Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed). FIX: Fixation (yes/no); TTFF: Time to First Fixation (seconds); TFD: Total Fixation duration (seconds); LSM: Living Standards Measure.

less likely to look at the weight of the pack. A significant negative correlation was identified between gender (0.05) and the time to first fixation on the weight of the pack, suggesting that women paid attention to the weight of the pack at an earlier stage. Total time spent fixating on the weight of the pack was negatively correlated with LSM score (0.05) as well as with age (0.01). This could indicate that higher income consumers pay attention to the weight of the pack for shorter periods along with older consumers. Age showed a significant negative correlation to the time to first fixation on the pack date (0.01), thus older consumers pay attention to the pack date earlier.

Total fixation duration on the pack date (see Table 4) was negatively correlated with LSM score (0.05) as well as with the age of consumers (0.05). From these results it can be deducted that lower income consumers and younger consumers spent more time fixating on the pack date and could be more concerned with the freshness of the beef. This disagrees with Vermeulen et al. (2015) who found that the freshness indicators shown on beef products become more important as household income increases. Gender showed a positive correlation (0.05) with the time to first fixation on the sell by date, indicating that men only paid attention to the sell by date at a later stage. The total fixation on the pack sell by date had a positive correlation with consumers' gender (0.05) and a negative correlation with the age of consumers (0.05). This shows that younger consumers and men are likely to spend more time paying attention to the sell by date. Fixation data showed fixation on the bar code was positively correlated (0.05) with level of education implying higher educated consumers were more likely to look at the bar code. The LSM score was found to have a strong positive association with the overall fixation period on the meat's bone (0.05). This demonstrates that higher-income consumers spent more time inspecting the bone on the

meat. This is different from what was found by Vermeulen et al. (2015) where the appearance of meat was ranked more important to consumers as their household income decreased.

These significant relationships found in fixation data show that younger customers looked at price labelling information more than older consumers, whereas older consumers paid attention to some price label information earlier. This suggests that older consumers start their investigation of beef products with the assistance of label aspects whereas younger consumers first pay attention to other aspects before focussing on the labelling aspect. Results also suggest that higher educated consumers are more likely to fixate on price label information. This is consistent with the findings of Mabhera (2014), who discovered that consumers with larger degrees of knowledge placed a greater importance on beef product labelling. The level of consumers' education were positively correlated with some of the labelling aspects and would suggest that higher educated consumers were generally more likely to make use of labelling aspects when investigating beef products. This is corroborated by Antunez et al. (2016), who discovered that customers with a better grasp of labelling pay attention to these features for a longer period of time. This, despite the fact that Samant and Seo (2016) discovered that customers with a lower degree of label comprehension glanced at the meat in the pack for longer periods and more often than consumers with a greater level of label understanding.

4. Conclusion and managerial implications

Investigation of the price label information identified a difference between the questionnaire and eye-tracking data. While the price per kg was ranked as the most important, but the eye-tracking results did not

correspond with this. In the eye-tracking test, the pack's price was ranked as the most important according to the attention paid by the participants, with the weight of the pack and the classification of the meat in second and third place, respectively. Price per kg received less attention than the first three mentioned aspects but more attention than what was given to the freshness indicators. The freshness indicators were ranked the lowest and received the least amount of attention from the participants of all the price label information aspects. This emphasises the importance of ensuring that the price of the packs of meat that retailers display on their shelves suit consumers' budget per pack.

Here it can be concluded that the pack's price was of the greatest importance when consumers consulted when evaluating red meat products. Once the pack price falls within the market-required pack price, retailers can focus on other important price label information, such as the pack's weight and classification. This shows that while consumers might be lured to butcheries or meat outlets that offer a reasonable price on their meat per kg, they will still use the pack's price to base their final purchase decision on. Therefore, it is recommended that retailers ensure that the price of the pack of meat is presented to consumers. Retailers who attempt to increase their sales in the pre-packed red meat segment are advised to determine the price per pack budget for their target market and provide packs of meat that are in line with this budget.

Results from the Pearson's correlations shed some light on the behaviour of consumers when presented with beef product. It was found that older consumers are less likely to pay attention to labelling aspects but those who did look at it, tended to look at the aspects earlier than younger consumers. Price label aspects seem more important to higher educated consumers when investigating beef products.

The use of an eye-tracking device was able to assist in improving consumer research by detecting a difference between what the participants said was important and what they focused on when shown packs of beef. A valuable contribution can be added to research by using eye-tracking technology in future research.

This study was able to show the value that eye-tracking technology can contribute to red meat preference research and that consumers' words don't always match their actions still some limitations were experienced. Limitations to the study include:

- The study was not able to determine consumers' understanding of the different forms of price labelling. Although this was not part of the study's aims, it would have helped to know why a label was preferred based on consumers' understanding of the price label information when interpreting the results.
- The study area where future studies should be repeated in different areas of the country to ensure that results will correctly represent consumers throughout the country.

Future studies could test consumers prior and after receiving information on price labelling information to compare what they will regard as important once fully informed of what the information represents. It could be interesting to investigate consumers attention to price labelling information when the appearance of the meat differs in future. The placement of meat labels on the package and how it affects attention can also be investigated.

Declarations

Author contribution statement

W.A. Lombard: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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The data that has been used is confidential.

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The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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