

## CONSUMER PREFERENCES WITH REGARD TO RED MEAT: AN EYE-TRACKER CASE STUDY

Sub theme: Technology (robotics, other new technologies, traditional farm equipment)

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### Abstract:

*Modern day consumers are exposed to various advertising messages by means of different media channels such as retail shops, newspapers, magazines and internet sites on a daily basis. This extent of advertising creates the need for a product to be differentiated from the products of close competitors. Eye-tracking technology can be used to investigate packaging options and rebranding options in terms of the product's logo and/or brand name. To date, only limited eye-tracking research has been done on South African consumers. The aim of this study is to investigate red meat consumer preferences amongst campus employees of the University of the Free State, Bloemfontein. In total 16 participants were used for this study. After completion of the eye-tracker tests participants also completed a post-test questionnaire. This one of its kind study used eye-tracking technology to investigate South African consumers' preferences when purchasing red meat. From the results it is evident that most of the consumer attention is on the price label with the price of the pack, sell-by date and weight of the pack receiving the largest deal of attention. It has also been found that most participants prefer cherry red meat when looking at packs of meat.*

**Keywords:** Red meat, Eye-tracking, Labelling, Branding, Packaging

## **Introduction**

South Africa's beef industry remains one of the most valuable sectors in the livestock industry. During 2013 the total gross value of slaughtered cattle and calves was calculated at R22 717 million. This means that the beef industry was the second largest contributor (23.55%) to the total gross value for animal products valued at R96 445 million (DAFF, 2015). Beef and veal production in South Africa has increased in recent years and was calculated at 982 thousand tons in 2013 with an annual per capita consumption of 18.51 kg. Annual per capita consumption was calculated at 14.98 kg in 1995 implying that the country has seen a constant increase in beef consumption (DAFF, 2015).

Modern day consumers are exposed to hundreds of advertising messages by means of different media channels, including retail shops, newspapers, magazines and internet sites on a daily basis. This extent of advertising creates the need for a product to be differentiated from the products of close competitors. Significant main ways in which products can be differentiated include product features, packaging and branding (Fahy and Jobber, 2012). A marketer who wants to ensure success will attempt to understand the target market's needs, wants and demands because people use products to satisfy their own needs, wants and demands (Kotler, 2000). Before an organisation can make marketing decisions a frame of reference is needed. One of the important aspects of a frame of reference is to create a strategic marketing plan. Such a marketing plan will assist in reaching and servicing target markets, thus ensuring that the organisation remains competitive. Part of a strategic marketing plan is to utilize brand strategies, including the optimal brand positioning and updating the brand positioning over time (Jooste, Strydom, Berndt and Du Plessis, 2012). A branded product verifies that the product is from a known source and consumers make all kinds of associations to brands. These associations create the product's brand image (Kotler, 2000).

A shift in consumer preferences over the past two decades in South Africa has caused many changes in the way products are designed, packaged and marketed. According to Clement (2007) 70% of consumer purchases are made at the shelf in the retail shop; with 85% of the choices being made without picking up a competitive item and 90% of the decisions are made after consumers only looked at the front of the pack. This suggests

that packaging design clearly plays a significant role in determining the success of a product.

Information is power. This simple term captures the market control and business success as a result of adequate information. Marketing research relates the collection of information that provides decision makers with the power to find solutions for their business problems. The foundation of research is no new concept; however, advancements in technology have made a wider range of studies possible (Smith & Albaum, 2012). One such technology is eye-tracking. Eye-tracking can be used to quantify an observer's overt visual attention and can be used to evaluate and compare visual search patterns of individuals in an array of situations (Tonkin, Ouzts and Duchowski, 2011).

Eye-tracking technology can be used to investigate packaging options and rebranding options in terms of the product's logo and/or brand name. This creative and re-positioning of branding and other aspects can be done to attract more attention from potential consumers that could increase sales. Eye-tracking is a more scientific way to gather data that could be used to determine the preferences between brands, as well as the reminders of a brand. Results could be used to assist producers to successfully distinguish their products in the market (Durr, Van Zyl, Strydom, Beelders & Wium, 2015). Advertisers generally attempt to provide product information to the consumer in an efficient manner to heighten the consumer's awareness of the product's existence. If this product is then identified by the consumer as a product that might satisfy his/her needs, it is expected that the purchase of this product is more likely than if the consumer had not been aware of the product's availability (Duchowski, 2007).

### **What is eye-tracking?**

An eye-tracker is a piece of hardware used to measure the movements of eyes. Early forms of this technology were intrusive to users, for example, the scleral contact lens. This lens has to be placed directly on the eye of the person tested. Non-intrusive techniques that were developed later and are still used include head-mounted and table-mounted systems. To gain insight into the location of visual attention three types of eye movements are needed namely, fixations, smooth pursuits and saccades (Duchowski, 2007). Fixations are the eye movements that stabilize the eye over an area of interest.

Saccades are the movements between desired fixation locations. Smooth pursuits are the movement involved when visually tracking a moving target (Carpenter, 1977; Gregory, 1990; Leigh & Zee, 1991). Eye-tracking can be used in different ways, as seen from the previous types of eye movements, to understand consumers' actions and preferences when buying a product (Duchowski, 2007), in this case, red meat.

### **Objectives**

The use of eye-tracking in marketing research has increased in recent years. Only limited eye-tracking research has been done under South African conditions and to the knowledge of the authors no research has yet been done on red meat to date. The aim of this study is to investigate red meat consumer preferences amongst employees of the University of the Free State, Bloemfontein campus. This study focuses on how to position and reposition the labelling, branding and packaging of red meat to improve sales.

### **Data and Methods**

Data for the study was collected by means of a convenience sampling technique where employees from the University of the Free State were used as the participants. The total sample size consisted of 16 respondents. All of the respondents are red meat eaters; know what their monthly budget for food is and what amount of their household's budget is spent on red meat.

To collect the data a Tobii TX300 eye-tracker was used that is able to capture data at a rate of 300Hz. The Tobii TX300 is a table-mounted, corneal reflection eye-tracker and may be seen as a normal monitor screen to participants (Duchowski, 2007). During the test participants were shown a series of rump steak and minced meat images for a period of five seconds each. These packets of meat shown on the images differed according to the variations summarized in Table 1. For example, the images contained different labels and the cuts of meat were different in terms of colour.

**Table 1: Different aspects shown on images**

<b>Image aspect</b>	<b>Variation</b>
Meat aspects	
Colour	Bright (Cherry) red, dark red, brownish
Fat on cuts of beef	Very little, Medium and Large amounts
Meat packaging and price label	
Packaging	Vacuum packed vs. polystyrene plate vacuum-packed
Grade	A, B, C grade for age along with 0-6 for fat
Price per kg	Different price were made per kg along with the grade used on pack.
Price per pack	Differed along with price per kg
Additional labeling	
Nutritional information	Nutritional facts table vs. Multi traffic light label <sup>1</sup>
Brand of beef	Sernick, Sparta, Karan
Breed of cattle	Angus vs. Bonsmara
Quality indicating labels	Halal, No Antibiotics, No added hormones, Aged, Quality guaranteed, Grass-fed, Grain-fed, Organic, Free Range, Sustainable product
Origin	Free State Beef, Proudly South African, QR label

<sup>1</sup> Multi traffic light labels are used to show consumers at a glance whether the product contains low (green), medium (orange) or high (red) amounts of sugar, fat salt etc.

After completion of the eye-tracker tests participants also completed a questionnaire. This questionnaire contained questions regarding the monthly household income of participants, monthly food budget, how often their households eat red meat, etc. Questions from the post-test questionnaire focused on which aspect of the images could be recalled after the test, for example: which brands of beef were shown in the test.

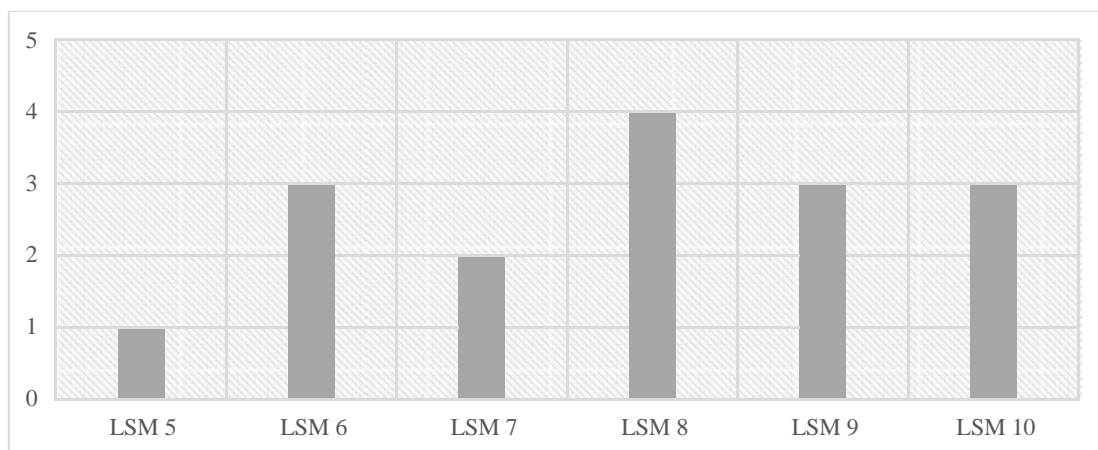
Once the eye-tracking test was completed, Tobii Studio® software was used for visualisations of the data. Gaze plots and heat maps are the two types of visualisations used for this study. The scan paths of participants are visually represented by a gaze plot. Each circle on a gaze plot represents a fixation of the participant's eye while the line between the circles represents saccades (note that saccades are drawn as straight lines though they are not). The fixation sequence for every participant is shown on the gaze plot. Heat maps are colour overlays that aggregate gaze data over a stimulus. Warmer (redder) colours indicate higher numbers of fixations or areas that received longer periods of gaze (Tobii, 2010). These areas can also be defined as areas of interest (AOI's). The software also provided data collected during the test such as duration of fixations and number of fixations on areas of interest on the image.

## **Results and discussion**

All 16 participants for the study were employees of the University of the Free State. The age of participants ranged between 23 and 56 years with the average of 34 (Table 2). Household sizes for the participants were between 1 and 6 people with the average at 3. The data revealed that the average monthly household budget for meat (all types of meat) was R941 and the average monthly household budget for red meat was R622. According to the data as shown in Table 3 the largest number of participants falls under Living Standard Measurement (LSM) 8. All participants fall under LSM 5 -10 indicating that the sample ranges from middle class consumers to upper middle and wealthy consumers. These higher LSM groups are the groups responsible for buying the bulk of red meat sold in South Africa (BFAP, 2014). By testing these higher LSM groups reliable results should be made since these groups buy the cuts of meat tested on the eye-tracker.

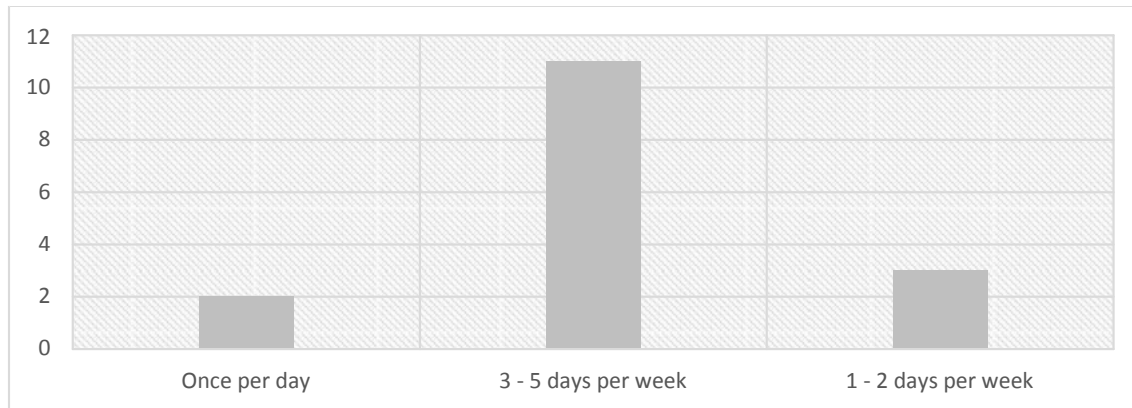
**Table 2: Descriptive statistics for participants**

	Age	Size of household	Household's monthly budget for meat	Household's monthly budget for red meat
Average	34	3	R 941	R 622
Standard Error	3	0	R 160	R 127
Standard Deviation	10	2	R 639	R 509
Range <sup>2</sup>	33	5	R 2 150	R 1 820
Minimum	23	1	R 250	R 100
Maximum	56	6	R 2 400	R 1 920

**Figure 1: Participants grouped according to LSM standards**

Although most of the tested participant households fall under LSM groups 8 and up, only two of these households ate some form of red meat once a day (Figure 2). The largest part of the participants indicated that their households ate red meat 3 to 5 times per week and remaining households ate red meat only once or twice per week. These findings could be explained by way of two reasons. Firstly, red meats are more expensive than substitute meats such as chicken, and households who are trying to cut down on living expenses for whatever reason, can easily replace red meats with a cheaper alternative. The second reason could be linked to the unhealthy image consumers have of red meats that has led to the replacing of red meats with “healthier” alternatives.

<sup>2</sup> Range is the difference between the minimum and the maximum of the shown variables.

**Figure 2: Red meat consumption of participants****Eye-tracking results**

Results from the gaze plots, as illustrated by Figure 3, show that in most of the images participants scanned across the meat with most of the AOI's on the price label of the packets. Note that Figure 3 represents a vacuum-packed steak that only contains a price label. Additional labelling such as breeds, nutritional labels and quality assurance, all received attention when shown on the packets. The attention given to these labels caused more AOI's on the labels while the AOI's on the meat reduced. Packets that contained meat that was not cherry red, but either dark red or brownish meat, showed a decrease in the AOI's on the price labels with an increase of AOI's on the meat. It seems that consumers are not that open-minded to accept darker and browner cuts of meat.

Investigation of the heat maps, similar to Image 4, indicate that most of the participants focused on the price of the packs of meat, the weight of the pack, sell-by date as well as packaged date. On the images that contained additional labelling more attention was given to these labels causing a reduction in the attention given to the price label. All the additional labels received attention irrespective whether it was a brand, breed, origin or quality indicator. This indicates that consumers are interested in the type of red meat that they buy and scan for additional information on their packets of meat. Nutritional tables that contained information with regard to the fat and sodium content of the packet of meat received attention from 88% of the participants for 1.17 seconds on average, indicating that consumers are aware of their health and what they consume. Similar to the gaze plot results the heat maps showed that darker and paler cuts of meat received more attention than cherry red cuts also distracting the participant's attention from other



aspects in the image. In the questionnaire 75% of the participants indicated that they prefer a cherry red (bright red) cut of beef with the remaining participants preferring a dark red cut. These findings, along with their gaze plots and heat maps, suggest that the colour of cut will largely affect how consumers evaluate the packs of meat on a shelf.

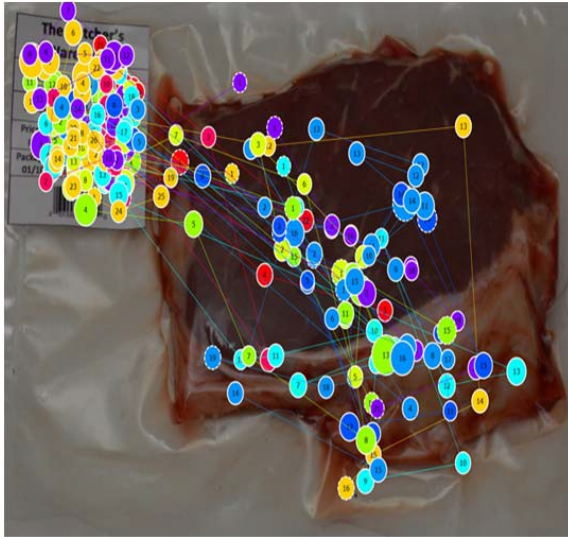


Figure 3: Gaze plot

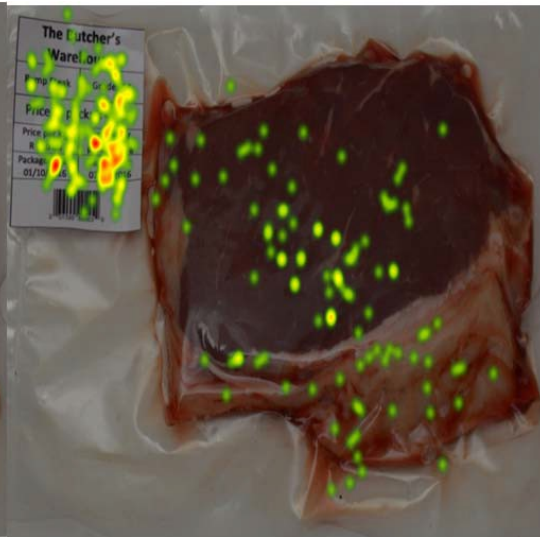


Figure 4: Heat map

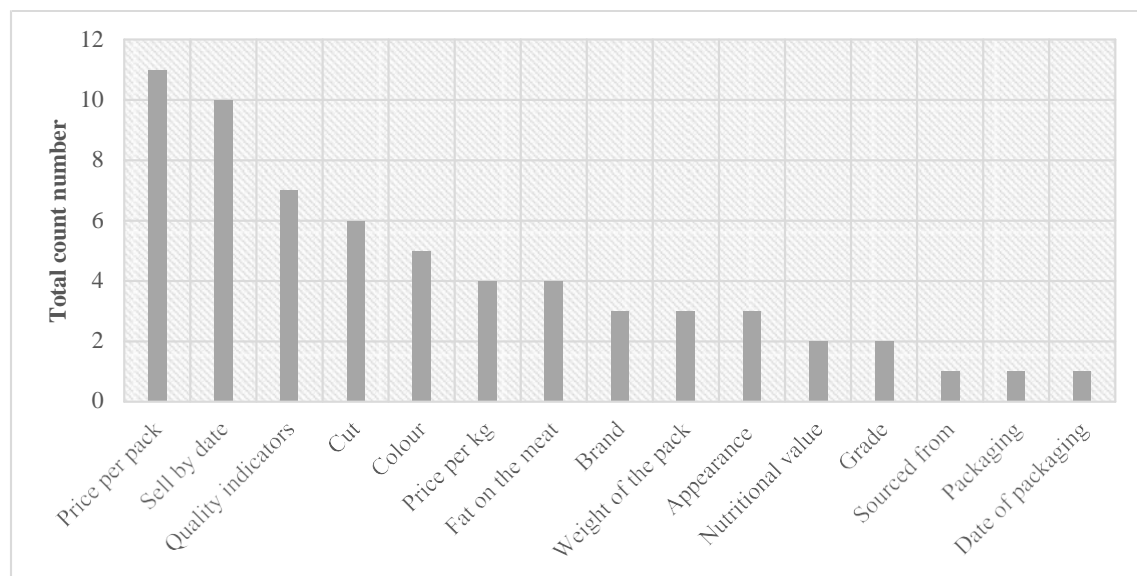
### On-pack aspects

The important aspects that participants require when purchasing red meat are shown in Figure 5. These aspects were identified in the post-test questionnaire and the top five aspects are: price per pack, sell-by date, quality indicators, cut of meat and colour. The most interesting aspect to note from these results is that even though the group of participants mostly fall in high LSM groups they still regard the price of the pack of meat as the most important aspect. Sell-by date was also very important to consumers and could be explained by the fact that fresh red meat is a perishable product that has a short shelf life. Quality indicators are important to consumers with the preference of indicators (grass-fed, no added hormones, etc.) differing between individuals.

While half of the participants were able to recall one or both of the breeds of cattle represented on the labels, none of the participants indicated that they prefer meat from a certain breed of cattle. This is interesting when taking into account the success seen in other countries, for example: Certified Angus beef in the USA. South African producers

have also introduced certain breed-certified meat to the local market such as Afrikaner Beef, Angus Beef and Karoo Lamb. The success of these certified meats might not depend on consumer awareness of the product only but also requires consumer education regarding the benefits of buying certified meats. Only then would it become obvious that consumers make their meat purchasing choices based on breed. The largest percentage of the participants (81%) has indicated that they do not prefer to purchase meat from a specific brand. Remaining participants have indicated not only that they prefer their meat from a certain brand but also that all of these participants preferred the same brand of meat. This indicates that, to a small extent, this specific beef brand has been successful in gathering loyal customers.

**Figure 5: Aspects considered by participants when purchasing red meat.**



Half of the participants indicated that they preferred meat that is vacuum-packed without a polystyrene plate. The other half of the participants did not have a specific preference of packaging. Despite half of the participants preferring vacuum-packed meat only one participant has indicated that packaging plays a role when deciding which packet of meat to purchase. Vacuum-packing seems to be a safe option for producers although these findings suggested that producers who want to increase their meat sales cannot rely only on their method of packaging.

Data analysed by the eye-tracker for a packet of meat containing only the price label revealed the following: the largest part of the group of participants (88%) looked at the price of the pack of meat on average for 0.31 seconds of the five seconds provided. It took participants on average 1.99 seconds before looking at the price of the pack for the first time and participants had an average visit count of 1.21; indicating that some participants looked at the price of the pack more than once during the test. Other aspects that received attention were the sell-by date and weight of pack that was looked at by 56% of the participants. Of these two aspects sell-by date had the lower time until first fixation (1.48 vs. 1.58 - seconds) indicating that participants first verified the sell-by date before moving their attention to the weight of the pack and after that focused on other aspects such as the price of the pack.

Additional labelling on the pack of meat, such as a breed certification label, received attention from 75% of the participants. On these packets of meat containing additional labelling, fewer participants looked at the price of the pack of meat (56%) and sell-by date (44%). On average it took participants 1.11 seconds before they looked at the label for the first time. An average visit count of 1.25 was found for the labelling indicating that participants looked at these labels more than once in the provided time.

Similar to the results shown on the heat maps the analysed data shows that packets containing dark cuts of meat led to participants paying less attention to the price of the pack (50%), the sell-by date and the weight of the pack (44%). Interesting though, is that an increase was found in the average duration that the price of the pack was looked at. Participants might have expected that these darker cuts are sold at a different price.

Data for meat packets containing a nutritional table showed that 88% of the participants looked at the nutritional table for approximately 1.17 seconds each. Participants took 1.86 seconds, on average, before looking at the nutritional table for the first time. The attention given to the nutritional table caused a reduction in the participants looking at the price of the pack (50%) and the sell-by date (38%). It is interesting to note that more participants looked at the weight of the pack on these images (62%).

## **Conclusion**

This study is one of its kind, by using eye-tracking technology to investigate South African consumers' preferences when purchasing red meat. From the results it is clear that most of the consumer attention is on the price label with the price of the pack, sell-by date and weight of the pack receiving the largest deal of attention. Additional labelling such as quality indicators received attention when shown on the eye-tracker. In addition to the eye-tracker results, data from the questionnaire revealed that consumers have certain preferences when it comes to quality indicators. This could serve as one method of increasing sales to red meat producers producing meat with a preferred quality indicator. Market research should, however, be done to determine which niche markets exist in the targeted area to ensure the success of a quality indicator.

Further recommendations that can be made from this study are that most red meat consumers prefer a cut of meat that is cherry red. The price of the pack of meat is also a major aspect determining the sale of the meat and should be highly visible on the pack. A sell-by or best before date is a crucial aspect that should not be forgotten. On-pack product information such as the nutritional table captures the attention of potential clients and could play a larger role in the successful marketing of red meat amongst South Africans in the future.

The majority of the red meat consumers in the study are not very loyal towards a specific brand. For producers to increase their brand loyalty and gain market share, advertisement campaigns will be required. These producers should also produce the same quality of meat continuously to gain consumers' trust and support their product with certifications done by an independent authority. Consumer education with regard to the meaning of a specific quality indicator, breed label and grade of beef could assist red meat consumers with making a more informed decision. Once consumers know what the labelling on a pack of meat means, they might be willing to pay a premium for such quality certifications, brands, etc.

Due to the small sample size used, results cannot yet be generalized. Further research on this topic with a larger sample size, as well as a larger area, could confirm the results and

could have increased implications and advantages for South African producers and consumers.

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