

## **CONSUMPTION AND PREFERENCES OF SOME PROCESSED MEATS AMONG RIYADH RESIDENTS IN SAUDI ARABIA**

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### **ABSTRACT**

This study was conducted to investigate the consumption patterns and preferences of some processed meat products among residents in Riyadh Metropolitan area. Questionnaires were randomly distributed to 300 individuals representing Saudis and non-Saudis of which 276 answered questionnaires were received. Seventy-four percent of the participants consumed processed meat, and 62.8% of these people accustomed to eat processed meats for more than five years. Consumption of processed meats was mostly on weekly basis (35.1%), and associated with main meals, usually dinner (51.9%). Hamburgers ranked top (37.4%) as the most preferred products, followed by mortadella (8.4%). Consumers liked chicken (46%) as processed meat raw material and they preferred the products to be prepared locally (82.4%). The brand name was the main reason that makes 77.6% of Riyadh residents purchase certain types of processed meats. Health concern was the reason for 62.5% of the non-consumer participants not eating processed meat products. Income and marital status positively correlated with consumption of processed meats ( $P<0.01$ ), however, age correlated negatively ( $P<0.01$ ) with the consumption of processed meat products. Preference of processed meat type associated ( $P<0.01$ ) with consumer type of occupation. The knowledge of processed meats nutritional values was highly correlated ( $P<0.01$ ) with the education level and monthly income of consumers. Selection of processed meat items was significantly ( $P<0.01$ ) influenced by the product brand name.

*Key words: processed meat - processed meat consumption - processed meat preference.*

## 1. INTRODUCTION

The Gulf Cooperation Council (GCC) countries and West-Asia sub-regions recorded the highest population growth rates (Musaiger and Miladi, 1997). In such countries, the total population growths together with demographic attributes (age, sex, structures, family status, and education levels) and economic factors have contributed significantly to changes of eating habits and diets.

The intensive and semi intensive systems of livestock production are more responsive to market conditions, like dairy, poultry and meat production, which are spreading in Saudi Arabia as well as in many other countries of the region (FAO/RNEA, 1992).

Studies on food consumption, particularly on dietary intake in the Near East region (NER) are lacking. By using two relevant indicators, per capita economic national product (ENP) and daily energy supply (DES), derived from FAO Food Balance Sheets, the Near East region was divided into three major groups of countries, of which high-income countries concern us. Of these high-income countries, Saudi Arabia had the ENP/ capita above US \$6000 and DES above 3000 Kcal/capita/day. Consumption of cereal and animal products in Saudi Arabia is comparable to that in industrialized countries. In Saudi Arabia the per capita consumption of meat was 59.4 kg, milk 45.7 kg, and 6.3 kg for eggs (Ministry of Agriculture and Water, 1998).

Food industry in Saudi Arabia has exhibited considerable growth and development. The number of food plants increased from 144 factories in 1980 to 346 factories in 1994 (Ministry of Industry and Electricity, 1998). Meat processing is considered to be one of the most flaring and fast developing sectors of food industry. In 1975, there was only one meat plant, in 10 years, 10 factories were working, and in 1997 the number reached 24 producing factories (Ministry of Industry and Electricity, 1998). In 1998, the number of factories specialized in slaughter, preparation, storage, and processing of meats reached 40 factories with total licensed production of more than 300

thousand tons, and with a total working capital of SR923 millions and 2000 employees. The number of licensed factories working only in processing of red and white meats up to the end of year 1998 was 25, with a total production capacity of 100 thousand tons (Ministry of Industry and Electricity, 1998). All the above quotations are indicative of the population demands for processed meats. However, information on the consumption (patterns and preferences) of such products in the country is lacking. Thus, the aim of this study was to investigate the consumption patterns and preferences of some processed meat products among the population of Riyadh Metropolitan area.

## **2. MATERIALS AND METHODS**

This study was conducted between February and March 2000. A random sample of 300 Riyadh residents, representing Saudis and non-Saudis was screened. Participants were given a questionnaire that was prepared for self-completion. The questionnaire was designed to address the study issues. The issues covered include: (1) demographic characteristics of participants (age, education level, social status, occupation, monthly income, nationality, and residence locality in Riyadh); (2) consumption patterns of processed meats [consuming or not consuming processed meats, frequency of processed meat consumption (daily, weekly and monthly)]; (3) years of consumption; (4) meals at which processed meat are consumed; (5) preferences [type of processed meats preferred, source (local or imported), condition of product at purchase; (6) knowledge of composition and nutritional value; (7) health problems associated with consumption, and reasons for consuming or not consuming processed meats.

Of 300 participants, 276 completed questionnaires were received (199 questionnaires were filled by Saudis and 77 by non-Saudi). Data were then introduced into the computer and analysis was conducted using the statistical analysis system (SAS, 1995). Frequencies, percentages, chi-square and Pearson's correlation coefficient were determined to assess the processed meats consumption patterns and preferences among Riyadh residents.

### 3. RESULTS AND DISCUSSION

The demographic characteristics of the participants are shown in Table (1). The study included 276 participants aged <15 years - >30 year. Those who were 21-25 year old, 26-30 year old and >30 years old, represented 31.5%, 24.6% and 25.4% of the total sample, respectively. Around 75% of respondents completed their secondary (39.5%) and university (35.1%) education, while 6.5% of the respondents with post graduate, and an intermediate level of education constituted 15.9%. Seventy two percent of the participants were Saudis, and more than half of the participants were married (55.3%). Study subjects that were employed by government and private sectors amounted to 157 persons constituting 57.3% of the total participants. Forty-five percent of the participants had a monthly income ranging between 5000 to 7000 SR, while the rest of the participants had a monthly income ranging between 1000 to 3000 SR; 25.8% of them with SR 1000 income. Collected data indicated that the participants were distributed in approximately near percentages (15-19%) from northern, central and western area of Riyadh city, while the majority of participants were from southern (25.7%) and eastern (24.3%) Riyadh city.

Table (2) reveals that 74.3% of the 276 respondents consumed processed meat products. The data also indicated that the non-Saudi participants consumed processed meats more than the Saudis (77.8 % vs. 73.2%). A considerably high percentage of consumers (62.8%) stated that they consumed processed meats for more than 5 years. The most important reasons for consuming processed meats include; easy preparation (35.1%), and for a change as well as for different taste (31.7%). Thirty-five percent of the individuals who consumed processed meats stated that they ate processed meats weekly, while 31.6% said they consumed such products occasionally. Low percentages of respondents consumed processed meats on monthly and daily basis (17.5% and 14.1%, respectively). A high percentage of consumers (51.9%) preferred to eat processed meats at dinner time, while small percentages (12.1 and 8.3%) of the consumers liked to serve processed meats at breakfast and lunch times, respectively. The data also reveal that processed meat products were considered as snacks by 22.8 % of the consumers. For non-processed meat

**Table(1):Distribution of participants according to their emographic characteristics.**

| Characteristic          | Percentage of distribution | Total % |
|-------------------------|----------------------------|---------|
| <b>Age:</b>             |                            |         |
| <15 years               | 02.5                       | 100     |
| 15-20 years             | 15.9                       |         |
| 21-25 years             | 31.5                       |         |
| 26-30 years             | 24.6                       |         |
| >30 years               | 25.4                       |         |
| <b>Education level:</b> |                            |         |
| Primary                 | 2.9                        | 100     |
| Intermediate            | 15.9                       |         |
| Secondary               | 39.5                       |         |
| Graduate                | 35.1                       |         |
| Post-graduate           | 06.5                       |         |
| <b>Social status:</b>   |                            |         |
| Married                 | 55.3                       | 100     |
| Un-married              | 44.7                       |         |
| <b>Occupation:</b>      |                            |         |
| Student                 | 33.6                       | 100     |
| Government employee     | 27.7                       |         |
| Private sector          | 29.6                       |         |
| Business man            | 06.6                       |         |
| Others                  | 03.6                       |         |
| <b>Income:</b>          |                            |         |
| 1000 SR                 | 25.8                       | 100     |
| 3000 SR                 | 29.2                       |         |
| 5000 SR                 | 19.7                       |         |
| 7000 SR                 | 09.8                       |         |
| >7000 SR                | 15.5                       |         |
| <b>Nationality:</b>     |                            |         |
| Saudi                   | 72.1                       | 100     |
| Non-Saudi               | 27.9                       |         |
| <b>Residence:</b>       |                            |         |
| Northern Riyadh         | 15.2                       | 100     |
| Southern Riyadh         | 25.7                       |         |
| Central Riyadh          | 18.8                       |         |
| Eastern Riyadh          | 24.3                       |         |
| Western Riyadh          | 15.9                       |         |

consumers, health reasons were rated first (63.4%), followed by health and nutrition (21.1%), then nutrition only (15.5%) as factors for not consuming processed meat products.

Table (3) discloses distribution of processed meat consumers according to their preference of processed meat type, condition at purchase, raw meat used, source and product brand name. As appearing in Table (3), hamburger was ranked top preferential product by the highest percentage of consumers (37.4%), with a great difference from the secondly favoured product mortadella, which was preferred by only 8.4% of the consumers. Preferences for the rest of products individually or in combinations of two or more, were shown by comparatively lower percentages (8.0 to 0.5%) in the order listed in Table (3). In the United States of America, it was reported that beef burgers ranked as the top five of the most preferred food products in 1977 and 1990 (Kinsman, *et al.*, 1994). Unlike what was encountered in Riyadh and America, Australia hamburgers ranked third in the list of the most popular foods according to a survey released by the economic research firm BIS Shrapnel (Dale, 2001).

In the present study, sausages ranked fifth (5.4%) as preferred processed meat products alone, but when it was combined with hamburgers and mortadella/hamburgers, it ranked third (7.9%) and sixth (4.4), respectively (Table 3). The low preferences of sausages may be due to the fact that Saudis are not used to such a product and may take long time to be familiar with it, if it can be. On the contrary, in South Africa vacuum-packaged Vienna sausages alone represent 23% of total processed meat consumption (Wessels and Plessis, 1992). Furthermore, consumption of sausages in USA is considerably enormous. In America, refrigerated dinner sausage retail sales for the 52 weeks ending April 2000 topped \$1.134 billions, frozen sausages retail sales was up to \$295 millions, and breakfast sausages up to \$733 million. These apart from sausage food service sales whose data are not available from market research services, however, overall sausage sales by US manufacturer were expected to be \$8.1 millions in 2000 and projected to grow up to 11.7 billions by 2008, representing annual increase of 3.9% (Anonymous, 2000).

In the present study, approximately 46% of the consumers stated that they preferred processed meat products in which chicken meat was used as raw material, followed by mutton and beef meats (20 %

Table (2): Distribution of participants according to patterns and reasons for their consumption of processed meats.

| Items   | Frequency | Percentage |
|---|-----------|------------|
| <b>1-Consumption</b>                                |           |            |
| Yes   | 205       | 74.3       |
| No  | 71        | 25.7       |
| Total   | 276       | 100        |
| <b>2- Duration of consumption</b>                   |           |            |
| 1 year  | 11        | 5.5        |
| 2 years   | 22        | 11.1       |
| 4 years   | 41        | 20.6       |
| 5 years   | 125       | 62.8       |
| Total   | 205       | 100        |
| <b>3- Frequency of consumption</b>                  |           |            |
| Daily   | 29        | 14.1       |
| Weekly  | 72        | 35.1       |
| Monthly   | 36        | 17.5       |
| Annually  | 3         | 1.7        |
| Occasionally  | 65        | 31.6       |
| Total   | 205       | 100        |
| <b>4- Meal in which the products are eaten</b>      |           |            |
| Breakfast   | 24        | 12.1       |
| Lunch   | 17        | 8.3        |
| Dinner  | 107       | 51.9       |
| Snacks  | 47        | 22.8       |
| Lunch/dinner  | 10        | 4.9        |
| Total   | 205       | 100        |
| <b>5- Reasons for consuming processed meats</b>     |           |            |
| Easy preparation                                    | 71        | 35.1       |
| Price   | 15        | 7.4        |
| Change  | 64        | 31.7       |
| Encouraged by friend                                | 16        | 7.9        |
| Social family occasion                              | 12        | 5.9        |
| Others  | 27        | 11.9       |
| Total   | 205       | 100        |
| <b>6- Reasons for not consuming processed meats</b> |           |            |
| Nutritional   | 11        | 15.5       |
| Health  | 45        | 63.4       |
| Nutritional/health                                  | 15        | 21.1       |
| Total   | 71        | 100        |

Table (3): Distribution of consumers according to product preferences, condition of product at purchase, raw meat used in processing and marketing aspects.

| Items  | Frequency | Percentage |
|--|-----------|------------|
| <b>1-Preference of processed meat according to their types</b>                           |           |            |
| Hamburger  | 76        | 37.4       |
| Mortadela  | 17        | 08.4       |
| Sausage  | 11        | 05.4       |
| Koufta   | 04        | 02.0       |
| Luncheon   | 04        | 02.0       |
| Pasterma   | 03        | 01.5       |
| Salami   | 03        | 01.5       |
| Bologna  | 01        | 00.5       |
| Sausage & Hamburger  | 16        | 07.9       |
| Hamburger & Koufta   | 15        | 07.4       |
| Sausage & Mortadella & Hamburger   | 09        | 04.4       |
| Others   | 44        | 20.6       |
| Total  | 205       | 100        |
| <b>2- Preference of processed meats according to type of raw meat used in processing</b> |           |            |
| Chicken  | 93        | 46.0       |
| Mutton   | 41        | 20.0       |
| Beef   | 29        | 14.0       |
| Chicken/mutton   | 17        | 08.0       |
| Chicken/beef   | 08        | 04.0       |
| Others   | 17        | 08.0       |
| Total  | 205       | 100        |
| <b>3- Preference of processed meats according to their conditions at purchase</b>        |           |            |
| Fresh  | 112       | 55.2       |
| Chilled  | 30        | 14.8       |
| Frozen   | 45        | 22.2       |
| Canned   | 9         | 04.0       |
| Others   | 9         | 04.0       |
| Total  | 205       | 100        |
| <b>4-Preference of processed meats according to their sources</b>                        |           |            |
| Local  | 169       | 82.4       |
| Imported   | 36        | 17.6       |
| Total  | 205       | 100        |
| <b>5- Preference of processed meats according to their brands and packages</b>           |           |            |
| Brand  | 156       | 77.6       |
| Package  | 44        | 21.9       |
| Package & brand  | 01        | 00.5       |
| Total  | 201       | 100        |
| <b>6- Preference of camel meat as a source of raw material</b>                           |           |            |
| Do prefer  | 31        | 16.6       |
| Do not prefer  | 154       | 82.4       |
| May prefer sometimes   | 02        | 01.0       |
| Total  | 187       | 100        |

and 14%, respectively) (Table 3). These findings are in agreement with those of Al-Owaimer (1999) who reported that chicken was the meat of preference, followed by mutton, beef and camel meat among Saudi citizens living in Riyadh City. Furthermore, Krupa and Majka (2000) stated that poultry, bacon and sausages were the most popular of the meat products in Poland. Eighty-two percent of the participants did not recommend camel meat to be used as raw material for processed meats, and this may be due to social factors, food habits and traditional patterns of preparation and consumption of dishes containing camel meat.

Locally produced processed meats were favored by 82.4% of the participants locally, and more than 55% of those consuming processed meats liked the products to be freshly prepared. This agreed with the fact that local products are more preferable than imported ones among Riyadh residents (Table3).

Meat consumption in Saudi Arabia is a traditional food habit. It follows religion traditions, which are continuous and adhered to through requirements for ritualistic slaughter and processing procedures by Islamic Halal Laws. However, although Muslims obey and closely stick to their religion mandates, many Muslims societies including Saudi society are undergoing lifestyle, food habits and dietary patterns changes. These changes affect consumers' food buying decision, which is driven by; (1) variety of choices represented by new products displayed in food supermarkets, cafes, restaurants, and fast food chains; (2) social factors such as work of women, and work of students, and (3) comparative prices of processed meats versus fresh meats for the low income groups. In the present study, Brand name and package shape were important factors determining consumer preferences for processed meat. Brand name was on the minds of roughly 77.6% of the processed meat purchasers, whereas, package shape convinced only 21.9% of the consumer to buy processed meats (Table 3). Branding and packaging information were reported third factor that influenced purchase of processed meat products in Poland (Krupa and Majka, 2000).

Health and diet consideration should not be ignored. Although consumption of processed meats in Saudi Arabia is expected to increase under the prevailing factors listed above, consumer concerns over health issues such as those related to fat and cholesterol are

increasing. These concerns appear most at times of disease outbreaks events such as food poisonings, and others like the Rift Valley Fever recently encountered in Saudi Arabia, at which times public awareness and attention were agitated. There is no question that muscle foods will continue to be the food of choice around which meals will revolve. However, as facts become known and research and scientific advises and counseling demonstrate the efficacy of new knowledge and its application to humans, and as the awareness of the public improves, the consumption decisions could then be expected to improve and focus on those areas that determine greater health benefits. Table (4) shows the data related to consumer perceptions and knowledge of the composition, nutritional values and health problems associated with processed meat consumption. As shown in the Table, approximately half of the consumers (50.2%) claimed their knowledge of processed meat composition. Around 40% of the participants perceived processed meats as useful products, while 27.7% of them think that processed meats are nutritionally un-useful. Sixty-eight percent of the consumers stated that they encountered no health problems when consuming processed meats, while 25.9% claimed that they had problems sometimes and 5.9% usually encountered health problems as a result of the consumption of processed meats. Advertisement (45.7%), friends (26.4%), and travel (16.2%) were the main ways by which consumers came to know processed meat products available in the market (Table 4).

Association of people consuming processed meats with their demographic characteristics and nationality was determined (Table 5). Percentages of participants who consumed processed meats were calculated and chi-squares were used to define differences due to their demographic characteristics (age, education, marital status, occupation and income). A negative but significant association ( $P < 0.05$ ) was found between all of the processed meat consumers and their ages (Table 5). The percentages of consumers age <15 years, 16-20 years, 21-25, 26-30 and >30 years of all participants were 85.7, 84.1, 82.6, 66.2 and 65.7, respectively. This is expected, and it is understandable that children and teenagers like to eat processed meats (as snacks and/or fast foods) more than what adults would do. When consumers were grouped according to their nationality, a negative but significant ( $P < 0.05$ ) association between percentage of Saudi

**Table (4): Distribution of consumers according to their perception and knowledge of the composition, nutritional value, and health problems associated with processed meat products.**

| <b>Items</b>   | <b>Frequency</b> | <b>Percentage</b> |
|--|------------------|-------------------|
| <b>1- Knowledge of processed meat composition</b>                        |                  |                   |
| Know   | 103              | 50.2              |
| Do not Know  | 102              | 49.8              |
| Total  | 205              | 100               |
| <b>2 - Perception of nutritional value of processed meat</b>             |                  |                   |
| Useful   | 82               | 40.6              |
| Un-useful  | 56               | 27.7              |
| Do not Know  | 64               | 31.7              |
| Total  | 202              | 100               |
| <b>3- Health problems associated with consumption of processed meats</b> |                  |                   |
| Usually have problems  | 12               | 5.9               |
| Have no problems   | 190              | 68.3              |
| Have problems sometimes  | 53               | 25.9              |
| Total  | 205              | 100               |
| <b>4- Ways for knowing processed meats products</b>                      |                  |                   |
| Travel   | 32               | 16.2              |
| Friends  | 52               | 26.4              |
| Advertisement  | 90               | 45.7              |
| Others   | 53               | 11.7              |
| Total  | 197              | 100               |

Table (5): Percentages and association of people consuming processed meats with their demographic characteristics and nationality.

| Demographic characteristics of consumers | Participants groups       |                 |                    |
|--|---------------------------|-----------------|--------------------|
|  | All participants (No=276) | Saudis (No=199) | Non-Saudis (No=77) |
| <b>Age:</b>                              |                           |                 |                    |
| <15 years                                | 85.7                      | 83.3            | 100                |
| 16-20 years                              | 84.1                      | 81.6            | 100                |
| 21-25 years                              | 82.6                      | 81.2            | 93                 |
| 26-30 years                              | 66.2                      | 65.1            | 68                 |
| >30 years                                | 65.7                      | 61.0            | 72                 |
| <i>Chi-square</i>                        | 10.87*                    | 8.52*           | 6.26               |
| <b>Education level:</b>                  |                           |                 |                    |
| Primary                                  | 75.0                      | 50.0            | 100                |
| Intermediate                             | 70.5                      | 65.6            | 83.3               |
| Secondary                                | 69.7                      | 68.9            | 73.5               |
| Graduate                                 | 79.2                      | 80.8            | 73.9               |
| Post-graduate                            | 83.3                      | 78.6            | 100                |
| <i>Chi-square</i>                        | 3.48                      | 5.08            | 3.07               |
| <b>Marital status:</b>                   |                           |                 |                    |
| Married                                  | 44.9                      | 79.5            | 89.5               |
| Un-married                               | 29.2                      | 64.3            | 66.7               |
| <i>Chi-square</i>                        | 9.51**                    | 5.6             | 5.82               |
| <b>Occupation:</b>                       |                           |                 |                    |
| Student                                  | 81.3                      | 80.3            | 90.0               |
| Government employee                      | 71.1                      | 66.7            | 92.0               |
| Private sector                           | 69.1                      | 68.6            | 71.1               |
| Business man                             | 72.2                      | 68.8            | 100                |
| Others                                   | 71.44                     | 0.0             | 77.4               |
| <i>Chi-square</i>                        | 3.92                      | 3.91            | 4.36               |
| <b>Income:</b>                           |                           |                 |                    |
| 1000 SR                                  | 86.8                      | 84.9            | 93.3               |
| 3000 SR                                  | 73.7                      | 80.0            | 66.7               |
| 5000 SR                                  | 73.1                      | 67.7            | 85.0               |
| 7000 SR                                  | 46.2                      | 45.8            | 50.0               |
| >7000 SR                                 | 73.2                      | 71.8            | 100                |
| <i>Chi-square</i>                        | 16.33**                   | 14.34*          | 6.64               |

\* significant at  $P < 0.05$

\*\* significant at  $P < 0.01$

consumers and their ages was detected. Meynesse and Jianguo (1997) reported that convenience meat preferences were influenced by gender, age, marital status, religion, race and price levels.

Although it is not significantly associated ( $P > 0.05$ ), the consumption of processed meat increased with the increase of education levels of Saudi participants. However a definite pattern of association was not evident for the non-Saudi consumers (Table 5). Again, this observation could be interpreted in the light of educated subjects may be having better knowledge of the processed meats, their composition, and nutritional values.

Results in Table (5) revealed that marital status was highly significantly ( $P < 0.01$ ) associated with processed meat consumption. The married people consumed processed meats more than ( $P < 0.01$ ) unmarried ones. It is also shown that married non-Saudis consumed processed meats more than married Saudis (89.9 versus 79.5%), however, the difference was not significant ( $P > 0.05$ ). Furthermore, the results indicated that there were no significant differences ( $P > 0.05$ ) among all three groups of participants in the consumption of processed meats according to their occupation, although students (young) appeared to consume processed meats more than others (Table 5).

In the current study, there were differences in the percentages of all ( $P < 0.01$ ) and Saudis ( $P < 0.05$ ) participants in consuming processed meats according to their income, but this difference was not detected for the non-Saudi consumers. It was observed that low-income people (SR 1000), in general, in all three groups of participants consumed processed meat more than the high-income people (Table 5). This was in agreement with the findings of the National Hot Dog and Sausage Council who reported that lower income families in the US consume sausages in breakfast. Differences in consumption of sausage were found to be due to sizes of families, ages, and residence locality (Anonymous, 2000).

The correlation coefficient of demographic characteristics of consumers with some variables of consumption and preferences of processed meat are shown in Table (6). Consumption of processed meat correlated negatively significantly ( $P < 0.01$ ) with age of consumers. This supports the data in Table (5) in which the numbers of consumers decreased with the increase of the age. Therefore it can

be concluded that children and young people were the most consuming group of processed meat products. Consumption of processed meats also correlated significantly ( $P < 0.01$ ) with marital status, where married people consumed processed meat more than unmarried one. This could be due to the fact that children and young adults, who are the most consuming group of processed meats (Table 5), usually live with families. Monthly income also did demonstrate significant Pearson's correlation ( $P < 0.01$ ) with the consumption of processed meats, and this supports the finding in Table (5), in which consumers as a whole and Saudi as a part presented significant differences in consumption by income ( $P < 0.01$  and  $p < 0.05$ , respectively). Other demographic characteristics such as education, occupation, residence locality, and nationality of consumer did not show any significant ( $P > 0.05$ ) correlation with consumption pattern of processed meats.

Types of processed meats preferred by consumers were correlated significantly ( $P < 0.05$ ) with only the consumer occupation. Although a small percentage of processed meat consumers (16.6% - Table 4) preferred camel meats, there were significant ( $P < 0.01$ ) correlation found between age, monthly income and nationality with the preference of camel meat to be used as a raw material for processed meat products. Older Saudi consumers with high monthly income favored camel meat as a raw material for manufacturing processed meats.

Education and monthly income were both positively significantly ( $P < 0.01$ ) correlated with knowledge of nutritional values of processed meats, this may possibly be due to the better understanding of educated subjects to processed meats, and definitely the more educated, the more income they would have.

Marketing factors such as brand name highly influenced consumer decision for buying certain types of processed meats (Table 3). This appeared to be true for educated consumers since their selection of processed meats was significantly ( $P < 0.01$ ) associated with brand names and package design (Table 6).

In conclusion, processed meat products are preferred by a large percentage of people living in Riyadh metropolitan area. Most consumers know little or nothing about the composition and nutritional values of such products, and most of their knowledge came

Table (6): Pearson's correlation coefficient values (r) of demographic characteristics with some variables of consumption and preference of processed meats<sup>1</sup>

| Demographic characteristics | Consumption | Preferred type of meat product | Preference of camel meat | Importance of source (local or imported) | Knowledge of nutritional value | Marketing factors of preference |
|-----------------------------|-------------|--------------------------------|--------------------------|--|--------------------------------|---------------------------------|
| Age                         | -0.17**     | --                             | 0.18**                   | --                                       | --                             | --                              |
| Education level             | --          | --                             | --                       | --                                       | 0.16**                         | 0.16**                          |
| Social status               | -0.18**     | --                             | --                       | --                                       | --                             | --                              |
| Occupation                  | --          | 0.14*                          | --                       | 0.14*                                    | --                             | --                              |
| Monthly income              | -0.15**     | --                             | 0.26**                   | --                                       | 0.16**                         | --                              |
| Nationality                 | --          | --                             | 0.16**                   | 0.18**                                   | --                             | --                              |
| Residence localit           | --          | --                             | --                       | --                                       | --                             | --                              |

<sup>1</sup> Numbers are representing (r) values

\* significant at  $P < 0.05$

\*\* significant at  $P < 0.01$

-- not significant  $P > 0.05$

through advertisements. To boost meat industry, educational institutions and investors in processed meat industry should provide consumers with more information about processing, composition and nutrition values of different processed meat products. In addition, more research needs to be done in assessing consumption of processed meats. Aspects to be emphasized in such investigation include: (1) amount of family purchases and prices of processed meats; (2) supplemental additional information on preparation of processed meats (freezing, thawing, cooking methods, time of cooking...etc); (3) where processed meats are cooked and eaten (whether at home or outside, and determination of the extent of consumption in both); and (4) health issues as well as consumer food safety behaviors (such as handling, cooking and serving).

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## النمط الإستهلاكي وتقبل اللحوم المصنعة في منطقة الرياض بالمملكة العربية السعودية

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### ملخص

أجريت هذه الدراسة لمعرفة النمط الاستهلاكي ومدى تقبل منتجات اللحوم المصنعة لدى سكان مدينة الرياض. تم توزيع ٣٠٠ استمارة استبيان توزيعا عشوائيا على السكان السعوديين وغير السعوديين، استكمل ٢٧٦ منهم الإجابة عليها. وقد اتضح أن ٧٤% من المشاركين يستهلكون اللحوم المصنعة وأشارت النتائج على أن ٦٢,٨% من المستهلكين يتناولون اللحوم المصنعة منذ ٥ سنوات أو أكثر، وفي الغالب يتناولونها مرة واحدة في الأسبوع (٣٥,١%). ارتبط استهلاك اللحوم المصنعة بالوجبات الرئيسية خاصة في وجبة العشاء (٥١,٩%). واتضح من الدراسة أن الهمبرجر هو المنتج المفضل الأول (٣٦,٤%) تليه المرتاديل (٨,٤%). وتبين أن ٤٦% من المستهلكين يفضلون لحم الدجاج كمادة خام لتصنيع تلك المنتجات، ومعظم المستهلكين (٨٤,٤%) يفضلون اللحوم المصنعة المنتجة محليا على مثيلاتها المستوردة. وأشارت النتائج أن العلامة التجارية للمنتج هي السبب الأساسي الذي يجعل ٧٧,٦% من سكان الرياض مستهلكي اللحوم المصنعة يفضلون نوعا معينا من اللحوم المصنعة. وكانت الاهتمامات الصحية لـ ٦٢,٥% من غير المستهلكين هي السبب في عدم استهلاكهم للحوم المصنعة. ارتبط كل من الدخل و الحالة الإجتماعية ارتباطا معنويا ( $p < 0.01$ ) إيجابيا مع استهلاك اللحوم المصنعة، بينما ارتبط العمر ارتباطا معنويا ( $P < 0.01$ ) عكسيا. ارتبط تفضيل نوع معين من منتجات اللحوم المصنعة معنويا ( $P < 0.01$ ) مع وظيفة المستهلك. ارتبط معرفة القيمة الغذائية للحوم المصنعة ارتباطا معنويا قويا ( $P < 0.01$ ) مع دخل ومستوى المستهلك التعليمي. أما اختيار المستهلك لنوع معين من منتجات اللحوم فتبين انه مرتبط معنويا ( $P < 0.01$ ) بماركة المنتج التجارية.