Qualitative factors affecting the price and demand of honey in Saudi Arabia
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Abstract
This study was conducted to analyze the impact of quality factors on the price of honey in the Kingdom of Saudi Arabia. The data were collected from 674 (343 retailer and 331 consumers) of seven major cities of Saudi Arabia; and analyzed using descriptive statistics, ANOVA and HPM. The result of the study revealed that locally produced honey such as Sidr, Sumra and Talh were preferable due to its quality. The most important quality characteristics of locally produced varieties of honey are good flora and attractive packaging. It also added a significant retail price premium to the base price. The premium for local and imported honey was estimated to be SR11/kg. and SR8.5 kg., respectively. However, purity adds insignificant price premium amounted to be SR 5.13/kg. Beekeepers are advised to carefully choose the type of flowers where their honeybees feed on, as it influences honey preference of the consumers. Marketing services, especially attractive packages are also highly recommended as it increase honey retail price significantly.

Key words: Hedonic Price Model, honey price variations, honey quality attributes, honey varieties

Introduction
Honey consists wide range of sugars, minerals and vitamins and their proportions are varying from honey to honey depending on their quality and botanical origins (Saadatmand, 1999). Types and quality attributes of honey are the most essential factors explaining honey price variations. Consumer tastes and their abilities to differentiate between type and quality characteristics are the bases of prices they pay for honey. Relative importance of each quality characteristic is represented in scores given from consumers’ point of view in light of their ability to distinguish the product type and qualitative characteristics.

Honey quality attributes are the characteristics, which relate to consumer’s expectations and complements the determination of botanical origin and physicochemical characteristics. Honey properties may be scored and described using the senses of human beings as an analytical tool. Sensory analysis of honey has been practiced since many years back in different countries like in France, Italy and Spain (Gonnet and Vache, 1998; Estupinan et al., 1999; Piana et al., 2004; Galán-Sodevilla et al., 2005; Gonzalez et al., 2010). Moreover the International Honey Commission (IHC,
2001), and the United State National Honey Board (2002), have published extensive work on the
sensory attributes of honey. Moreover, many studies used analytical methodology and descriptions of
honey attributes (Aparna and ajalakshmi, 1999; Ciappini, 2002; Anupama et al., 2003; Garitta and
Rodriguez, 2006; Montenegro et al., 2008 and Sabag et al., 2009).

Literatures indicated that many economic studies analyzed the impact of different explanatory factors
(product type and quality attributes) on the price of honey through a standard econometric model
(Hedonic Pricing model (HPM)). Hedonic pricing model was specified as the price of a homogeneous
commodity which is a function of the quality characteristics and marketing services of such
commodity. HPM, has been utilized by Haas and Court (Goodman, 1998 and Colwell and Dilmore,
1999). HPM has been utilized in a wide range of commodities, like the impact of the type of marketing
services and quality characteristics of fruit on their prices in Saudi Arabia (Esa, 1998), and the impact
of several factors on changes in housing prices in China (Wen et al., 2005) using various functional
forms to express the relationship between the price, as the dependent variable, and the variables
causing the variation in price, as explanatory variables. Moreover, HPM has also been used to analyze
the relative importance of the influence of quality factors on rice price (Ghorbani, 1996). Moreover,
Horbani and Mirbemani (2005) utilized HPM to explain factors influencing changes in prices of beans
as a result of the changes in the color, purity, cooking and the level of packaging. HPM was also used
to investigate the impact of environmental changes on food expenditure and housing for a family in
the city of Riyadh (Rejaib, 2009). Latinopoulos et al. (2004) used HPM to detect the implicit value of
irrigation water through the analysis of the value of agricultural land in a typical rural area in Greece
and he found the high impact of irrigation water on the price variations of agricultural land. Similarly,
Batalhone et al. (2002) used Hedonic Pricing Model to estimate the economic impact of the strong
smell that arise from sewage water treatment plants, on the values of properties, which lies around the
plant and the study indicated the presence of a significant decline in the value of the property because
of the pollution in the environment. These generally indicate that HPM is very important tool to
determine the price of wide range of commodities.

HPM model was also employed by different investigators to determine the influence of the type and
quality characteristics of honey on its price (Becker, 1965; Lancaster, 1966; Rosen, 1974 and Lucas,
1975). To explain the reasons of variations in honey price Abebini and Asgari (2005) analyzed the
effect of the destination of import and export market on the price of honey in Iran. Moreover,
Ghorbani and Khajehroshanaee (2009) analyzed qualitative factors that affect consumers demand for
honey, using Hedonic Pricing Model in province of Khorasan Razavi Republic of Iran. Moreover, the
authors reported that type, with beeswax (as with comb), packaging, color, aroma, sweetness, and purity were the most important factors that have a direct impact on the variation of honey prices.

Ciappini et al. (2013) indicated that sensory analysis of honey is an important tool for determining its floral origin, for subsequent quality control practices and which ultimately will determine consumer preferences towards the product. The sensory quality characteristics include color, floral flavor, intense flavors, tendency to quick crystallization, intensities of sweetness and aroma. These indicators of quality provide a differentiating tool to determine the value of honeys and their prices.

With this background the study was aimed at analyzing the impact of quality factors on the price of honey in the Kingdom of Saudi Arabia. The study specifically focused on the descriptive analysis of the most important varieties and quality characteristics of honey; honey price variation and finally the study attempted to econometrically estimate the parameters using Hedonic Pricing Model.

**Research Methodology**

The study was mainly based on primary data, generated from sampled retailers and consumers of honey. The data collection was carried out using direct contact with targeted retailers and consumers. The study covered seven major cities of Saudi Arabia (Riyadh, Jeddah, Taif, Tabuk, Dammam, Asir and Jizan. For the purpose, questionnaire was developed and has been used after being tested, and revised. The questionnaire was designed to accommodate both quantitative and qualitative data. The questionnaires related to retailers include: nationality, educational level, profession, proportion of the annual income from honey trading, quality attributes, and outlets to procure the honey, honey marketing problems and retail prices of honey. For honey consumers in addition to the above information; their annual income, occupation of the head of the household and the motives for honey consumption were included. For both categories the quality attributes like: origin of the honey, comb honey, degree of sweetness, color, degree of purity, physical state (liquid or crystalized), viscosity and packaging status were considered. The data were collected through personal interviewing of a total of 674 (343 retailer and 331 consumers). Both retailers and consumers households were interviewed in retail outlets selling and buying honey in the above mentioned seven cities. Descriptive statistics, analysis of Variance and HPM were utilized to analyze data using SPSS version 15.
Honey HPM specification

Honey hedonic pricing model was specified according to economic theory, previous studies and accurate knowledge about Saudi market based on field observation and interviewing of stakeholders in honey system in Saudi market. Dummy variables (Ismaiel, 1990; Philips, 1975) were utilized as instrumental variable representing honey varieties and quality attributes that case additional price premium over the honey price base. Regular Kashmiri honey with no favorable quality attributes

\[
P = a + b_1 S_0 + b_2 W_X + b_3 S_W + b_4 C_0 + b_5 S_C + b_6 P_r \\
+ b_7 P_u + b_8 P_a + b_9 S_i d_r + b_{10} S_u m_r a \\
B_{11} T_a l h + b_{12} O_t h_e r_s + U
\]

Where:

- \( P \): honey price (Riyal/kg.)
- \( S_0 \): honey source (imported = 0 and local = 1)
- \( W_X \): Comb honey (without = 0 and with = 1)
- \( S_W \): natural sweetness (high sweet=0 and natural sweetness=1)
- \( C_0 \): color (dark=0 and light=1)
- \( S_C \): flora or scent (no scent=0 and intense scent=1)
- \( P_r \): viscosity (low=0 and high=1)
- \( P_u \): purity (low=0 and high=1)
- \( P_a \): packaging (regular=0 and attractive=1)
- \( S_i d_r \): Sidr (Zisiphus spina-christii) honey variety (=1 and otherwise =0)
- \( S_u m_r a \): Sumra (Acacia tortilis) honey variety (=1 and otherwise =0)
- \( T_a l h \): Talh (Acacia origina) honey variety (=1 and otherwise =0)
- \( O_t h_e r_s \): Other honey varieties (=1 and otherwise =0)
- \( U \): Residuals

- \( a \): Basic honey price (SR/kg.) the price of regular kashmeri honey of low quality characteristics.
- \( b \): honey price premium for favorable hone variety or quality attributes.

Result and Discussion

Result of this study showed that about 64% of sampled consumers prefer to buy comb honey as strained, while about 36% of them prefer to buy comb honey. Comb honey is observed to affect the
price level of honey because it reflects the natural characteristic of honey which agrees with the findings Ghorbani and Khajehroshanaee (2009) who reported the strong positive effect of comb honey on its price.

About 58% of respondents prefer honey with a moderate sweetness and 42% prefer the high sweetness honey. About 51% of the respondents preferred light colored honey, while 49% prefer dark color. About 60% prefer a honey with a characteristic aroma honey, while about 40% of them preferred honey without aroma. About 58% of the sampled respondents preferred honey with high viscosity, while 42% prefer the honey with less viscosity. About 65% of the respondents prefer pure honey, free from dead bees, beeswax residue and impurities, while 35% of respondents do not care about the purity of honey. The packaging of honey is considered essential marketing service for honey. However, 50% of the sampled respondents do not care much about the quality of the package (whether attractive or regular), but they care about the content of the package the variety and quality of honey, where the price is not affected much by the type of package, especially for locally produced honeys.

Generally, the study showed that consumer preference in the Saudi market tends to pay higher prices for the honey without wax, with natural taste, light colored, having characteristic aroma, with high viscosity, well strained. It is also concluded that consumers do not pay much attention or much concern for attractiveness of the packaging of honey in Saudi market.

**Analysis of honey price variation**

The field survey study showed the prevailing of very large discrepancies in the prices of various types of honey in the Saudi market. The honey retailing prices ranged between a minimum of 20 SAR/kg ($5.33/kg) to a maximum of 700 SAR/kg ($186/kg). To understand honey consumer segments according to the prices they pay for honey, purchased honey has been divided into four price categories: first, category was honey of low price, which ranges between SAR 20/kg to 100SAR/kg, the second category was, honeys of price in the range of 100 SAR/kg to 200SAR/kg, the third category was honey with the price range between SAR200/kg to 300 SAR/kg, and the fourth category was those honey with prices above SAR 300/kg. The study result showed that 42.1% of consumers are buying honey with a first category (low price), 26.6 % of the sampled consumers were buying honey with a second price category, about 22.7 % of sampled consumers were buying the third price category, while limited percentage (8.5 %) of consumers purchased honeys with fourth price category (high price honey).
The finding is in agreement with some published studies such as Ghorbani and Khajehroshanaee (2009).

Table 1 shows the average retail prices for different types of honey according to quality attributes from the perspective of sampled retailers in the Kingdom. In all cases, it was noted that the Sidr honey is highest price, followed by Sumra honey, then Talh honey and Kashmiri honey was the cheapest. In terms of quality attributes under study, result showed that the locally produced honey are higher priced than imported honey, honey sold with natural wax is higher priced than honey marketed without wax, honey with natural taste was more expensive than high sweet honey, light colored honey is higher priced than dark colored honey (except Sumar and Talh honey), honey with strong aroma was higher price than honey of no aroma, and strong viscous honey is higher price than honey of low stickiness, pure honey is more expensive than non-pure honey. It is also noticed that attractive packaging make the price little bit higher.

The result showed that Sidr honey retailing price was generally high and was ranging between a minimum of SR 125/kg, to a maximum of 660 SR/kg, with an average of 308.17± 67.60 SR/kg. The retail price of Sumra honey was ranged between a minimum of SR 50/kg, to a maximum of SR 500/kg, with an average of 210.99±81.04 SR/kg. The retail price of Talh honey ranged between a minimum of 70 SR/kg, to a maximum of SR 500/kg, with an average of 208.21±71.18 SR/kg. Finally the retail price of imported honey was ranged between a minimum of 35 SR/kg and a maximum of SR 500/kg, making an average of 175± 13.987 Riyals/kg.

Generally, the retail price of honey is very high in the country which could be many associated factors like high living standard (level of household income), cultural and religious reasons believing more in medicinal and nutritional value of honey.

It was also noticed the convergence of the maximum retail price for all honey types, this could be interpreted by various several reasons, including the possibility of the existence of some commercial fraud because of the inability of the consumer to distinguish between types of honey.
Table 1. Average retail price of honey (SR/kg) with different characteristics in the Saudi market, 2012.

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Rank</th>
<th>Type of honey</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sidr</td>
<td>Sumr</td>
</tr>
<tr>
<td>Originality</td>
<td>Imported</td>
<td>287.6</td>
<td>181.28</td>
</tr>
<tr>
<td></td>
<td>Local</td>
<td>328.8</td>
<td>254.52</td>
</tr>
<tr>
<td>Comb honey</td>
<td>Without</td>
<td>326.4</td>
<td>250.73</td>
</tr>
<tr>
<td></td>
<td>With</td>
<td>369.6</td>
<td>285.79</td>
</tr>
<tr>
<td>Sweetness</td>
<td>normal or law</td>
<td>328.4</td>
<td>250.12</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>263.6</td>
<td>200.28</td>
</tr>
<tr>
<td>Color</td>
<td>Dark</td>
<td>283.9</td>
<td>248.59</td>
</tr>
<tr>
<td></td>
<td>Light</td>
<td>328.4</td>
<td>204.27</td>
</tr>
<tr>
<td>Scent</td>
<td>Without</td>
<td>229.3</td>
<td>171.83</td>
</tr>
<tr>
<td></td>
<td>With</td>
<td>328.7</td>
<td>250.73</td>
</tr>
<tr>
<td>Protraction</td>
<td>Low</td>
<td>255.3</td>
<td>193.96</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>328.8</td>
<td>251.65</td>
</tr>
<tr>
<td>Purity</td>
<td>Low</td>
<td>233.9</td>
<td>171.00</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>328.8</td>
<td>250.12</td>
</tr>
<tr>
<td>Backing</td>
<td>Normal</td>
<td>313.4</td>
<td>242.88</td>
</tr>
<tr>
<td></td>
<td>Attractive</td>
<td>329.1</td>
<td>250.74</td>
</tr>
</tbody>
</table>

Source: calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

The effect of quality on honey price was tested among quality characteristics using one way analysis of variance. It indicated the presence of significant (P < 0.01) price variations as a result of quality attributes of different honeys (Sidr, Sumra, Talh, Kashmiri) in aggregate manner (Table 2).
Table (2) Analysis of variance for retail price of honey according to quality characteristics in Saudi market, 2012.

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Rank</th>
<th>Average price (SR/kg)</th>
<th>F</th>
<th>P (value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originality</td>
<td>Imported</td>
<td>235.9872</td>
<td>222.143**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Local</td>
<td>132.9030</td>
<td>222.143**</td>
<td>.000</td>
</tr>
<tr>
<td>Comb honey</td>
<td>Without</td>
<td>216.5263</td>
<td>29.108**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>With</td>
<td>160.4839</td>
<td>29.108**</td>
<td>.000</td>
</tr>
<tr>
<td>Sweetness</td>
<td>low</td>
<td>185.7623</td>
<td>62.512**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>132.1847</td>
<td>62.512**</td>
<td>.000</td>
</tr>
<tr>
<td>Color</td>
<td>Dark</td>
<td>139.6076</td>
<td>37.838**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Light</td>
<td>182.6731</td>
<td>37.838**</td>
<td>.000</td>
</tr>
<tr>
<td>Aroma</td>
<td>Without</td>
<td>167.9429</td>
<td>3.025**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>With</td>
<td>155.4743</td>
<td>3.025**</td>
<td>.000</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Low</td>
<td>184.8083</td>
<td>42.956**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>139.1222</td>
<td>42.956**</td>
<td>.000</td>
</tr>
<tr>
<td>Purity</td>
<td>Low</td>
<td>184.5276</td>
<td>67.247**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>125.7467</td>
<td>67.247**</td>
<td>.000</td>
</tr>
<tr>
<td>Packing</td>
<td>Normal</td>
<td>167.4160</td>
<td>9.666**</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>Attractive</td>
<td>143.4979</td>
<td>9.666**</td>
<td>.002</td>
</tr>
</tbody>
</table>

** Significant at 0.01 significance level.

Source: calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

Types of honey prevailing in the Saudi market and its quality attributes

Saudi market has many types of locally produced as well as imported honey. The honey is mainly categorized according to the source of the botanical origin used by honey bees to collect nectar which is the major raw material of honey. Moreover, different honey types by country of origin are also very common. According to this study, in current Saudi markets 8 and 10 major types of honey are traded as locally produced and imported honey respectively indicating very diverse honey types are being used.
As many countries in the world here locally produced honey is favored by consumers in the Saudi honey market in spite of their high price, especially Sidr, Sumra and Talh honey. The preferences of locally produced honey may associate with long time familiarization of local consumers of the taste of local honey. The quality of honey from the consumer's perspective is determined based on several characteristics, the most important quality characteristics are purity (free from any foreign objects) the higher the degree of purity of honey, the higher consumer willingness to pay a higher price, and this encourages beekeepers and honey traders to display pure honey.

The aroma of honey is also one of the most important attributes of quality for the consumer, as the aroma of honey depends on the type of flower honeybee fed on, so beekeepers carefully choose places where there are adequate flowers. Some beekeepers feed their bees on sugar, so honey gain more sweetness than of natural sweetness of honey, and consumers generally prefer the natural taste of the honey, and therefore high sweetness is considered a sign of sugar for honey bees.

The honey color is always considered as one of the most important characteristics of honey quality, and it is determined by the type of flower on which bees collect the nectar, so the beekeepers do their best to intend specific places in which the appropriate flowers exist. Honey viscosity is considered as an important honey quality attributes. It has a positive impact on the price of honey. The viscosity depends on the maturity of the honey; and it is commonly recommended to leave the honey inside the hive for long, otherwise using artificial techniques to reduce moisture.

The estimation of the expected quality price premium of honey varieties and quality attributes

**Hedonic Pricing Model (1): Variety premiums**

The equation below is the estimated HPM showing variety premiums. The retail price of Kashmiri honey is considered the base price in the model.

\[
P = 48.36 + 228.3 \text{ Sidr} + 104.22 \text{Sumra} + 127.4 \text{Talh} + 52.30 \text{ other}
\]

\[
\begin{align*}
(24.877)^* & \quad (12.876)^* & \quad (18.039)^* & \quad (66.328)^* & \quad \text{price (29.145)}^*
\end{align*}
\]

\[
R^2 = 0.57 \\
F = 1254.615
\]

Where:

- \(P\) : honey price of specific varieties (Riyal/kg.) in addition to the base honey price (SR 48.36 = regular Kashmiri honey retail price)
- \(\text{Sidr}\) : Sidr honey variety premium price (Riyal/kg.) (=1 and otherwise = 0)
Samr: Samr honey variety premium price (Riyal/kg.) (=1 and otherwise = 0)
Talh: Tah honey variety premium price (Riyal/kg.) (=1 and otherwise = 0)
Others: Other honey varieties premium price (Riyal/kg.) (=1 and otherwise = 0)

Estimated HPM gives logic forecasting for retail prices of various varieties of honey (Kashmiri, Sidr, Sumra, Talh, Kashmiri and other honey varieties). The estimated HPM showed that honey varieties explained for 57% of the changes in the retail price of honey. The estimated model suggested that the estimated expected retail price of Kashmiri honey was about 48 SR/kg. It also indicated the estimated expected premium price for honey varieties, were about 228 SR/kg for Sidr honey, about 104 SR/kg for Sumra honey, about 127 SR/kg for Talh honeys, and about 52 SR/kg for other varieties of honey traded in the Saudi market.

**Hedonic Pricing Model (1): quality characteristic premiums**

The base retail and premium prices for quality characteristics are shown on table (3). The result indicated that the base regular average honey price of about SR 94. This base price is the expected average regular honey prices (average of all honey varieties including Sidr, Samr, Talh, Cashmiri, and other honey varieties at the minimum quality attributes prevailing in Saudi market. Locally produced, pure honeys with good aroma are the main quality characteristics which make additions to the honey base price. Honey being produced locally adds a significantly high premium to average base price, this premium amounted in average was about SR 75/kg.

Purity also add a significant premium of about SR 42/kg to average honey base price. However, good aroma adds insignificant premium price of about SR11/kg to the average retail base price of honey in the Saudi market. However in addition to sweetness, aroma is important natural characteristics of honey and each honey may have its own distinctive aroma.

Table (3) Estimated quantitative regression parameters showing the effects of honey quality attributes on it's retail price in Saudi market, 2012.

<table>
<thead>
<tr>
<th>Base/ quality attribute</th>
<th>Price (base/premium)</th>
<th>T</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average retail price of all varieties (base)</td>
<td>93.810</td>
<td>19.553**</td>
<td>.000</td>
</tr>
<tr>
<td>Locally produced honey</td>
<td>75.049</td>
<td>15.140**</td>
<td>.000</td>
</tr>
<tr>
<td>Good aroma honey</td>
<td>11.342</td>
<td>1.315</td>
<td>.189</td>
</tr>
</tbody>
</table>
** Significant at 0.01 significance level.

**Source:** calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

Color, high sweetness, viscosity and wax have been excluded from this HPM because they were correlated differently with each of honey variety. Light color is directly related to high quality Sidr honey, while dark color is highly correlated with Sumra honey and Talh honey.

**Hedonic Pricing Model (2): Variety and quality characteristic premiums**

Regular Kashmiri honey variety was considered the basis in this HPM, Also, color and viscosity characteristics were ruled out because they are associated with the varieties' of honey, and also because the light color is linked to certain types of honey, such as Sidr honey, while the dark color is associated some honey brands such as Sumra and Talh honey. The wax has also been excluded because most of consumer respondents prefer honey without wax, while the presence of comb honey has a positive impact on the price of some honey brands. Sweetness has been also excluded from the model, because some of honey varieties has natural sweetness, and for some extend, there is misunderstanding and mixing between natural honey sweetness and sweetness resulting from added sugar.

Table (4) presents estimated parameters of HPM showing base honey retail price and estimated premiums due to both honey variety and quality characteristics. Honey bas retail price (regular Kashmiri honey of minimum quality characteristics prevailing in Saudi market) is estimated to be SR 34/kg.

Additional quality characteristics would significantly cause additions to honey retail prices (being produced locally, good aroma, attractive packaging), given that good variety honey (Sidr, Sumra, and Talh) make the most additional premiums. The retail price premiums for honey good varieties and better quality characteristics were clearly presented on table (4).
Table (4) Estimated quantitative regression parameters showing the effects of honey variety and quality attributes on its retail price in Saudi market, 2012.

<table>
<thead>
<tr>
<th>Honey Variety and quality attributes</th>
<th>Base price/premium (SR/kg)</th>
<th>T</th>
<th>sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kashmiri regular honey (base price)</td>
<td>33.892</td>
<td>7.681**</td>
<td>.000</td>
</tr>
<tr>
<td>Locally produced</td>
<td>25.830</td>
<td>7.088**</td>
<td>.000</td>
</tr>
<tr>
<td>Good scent</td>
<td>10.992</td>
<td>1.853</td>
<td>.064</td>
</tr>
<tr>
<td>Pure</td>
<td>5.137</td>
<td>.792</td>
<td>.428</td>
</tr>
<tr>
<td>Attractive packaging</td>
<td>8.545</td>
<td>2.490*</td>
<td>.013</td>
</tr>
<tr>
<td>Sidr</td>
<td>230.008</td>
<td>46.517**</td>
<td>.000</td>
</tr>
<tr>
<td>Samr</td>
<td>92.397</td>
<td>18.669**</td>
<td>.000</td>
</tr>
<tr>
<td>Talh</td>
<td>122.712</td>
<td>17.021**</td>
<td>.000</td>
</tr>
<tr>
<td>Other varieties of honey</td>
<td>43.676</td>
<td>8.935**</td>
<td>.000</td>
</tr>
<tr>
<td>Determination coefficient (R²)</td>
<td>.64</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>461.9</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

** Significant at 0.01 significance level. * Significant at 0.05 significance level

**Source:** calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.
Table (5) Expected prices (SR/kg) of varies honey varieties with various quality attributes prevailing in Saudi market in 2012.

<table>
<thead>
<tr>
<th>Quality attribute</th>
<th>Base (Regular Kashmiri honey)</th>
<th>Sidr honey</th>
<th>Sumra honey</th>
<th>Talh honey</th>
<th>Other honey varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>34</td>
<td>230</td>
<td>92</td>
<td>123</td>
<td>44</td>
</tr>
<tr>
<td>Locally produced</td>
<td>-</td>
<td>256</td>
<td>118</td>
<td>149</td>
<td>70</td>
</tr>
<tr>
<td>Of good smell</td>
<td>45</td>
<td>241</td>
<td>103</td>
<td>134</td>
<td>55</td>
</tr>
<tr>
<td>Pure</td>
<td>39</td>
<td>235</td>
<td>97</td>
<td>128</td>
<td>49</td>
</tr>
<tr>
<td>Attractive package</td>
<td>42</td>
<td>238</td>
<td>100</td>
<td>131</td>
<td>52</td>
</tr>
<tr>
<td>Highest quality</td>
<td>58</td>
<td>280</td>
<td>143</td>
<td>173</td>
<td>94</td>
</tr>
</tbody>
</table>

**Source:** estimated based on the estimated parameters of the regression models HPM using sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

Based on the result presented on table (4) the expected price for various combinations of honey varieties and quality characteristics were calculated and presented in table (5). These expected values of retail prices seem logic as they compared with average prices computed from the result presented on table (1).

**Conclusion**

Locally produced Sidr, Sumra and Talh honeys were preferred in the Saudi market. The expected price representing consumer to pay for regular quality (minimum quality attributes) were SR. 230/kg., SR. 123/kg., SR.92/kg. and SR.44/kg for Sidr, Talh, Sumra and other varieties of honey respectively. Locally produced honey is superior compared to imported honey in the Saudi market as it made a price premium of about SR 75/kg. The most important quality characteristics of locally produced honey of Sidr, Talh, Sumra, and other varieties of honey are good smell and attractive packaging, as they add a significant retail premium price to the base price. It is recommended that beekeepers are advised to carefully choose the type of flowers where their bee hives feed on. Moreover, an attractive package is highly recommended as it increases honey retail price significantly.
References


Court, A. T. (1939) Hedonic price indexes with automotive examples, in ‘‘The Dynamics of Automobile Demand,’’ General Motors, New York, pp. 98]119 1939


International Honey Commission), 2001. Minutes of the workshop of the IHC on sensory characterization of European unifloral honeys.


