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by

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ABSTRACT

With Malaysian government plan to increase production of beef and open the beef market to more abattoirs from other countries, domestic beef market has become more challenging. The domestic beef market is postulated to be available in a variety of qualities in future. Consumers do not only make decisions on how much to purchase but also at what qualities. This study is to analyze consumer evaluation of quality and quantity on demand for beef in Malaysia. A demand model incorporated consumer socio-economic variables and another applied demand analysis incorporated quality variable are estimated via two-stage least squares. Beef demand elasticities are estimated in the first demand model and a quality elasticity of demand for beef is estimated in the second applied demand analysis. The models are applied to a cross-sectional data set from Household Expenditure Survey 2004/2005. The results indicate that beef demand is inelastic to meat expenditure and to its own price. On another side, the results also indicate that beef demand is inelastic to quality. The elasticities in this study suggest that consumers substitute quantity for quality in demand for beef in Malaysia.

Keywords: *beef, quality, quantity, demand elasticity, quality elasticity*

JEL code: D12

1.0 INTRODUCTION

From 1960 to 2005, per capita consumption of beef had increased from 1.56kg to 6.01kg. This is mainly attributed to per capita income growth, which subsequently has made beef affordable. According to Baharumshah and Mohamed (1993) and Nik Mustapha *et al.* (1994), Malaysian consumers would purchase more beef if income rises. However, the price of beef is still considerably higher than other major meat products as the beef market is nearly monopolized by a cartel.

With Malaysian government plan to increase production of beef and open the beef market to more abattoirs from other countries, domestic beef market has become more challenging. The domestic beef market is postulated to be available in a variety of qualities in future. In lieu with this, an economic analysis on the relationship between quality and demand for beef is particularly timely. The objective of this study is to analyze consumer evaluation of quality and quantity on demand for beef in Malaysia.

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2.0 BACKGROUND

In Malaysia, different cuts like tenderloin and sirloin are available to consumers and are priced differently. It is further differentiated by the country of origin of beef, namely local beef, Australian beef, American beef, Indian buffalo meat, or hybrid beef (imported as cattle and grow locally). It is interesting to assess whether beef in the marketplaces can be graded based on their intrinsic quality features, mainly in term of fat content.

The relationship between undesirable nutrients such as fat and cholesterol in diet and food demand has been well studied in developed countries. Brown and Schrader (1990) and Capps and Schmitz (1991) found consumer health and nutrition concerns have a significant effect on food demand. Another perspective from Unnevehr and Bard (1993) reported that consumers are willing to pay more for removing fat from beef.

As early as the 1950s, Rhodes and Kiehl (1956) claimed that grading had been promoted as a means of classifying various agricultural products in the market. Consumers at different income levels have different preferences on beef quality. Based on the findings of Tweeten and Mlay (1986), the marginal utility of income is a decreasing function of income. Low income consumers tend to overestimate the value of low quality beef while high income consumers tend to overestimate the value of high quality beef.

3.0 DATA AND ESTIMATION PROCEDURES

Data used in this study are from the Household Expenditure Survey 2004/2005 obtained from the Malaysia Department of Statistics. The survey contains food consumption and socio-economic information on 14,084 respondents in Malaysia.

Followed the approach used by Capps and Schmitz (1991), the demand for beef is determined by total meat expenditure, beef price, prices of other meat products, and socio-demographic variables. Chalfant and Alston (1988) showed that prices and expenditures are inadequate in explaining observed patterns of meat consumption. Pollak and Wales (1992) pointed out that socio-economic variables such as family size and race have traditionally played a major role in the analysis of household demand behavior.

LaFrance (1986) suggested that it is plausible to use the functional form below as it is linear in its parameters, robust to model misspecification, and elasticities appear as parameters. The linear empirical functional form can be expressed as:

$$\log(Q_{bf}) = \alpha_0 + \alpha_1 \log(EXP) + \alpha_2 \log(P_{bf}) + \sum_{i=1}^{n} \alpha_{i+2} \log(P_i) + \sum_{j=1}^{m} \alpha_{n+j+2} D_j + u \qquad (1)$$

where Q_{bf} and P_{bf} are quantity and price of beef, respectively, EXP is aggregate meat expenditure, P_i is price of *i*th meat (pork, mutton, poultry, and other meats), D is a set of demographic variables (household size, urban dummy, Malay dummy, Chinese dummy, and Indian dummy), α 's are parameters to be estimated, and u is the error term.

Based on the hedonic methodology and the procedure used by Houthakker (1952) and Deaton (1988), the beef price is assumed to be determined by the fat content of beef and socio-demographic characteristics. The empirical specification is expressed as:

$$\log(P_{bf}) = \beta_0 + \beta_1 \log(FAT) + \beta_2 \log(TOTFD) + \sum_{j=1}^{d} \beta_{2+j} D_j + e \qquad (2)$$

where FAT is fat content of beef, $TOTFD$ is total food expenditures, D is a vector of consumer demographic variables like mentioned above, β 's are parameters to be estimated, and e is the error term.

Followed the procedure of Houthakker (1952), the β_1 and β_2 are interpreted as the fat elasticity and quality elasticity of the beef price. Equations (1) and (2) comprise a recursive simultaneous equation system and can be estimated by a two-stage least squares (2SLS) procedure.

4.0 RESULTS

Table 1 presents the estimation results of beef demand equation by 2SLS procedure. The demand elasticities of beef with respect to expenditure and its own price elasticities are the estimated coefficients for meat expenditure and price of beef respectively. The estimated demand and own price elasticities are 0.7845 and -0.8283. The inelastic demand elasticity suggests that beef has become a normal good, which was regarded as luxury good by Baharumshah and Mohamed (1993) and Nik Mustapha *et al.* (1994). The estimated own-price elasticity of demand for beef is -0.8283. Tomek (1965) explained that beef has become less price elastic due to quality changes in the product.

The demographic variables capture the other effects on meat consumption. The result shows that per capita demand for beef declines as household size increases due to the economies of scale enjoyed as household size expands or large households may consume more variety of meats owing to possible taste differences. Surprisingly, the result finds that consumers in rural region consume more beef than those in urban region. As expected, Malay demand more beef than other races. Due to religion beliefs, only small population of Chinese and Indian consume beef in Malaysia.

TABLE 1: Estimation results of beef demand equation by 2SLS

Variable	Demand Equation	
	Coefficient	**(Std. Error)**
C	8.0982	(6.8467)
Log(EXP)	0.7845	(0.0113)***
Log(P_{bf})	-0.8283	(0.0164)***
Log(P_{pork})	-1.2802	(0.1153)***
Log(P_{mutton})	-1.6178	(0.6260)***
Log($P_{poultry}$)	0.6809	(0.1460)***
Log($P_{othermeats}$)	-1.4098	(2.7382)
Log(household size)	-0.2836	(0.0181)***
Urban dummy	-0.0445	(0.0181)**
Malay dummy	0.1886	(0.0282)***
Chinese dummy	-0.1341	(0.0354)***
Indian dummy	-0.0270	(0.0703)
R-squared	0.5917	

Note: Significance levels are denoted by *** for 1%, ** for 5%, and * for 10%.

Table 2 presents the estimation results of beef price equation by 2SLS procedure. The coefficient of total food expenditure is the direct estimate of quality elasticity (0.0219). The quality elasticity is statistically significant and positive as expected. It indicates that high income consumers demand higher-price beef, which is always referred as higher quality. The elasticity of price with respect to fat content is statistically significant and negative (-0.0843). This implies that fat is negatively valued. Consumers are willing to pay for fat reduction. It is noteworthy that a comparison of the parameters of urban dummy in price equation and demand equation indicates that urban consumers are more willing to pay for higher-price beef.

TABLE 2: Estimation results of beef price equation by 2SLS

Variable	Price Equation	
	Coefficient	**(Std. Error)**
C	2.9550	(0.0677)***
Log (FAT)	-0.0843	(0.0061)***
Log (TOTFD)	0.0219	(0.0129)*
Log(household size)	-0.1022	(0.0127)***

Urban dummy	0.0086	(0.0114)
Malay dummy	-0.0062	(0.0183)
Chinese dummy	0.0531	(0.0224)**
Indian dummy	0.0341	(0.0458)
R-squared	0.0486	

Note: Significance levels are denoted by *** for 1%, ** for 5%, and * for 10%.

5.0 CONCLUSIONS

This study is built on the basis that consumers do not only make decisions on how much to purchase but also at what qualities. This study is to analyze consumer evaluation of quality and quantity on demand for beef in Malaysia. A demand model incorporated consumer socio-economic variables and another applied demand analysis incorporated quality variable are estimated via two-stage least squares. Beef demand elasticities are estimated in the first demand model and a quality elasticity of demand for beef is estimated in the second applied demand analysis. The models are applied to a cross-sectional data set from Household Expenditure Survey 2004/2005.

From the demand equation, the results indicate that beef demand is inelastic to meat expenditure (0.7845) and inelastic to its own price (-0.8283). The price equation shows different sign of estimates of quality elasticity (0.0219) and fat elasticity (-0.0843). By comparing the estimates of demand elasticity (0.7845) and quality elasticity (0.0219), the elasticities suggest that Malaysian consumers substitute quantity for quality in demand for beef in Malaysia. However, the term of quality is not defined in this study. It can be in terms of cleanliness, tenderness, color, juiciness, leanness or just a positive brand/country-of-origin identity.

On another hand, the finding of the fat elasticity of beef price suggests that Malaysian consumers are willing to pay a higher price for reducing fat content in beef. However, the estimated fat elasticity (-0.0843) is smaller than the own price elasticity of beef (-0.8283) in absolute value, suggesting that trimming extra fat in the beef most probably will not improve the net revenue of the beef sector. This is because beef industry has yet to reach a developed stage like high-income countries and only a small higher –income population of consumers is willing to pay for the trimmed beef products.

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