Perceptions on Captive Malayan Porcupine (*Hystrix brachyura*) Meat by Malaysian Urban Consumers.

Norsuhana AH[a*], Shukor MN [b], Aminah A [c]
[a]*Biology Section, School of Distance Education,*
Universiti Sains Malaysia (USM), 11800 Minden,Penang Malaysia
[b] *School of Environmental Science and Natural Resources, Faculty of Science and Technology,*
University Kebangsaan Malaysia (UKM),
43600 Bangi, Selangor Malaysia
[c]*School of Chemistry Science and Food Technology, Faculty of Science and Technology,*
University Kebangsaan Malaysia (UKM), 43600 Bangi, Selangor Malaysia
[d]*Department of Wildlife and National Parks (DWN,), km 10, Jalan Cheras*
56100 Kuala Lumpur Malaysia

Corresponding author email: norsuhana@usm.my
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ABSTRACT: The objective of this study is to investigate the acceptance and purchasing behaviours of Malaysian consumers for captive bred Malayan porcupine (*Hystrix brachyura)* meat as an alternative meat product in the domestic market. Result showed that 53.5% of the respondents acknowledged that porcupine meat can be eaten and is according to Muslim law (*Halal*). However, only 20% of the respondents had tried the meat. More than half (55.8%) of the respondents indicated that porcupine meat is delicious while 11.6% stated differently. Respondents preferred to try porcupine meat if it possesses high nutritional values, is of reasonable price and is good for health (62.4%). From the evaluation, 53.8% of the respondents are willing to pay if the price is higher than beef's price. Suggested price is between RM20.00 to RM25.00 / kg. Our data also indicated meat preference for wild porcupine meat is slightly greater than captive with percentages of respectively 54.7% and 45.3%. The reason of the choice is quality. Marketing strategy was suggested to promote porcupine meat in restaurants with ready cooked food. Packaging method was also introduced with pre-cooked food in packed form.

Keywords: Consumer acceptance; Malayan porcupine meat; Malaysian; market strategy

Introduction

It is very difficult to evaluate Malaysian consumers perceptions in their food preferences especially food from game meat. This is because no reliable data had indicated the answers. Malaysian consumers get their source of meat from domestic animals such as chicken, beef and lamb. These animals are mostly farmed in order to meet the market and wholesaler's demand. Meats from the domestic animals are known to have high fat and cholesterol content. Thus, consumers prefer an alternative meat such as game meat in their diet to get the nutrients they require. Nowadays, consumers were changing their food preference because of the increasing awareness in their food issues and health concerns (Hoffman, 2005). Consumers in developing countries also took the same action by reducing their meat intake due to health concerns (Beckers *et al.,* 1998; Becker *et al.,* 2000; Richardson *et al.*, 1993; Richardson *et al.,* 1994).

In Malaysia, a previous study indicated that the frequency of daily meat consumption by consumers is more than twice per week in urban area (Norsuhana, 2008). The main reason stated by consumers is because of the nutrient contents that can fulfill their daily diet. Meat diet can provide important nutrients that are needed by the human body. Red meat, especially, contains high biological values of protein and important micronutrients, which are essential for a good health (Willianson *et al.,* 2005) can also cause exceeding intake of fat if taken regularly (Given *et al.,* 2006). For example, saturated fatty acid (SFA) is positively correlated to disease such as coronary heart disease. Balance intake of Omega 3 and Omega 6 is also important in the diet. The ideal ratio of Omega 3 to Omega 6 shall be less than four, otherwise it may cause heart problem (Enser, 2001).

Throughout the years, Malaysian consumers have been improving their standard of living and knowledge about healthy balanced diet. This is perhaps due to alleged relationship of fat intake and its contribution to the problems such as heart disease. Consumers expect that meat products in the market would have high nutritional values, fresh, lean and contain adequate juiciness, flavour and tenderness (Hofman and Wiklund, 2006). It should be the same as other game meat that has already been established in the market. According to Hofman (2001), the tenderness of game meat is similar to beef. Hoffman (2000) also reported that game meat contains lower fat level compared to beef, pork or mutton and has an average fat content of 2-3% only. Similar report was produced by Dahlan and Noor Farizan (2000) where venison meat is lower in fat level and has high level of Omega 3 and Omega 6. Based on the report, Malaysian consumers shall change their preferences with meats come from natural methods or organic sources. According to Hoffman and Bigalke (1999), game meat is also known as organic product as it comes from natural production or original habitats. Thus, the demand of game meat for market and wholesalers has increased similar to other organic products. For the same reason, ostrich farming has also been growing because of its positive value in nutrients content which concerns the health.

For commercialization of new products, consumer's behaviour is the most important characteristic that should be considered first. Radder and Roux (2005) found two factors which influenced consumer's preference to game meat namely the consumer-related forces and market-related forces. The former includes health consideration, sensory variables, social interactions, familiarity and habit, psychographics and demographics while the latter involves prices, distributions and promotions.

Malayan porcupine (*Hystrix brachyura*) is also one of the new wildlife species proposed to be commercialized as a meat product due to its high reproductive performances, large body size and easy management (Zainal, 1998). Previous study also indicated that Malayan porcupine meat is a healthy meat due to its lower fat content (3.6 %) and has an ideal ratio of PUFA to SFA (0.7) (Norsuhana, 2007). As the biggest animal classified under Order Rodentia in South East Asia, this species is protected under Wildlife Act (1972) by Malaysian Law. Under this law the hunting of this species is done only after approval license is obtained from The Department of Wildlife and National Parks (DWN) of Malaysia and hunting is limited to five porcupines per year. This new wildlife species can provide an economic income for farmers if clear information and responds from consumers are obtained. However, until today, no reliable data have been reported on consumer's perceptions and purchasing

behaviours on porcupine meat in Malaysia. Therefore, the objectives of the research were to (i) study and evaluate the perceptions, and (ii) to identify the purchasing pattern of urban consumers in Klang Valley, Malaysia. The finding is important so that the Malayan porcupine (*Hystrix brachyura*) can be the alternative source of healthy game meat to meet the target of the markets in near future.

Methods

The survey was conducted using a self-administered structure of questionnaires. The pattern of questions was developed under demographics and socioeconomics. As to evaluate the consumer's perceptions and to identify their purchasing patterns, the study was conducted on 170 respondents living in Klang Valley, Malaysia. Klang Valley was selected because it is one of the biggest cities in Malaysia and has a population of consumers with different demographic and socioeconomic life. **TABLE 1** summarizes the patterns of demographics and socioeconomics of the respondents which was used as the main sample in the questionnaires. Since the study aimed to commercialize Malayan porcupine as new game meat, the questionnaires were divided in two sub topic which included the perception to alternative meat (another meat such as venison, rabbit, ostrich, and camel - not include chicken, beef, lamb and pork) and perceptions to Malayan porcupine meat. These types of questions are in line with main references point as to ensure respondents give direct responses to the question's aims.

Preliminary test was conducted on the questionnaires. 20 respondents were selected to answer all the questions. From the feedback obtained from the respondents, the questionnaires were modified again according to requirement prior to the survey. The data were analyzed using Statistical Package for the Social Sciences (SPSS, 2002), version 11.5 for Windows. Chai square test (χ^2) was performed at 95% of confidence level ($p<0.05$).

TABLE 1- Percentages distribution of sample characteristics (demographic and Socioeconomic)

Items	***No. respondents***	***Percentages***
Demographic		
Age		
20-30	77	45.3
31-40	44	25.9
41-50	49	28.8
Genders		
Male	72	42.4
Female	98	57.6
Nations		
Malay	117	68.8
Chinese	41	24.1
Indian	12	7.1
Educations		
Primary school	4	2.4
Secondary school	51	30.0
Certificate/Diploma	31	18.2
Degree	54	31.8
Master/PhD	30	17.6
Socioeconomic		
Employments		
Government	102	60.0
Private	42	24.7
Self-employed	8	4.7
Housewife	2	1.2
Student	9	5.3
Others	7	4.1
Total monthly income/salary		
None	6	3.5
<RM500	-	0.0
RM500-1000	35	20.6
RM1001-1500	39	22.9
RM1501-2000	25	14.7
RM2001-2500	24	14.1
>RM2501	41	24.1

Results

Perception on alternative meat (other meat excluded of chicken, beef, lamb and pork)

The results show that 55.6% of respondents had tried the alternative meat (excluded of chicken, beef, lamb and pork) whereas 43.5% of respondents stated that they had not tried ($p<0.05$). **TABLE 2** shows the percentages of alternative meat that had been tried by respondents with lead by venison (71.9%) and followed by rabbit (58.3%), ostrich (38.5%), other game meat (37.5%) and camel (26.0%). Barking deer and mouse deer were considered the least intake by consumers with percentages of 24.0% and 18.8%, respectively.

Respondents were asked to state how they perceive the availability of this meat from their residence area. Majority of respondents (61.5%) indicated that they acquired meat from restaurants (cooked), whereas 33.3% from hunters, 30.2% purchased them from fresh market and 18.8% purchased them directly from farm ($p<0.05$). Our data also indicate that the reason for them to turn to alternative meat was to the change in their appetite (83.3%) compared to high nutrients value (28.1%) and available from hunters (24.0%). Only 9.4% of respondents selected game meat product as complement for better health.

TABLE 2 – Percentage for alternative meats that have been eaten by respondents. The percentage are statistically difference among type of meats ($p<0.05$)

Type of meats	***Frequency of percentage (%)***
Camel	26.0
Rabbit	58.3
Ostrich	38.5
Venison	71.9
Barking deer	18.8
Mouse deer	24.0
Others	37.5

Perception on porcupine meat

Our data indicate that 23.5% of the respondents believe that porcupine meat is *Halal* to be eaten by Muslims, while 53.5% believed that it is not ($p<0.05$). Only 22.9% were not sure. In order to evaluate the consumer's knowledge about the porcupine meat, they have to state their perceptions on whether this meat can give benefits to our health or not. To this point, most respondents (76.5%) agreed that Malayan porcupine meat has potential for health benefit in contrast with another 23.5% who believed otherwise ($p<0.05$). Furthermore, when the respondents were asked whether they have consumed the porcupine meat before, 20% of the respondents did have the experience of consuming porcupine meat, with more than half of the respondents stated that this meat was delicious (55.8%), while only 11.6% stated otherwise.

Assessment of the future market of porcupine meat indicated that more than half of respondents (62.4%) preferred to try porcupine meat if it possesses high nutritional values, comes with reasonable price and is good for health ($p<0.05$). 53.8%

of respondents would still purchase the meat even if the price is higher than beef. The reason why the respondents were in favour of porcupine meat is probably due to its physical appearance (59.4%) and because they were not familiar to the taste of the meat (46.9%).

Our data further revealed that majority respondents (87.7%) preferred to buy porcupine meat ($p<0.05$) if the price is between RM20.00 and RM25.00/kg, followed by RM26.00 to RM30.00/kg (9.4%), RM36.00 to RM40.00/kg (0.9%) and RM41.00 to RM45.00/kg (1.9%). Respondents have no specific preference on either captive or wild meat porcupine. 54.7% of the respondents preferred to buy wild meat, while the rest preferred captive porcupine meat. Respondents believed that the wild porcupine meat has high nutrient content (44.8%). Only 25.0% of the respondents chose captive porcupine meat due to its higher nutrient content than wild meat, with 27.1% believed that captive breed is free from disease and 4.2% for personal or other reasons.

In market evaluation study, **TABLE 3** indicates the total results where no significant difference was found ($p>0.05$) in respondents ages. Respondent's ages between 20-30 years old were willing to buy Malayan porcupine meat if the price is higher than beef (24.5%) and followed by respondents ages between 31-40 years old (15.1%) and respondents ages between 41-50 years old at the least (14.1%).

For ethnicity comparison, Malay consumers showed the highest percentage ($p<0.05$). Malay, Chinese and Indian participants who were willing to pay for the porcupine meat if the price is higher than beef are 37.7%, 13.2% and 0.9%, respectively. Whereas degree and diploma holder (19.8% and 15.1%) and respondents who were working in the government sector (31.1%) showed the highest percentage ($p<0.05$) to purchase porcupine meat if the price is higher than beef. 34% respondents from the government sectors who were not willing to purchase porcupine meat if the price is higher than beef. This evaluation shows that only less than half of the consumers from the government sector and consumers ages between 31-50 years old would not choose porcupine meat if the price is higher the price of beef.

TABLE 3-Number and percentage respondents who are preferred and not preferred to Buy porcupine meat if the price are higher than beef's price based on the background of respondents (n=106 respondents).

Criteria	Willing to buy		Not willing to buy	
	No. respondent	**%**	**No. respondent**	**%**
Ages				
20-30	26	24.5	18	17.0
31-40	16	15.1	14	13.2
41-50	15	14.1	17	16.0
Gender				
Male	29	27.5	21	19.8
Female	28	26.4	28	26.4
Race				
Malay	40	37.7	42	39.6
Chinese	14	13.2	6	5.7
Indian	3	2.8	1	0.9
Education Level				
Primary School	2	1.9	1	33.3
Secondary School	10	9.4	19	17.9
Certificate/Diploma	16	15.1	9	8.5
Degree	21	19.8	14	13.2
Master/PhD	8	7.5	6	5.7
Job				
Government employees	33	31.1	36	34.0
Private employees	16	15.1	9	8.5
Self-employee	3	2.8	1	0.9
Student	2	1.9	2	1.9
Other	3	2.8	1	0.9
Monthly income				
None	2	1.9	1	0.9
RM500-1000	9	8.5	11	10.4
RM 1001-1500	13	12.6	13	12.3
RM 1501-2000	7	6.6	9	8.5
RM 2001-2500	9	8.5	9	8.5
>RM2501	17	16.0	6	5.7

TABLE 4- Reason stated by respondents for buying captive porcupine or wild porcupine.

Reasons	Percentage	
	Captive porcupine (n=48 respondents)	**Wild porcupine (n=58 respondents)**
Nutrient content	25.0	44.8
Meat quality	43.8	58.3
Free from disease	27.1	-
Personal reason/Others	4.2	8.3

Discussions

More than half (55.6%) of the respondents took alternative meat in urban area of Peninsular Malaysia. Different result was reported in Africa with 69% respondents took alternative meat (Radder and Roux, 2005). Factors such as development and growth of wildlife farming in Africa have varied the consumer's choice (Hoffman and Wiklund, 2005). Respondents in Malaysia strongly preferred alternative meat such as rabbit and venison with several farms being established to breed rabbit and venison for their meat (Nor, 2003; Anon, 2006). Perak state has produced 8.7 ton of venison meat in 2002 and the amount has slightly increased annually to 11.8 ton in 2005(Anon, 2007). Data collected from Department of Veterinary Service, Malaysia also showed increase in the total number of venison and rabbit with 8077 venison and 7181 rabbits in 2003 to 8402 venison and 7598 rabbits in 2004.

The popular meat regularly taken by the respondents are meat from animal species that has already been commercialized in the market that include deer, rabbit and ostrich. Increase in the demand for the meat of wildlife species shows the opportunity for porcupine meat as the alternative source of meat. Demand for other commercial wild stocks such as camel, barking deer and mouse deer were lower than 30%. The difficulty in getting these types of meat in the market may be the reason of low demand.

The results showed that more than half of the respondents (61.5%) got their meat from restaurants suggesting that the marketing strategy for Malayan porcupine meat should be developed in restaurants with ready cooked food. Zotte (2002) reported that due to the factor of having limited time, consumer's demand towards meat nowadays has changed to cooked meat. Gale *et al.* (2000) studied the marketing of veal in Canada and suggested that the restaurant was a good medium to market and promote the meat. Hoffman *et al.,* (2003) also proposed restaurant as a medium to promote game meat to tourists. In our questionnaires, no questions have directly asked respondents to suggest any marketing strategy for Malayan porcupine meat. However, from the result, only 29% of the respondents who purchased alternative meat from fresh market claimed that marketing through fresh market probably less effective than marketing through restaurant.

76.5% of the respondents stated that they knew porcupine meat is a healthy meat. This statement is scientifically unreliable because to date, no study has been conducted nor reports about the nutrients composition in porcupine meat. However, information in other game meat may affect the statement, because more than half of the respondents (67.6%) are among professional levels.

Respondents assumed that wildlife meat contains higher nutritive value than domestic livestock. This mindset might also give advantages to porcupine meat as it is a wildlife animal.

Lack of preference on porcupine meat might be associated with the difference in culture and social life. Study in United State showed that social structure influenced meat intake for Asian and Coloured people. Meat intake by Asian and Coloured people is higher than Western people; even though Asian's food may not totally based on meat compared to western food (Gossard and York, 2003). Therefore, it is possible that in the future, factors such as a change in the way of lifestyle (culture) and social life can help consumers to accept porcupine meat.

Price is a pressuring factor especially in marketing. It is the core factor described in food preference by users (Radder and Roux, 1995). In developed country, price becomes the core factor and key indicator for user's assessment. Therefore, manufacturers must compete in the aspect of price, quality and diversity of the meat products (Harrington, 1994). The percentage of respondents willing to purchase porcupine meat even if the price is higher than beef is higher compared to respondents in an African study with only 22% of the respondents agreed to purchase wild animal meat if the price is higher than prices of other meat (Hoffman *et al.,* 2005).

Respondents aged between 20-30 years old preferred buying porcupine meat if the price is higher than beef (24.5%). From the results, younger respondents were willing to spend more money to get better health. Harrington (1994) reported that youth and young group were more sensitive towards meat intake. Different reaction were shown by respondents in Australia where respondents ages between 50-60 years old had the same opinion as youth ages between 20-30 years on health issues (Russell and Cox, 2004). Youth reduces red meat intake and consumes more white meat as the latter gives bad effect to the health (Santos and Booth, 1996). The consumption per capita of red meat declined in worldwide (Grunert, 2006) probably caused by consumer's negative perception on red meat and associated it with cardiovascular and other diseases. Respondents aged between 31-40 and 41-50 years old also preferred buying porcupine meat if the price is higher than beef (15.1%).

The price between RM20.00 and RM25.00/kg was proposed by majority respondents who were willing to buy porcupine meat. Similar results were found by Gale *et al*. (2000) for consumers who interested and are willing to purchase veal meat. Wilkie *et al*. (2005) reported that if the prices of wild meat, fish, chicken and domestic animal were slightly higher, it would decrease the demand from consumers. Therefore, porcupine meat marketed at lower prices to ensure its purchasing ability by consumers from multiple economic backgrounds. It should also be noted the costs might be neglected by the consumers if the meat is of high nutritional value. Research by Dransfield (1998) revealed that consumers were willing to pay more if the meat contains high nutritional value.

Quality is an important factor to influence the decisions in purchasing either captive or wild porcupine meat. If the quality of the captive porcupine meat is similar or better than wild porcupine meat, respondents may not hesitate to choose captive porcupine meat. Different scenario was shown by African consumers, where quality was not emphasized by users when they buy wild

animal meat compared to domestic meat (Hoffman *et al.,* 2004). Meat quality in market comprises intrinsic indicator (label, place of purchase, price and country of origin), extrinsic indicator (color, marbling, and leanness) and food quality (sense, tenderness, color, smell, leanness, juicy and free from grees) (Becker *et al.,* 1998). Nowadays, quality of meat is more complex and influenced by many factors such as management system, breed, genetic, nutrition, handling steps before slaughtering, slaughtering process and storage system (Andersen *et al.,* 2005). The quality of wild animal meat can be indicated by its colour. Wild meat usually is dark in colour and appears unattractive. Two factors known to affect the quality of the meat are stress during the slaughtering process and the nature of the wild animal which is more active than the domestic animal (Hoffman *et al.,* 2005).

Conclusion

Only one fifth of respondents have tried porcupine meat. However, more than half (62.4%) strongly agreed to try the meat if it is of high nutritional values, sold at reasonable price and is good for health. We conclude that efforts in commercializing porcupine meat should include promotions to expose widely the advantages and disadvantages of Malayan porcupine meat in the scope of nutrition values and the positive effects for health if it is consumed. Also, it is vital to establish marketing strategy, provide ready cooked meat in restaurants and pre-cooked food in packages, setting a reasonable price and improve the quality of the meat in term of attractiveness shall also be emphasised.

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