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Characterizing Beef Consumption Behaviors of Households in Dien Bien Province, Vietnam

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Abstract

The basket of meat consumption has changed during the last decade in Vietnam, including increased consumption of beef. This paper analyzes the beef consumption behaviors of households in Dien Bien province, located in Northwest Vietnam. Data were collected from a survey of 108 consumers and three focus group discussions. It was evident that the preferences of beef consumers were varied between different ethnic groups. The important criteria used in selecting meat were color, freshness, and tenderness. Consumers mentioned, but had little concern, for meat packaging, nutritional information, or quality certification, while they showed almost no concern for animal welfare in purchasing beef. As the consumers' choice of purchasing beef was very much influenced by meat appearance, improving the conditions of butcher counters is suggested as an immediate measure. There exists an opportunity to introduce 'cold' beef widely as a longer-term measure.

Keywords

Beef consumption, household behavior, Dien Bien province

Introduction

Foods from animal sources provide a variety of micronutrients that are difficult to obtain in adequate quantities from plant sources (Murphy & Allen, 2003). Robinson & Pozzi (2011) highlighted that increasing demand for animal source foods has been driven by several factors, including increasing household incomes, and this is also true for Vietnam (Hoang Vu Linh, 2009; Pham Van Hung *et al.*,

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2017). Vietnam, an emerging economy, has experienced a GDP growth rate of about 5-7 percent annually from 2000 to 2018 (World Bank, 2019). The livestock sector in the country also has expanded with average annual growth rates of 7.3, 5.6, and 7.6 percent for beef, pig, and poultry meat production, respectively (General Statistics Office, 2021), during the same period. Pork, beef, poultry, and seafood are the main animal source foods consumed in Vietnam, with pork traditionally being dominate (Nguyen Thi Duong Nga *et al.*, 2014; Blair, 2018), partly for its higher availability and accessibility, its reasonable price, and the fact that it is easy to process for different dishes (Nguyen-Viet Hung *et al.*, 2019). However, the meat consumption basket has seen some changes, with the pork share decreasing from 62 to 57 percent, and the beef share increasing from 5.6 to 8.3 percent during the period of 2002-2010 (Nguyen Thi Duong Nga *et al.*, 2014). Yet, domestic beef production is relatively low, with per capita production being about 4.5 kg (live weight) in 2019 (General Statistics Office, 2021), which cannot meet domestic demand. This has contributed to a steady increase of imported beef over the years, with a growth rate in value during 2013-2018 at 22 percent for live bovine animals (General Statistics Office, 2021).

The beef sector in Vietnam is increasingly becoming important because (i) its growth in consumption has increased fourfold in the last decade while domestic production has not met demand (Rasadhika *et al.*, 2018; Tran The Cuong *et al.*, 2021); and (ii) beef cattle production plays an important role in the country's farming system and provides livelihoods for smallholder farm households (Smith *et al.*, 2018). This applies to upland areas in Vietnam such as the North West where the poverty rate is higher than the national average (Duteurtre *et al.*, 2014). Rasadhika *et al.* (2018) also highlighted that the rearing of large livestock, such as beef cattle and buffalo, is associated with higher income effects and aids in reducing income inequality. Dien Bien province is located in North West Vietnam, where beef cattle production is considered as one of the key activities contributing to local socio-economic development, and meeting local (provincial) beef demand is a short-term goal of the sector (ACIAR Project LPS/2008/049). Hence, understanding local consumer demand, preferences, and consumption behaviors are vital for the industry's development. However, such contextual understanding is limited in the literature. This paper aimed to characterize beef consumption at the household level and provide implications for beef cattle sector development in the province.

Methodology

Site selection

The study was carried out as part of a beef value chain analysis under the project LPS/2015/037 "Intensification of beef cattle production in upland cropping systems in Northwest Vietnam". Two districts were identified representing both the urban and peri-urban markets. Tuan Giao district (Tuan Giao town) and Dien Bien Phu city were selected for the study. Tuan Giao town represented a typical peri-urban market in the mountainous area in Dien Bien province, and is the home of minority ethnic groups such as Thai and Hmong. Dien Bien Phu city represented the emerging urban market (**Figure 1**).

Data collection and analysis

Primary data were collected through focus group discussions (FGDs) and a consumer survey. The FGDs were carried out in Dien Bien Phu city (2 groups with 11 consumers) and Tuan Giao district (1 group with 8 consumers), and aimed to gather qualitative data on the consumers' preferences and reasons behind their options for different types of meat. A survey using a semi-structured questionnaire was given to 108 random consumers in Dien Bien Phu city and Tuan Giao town. The questionnaire's focus was on individual household behaviors in beef consumption, preferences, choices, buying habits, and preserving/processing beef at home, as well as their willingness to pay for different beef attributes. Consumers were selected randomly by using the market-intercept method based on their interest and willingness to participate when approached, resulting with 80

Figure 1. Study site

respondents in Dien Bien Phu city, and 28 in Tuan Giao town. Aside from this, two stakeholder workshops with various actors (farmers, collectors, slaughterhouse representatives, retailers, supermarket managers, veterinary staff, DARD officers, and commune leaders) in the beef value chain in Dien Bien Phu city and Tuan Giao district were carried out, aiming to gain better understanding of the beef market in Dien Bien province, including supply and demand for beef as well as issues and opportunities for the beef sector in Dien Bien province.

Simple descriptive and comparative statistics were employed, with a t-test for mean difference comparison and Chi-square test for independence of variables. These methods were used to report the findings for the two main research questions of the study, (i) What are consumers' preferences for beef? and (ii) Are there differences in the household behaviors in beef consumption between Kinh and Thai ethnicities?

Results and Discussion

General characteristics of households

About two-thirds of the respondents were female, with the average age of about 53 years old (**Table 1**). A larger percentage of the Kinh ethnic group was observed in the city due to the migration of this ethnic group in the 1960s and 1980s, and members generally lived in more populated areas in the province. The family size had an average of 2.5 members but ranged from 1 to 7 persons. Per capita income was estimated at about USD 268 monthly, which was much higher than the reported average of Dien Bien province ($USD 67 in 2018) (General Statistics Office, 2021) due to differences between urban and rural/mountainous areas in the country. On average, a family spent about $USD 38 per week on food, accounting for about 25 percent of their total household income, which was lower compared to the North West average of 36.6 percent in 2018 (General Statistics Office, 2021), and reflects the trend of rising incomes in Vietnam specifically as well as in other low and middle countries (FAO & World Bank, 2018).

Households' behavior in consuming beef

Preferences

Beef and buffalo meat are considered strong substitutes for pork, which is the most preferred

Table 1. General characteristics of **households** in Dien Bien province

Description	Dien Bien Phu city	Tuan Giao town	All	Test for difference
	(n = 80)	*(n = 28)*	*(n = 108)*	
Percentage of respondents as female	68.8	57.1	65.7	1.98^{ns}
Age	54.9 *(15.9)*	46.0 *(15.4)*	52.6 ***(16.2)***	2.6**
Family size (no. of people/hh)	2.6 *(1.3)*	2.3 *(1.1)*	2.5 *(1.3)*	1.1 ^{ns}
Ethnicity (%)				
Kinh	86.3	46.4	75.9	
Thai	12.5	50.0	22.2	20.1***
Others	1.3	3.6	1.9	
Household income ($US/month)	646.0 *(473.9)*	475.5 *(266.5)*	601.8 *(435.2)*	2.3**
Per capita income ($US/month)	277.1 *(218.6)*	243.6 *(224.7)*	268.4 *(219.6)*	0.7 ^{ns}
Average weekly food expenditures ($US)	39.8 *(21.6)*	33.2 *(17.6)*	38.1 *(20.8)*	1.6 ^{ns}
Share of food expenditures in total household income (%)	24.7	27.9	25.3	-

*Note: *** and ** indicate significance at 1 and 5%, respectively. ns: non-significant. Standard errors in parenthesis.*

meat regardless of location or ethnicity, in Dien Bien. Beef is less popular than pork due to its higher price and the taste not being considered attractive, primarily by children and sick family members (FGDs, 2019). Thai people process almost all the parts of cattle into food, even the rind and intestine. Thai consumers showed a substantially higher interest in beef or buffalo meat than Kinh people, as their culture has unique recipes from beef or buffalo meat such as buffalo meat cooked with *Nom* leaves (sour taste), salted and fermented buffalo rind, beef/buffalo cowhide salads, *Nam Pia* (cooked from intestine), dried meat, and other foods. However, these recipes are primarily prepared for special events such as festivals, weddings, or in restaurants. For these special and favorite foods, Thai people prefer local beef varieties because they produce a better taste for their traditional cuisines. Hongbo and Claus (2007) also found that Chinese consumers' unfamiliarity with beef recipes and higher prices were the main limitations for beef consumption in the country. The most important animal-source foods are described in **Table 2**. Chi-square tests were used to compare meat preferences and the results were not significant by location or ethnicity. In the research sites, the highest percentage of consumers considered pork as the most important animal source food. Less than a quarter of animal source foods came from beef/buffalo, poultry, and fish (**Table 2**).

Among the types of meat cuts, shank, loin, and plate were the most preferred, and similar results were found in nearby provinces (Centre for Global Food and Resources, 2016). Loin is considered the most tender part among beef meat cuts, which is perceived to contain less fat and is more suitable for processing different dishes for family members of all ages. More than half of the households preferred this type of beef (**Table 3**). Meanwhile, the shank is perceived as the juiciest part, is less tender, and can be processed in different dishes from simple family meals such as frying it with vegetables to party dishes such as salads, steamed, salted, and soups. *Pho* – a famous soup in Vietnam – also is normally prepared with loin or shank. Shank was the most preferred meat cut for both Kinh and Thai consumers (more than 60 percent of respondents).

Table 2. The most important animal source foods as perceived by consumers

Unit: % of respondents

Meat	Pork	Beef/buffalo	Poultry	Fish
By location				
Dien Bien Phu city (n = 80)	80.0	6.2	8.8	5.0
Tuan Giao (n = 28)	71.4	10.7	10.7	7.2
By ethnicity				
Kinh (n = 82)	79.3	4.9	9.7	6.1
Thai (n = 26)	73.1	15.4	7.7	3.8
All (n = 108)	77.8	7.4	9.3	5.5

Table 3. The meat cuts that are most frequently consumed by households (%)

Cuts of beef	Kinh consumers	Thai consumers	All	Chi Squares Test
Shank	67.1	61.5	65.7	0.27 ns
Loin	54.9	38.5	50.9	2.13 ns
Plate	23.2	34.6	25.9	1.35 ns
Offal	6.1	23.1	10.2	6.22**
Heart, tongue	4.9	19.2	8.3	5.32**
Ribs	4.9	15.4	7.4	3.18*
Tendon	3.7	3.8	3.7	0.002 ns
Tail	2.4	3.8	2.8	0.14ns
Cowhide	0	11.5	2.8	9.73***
Brisket point (*gầu*)	1.2	0	0.9	0.32 ns
Other cuts	9.8	23.1	13	3.1**

*Note: ***, ** and * indicate significance at 1, 5, and 10%, respectively. ns: non-significant.*

Beef plate is perceived as the fatty meat cut of beef, is much tougher than loin and shank, and is preferred mostly for over-cooked dishes. Plates were preferred by more than a quarter of consumers. People in East and Southeast Asian countries generally prefer raw beef with a moderate amount of marbling (Frank *et al.*, 2016), therefore, in the future, consumers in Vietnam in general and in Dien Bien in particular may also have the same preferences for this type of beef. Other types of meat such as heart, tongue, ribs, and cowhide, which are suitable for Thai recipes (**Table 3**), were consumed mainly because these meat cuts are much cheaper than loin or shank. The Kinh consumer group with a higher average income purchased more good quality meat cuts, as mentioned by the Center for Global Food and Resources (2016).

The outlets and frequency of purchase

Beef or buffalo meat are usually bought from a market for home consumption. Occasionally, beef meat is presented as a gift item. Some families also buy live cattle and slaughter them at home for special events, especially those of Thai ethnicity. On average, household consumers bought beef meat once every 4-5 days (**Table 4**). This was different from Western consumers, for example, Valentina *et al.* (2017) reported that the majority of Italian consumers consumed beef 1-5 times per week, or nearly 50 percent of consumers ate beef twice or more per week (Mannion, 1998).

Both Kinh and Thai consumers preferred buying beef in wet markets than in convenience stores or supermarkets (almost 90% of respondents), and usually in the morning, primarily due to the habit of consuming fresh

Table 4. Place and frequency of buying beef by households

Description	Kinh consumers	Thai consumers	All	Test
Frequency of purchase (number of purchases/month)	6.2	5.2	5.9	1.674^{ns} (t-test)
Buying place (%)				
Market	89.0	88.5	88.9	
Slaughterhouse	0.0	15.4	3.7	13.87^{***} (Chi square test)
Convenience store/ supermarket	1.2	0.0	0.9	
Roadside meat vendor	6.1	0.0	4.6	
Other	3.7	7.7	4.6	

*Note: *** indicates significance at 1%. ns: non-significant.*

and warm meat – which was similar to pork consumption as described in Jabbar *et al.* (2010) and Nguyen Thi Duong Nga *et al.* (2015). This is different in other countries, for example, only one-third of rural consumers in China prefer to buy beef at a countryside market (Yanwei *et al.*, 2016), or give priority to buying beef at a trusted butcher or supermarket instead of farm markets (Valentina *et al.*, 2017).

The market system in Dien Bien province is quite poor with an absence of regulated market places in many communes. Therefore, temporary food selling vendors are set up along roadsides or in villages in less populated or distant areas, offering vegetables and other foods, including meat and beef from the same outlet. In Tuan Giao, consumers could also go to buy meat at a slaughterhouse because of insufficient supply at markets since beef often sold out quickly (about 15 percent of Thai respondents – **Table 4**). The insufficient supply of beef in Tuan Giao town market is much influenced by a low supply of beef cattle and low weight and/or low carcass rate of beef cattle. The average weight of beef cattle slaughtered in the area was found to be around 210 kg and the carcass rate was less than 35 percent. This presents a dilemma to the sellers on how many heads to slaughter. If two cows are slaughtered in a day for the town market, supply exceeds demand, and if one cow is slaughtered, the actual demand could not be satisfied (from FGD). In the face of this dilemma, slaughterhouses were found to prefer one head slaughtered instead of two.

Imported beef from Australia and the U.S has been seen for sale in modern outlets such as supermarkets in Dien Bien Phu city but so far has gained little interest from household consumers. It was evident that very few Kinh consumers bought imported beef from convenient stores and no Thai consumers did. The main reasons are likely to be (i) the imported beef is not suitable for cooking traditional dishes, especially for Thai families, (ii) imported meat is frozen or chilled, while consumers prefer warm meat, and (iii) imported beef is not available to consumers far away from the city. However, the trend of out-of-home beef consumption with imported styles (Korea, Japan) was observed, especially for younger generation (Vu Thi Hoa, 2010). These cooking styles mostly use imported beef, which is normally softer as compared to local breeds and could be marbled meat. Therefore, breed diversification could be important to serve the market in the future.

Criteria for selecting retailers

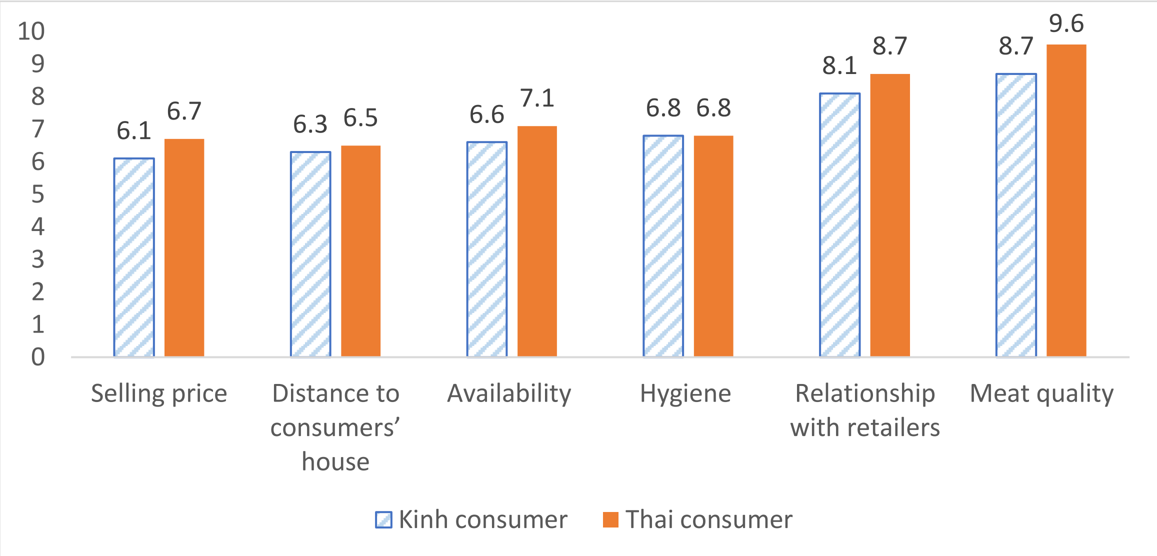
In both sites, the number of beef retailers in the market ranged from 1-7 depending on the market size. Consumers had different criteria in selecting the beef retailer, but the most important criterion was beef quality, with the average score of responses being 8.9, and Thai consumers gave higher points for this criterion (**Figure 2**). A relationship with the retailers was the second most important criterion, with the average score of 8.2. In a traditional market with a lack of certification for foods, trust could play as guarantee on quality and price of the meat from the retailers, which has also been found in the case of pork (Nguyen Thi Duong Nga *et al.*, 2015) and beef (Valentina *et al.*, 2017). A supplier's reputation is also one of the top influencing factors to beef purchasing (Pieter & Christo, 2016).

Hygiene at the meat counter and meat availability were also considered as criteria in selecting a beef retailer. Due to the small market size in Tuan Giao district and that some retailers do not operate daily and their business scale is limited, meat availability was important for consumers, especially Thai consumers. Despite the inadequacy of the beef supply in Tuan Giao, interestingly, the selling price was the least important criterion in selecting retailers (**Figure 2**), as price is set at the same level by retailers in a market. "We take price as a given and get familiar with the fact that the price of beef is more expensive than the pork price" – said a consumer in a FGD.

Criteria for buying beef

It was believed that there was no difference in the importance of the order of meat attribute choices between Kinh and Thai consumers (**Table 5**). However, Thai consumers were very much concerned about meat color and freshness (96.2 percent of Thai respondents), as most of their custom dishes require freshness for good taste. Meat tenderness and color were the most influencing criteria in selecting beef, as reported by consumers. Meat color was vital for consumers in several ways. First, it could be a signal of whether the meat was fresh or not – freshness is considered the most important buying criterion for beef, and the Center for Global Food and Resources (2016) also confirms this. Second, consumers also saw meat color as an indicator for cooking quality – a bright red color was preferred, and was also considered as meat produced from healthy cattle. However, the average temperature and humidity in Dien Bien were quite high, especially during the summer, and were recorded at 35-36°C and 84-87 percent, respectively (Dien Bien Department of Statistics, 2012). Under these conditions in a traditional market, beef color and freshness might deteriorate quickly, affecting consumers' choice as well as price.

Consumers were also very concerned about meat tenderness (**Table 5**), which influences cooking quality. "More tender beef could produce better taste and suit everyone in the family" – said one interviewee. Mannion (1998) also highlighted that tenderness, color, and flavor were the most important attributes, however at the consumption point, not the purchasing point as in this case. In contrast, Italian consumers did not highly appreciate tenderness or meat color while purchasing beef, with these criteria placed among the least concerning attributes (Valentina



Note: 10 for most important, 0 for irrelevant.

Figure 2. Consumer's criteria for selecting beef retailers

Table 5. Criteria in purchasing beef

Unit: % of respondents

Criteria	Kinh consumers			Thai consumers			All		
	1	2	3	1	2	3	1	2	3
Meat attributes									
Color and freshness	78.0	3.7	18.3	96.2	0.0	3.8	82.4	2.8	14.8
Smell	40.2	3.7	56.1	65.4	0.0	34.6	46.3	2.8	50.9
Tenderness	64.6	1.2	34.1	65.4	0.0	34.6	64.8	0.9	34.3
Price, production, and traceability									
Price	30.5	13.4	56.1	26.9	15.4	57.7	29.6	13.9	56.5
Breed	15.9	6.1	78.0	11.5	7.7	80.8	14.8	6.5	78.7
Safe farming practices	22.0	2.4	75.6	23.1	7.7	69.2	22.2	3.7	74.1
Origin	23.2	13.4	63.4	19.2	19.2	61.5	22.2	14.8	63.0
Traceability	6.1	18.3	75.6	7.7	15.4	76.9	6.5	17.6	75.9
Packaging and quality certifications									
Nutritional information	11.0	18.3	70.7	7.7	15.4	76.9	10.2	17.6	72.2
Packaging	7.3	18.3	74.4	7.7	15.4	76.9	7.4	17.6	75.0
Quality certifications	12.2	20.7	67.1	7.7	15.4	76.9	11.1	19.4	69.4
Animal welfare	1.2	19.5	79.3	0.0	15.4	84.6	0.9	18.5	80.6

Note: 1= most influence, 2=little influence, 3=no influence.

et al., 2017). Chad *et al.* (2020) found that older consumers placed more emphasis on meat tenderness for their beef consumption choice. Cooking methods might influence beef attribute choice, with Chinese cooking methods for beef being different from Australian ones. Therefore, meat tenderness was not highly valued by consumers, as mentioned by Hongbo & Claus (2007).

Besides observing color and checking for meat tenderness, a certain percentage of consumers practiced sniffing meat before purchasing it to check if the smell was strange – a signal of unexpected practices during fattening, slaughtering, or retailing, or simply just an indicator of freshness. Interestingly, meat smell was considered in the top three influencing choice attributes (**Table 5**), similar to pork consumption (Nguyen Thi Duong Nga, 2016; 2017).

Beef price was also a concern of the consumers. About 30 percent of the respondents placed beef price as the top factor influencing beef purchase (**Table 5**). Given that beef price has always been much more expensive than pork (which was almost doubled at time of the survey), beef was less frequently consumed by families compared to other meats (i.e. pork). Valentina *et al.* (2017), Yanwei *et al*. (2016), *Njazi et al.* (2012), and Taljaard *et al*. (2006) also reported that price was the key attribute influencing beef consumption.

Food safety was also considered as an influencing factor to the consumers' purchasing behavior with about one-fifth of the respondents (**Table 5**) concerned with safe farming practices. Consumers in Hanoi, Ho Chi Minh city, Lao Cai, and Son La put this criterion as the top driver for purchasing beef (Centre for Global Food and Resources, 2016). Food safety was also identified as a factor associated with beef consumption by Mannion (1998) and Pieter & Christo (2016).

It was evident that the consumers were also concerned about provenance (more than 20 percent of respondents), but very few of them (6.5 percent) were concerned about traceability. This probably reflects the consumers' trust in the retailers in the context of no labelling or information on the product's origin. Additionally, it may be due to the fact that beef sold in the market was produced from farm households in the province.

The data also revealed that only a few consumers were concerned about packaging and quality certification of the beef. In traditional markets where beef is sold fresh, no special packaging is utilized, hence no labeling as well. This is very different with the results of Pieter & Christo (2016), who found that packaging was one of the top influencing factors to beef purchasing behavior.

About 70 percent of the consumers reported that quality certification was not important in purchasing beef, which was also the case in Valentina *et al.* (2017). Almost none of the respondents were concerned about animal welfare during cattle production, transportation, and slaughtering, which is contrary to Valentina *et al.* (2017) where animal welfare was placed as the second most important choice attribute when purchasing beef. In Mannion (1998), the influence of animal welfare issues on beef consumption was not validated.

The type of breed was not a top attribute choice for purchasing beef. The FGDs with consumers revealed that the local breed was preferred, especially for Thai consumers, because it gives a better taste in special dishes with cow intestines, unlike cross-bred beef cattle. According to meat retailers, consumers were not always able to differentiate breeds when purchasing beef, especially in the city. Chad *et al.* (2020) found that US consumers preferred local beef over Australian beef. Cattle breed was also one of the top attributes at the purchasing point for consumers in the study of Valentina *et al.* (2017). From the analysis, we found that there existed at least two segments in the market: one for local consumers who preferred the local breed and/or opted for medium-to-lower quality meat cuts, and another for higher-quality meat cuts, that were not necessarily from the local breed.

Purchasing, processing, and storage at home

Interestingly, there was no significant difference in beef quantity purchased recently among Kinh and Thai consumers although their reported incomes were different (**Table 1**). The probable reason could be attributed to more Thai people generally preferring beef over pork or other animal source foods (**Table 6**).

Nearly two-thirds of the consumers reported that they cooked beef right after bringing it home, and more than half put the meat (either all or a portion) in a refrigerator or freezer for storage. The average time for keeping beef in a refrigerator was 5 days (Table 7), but there were non-significant differences between Kinh and Thai consumers. The majority of consumers kept cooked beef leftovers to use during their next meal, especially putting it in fried dishes or reheating it, which were preferred more by Thai consumers. However, about 9 percent of the respondents reported that they used the same cooking utensils (including cutting board) for raw and cooked meat. A high risk of cross contamination from raw to cooked pork in Vietnam was found by Sinh *et al.* (2018), therefore, home cooking practices should be improved in the study locations.

Several scenarios of meat quality and price changes in the market were developed and presented for the consumers to respond to. According to the FGD, most consumers preferred regular shops to buy meat where they had developed relationships with the retailers. However, if the meat quality was not good, the consumers would not buy, switch to other types of meat, or try buying from other retailers (**Table 8**). Nearly one-third of the consumers did not buy beef meat if the quality at their regular shops was not good. This was also almost the same response in the case of pork, where Nga *et al.* (2015) showed that more than one-third of consumers stopped buying meat because of decreases in quality. The consumers' reaction to changes in the price of beef was similar to pork as found by Nga *et al.* (2015), with more than 15 percent of consumers buying more or shifting to better quality meat when the product price decreased. Higher beef prices influenced the consumer's purchasing decisions more strongly than lower beef prices. When the price of beef decreased, about 84 percent of consumers reported that they maintained their consumption

Table 6. Quantity of beef purchased at the latest time (kg/hh)

Cuts of beef	Kinh consumers	Thai consumers	All[a]
Loin	0.4	0.6	0.4
	(0.20)	(0.60)	(0.30)
Shank	0.5	0.8	0.6
	(0.50)	(1.60)	(0.90)
Plate	0.7	0.6	0.7
	(0.90)	(0.50)	(0.80)
Ribs	0.5	0	0.5
	(0.20)	0.00	(0.20)
Offal	0	0.5	0.5
	(0.00)	(0.00)	(0.00)

Note: Standard errors in parentheses. (a) There were statistically non-significant differences between Kinh and Thai consumers.

Table 7. Storage and processing **of** beef at households

Activity	Kinh consumers	Thai consumers	All	Chi square test
When beef is bought and brought home (%)				
Cook right away	62.2	65.4	63.0	0.086 [ns]
Put in refrigerator	56.1	46.2	53.7	0.7851 [ns]
Time for storing raw beef (days)				
In cool shelves of refrigerators	1.9	1.6	1.8	0.521 [ns]
Frozen shelves of refrigerators	4.5	8.0	5.3	0.373 [ns]
Cooked beef left after meals (%)				
Leave at room temperature for next time	7.3	3.8	6.5	0.3924 [ns]
Fried or reheated for next time	69.5	88.5	74.1	3.6911*
Feed animals	3.7	3.8	3.7	0.0019 [ns]
Throw away	6.1	0.0	4.6	1.662 [ns]
Use the same cooking stuffs (cutting board, knife) for both cooked and raw meat (%)				0.1001 [ns]
Yes	9.8	7.7	9.3	
No	90.2	92.3	90.7	

*Note: * indicates significance at 10%; ns: non-significant.*

habits and 14 percent of consumers reported that they would buy more. When the price increased,about 22 percent of the consumers switched to other substitutes, 16 percent of consumers bought less, and 57 percent of the respondents did not change their buying quantity.

Consumer perception of safe beef and willingness to pay

About half of the respondents thought that safe beef could be detected by observing and sniffing meat cuts (**Table 9**). They believed that safe beef meat should have a bright color (red), which was not too red nor pale. They also checked by pressing their thumbs on the meat cuts and

Table 8. Consumer's behavior in different scenarios

Unit: % of respondents

Scenarios	Kinh consumers	Thai consumers	All[a]
1. Meat quality at regular shop is not good			
Buying smaller amounts	1.2	0.0	0.9
Buying other meats	31.7	30.8	31.5
Buying beef from other retailers	39.0	46.2	40.7
Not buying	28.0	23.1	26.9
2. Price decreases			
Buying a larger volume	14.6	11.5	13.9
Buying beef with a higher quality	2.4	0.0	1.9
No change (volume)	82.9	88.5	84.3
3. Price increases			
Waiting to buy	2.4	0.0	1.9
Buying a smaller amount	14.6	19.2	15.7
Buying other meat	23.2	19.2	22.2
Buying from other retailers	4.9	0.0	3.7
No change (volume)	54.9	61.5	56.5

Note: (a) There were statistical non-significant differences between Kinh and Thai consumers.

observed if the meat had high viscosity, meaning freshness. Some of them picked meat cuts to sniff to check for strange odors, which might come from diseased cattle, or any residuals contaminates. About 10 percent of the respondents trusted that their regular retailers sold safe meat. Other respondents thought that if the cattle were fed with no industrial feed or if the meat was stamped with quarantine assurance, then the meat would be safe. More than one-fifth of the respondents did not know about safe beef (**Table 9**). Trust in a quarantine stamp was very low, with about two-thirds of the respondents not trusting or partly trusting quarantine stamps on meat. Low trust in certified products in Vietnam has been seen not only in the case of meat (Nguyen Thi Duong Nga *et al.*, 2015; Nguyen-Viet Hung *et al.*, 2017) but also in vegetables (Pham Van Hoi *et al.*, 2013; VECO Vietnam, 2016).

Nearly two-thirds of the consumers agreed that they were willing to pay more for beef with better quality (**Table 10**). Food safety for beef was shown to be a growing concern of the consumers, as nearly 70 percent of the consumers were willing to pay for safer meat (coming from safe production and hygienic slaughtering). About half of the consumers reported that they were willing to pay more than 15,000 VND/kg, equivalent to about 7.5 percent of the prevailing price (**Table 10**). These consumers probably believed that family income will be higher in the future and safe beef was acceptable, as was shown in case of pork (Lapar *et al.*, 2010; Nguyen Thi Hao *et al.*, 2019).

Seasonality in beef consumption

Food consumption is generally seasonal in nature (Charles, 2021). In Vietnam, Tet holiday (Lunar New Year) is the most important event in a year. The majority of the respondents reported that they bought more beef during Tet holiday, especially Thai consumers (**Table 11**). The average quantity of beef purchased for Tet

Table 9. Perception of safe beef

Unit: % of respondents

Description	Kinh consumers	Thai consumers	All[a]
Bright color, high viscosity, no odor	53.7	50	52.8
Buy from known people/clear origin	12.2	3.8	10.2
Free of disease	8.5	3.8	7.4
Others	6.1	7.6	6.5
Do not know	19.5	34.6	23.1
Trust in quarantine stamp on meat			
Yes	13.4	26.9	16.7
Partly	14.6	7.7	13.0
No	53.7	42.3	50.9
Don't know	18.3	23.1	19.4

Note: (a) There were statistical non-significant differences between Kinh and Thai consumers.

Table 10. Willingness to pay for quality beef

Description	Kinh consumers	Thai consumers	All[a]
Willing to pay for better meat quality (% of respondents)			
Yes	64.6	53.8	62.0
No	34.1	42.3	36.1
Don't know	1.2	3.8	1.9
Willing to pay for beef with safe production and hygienic slaughtering conditions (% of respondents)			
Yes	70.7	61.5	68.5
No	29.3	34.6	30.6
Don't know	0.0	3.8	0.9
Premium (1000 VND/kg)			
2-5 (1-2.5%)	12.5	33.3	16.9
6-10 (3-5%)	17.9	6.7	15.5
11-15 (5.5-7.5%)	14.3	0.0	11.3
>15 (>7.5%)	55.4	60.0	56.3

Note: (a) There were statistical non-significant differences between Kinh and Thai consumers.

holiday of Thai households was much higher than Kinh households, with values of 8.6 kg and 5.4 kg, respectively. A few households (only among the Kinh people) purchased more beef when they had visitors, while none of the Thai households practiced this. Generally, at the research site, Thai families raised different animals in their house, such as chickens, ducks, and pigs for home consumption. This, coupled with the lower incomes (especially cash) of Thai households, might be reasons for buying less processed beef for Tet holiday. According to Yanwei *et al*. (2016), beef is considered to be a kind of warm or hot food, and is considered healthy to consume in cold weather, therefore Chinese consumers were more likely buy more beef in the winter than in the summer.

Besides fresh beef, dried beef is also a favorite food during Tet holidays. In fact, dried beef in the Northwest Vietnam is quite famous and considered as special local product known for its quality. None of the Thai households

Table 11. Special consumption of fresh and processed beef

Description	Kinh consumers	Thai consumers	All	Test
Peak time of buying beef (%)				5.556*
Tet holiday	56.1	76.9	61.1	(Chi
Have visitors	6.1	0.0	4.6	square)
None	36.6	19.2	32.4	
Other	1.2	3.8	1.9	
Quantity of fresh beef purchased during Tet holiday (kg)				
Average	5.4	8.6	6.2	2.134** (t-test)
- Min	0.6	1.0	0.6	
- Max	15.0	25.0	25.0	
Buy processed beef for Tet holiday				4.0525*
Yes	20.7	3.8	16.7	(Chi
No	79.3	96.2	83.3	square)

*Note: * and ** indicate significance at 10 and 5%, respectively*

bought dried beef during Tet holiday because they could process it at home using heat from burning wood materials during cooking as they practiced traditional methods of processing. Meanwhile, Kinh households did not have such processing activities at home, and therefore were the major buyers of dried beef.

Conclusions and Implications

Beef remains an important component in the meat consumption basket of Vietnamese consumers, but preferences vary among different groups, where ethnic (Thai) consumers showed stronger preferences for beef than Kinh consumers. More Thai consumers bought lower quality cuts such as intestines, ribs, and organs. Wet markets were the most common outlet for selling and purchasing beef in Dien Bien, and even though the market system in the province tended to operate under poor conditions, consumers had a strong preference for fresh meat. Meat quality was the most critical criteria in selecting beef (mostly meat color, freshness, and tenderness), followed by price and safety. Meat packaging, nutritional information, and quality certification were considered by consumers to be less important. At the moment, food safety may be not an issue for consumers in the research site, but in the future, when the process of economic integration increases, this issue should be considered.

Beef consumption is forecasted to increase around the world (Centre for Global Food and Resources, 2016). Given the small, scattered beef value chain in Dien Bien, building a strongly linked beef value chain, in which meat quality and safety will be improved, will become more important. As the consumers' choice to purchase beef was very much influenced by meat appearance, a butcher counter might be set within supermarkets where the environment temperature is favorable to keep the meat's color and freshness sustained for longer than in a wet market. Production should be improved in terms of productivity and cost, and quality improved through breeding programs and feeding slots. With the stronger reaction of consumers to price increases as well as increasing competitiveness from other supplying provinces, cost reduction in beef cattle production is important. Aside from the introduction of cross bred cattle, local breed quality should also be improved to serve the premium segments of the market, especially Thai consumers and those who prefer local products.

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