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The effect of information about a complex agricultural supply chain on consumers: The case of beef demand in Mexico

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1. Introduction

- The cattle production industry is an essential part of the US agricultural sector.
- In 2022, the cattle production industry in the US accounted for approximately 17% of the total cash receipts for agricultural commodities (\$462 billion).
- The United States is the leading beef producer globally and ranks third in the global beef exporters list.
- The US beef industry faces challenges, including reduced domestic consumption and competition for export markets.
- One way to address these concerns is by promoting US beef more extensively domestically and internationally.
- In 2022, Mexico was the fourth largest US beef export market, accounting for \$969.4 million.
- Understanding foreign markets consumers' perceptions and preferences is crucial for promoting US beef products worldwide.

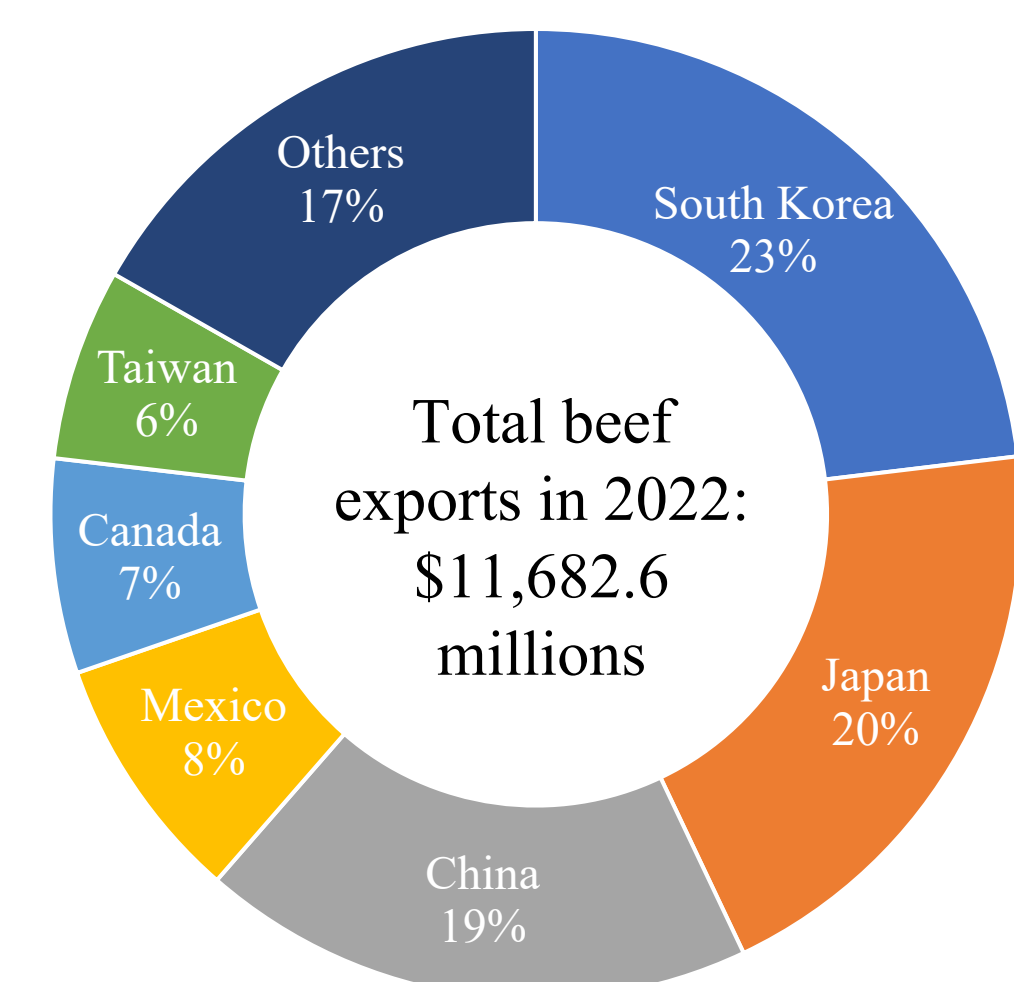


Figure 1. Percent of US beef export markets in 2022
Source: USDA-FAS

Main Objectives:

- to assess Mexican consumers' preferences for beef produced in single and multiple countries.
- to evaluate Mexican consumers' preferences for food safety and production practices attributes.

2. Data and Methods

- Data was obtained from an online survey of 2,215 Mexican households in December 2020, conducted by Qualtrics.

The survey collected information about consumers:

- socio-demographic characteristics
- beef products consumption and purchase habits
- perceptions of the importance of various meat products attributes
- responses to a choice experiment with twelve hypothetical choice scenarios of beef products with different attributes and prices

The choice experiment

The attributes and levels presented in the choice experiment were:

- Country of origin for three stages of production (Born, Raised, and Slaughtered):



- Price levels (Pesos/kg) 150, 220, 280, and 350.
- Food safety levels: Enhanced and Standard food safety
- Production certification levels: Approved and Natural

Select your preferred option in the boxes below the table (check only one):

Characteristics		Option 1	Option 2	Option 3
Place of origin	Born	U.S.A.	Canada	
	Raised	Mexico	U.S.A.	
	Slaughtered	Mexico	Canada	None
Price/kilogram (Mexican pesos)		350 Pesos	280 Pesos	None
Food safety		Enhanced	Standard	
Production practices		Approved	Natural	
I choose...		Option 1 <input type="radio"/>	Option 2 <input type="radio"/>	Option 3 <input type="radio"/>

Figure 2. Example of Choice Experiment Scenario

Data Analysis

The economic framework: The Random Utility Model

The econometric model: The Mixed Logit Model in Willingness to Pay (WTP) Space

3. Descriptive Statistics

Table 1. Description and summary statistics of respondents' characteristics

Variable and Category	Category Percentage	Mean	Standard Deviation
Age (years)		33.48	9.84
Household size (members)		4.37	6.71
Share of household income spent on food (%)		52.13	18.98
Share of food budget spent on beef (%)		34.00	19.67
Female	61.5%		
Location			
Urban	92.7%		
Rural	7.3%		
Education			
Middle School or below	0.3%		
High school	34.0%		
Professional (Technicians, BS, Graduate Degree)	65.7%		
Monthly household income			
Under 3,000 Pesos	9.4%		
3,000 - 7,999 Pesos	19.8%		
8,000 - 12,999 Pesos	30.2%		
13,000 - 19,999 Pesos	20.4%		
20,000 - 30,000 Pesos	10.1%		
More than 30,000 Pesos	10.1%		

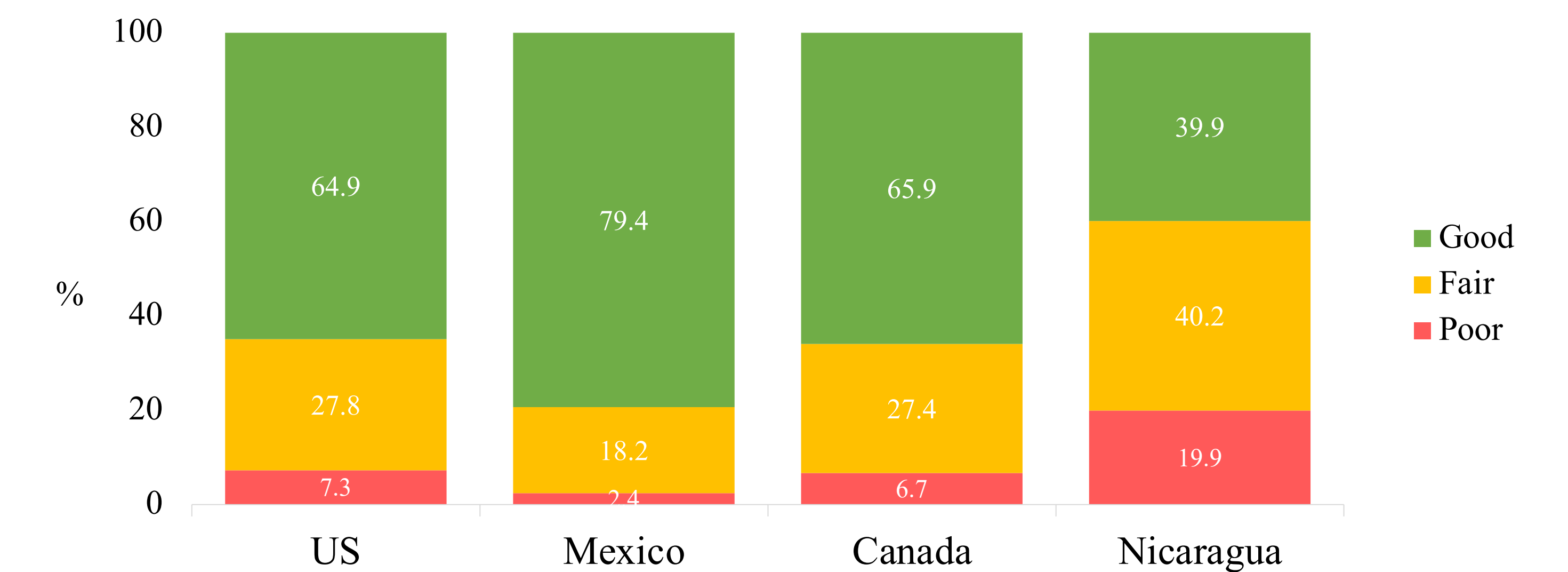


Figure 3. Consumers' perceptions of beef quality by country of origin.

4. Empirical Results

Table 2. Results of the Mixed Logit Model in WTP space for beefsteak (\$/lb)

Attributes	Mean coefficients	Standard Deviation coefficients
ASC	-23.148 ***	1.091 ***
Born-US ¹	-1.085 ***	0.197
Born-Canada ¹	-0.708 ***	0.188 ***
Born-Nicaragua ¹	-0.523	0.395 *
Raised-US ¹	-0.125	0.137
Raised-Canada ¹	-0.806 ***	0.233
Raised-Nicaragua ¹	-1.682 ***	0.249 ***
Slaughtered-US ¹	-1.184 ***	0.155 *
Slaughtered-Canada ¹	-1.260 ***	0.209 *
Slaughtered-Nicaragua ¹	-2.940 ***	0.265 ***
Enhanced Food Safety ²	0.441 ***	0.104 ***
Natural Production practices ³	1.160 ***	0.144 ***
Number of obs	37,476	
Log likelihood	-10402.304	
Prob > chi2	0.000	

Note: Significance levels: * 10%, **5%, ***1%.
ASC is a dummy variable identifying the alternative specific constant of the no-purchase option of beef steak.

¹ Mexico is the baseline category.

² Standard food safety level is the baseline category.

³ Conventional production practices is the baseline category.

5. Conclusions

- Mexican consumers prefer domestically produced beef products.
- There is evidence of heterogeneous preferences among Mexican consumers for the complex supply chain of beef, food safety, and production practices.
- Foreign slaughtering is the production stage with the largest discounts.
- Mexican consumers are willing to pay premiums for enhanced food safety and natural production practices.
- Sharing information on the stages of production could lead to lower discounts for US meat in the Mexican beef market.

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