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Final Performance Report
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An Outline of the Issue or Problem: Indiana and Michigan hog production ranks 5 and 13 among all U.S. states, respectively and contributes to approximately $3 billion and $600 million of each State's economy annually. Strategic plans for both Indiana and Michigan call for increased pork production, but a sharper increase relative to demand is set to hurt pork producers by depressing domestic pork prices. The U.S. pork industry has suffered with high feed prices partially driven by three consecutive years of poor U.S. corn crops, and decreased buying power of U.S. consumers has suppressed domestic market growth, further contributing to low market prices. As a result, serious questions arise as to how the Indiana and Michigan hog industries remain profitable by increasing outputs when facing market constraints.

Economic globalization has opened up international markets for U.S. products, especially new markers in emerging economies. China, with one-fifth of the world's population and a significant share of its citizenry entering a newly emerged middle class, has become a major purchaser of high quality products. Pork is by far the staple meat in the Chinese diet, accounting for over 50% of total meat expenditures. Though China has a history of self-reliance when it comes to pork production, recent price fluctuations have led to increased interest on foreign supplies of pork to meet rising Chinese demand. With regards to pork, Chinese consumers have different preferences structures for varying cuts than their U.S. counterparts, resulting in a price difference that is complementary to the domestic U.S. market. Moreover, the constant reports of domestic food safety incidents in well-known pork processing plants is prompting Chinese buyers to switch to imported pork products which are safer for consumption.

In 2011, China/Hong Kong was the third largest export destination for U.S. pork accounting for 910 million USD and 483 thousand metric tons of product. Due to increased production costs feed costs, animal disease epidemics environmental challenges and food safety concerns, China's status as a major pork importer will likely continue to grow. While opportunities for increased demand for U.S. pork in China look promising, little is known about this emerging market, especially regarding consumer preferences and attitudes for product specific attributes. This information is critical if producers in Indiana and Michigan want to realize maximum market penetration in the Chinese market and increase the profitability of the industry.

Goals and Objectives: Describe the goals and objectives of the project and how the work was accomplished.

The goal of this project is to assess emerging demand for U.S. pork in China by evaluating urban Chinese consumer preferences for various product attributes using a well established experimental economics methodology. Supporting objectives include:

1. Assisting in the development of more efficient marketing methods, and practices by informing U.S. producers of specific pork attributes being demanded by Chinese consumers.
2. Facilitate the elimination of artificial barriers to the free movement of agricultural products in commercial channels by promoting U.S. pork to Chinese consumers as a safe, high quality alternative.
3. Fostering new foreign markets for U.S. pork by providing an emerging market analysis for the Indiana and Michigan hog industry.
4. Collect and disseminate marketing information to hog producers and their supporting organizations in order to anticipate and meet foreign consumer requirements, thus increasing the profitability of the industry.

These objectives were accomplished via a market and consumer study carried out in four major Chinese cities: Beijing, Shanghai, Guangzhou and Hong Kong. These four cities were chosen because they are representative of urban centers where consumers are more likely to purchase imported pork. Furthermore, Hong Kong is prime destination for U.S. pork, which then makes its way to Mainland China via Guangzhou. After conducting a review of existing literature, gathering data on pork prices (domestic and foreign), assessing major U.S. competitors to the Chinese market, the research team designed a survey to elicit consumer preferences and demand for U.S. pork. Chinese consumers' willingness-to-pay for specific product attributes related to quality and safety were assessed using experimental economics and state of the art econometric methods. Information dissemination is at the core of our project. We shared our findings with pork producers, their supporting organizations, academic and high-level government officials.

Contribution of Project Partners: Collaborators at Purdue University were instrumental in designing and executing the consumer study. Specifically, they assisted with survey design, translation and field implementation. Additional project partners at Purdue disseminated results to industry, academia, and policy makers via outreach publications, conference presentations and policy hearings.

Results, Conclusions, and Lessons Learned:

With the rising appetite for pork, Chinese consumers are no longer only focusing on domestic pork products. China has been a net pork importer since 2008. Net imports of pork meat increased from 486 thousand metric tons in 2008 to 600 thousand metric tons in 2015. As the largest pork exporter to China, U.S. pork suppliers have increased their sales to China significantly (Table 1). Multiple factors have led China to increase its pork imports. One set of factors is a result of domestic supply, including price increases (data from China Health and

Nutrition Survey show that pork price increased from 5.32 yuan/kg in 2000 to 14.3 yuan/kg in 2011 (in 2011 yuan)) and a tarnished reputation due to the occurrence of several food safety incidents. The other set of drivers is a result of increased domestic demand and changing consumer preferences and lifestyle.

Supply-side factors are mainly a result of the unstable nature of China's pork industry. First, given the positive relationship between China's pork price and its imports (Gale *et al.,* 2012), the fluctuation of domestic pork prices creates opportunities for foreign pork suppliers. Although Chinese self-sufficiency has been projected to reach 90% over the next five years, producers face a number of challenges including a lack of arable land, high production costs and various disease issues. Rising production costs in particular are contributing to increase pork prices. In China, rapidly rising feed costs, which accounts for over 50% of total cost, is the main driver behind rising production costs (Gale *et al.,* 2012). Second, the tarnished reputation of domestic pork suppliers has helped to increase China's pork imports. Recent pork safety incidents, such as Clenbuterol-tainted pork in 2011 and the Huangpu river dead pig incident in 2013, have weakened Chinese consumers' trust in their domestic pork suppliers. This distrust may potentially increase western pork suppliers' sales due to their relatively well-established reputations. Third, the frequent flare up of hog diseases resulting in production shocks also call for imports. The weak disease control technology used by hog growers and the distribution of small hog farms in densely populated areas are some of the main drivers of diseases.

Demand-side factors have also driven the increase in pork imports. First, with rising incomes, consumers will demand higher quality and improved food safety, which will boost sales of imported pork in China. Ortega *et al.* (2009) found that food-safety-sensitive consumers in Beijing and Shanghai had a positive willingness to pay for U.S. pork. This implies that, as more people are becoming part of the Chinese middle class, imported pork may be an alternative for urban consumers, who are seeking safer and higher quality food products. Second, the rapid urbanization brings better infrastructure, including better transportation, more supermarkets in small cities, and more cold storage equipment in both homes and stores. The imported pork and processed pork products become widely available. Third, much of the imported pork enters the food processing and service sectors directly. Also, busier lifestyles in China resulting from economic and social development implies that consumers have less time to purchase and prepare fresh food. Consequently, fast food restaurants, convenience foods such as refrigerated meat products, and online retailing are becoming more popular in urban China.

Table 1. Top 5 pork exporters to China (Values in Thousands of USD).

Country	Rank in 2014	2008	2009	2010	2011	2012	2013	2014
United States	1	439,708	82,213	236,233	1,234,857	1,068,791	762,609	761,729
Denmark	2	259,858	196,369	357,902	316,367	364,439	413,756	377,304
Germany	3	69	176	42,949	78,547	287,514	410,449	356,466
Spain	4	234	41,426	54,633	124,313	186,198	217,737	288,665
Canada	5	111,381	129,121	222,532	204,677	237,720	296,250	195,172

Source: United Nations Statistics Division.

Given supply and demand-side drivers, China is becoming a promising market for global pork suppliers. The emergence of foreign imported pork will motivate the Chinese market to be more competitive and diverse, meaning that Chinese consumers will be confronted with various pork products from different countries and with differentiated quality attributes. Chinese consumers may show preferences for country of origin, not only based on the quality reputation of different countries but also on emotions towards different countries due to international relations. Knowing how Chinese consumers perceive imported pork, and what their preferences are, will allow for a better understanding of the potential of the Chinese pork market for U.S. pork suppliers.

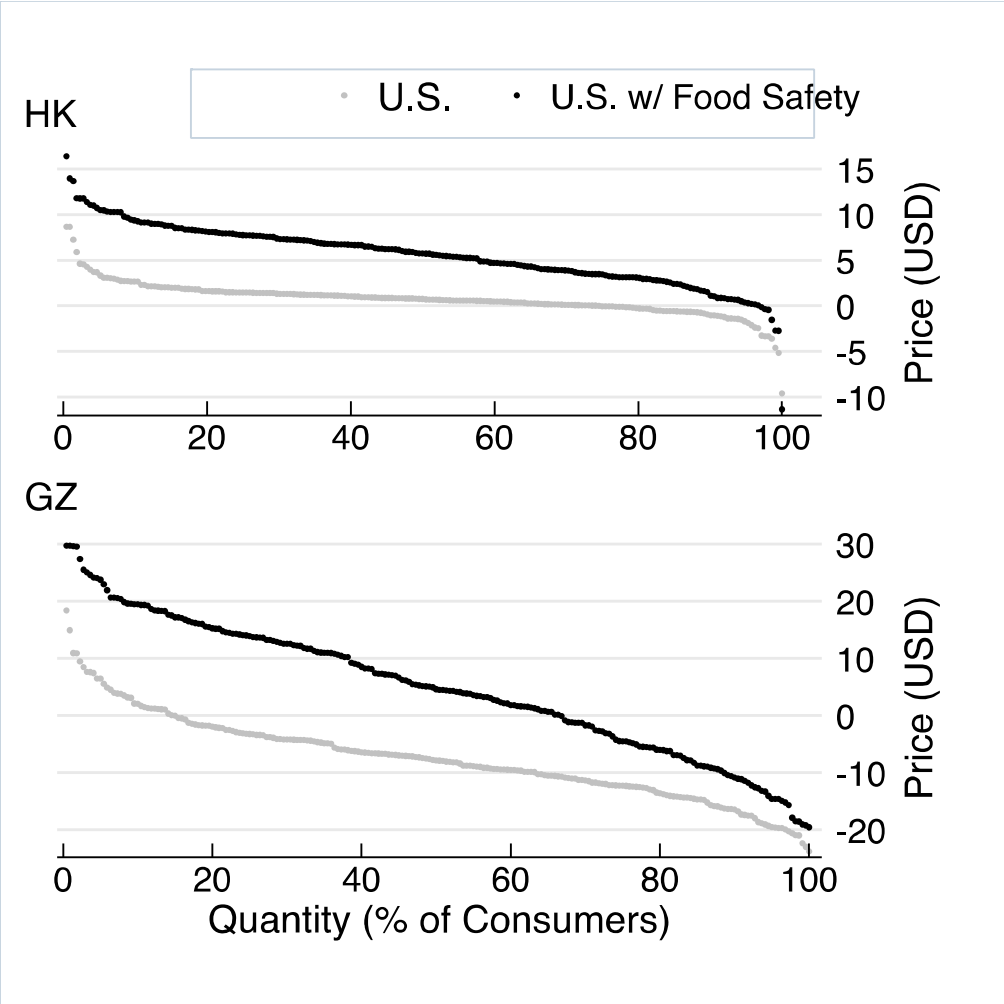
We used discrete choice experiments to study Chinese consumer demand for imported and domestic pork and understand how preferences differ between mainland and Hong Kong consumers. We specifically evaluated demand for country of origin as well as food safety, animal welfare and environmental claims. We find that demand and underlying preferences for U.S. pork differ between these two groups of consumers (Table 2). Our results further indicate that, in addition to taste heterogeneity, differences in preference for domestic over imported pork can also be explained by consumers' nationalistic attitudes and view of their country relative to those of the imported country. Despite little preference for imported pork (relative to a domestic product) absent credence attributes, demand for U.S. pork can be increased by claiming that U.S. pork is substantially safer than domestic pork (Figure 1). We note that only adding a food safety claim may not be enough because some domestic products started emphasizing food safety, and average consumers may prefer domestic pork to U.S. pork if both are equally safe. This tendency is more evident in mainland consumers given the dire food safety situation that is affecting the domestic food marketing system.

Table 2. Willingness to Pay for U.S. pork in USD

Product Attributes	**Hong Kong (HK)**		**Mainland China (GZ)**	
U.S.[a]	0.64[b]	[-0.24, 1.51][c]	-7.78	[-11.23, -4.51]
U.S. + FS	**5.60**	[4.56, 6.59]	**4.62**	[1.43, 7.51]
U.S. + AW	**2.67**	[1.59, 3.82]	-5.34	[-8.11, -2.70]
U.S. + EN	**2.01**	[0.95, 3.02]	-3.95	[-6.94, -0.95]
U.S. + FS + AW	**7.64**	[6.35, 8.92]	**7.05**	[3.36, 10.47]
U.S. + FS + EN	**6.97**	[5.70, 8.13]	**8.44**	[4.85, 11.91]
U.S. + AW + EN	**4.05**	[2.78, 5.33]	-1.51	[-4.13, 1.13]
U.S. + FS + AW + EN	**9.01**	[7.55, 10.55]	**10.88**	[6.51, 14.87]

Notes: [a]U.S., FS, AW, and EN represents U.S origin, food safety claims, animal welfare claims and environmental claims, respectively. [b] Bold figures are statistically greater than zero with at most a 5 percent probability of Type I Error. [c] 95% confidence intervals are presented in brackets.

Figure 1. Demand for US Pork



Our study highlights the importance of knowing exactly whom a company or industry is marketing to in a foreign market. Not all Chinese consumers have the same set of preferences and promotional strategies that work for one set of consumers may be ill received by another. We find that this is the case between mainland Chinese and Hong Kong consumers. We show that preferences and demand can vary drastically between two adjacent urban centers. Moreover, our research underscores the significance of accounting for nationalistic and patriotic attitudes when marketing foreign products in a new market. This is particularly critical in our context given the heightened political climate in this region in the wake of the political protest that took place between September and December 2014 in Hong Kong. At the same time, the political protest was more active in the younger generation of Hong Kong than the generation contained in our analytical sample. Thus, in Hong Kong, the level of patriotism may become lower than our analysis in the near future.

One caveat worth mentioning is that our results are based on a sample of urban supermarket shoppers and should not be taken to be representative of all Chinese consumers. Our findings illustrate the importance of understanding regional consumer preferences and attitudes before marketing recommendations are developed. This project serves as a benchmark for future research on consumer demand for imported pork in other regions of China as additional research is needed to fully understand the dynamic Chinese consumer. Little is known about the drivers of emerging demand for animal welfare, environmental and other credence attributes. Preferences for these characteristics could be related to product taste or other experience attributes that we were unable to capture with our experimental design. We also note the need for additional studies using non-hypothetical preference elicitation techniques. Given the scope of our study, we suggest these topics as areas worthy of further inquiry.

References

Gale, F., D. Marti, and D. Hu. 2012. *China's Volatile Pork Industry.* Washington, D.C.: U.S. Department of Agriculture, Economic Research Service Outlook Report LDP-M-211-01, February. Available online: http://www.ers.usda.gov/publications/ldpm-livestock,-dairy,-and-poultry-outlook/ldpm211-01.aspx.

Ortega, D. L., Wang, H. H., & Wu, L. (2009). Food safety and demand: consumer preferences for imported pork in urban China. *Journal of Food Distribution Research*, *40*(3), 52-63.

Ortega, D. L., H.H. Wang, N.J. Olynk, L. Wu and J. Ba. 2012. "Chinese Consumers' Demand for Food Safety Attributes: A Push for Government and Industry Regulations." *American Journal of Agricultural Economics* 94 (2):489-495.

Evaluation: Our evaluation plan included reaching certain milestones. First we completed a subsector analysis and review of the literature to inform the study design. We then implemented a consumer survey in four major Chinese cities which included Beijing, Shanghai, Guangzhou and Hong Kong. We have developed two academic journal articles based on the results of this study; these are currently under review and in preparation. Project results were disseminated to farmers, industry representatives, and policy makers via extension publications, meetings with stakeholders and presentations. This project has also supported two graduate and one undergraduate student: one MS student at Michigan State University (MS Thesis Completed 2015), one PhD Student at Purdue University (Expected Graduation 2017), and one undergraduate student at Purdue University.

Current or Future Benefits/Recommendations for Future Research: This project is one of the first studies to focus on demand for US pork in China. We utilize a well

recognized preference elicitation technique (choice experiments) which relies on consumer assessment of hypothetical shopping or choice scenarios. Given the market opportunities available to US industries in China, additional work should focus on validating our findings with non-hypothetical methods such as experimental auctions, real choice experiments or in-store field experiments. Additionally, consumer preferences for pork products via online retailing should be studied as this is an emerging marketing channel.

Project Beneficiaries: Our findings were disseminated to and benefited US hog producers, their supporting organizations, academia and policy makers.

Additional Information:

Outreach publications

- Wang, H. H. "Theme Overview: China as the Leading U.S. Agricultural Export Market." Choices: The Magazine for Food, Farm, and Resource Issues. 30(2) March 2015. http://www.choicesmagazine.org/choices-magazine/theme-articles/2nd-quarter-2015/theme-overview-china-as-the-leading-us-agricultural-export-market

- Ortega, D.L., H. H. Wang, and M. Chen. "Emerging Markets for US Meat and Poultry in China" Choices: The magazine of food farm, and resource issues, 30 (2) March 2015. http://www.choicesmagazine.org/choices-magazine/theme-articles/2nd-quarter-2015/emerging-markets-for-us-meat-and-poultry-in-china

- Lai, John, and H. Holly Wang, "Growing the Pork Industry: Exports to China." *Purdue Agricultural Economics Report*, March 2016: 8-11. https://ag.purdue.edu/agecon/Documents/PAER%20MARCH%202016.pdf

Policy engagement:

- U.S. Senate and House Briefing by H. Wang: The Role of U.S. Agriculture in Chinese Markets: Factors affecting Chinese food and agricultural trade. October 26, 2015. http://myemail.constantcontact.com/NC-FAR-Lunch-n-Learn---The-Role-of-U-S--Agriculture-in-Chinese-Markets---Save-the-date---October-26.html?soid=1116839265687&aid=GbK7sQlNW-0

Academic Publications

- Chen, Malong, "Emerging Markets for US Pork in China" http://web2.msue.msu.edu/afreTheses/fulltext/MaserThesis_Maolong%20Chen.pdf

- Xiao, Wuzheqian, "What Determines Urban Chinese Consumers' Choice of Shopping Outlets for Pork?" *Journal of Purdue Undergraduate Research*, 5 (Fall 2015):83. http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1187&context=jpur

- "Chinese Demand for Pork and Implications for the US Pork Industry: Experimental Results from Mainland and Hong Kong Consumers" *Under Review*

- "Chinese consumers' linkages to pork quality and safety: risk, environment, and animal welfare" *Under Preparation*

Academic Presentations

- "Chinese consumers' linkages to pork quality and safety: risk, environment, and animal welfare" International Academic Conference for Graduate Students, Nanjing Agricultural University. Nanjing, China 2014

- "Chinese Consumers' Perception of Imported versus Domestic Pork Quality" AAEA Annual Meetings, July, 2015, San Francisco, CA.

- "What Determines Urban Chinese Consumers' Shopping Outlets for Pork?" AAEA Annual Meetings, July, 2015, San Francisco, CA.

- "Do Chinese Consumers Prefer US Meat in the Presence of Severe Food Safety Issues?" AAEA Annual Meetings, July, 2015, San Francisco, CA.

- "Chinese Demand for Pork and Implications for the US Pork Industry: Experimental Results from Mainland and Hong Kong Consumers" AAEA Annual Meetings, July, 2015, San Francisco, CA.

- "Chinese Consumers' Risk Perceptions on Pork Attributes" Chinese Economists Society. Ann Arbor, United States 2015

- "Producers' Willingness to Adopt an Alternative Technology: Market Opportunities to Export Pork to China." AAEA Annual Meetings, July-August, 2016, Boston, MA.

- "What Determines Urban Chinese Consumers' Shopping Outlets for Pork?" AAEA Annual Meetings, July - August, 2016, Boston, MA.

Survey ID: _____

Block #: _____

City: Beijing

Shanghai

Guangzhou

Hong Kong

City District or Area _____

Supermarket/Location: _____

Address: _____

Date: _____

Enumerator Name: _____

Basic Information

1. Gender a. Male b. Female

2. In what year were you born? _____

3. Highest education level achieved. _____
   a. Primary School
   b. Secondary School
   c. 2-yearsof specialized or equiv.
   d. Undergraduate Degree
   e. Graduate or Professional Degree

4. What is your average monthly ***household*** income (RMB)?_____
   a. < 2,000
   b. 2,000-4,000
   c. 4,000-6,000
   d. 6,000-8,000
   e. 8,000-10,000
   f. 10,000-12,000
   g. 12,000-14,000
   h. 14,000-16,000
   i. 16,000-18,000
   j. 18,000-20,000
   k. 20,000-22,000
   l. >22,000

5. What is your marital status? Married Unmarried Other

6. How many individuals live in your household (including yourself and people eat with you regularly more than 4days per week)? _____

7. How many individuals under the age of 18 live in your household? _____

8. How many individuals over the age of 60 live in your household? _____

9. Are you the primary food shopper in the household? Yes No

10. Are you the primary food preparer in the household? Yes No

11. Do you or someone in your household consume pork? Yes No

12. How long does it take to get to the closest supermarket from your home?

    _____ hours and _____minutes by: walk bike car metro/bus

13. How long does it take to get to the closest wetmarket from your home?

    _____ hours and _____minutes by: walk bike car metro/bus

Pork Consumption Behavior

14. Have you purchased imported pork in the past year?
    a. Yes b. No c. Not Sure

15. Have you purchased pork from the United States in the past year?
    a. Yes b. No c. Not Sure

16. At which of the following do you primarily shop for pork? _____
    a. Wetmarket
    b. Specialized Meat Store
    c. Low-end domestic supermarket
    d. High-end domestic supermarket
    e. International supermarket
    f. Other:_____

17. How often does your household purchase pork?
    a. Daily
    b. 3-4 times/week
    c. 1-2 times/week
    d. every other week
    e. once per month
    f. less than once per month

18. How many ***jin*** of pork does your ***household*** consume in a ***week***? (Not including cooked pork in cafeterias, restaurants, vendors, etc.)

a. < 1 jin	f. 4-5
b. 1-2	g. 5-6
c. 2-3	h. 6-7
d. 3-4	i. j. >7 , _____jin

19. What are your household's most consumed pork cuts? (Select/circle up to 3)

    Loin Tenderloin Spare rib front leg hind leg

    Leg Shoulder Ground Pork Rump (TunJian) Offal

    Belly Other:_____

20. In the total pork purchased by your household this year, what percent is:

Chilled Pork_____% Hot Pork____% Frozen Pork_____% or Don't know

21. Are you aware of food safety problems in China? Yes No

22. How likely do you think ***you*** are to get sick from eating pork?
Extremely Highly Medium Low No likelihood

23. How likely do you think ***you*** are to get sick from eating domestic pork?
Extremely Highly Medium Low No likelihood

24. How likely do you think ***you*** are to get sick from eating imported pork?
Extremely Highly Medium Low No likelihood

25. How likely do you think ***you*** are to get sick from eating pork bought at a supermarket?
Extremely Highly Medium Low No likelihood

26. How likely do you think ***you*** are to get sick from eating pork bought at a wet market?
Extremely Highly Medium Low No likelihood

27. How likely do you think ***the average person*** is to get sick from eating pork?
Extremely Highly Medium Low No likelihood

28. On a scale of 1 to 5 how much do you trust the following when considering food safety. 5 indicates fully trust, 1 no trust (circle one)

a. (CN/HK) Government Food Safety Information and Certification

Fully Trust	5	4	3	2	1	No Trust

b. Industry (CN/HK) Food Safety Information and Certification

Fully Trust	5	4	3	2	1	No Trust

c. U.S. Food Safety Information and Certification

Fully Trust	5	4	3	2	1	No Trust

d. Chinese/HK Traceability System

Fully Trust	5	4	3	2	1	No Trust

e. U.S. Traceability System

Fully Trust	5	4	3	2	1	No Trust

f. European Traceability System

Fully Trust	5	4	3	2	1	No Trust

g. Labels with additive information

Fully Trust	5	4	3	2	1	No Trust

29. On a scale of 1 to 5 how do you feel about the following statement?5 indicates that you agree, 3 that you are indifferent and 1 that you don't agree

a. Pork products from animals that are treated well are of better quality

Agree	5	4	3	2	1	Don't Agree

b. Pork products from animals that are treated well taste better

Agree	5	4	3	2	1	Don't Agree

c. Pork products from animals that are treated well are safer

Agree	5	4	3	2	1	Don't Agree

30. On a scale of 1 to 5 how do you feel about the following statement?5 indicates that you agree, 3 that you are indifferent and 1 that you don't agree

a. The average Chinese person cares about the environment

Agree	5	4	3	2	1	Don't Agree

b. The average Chinese person is concerned about pig farms polluting the land

Agree	5	4	3	2	1	Don't Agree

c. The average Chinese person is concerned about pig farms polluting the air

Agree	5	4	3	2	1	Don't Agree

d. The average Chinese person is concerned about pig farms polluting water

Agree	5	4	3	2	1	Don't Agree

e. I care about the environment

Agree	5	4	3	2	1	Don't Agree

Choice Experiment

Next you will be provided ten choice situations, which contain the following attributesof fresh chilled pork loin:

Price (500g).	Price is expressed in RMB (yuan) per jin
Country of Origin	The location or origin where the pork was produced: mainland China, Imported--US or Imported—Other (Here we define "other" as countries including Europe, Canada and Brazil).
Food Safety Claims	Yes, indicates this product has any claims indicating the use of food safety practices that will reduce your likelihood of becoming ill. For example: certification, additive information and traceability. No means no such claims.
Animal Welfare Claims	Yes, indicates this product has any claims regarding the use of animal welfare practices. For example: type of production, standards and procedures to ensure that pigs are treated without cruelty and are fed with food of a certain quality.
Environmental Claims	Yes, indicates this product has any claims regarding environmental standards in the pig farms. For example: water quality, soil quality, standards for limiting the carbon footprint and for maintaining a sustainable ecosystem.

Each choice set represents a separate pork purchasing decision scenario. Please choose the most appropriate alternative out of the three options given. Research has shown that individuals tend to overestimate the amount they are willing to pay, please treat each scenario as you would a real purchasing decision.

Before we start, can you tell me about the pork that you usually buy:

What is the average price that you pay last month _____
per Jin

Where is it from: a. China b. United States c. Other/Imported d. I don't know

Does it contain food safety claims or information: Yes or No

Does it contain any animal welfare claims or information: Yes or No

Does it contain any environmental claim or information: Yes or No

Choice Experiment Responses (BLOCK NUMBER:_____)

1.	**6.**
2.	**7.**
3.	**8.**

4.	**9.**
5.	**10.**

31. In the previous choice situations, how often did you consider the following characteristics/claims?(Circle one)

Price	Always	Often	Sometimes	Rarely	Never
Country of Origin	Always	Often	Sometimes	Rarely	Never
Food Safety	Always	Often	Sometimes	Rarely	Never
Animal Welfare	Always	Often	Sometimes	Rarely	Never
Environmental	Always	Often	Sometimes	Rarely	Never

Pork and attribute preferences

32. In the following table please indicate which of the following characteristics you associate with each retail location. Check all that apply.

	Better Quality	Safe Product	Better Value	Better Treatment of Animals	Better Environmental Standards
Wet Market					
Dom SuperMkt					
Intl SuperMkt					

33. Please indicate the level of importance that you place on the following attributes when purchasing pork. 5 indicates high importance, 1 lowest importance.

Attribute	Highest Importance				Lowest Importance
Color	5	4	3	2	1
Fat cover	5	4	3	2	1
Drip	5	4	3	2	1
Marbling	5	4	3	2	1
Fresh/Chilled	5	4	3	2	1
Packaging	5	4	3	2	1
Price	5	4	3	2	1
Taste	5	4	3	2	1

Tenderness	5	4	3	2	1
Origin	5	4	3	2	1

Country of Origin Information

34. In your opinion, what is the ***quality standard***of fresh chilled pork produced by each of the countries listed below

	Highest Quality				Lowest Quality
China	5	4	3	2	1
Brazil	5	4	3	2	1
U.S.	5	4	3	2	1
EU	5	4	3	2	1
Canada	5	4	3	2	1

35. In your opinion, what is the ***food safety standard*** o ffresh chilled pork from each of the countries listed below

	Most Safe				Least Safe
China	5	4	3	2	1
Brazil	5	4	3	2	1
U.S.	5	4	3	2	1
EU	5	4	3	2	1
Canada	5	4	3	2	1

36. In your opinion, what ***animal welfare standards*** does each of these countries have? For example: standards and procedures to ensure that pigs are treated without cruelty and are fed with food of a certain quality

	Highest Standard				Lowest Standard
China	5	4	3	2	1
Brazil	5	4	3	2	1
U.S.	5	4	3	2	1
EU	5	4	3	2	1
Canada	5	4	3	2	1

37. In your opinion, what type of ***environmental standards*** does each of these countries have for their pig farms? For example: water quality, soil quality, standards for limiting the carbon footprint and for maintaining a sustainable ecosystem.

	Highest Standard				Lowest Standard

China	5	4	3	2	1
Brazil	5	4	3	2	1
U.S.	5	4	3	2	1
EU	5	4	3	2	1
Canada	5	4	3	2	1

38**. Mr.Li** buys pork every week from a wetmarket that is on his way home from work. The meat at this wetmarket is not kept refrigerated and there are flies and insects all over the market. The vendors are not able to tell Ming anything about the quality of the product where the pork came from since they do not have any information regarding the meat that they sell. He knows people that have gotten sick from eating pork from the wet market.

How likely do you think Ming is to get sick from eating pork?

Extremely Highly Medium Low No likelihood

39**. Mr. Sun**buys pork every week from a local butcher shop. The butcher keeps the meat refrigerated. The shop is somewhat clean although there are some flies around. The butcher does not have information on the meat that he sells. He has heard of one person getting sick from eating pork from this shop.

How likely do you think Mr. Sunis to get sick from eating pork?

Extremely Highly Medium Low No likelihood

40**. Ms. Wang**buys pork every week from a local supermarket. The meat is kept refrigerated. The store is clean. A sign in the store lets her know that the pork she buys is from a farm near her home town and that the meat does not contain any additives. She hasn't heard of anyone getting sick from pork at this supermarket.

How likely do you think Ms .Wang is to get sick from eating pork?

Extremely Highly Medium Low No likelihood

41**. Miss Chang** buys pork every week from an international supermarket. The meat is packaged, and is kept refrigerated. The pork that Chang buys is imported. He knows that the brand he buys has a good reputation since they raise the pigs with the highest standards; they have a good safety record and do not use any additives. He knows that no one has gotten sick from eating pork from this supermarket.

How likely do you think Miss Chang is to get sick from eating pork?

Extremely Highly Medium Low No likelihood

42. How serious do you think the current food safety problem is in China? "5" denotes very bad, "1" denotes not a problem, please circle a number from 1 to 5 to describe your perception.

Very bad	5	4	3	2	1	Not a problem

43. Have you or people you know ever been involved in any food safety incidents?

⊖Yes ⊖No

THANK YOU VERY MUCH!

Enumerator: Please don't ask respondents the following question. Instead, please you your own estimation

A1. Respondent Height

a. < 150 cm
b. 150-159 cm
c. 160-169 cm
d. 170-179 cm
e. >180 cm

A2. Respondent Weight

a. < 50 kg
b. 50-59 kg
c. 60-69 kg
d. 70-79 kg
e. >80kg

A3. Overall, how do you assess the quality of this sample?

a. Very bad
b. Below average
c. Average
d. Above average
e. Very good

DO NOT FORGET TO WRITE DOWN THE BLOCK NUMBER OF THE CHOICE EXPERIMENT THAT YOU USED IN THIS SURVEY

CHOICES
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Theme Overview: China as the Leading U.S. Agricultural Export Market

Holly Wang

JEL Classification: F1, F52, P2, Q13
Keywords: Agricultural Trade, China, Food Security, Food Safety

China is the largest agricultural export destination country for the United States, receiving 18% of total agricultural export value in 2013. The Chinese agricultural importing market is broad, extending from bio and ag-inputs such as seeds, farm chemicals, animal genes, and veterinary supplies, all the way to ready-to-eat (or drink) food in the retail or food sectors, with the majority being crop commodities. The market is also rather complicated—with trade barriers, strong domestic production supported by the Chinese government, fierce competition within the processing industry causing food safety fears, and consumers' concerns regarding biotechnology caused by confusing and incomplete information. Amid these complexities, the articles in this theme will address the Chinese food market with an emphasis on the U.S. trade perspective. Taken together, the articles will provide information, knowledge, and outlook for stakeholders to vision the roles each can play in domestic and the world markets.

China remains the world's fastest growing large economy, even with its annual gross domestic product (GDP) growth rate dropping to 7.5% from the double digit number it had half a decade ago. The 1.36 billion people's growing appetite for food from animal proteins supported by their increasing income provides an ample demand for grains, livestock, and other food stuff. China's newly much relaxed "one-child policy" will soon bring millions of additional people to its population. With the limitation on the quantity and quality of its land, soil, and water resources, such a demand will have to be satisfied by a strong domestic production and supplemented by imports from the world market, a good opportunity for the U.S. agricultural sector.

Articles in this Theme:

Three new issues emerged recently in the Chinese agricultural sector that affect its performance in the global market. First, the Chinese government has increased its support over time to the agricultural production sector. Second, Chinese companies have started to acquire agricultural assets overseas, including farmland, bulk commodity storage and transportation facilities such as railroads or ports, and meat processing firms. Third, Chinese consumers are very concerned about food safety scandals that are repeatedly reported in their meat, poultry, dairy, and other animal protein products. As described in this theme, their combined effect on trade is mixed.

The first paper, by Bryan Lohmar, discusses the perspective of China's corn import. China has dominated the world soybeans import, and most of it is from the United States to feed its livestock industry. More corn, or other

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energy grains, are needed to balance its feed and improve the efficiency of its livestock industry. Lohmar explores whether China will be able to produce more energy grains itself, discover new exporting sources from the world, or import more from the United States.

The second paper, by David L. Ortega, H. Holly Wang and Maolong Chen, discusses the market potential for U.S. meat in China. The authors base their analysis on their previous studies of Chinese preferences for pork, beef, dairy, and poultry for food safety and quality attributes, in the presence of biological based trade barriers.

The third paper by Fred Gale considers the trade barriers. The Chinese government strongly influences, if not controls, its food import in quantity, variety, timing, as well as the importers. This articles calls for a closer observation of China's changing importing behavior, instead of basing expectations solely on past trading patterns.

In the final article Elizabeth Gooch and Fred Gale draws our attention to a new phenomenon—China's worldwide investment in agricultural resources in production, processing, and logistic and marketing channels. The authors consider the potential impacts that these investments will have on China's agricultural commodity import pattern.

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Emerging Markets for U.S. Meat and Poultry In China

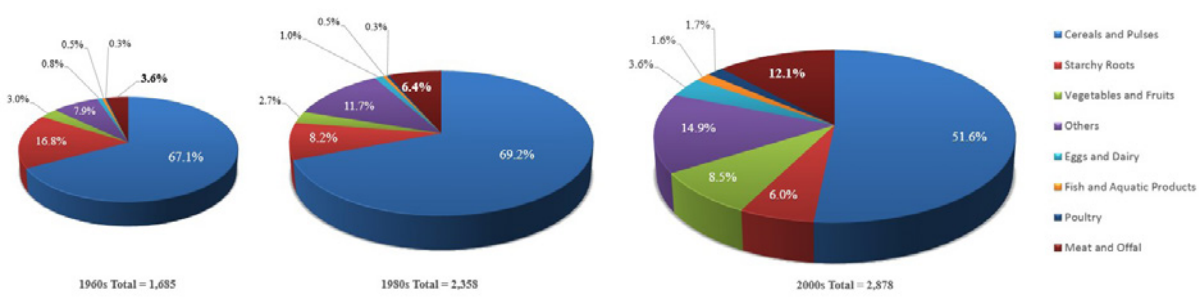
David. L. Ortega, H. Holly Wang, and Maolong Chen

JEL Classification: Q13, Q18, Q27
Keywords: Agricultural Exports, China, Meat Consumption

Rising Demand for Meat in China

As the most populous country, China is also the world's largest food consumer. Rising incomes in China are leading to a shift in the consumption of higher quality food products. This trend is represented by an increase in the consumption of animal protein, mostly meat, poultry, dairy, and aquaculture products. Meat consumption in China grew rapidly in the past three decades and has become the most important category of food consumption in recent years. Data from the Food and Agriculture Organization of the United Nations (FAO), presented in Figure 1, reveals how the typical Chinese dinner plate has changed in the past half a century. In the 1960s, cereals, pulses, and starchy roots provided 84% of total calories for Chinese people, while meat, including poultry and offal, contributed only 4%. As a result of economic development in the last 34 years, when annual GDP grew from $309 Billion in 1980 to $10,355 Billion in 2014 (IMF, 2014), meat, poultry, fish, eggs, and dairy products became a key source of calories and provided 19% of total calories in the 2000s. Among all kinds of meat, pork is the most favored animal protein; its consumption increased by more than 8% annually during this period. Data from the U.S. Department of Agriculture (USDA) shows that annual pork consumption increased from 16 million metric tons in 1985 to 52 million metric tons in 2012, and annual consumption of all chicken, beef, and pork combined increased from 17 to 71 million metric tons. This rising trend in meat consumption is highlighted in Figure 2.

Figure 1: The Evolution of The Chinese Dinner Plate: Food Consumption by Category (KCal/Day/Capita).



Source: Food and Agriculture Organization of the United Nations.

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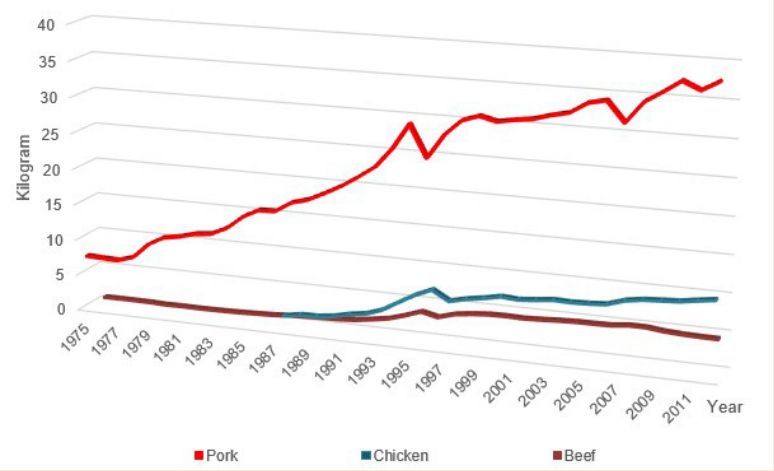
Figure 2: Annual Per Capita Consumption of Meat in China from 1975 to 2012.



Source: U.S. Department of Agriculture, Foreign Agricultural Service.

Table 1: Top 5 Pork Exporters to China (Values in Thousands of Dollars).

	Rank in 2013	2008	2009	2010	2011	2012	2013
United States	1	439,708	82,213	236,233	1,234,857	1,068,791	762,609
Denmark	2	259,858	196,369	357,902	316,367	364,439	413,756
Germany	3	69	176	42,949	78,547	287,514	410,449
Canada	4	111,381	129,121	222,532	204,677	237,720	296,250
Spain	5	234	41,426	54,633	124,313	186,198	217,737

Source: United Nations Statistics Division.

Constraints to Chinese Domestic Meat Production

While China has imported a significant amount of feedstuff to fuel its animal protein production, several constraints prevent Chinese producers from supplying necessary quantity and demanded quality. Limited agricultural space, urban sprawl, and industrialization have made it difficult to prevent the spread of animal diseases, and have lead to food safety problems in domestic animal production. These spatial constraints tend to either raise the cost of food products or compromise their safety and quality, and will likely remain in the presence of government regulations and as livestock industries modernize.

Large swine and poultry operations are densely concentrated around China's urban areas on the east coast of the country (Gerber et al., 2005), where there is also an extremely high density of human population. This provides an environment for animal diseases to spread, and can even result in situations where viruses are passed from animals to human, such as avian and swine influenza (H5N1 and H1N1, respectively). These operations also generate tremendous waste and dead animals, which unless properly handled can pollute surface and ground water. The presence of nitrogen and phosphorus in the water causes an over growth of bacteria, phytoplankton, zooplankton, and other pathogens which in turn affect aquaculture, water fowl, poultry, and swine production. As a result, antibiotics have been liberally administered in livestock operations, and there are serious concerns about the effects of antibiotic residuals in meat and other animal protein products for human consumption (Qi et al., 2009).

Food Safety and Demand for Imported Products

With the appetite for meat rising, Chinese consumers are no longer solely focusing on domestic products. China has been a net pork importer since 2008, with net imports of swine meat increasing to 535 thousand metric tons in 2014 (USDA). Information about China's main pork suppliers can be found in Table 1. As the largest pork exporter to China, U.S. pork suppliers increased the value of their sales in China from $439 million in 2008 to over $1 billion in 2012. This number is expected to increase over the next few years as a result of higher feed prices in China, natural constraints to production, domestic food safety events, and changing consumer preferences and lifestyles.

Because of constantly occurring food safety events, such as the melamine adulterated milk scandal that occurred in 2008, urban Chinese consumers are becoming increasingly concerned about the safety and quality of their food. Their revealed demand for food safety is evidenced by the flourishing of high end food retail stores carrying imported food and drink products from the United States, European Union, Australia and other developed countries. The high transportation cost for items such as meat and fluid milk are reflected in the high price for these products. While a growing minority of affluent consumers mostly patronizes these high-end supermarkets, imported products are making their way into supermarkets frequented by the average urban consumer. Moreover, the supermarket revolution in China

is driving changes in shopping behavior as consumers have experienced an accelerated change towards the procurement of food from modern retail channels, where branding and labeling allow consumers to differentiate the quality image of products (Hu et al., 2004). In the last two years, Internet food sales in China have grown rapidly surpassing $300 billion in 2013 with the largest online retailer, Taobao Marketplace, surpassing U.S. sales from Amazon.com, Inc. and eBay Inc. combined. As a result, online food sales for premium grocery products in China have also boomed, cashing in on food safety scares affecting traditional outlets (Patton, 2013). Same-day delivery of imported meat, poultry and dairy products have started to make an appearance in large cities in China.

In the wake of these Chinese food system transformations, various consumer preference studies have looked at consumer valuation of credence attributes, especially food safety (Wang, Mao, and Gale, 2008; Zhang, Bai, and Wahl, 2012; Bai, Zhang, and Jiang, 2013). Empirical results across studies of pork, beef, poultry, and fluid milk shows that urban consumers are willing to pay a price premium for products with greater food safety credibility, including reliance on certified brands, traceability, antibiotic-free products, and other indicators of premium quality. A series of recent studies have found evidence of effective urban consumer demand for products that can display government food safety certification, third party certification, and product traceability in domestic pork and milk (Ortega et al., 2011; Ortega et al., 2012). While consumers are willing to pay more for government certification of food safety in domestic products as compared to products without certification, there is evidence of emerging consumer preferences for imported food products. This is a result of persistent domestic food safety concerns, rising incomes and changing consumer lifestyles.

On the other hand, Chinese consumers seem to prefer domestic food to imports for less commonly consumed specialty products such as duck; this is mostly a result of local tastes and preferences. Our study conducted in 2013 on duck dishes consumed in restaurants in four major cities reveals that consumers perceive domestic duck meat to have superior flavor than imported duck—when controlling for other quality and safety attributes. Preliminary results from another study conducted in late 2013 indicate that while consumers in Beijing have a strong preference for domestic beef products, they perceive U.S. beef (not legally available in China) to be a safer alternative. Similar results were found in a series of consumer interviews conducted in the summer of 2014 regarding demand for U.S. pork. The strong preference for domestic products is due to perceived taste differences and cultural factors. However, U.S. meat products in China currently enjoy a reputation of being safe and of high quality.

Implications for U.S. Meat Industries

While Chinese concerns over food safety present an opportunity for U.S. products, it also poses a threat for foreign products, especially in the wake of the new Chinese Food Safety Law. Imported products are facing higher barriers to trade due to tightening food safety standards, which are easier to enforce for imported products than for the domestic market. As a result, U.S. meat exports to China have been at the center of controversial trade restrictions and political disputes in recent years. China has banned the importation of U.S. pork that is raised with the use of ractopamine—a feed additive that promotes lean meat production and is readily used in the U.S. swine sector. It is worth noting that despite this trade restriction, U.S. pork is known to have made its way to the Chinese mainland through a "grey channel" originating in Hong Kong where there are minimal trade barriers for imports (Gale, Marti, and Hu, 2012). China also remains the only major market that has not officially reopened to American beef after the first case of U.S. Bovine Spongiform Encephalopathy (BSE) in 2003.

Despite these setbacks and challenges, there is renewed optimism over the future of American meat exports in China. In 2014, Smithfield Foods Inc., the U.S.'s largest pork producer was acquired by China's WH Group (formerly known as Shuanghui International)—the biggest Chinese purchase of a U.S. company to date. Over most of the past decade, Smithfield has been the major U.S. pork exporter to China though these shipments have been largely unnoticed by consumers, as they have been comprised of frozen pork that ends up in meat processing and food service channels. This recent merger provides opportunities for U.S. pork to enter China's profitable chilled/processed pork market that is mainly sold in supermarket stores (Xia, 2014).

In the beef sector, recent talks between trade officials point to an official restoration of the United States-China beef trade in the near future. China is the world's fastest-growing beef market and a significant buyer of imported beef by volume, mostly sourcing from Australia, New Zealand, Canada, Uruguay, and Argentina. Booming domestic demand, coupled with tight domestic supply and favorable U.S. pricing is putting increased pressure on the Chinese to open up the market for U.S. beef. While not as popular as pork, the United States needs to maintain and expand its promotional strategy surrounding beef in China to increase consumer awareness and capture maximum market share once official trade is reestablished.

Starting from 2010, China levied a substantial anti-dumping duty on U.S. chicken—which has ranged from

46% to 105%. In addition, a 2015 ban on poultry from the U.S. to China due to high pathogenic avian influenza (HPAI) detections is currently dampening poultry exports, pointing to the continued existence of business risk on the export of meat products. Nevertheless, the United States has been a significant source of broiler imports in the Chinese market and is expected to recover its market share once official trade is reestablished.

To penetrate and expand into the Chinese market for meat, poultry, and other animal protein, U.S. industries need to recognize Chinese consumers' food culture and preferences with regards to taste, texture, cuts, and emphasize the established safety and quality reputation of U.S. products. Furthermore, as excess demand for animal protein continues to increase under natural and spatial domestic production constraints, the U.S. meat industry is well positioned to capitalize on the growing potential of the Chinese market.

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AGRICULTURE

What Determines Urban Chinese Consumers' Choice of Shopping Outlets for Pork?

Student researcher: Wuzheqian Xiao, Junior

Pork is the major meat in the Chinese diet, which is highly relevant to U.S. agricultural export. With rising concerns for domestic food safety, Chinese urban consumers now have the choice of consuming imported pork as it becomes available. Among several types of retail outlets, including wet markets, meat stores, and supermarkets, imported pork is most likely sold in supermarkets because of their supply channels. The purpose of this study is to determine which factors influence urban Chinese consumers' decisions in choosing pork shopping outlets. Although there are several studies examining factors effecting grocery shopping outlet choices in China, no study has focused on pork specifically. We conducted an in-person interview survey among random shoppers in Guangzhou, China, in July 2014. Questions about demographic information, pork shopping habits, store access convenience, and food safety concerns were asked. Using a Multinomial Logit Regression model, the marginal effect of each factor was calculated, that is, the change in the probability of choosing a specific shopping outlet brought by one unit increase in that factor. The results showed that if a shopper perceives that he or she is likely to get sick from eating domestic pork, then that shopper has a 14.9% higher probability of shopping in a supermarket. On the other hand, if the shopper thinks he or she is likely to get sick from eating pork bought in the supermarket, then that shopper is 1.4% more likely to shop elsewhere. The store access convenience measured by travel time does not affect the choice of shopping outlets. This is because the geographic distribution of all types of stores together with the transportation services, such as free shuttles provided by supermarkets, make it similarly convenient to those we surveyed. We conclude that urban Chinese pork consumers' lack of confidence towards domestic pork is the most influential factor that causes them to purchase pork in supermarkets, while the concern for pork safety in supermarkets is the most important reason keeping them away from supermarkets.

Research advisor Hong Holly Wang writes, "The growing Chinese urban middle class shows strong purchasing power for imported high-quality foods. Their choice of food retail outlets has an important impact on whether they can access such foods. Based on a 2014 consumer survey in Guangzhou, China, conducted by a Purdue team including the author, Wuzheqian Xiao, studied factors influencing consumers' choice of grocery shopping outlets and derived interesting results."

Chilled packaged pork sold in a supermarket in China.

Xiao, W. (2015). What determines urban Chinese consumers' choice of shopping outlets for pork? *Journal of Purdue Undergraduate Research, 5,* 83. http://dx.doi.org/10.5703/1288284315655