**Appendix** **1.**

***Prior knowledge of ASF and other swine diseases***

There was a general lack of awareness of ASF, with almost 50% of respondents answering that they were not at all aware of ASF (Figure 1.1). ASF was less known to the public than E. coli, salmonella, swine influenza, and the other Tier 1 swine diseases (FMD and CSF), but was better known than the production diseases of PED and PRRS. It is reasonable that respondents are more knowledgeable of E. coli and salmonella as they can cause foodborne illness. As can be rationalized, awareness of swine influenza, E. coli, and salmonella were similar. Humans are rarely infected by swine influenza viruses (CDC, 2014) but they have garnered attention, often because of confusion. The 2009 H1N1 influenza was first called “swine flu” because many of the genes in the virus resembled those found in pigs in North America. Even after the illness was renamed H1N1, many media outlets continued to refer to it as “swine flu,” and consumers did not fully grasp that H1N1 and pork consumption were unrelated (Attavanich et al., 2011).

FMD is a disease that affects many species with cloven hooves, including cows, pigs, sheep, goats, and deer. It was eradicated from the United States in 1929 (USDA-APHIS, 2021b). The virus is not a threat to public health or food safety (USDA-APHIS, 2021b). Only 20% of respondents said they were not aware of FMD, which is consistent with the findings of a previous study on U.S. residents' awareness of animal diseases, in which 76% of respondents indicated familiarity with FMD (Byrd et al., 2015). CSF, also known as hog cholera, is a Tier 1 disease that poses no risk to human health or food safety (OIE, 2021b). The United States eradicated CSF in 1978 (USDA-APHIS, 2020); still, only 30% of respondents said they were not aware of it. Conceivably, it could be that CSF is being confused with another swine disease. Among foreign animal diseases related to swine, respondents appear to be the least aware of ASF.

PRRS and PED are two of the most costly diseases in the U.S. swine industry (Holtkamp et al., 2013; Schweer et al., 2016). However, 60% and 57% respondents answered that they were not all aware of PED and PRRS, respectively. Following the first PED cases in the United States in April 2013, Schulz and Tonsor (2015) assessed that the virus was a supply impacting disease and the outbreaks received little attention from the major national media and there was no noticeable effect on consumer demand for pork. ASF, on the other hand, has garnered mass, widespread media attention in countries with outbreaks.

Using the same list of swine diseases, survey participants were asked to indicate which diseases, if any, they thought were a possible threat to human health. Both E. coli and salmonella were chosen by nearly 70% of the respondents, while 55% chose swine influenza (Figure 1.2). About 24% of respondents answer that PED and PRRS are potential human health threats. For Tier 1 diseases, 31% answered ASF as a human health threat, while 34% and 37% responded CSF and FMD as potential threats to human health, respectively.

***Latent class analysis with observed variables associated with prior knowledge of ASF***

We utilized three survey questions to understand consumers’ prior knowledge about ASF, and the observed responses may correlate with each other. There may be latent classes, which could explain the patterns of observed responses. The latent class analysis investigates sources of confounding between the observed data and groups each consumer into a latent class with certain probabilities (Linzer and Lewis, 2011). We utilized the poLCA package in R for the latent class analysis.

 $Y\_{ijk}=1$ if a consumer $i$ gives the $k$th response to the *j*th observed variable and $Y\_{ijk}=0$ otherwise, then $r=1,…,R$ represents the class membership, and the latent class model approximates the prior probabilities of latent class membership ($p\_{r}$) and outcome probabilities conditional on class *r* ($π\_{r}$), as $\hat{P\_{r}}$ and $\hat{π}\_{r}$, respectively. Using Bayes’ formula, we can calculate the posterior probabilities as:

(1.1) $p\_{ir}=\hat{p}\left(Y\_{i}\right)=\frac{\hat{P\_{r}}\*f(Y\_{i} ; \hat{π}\_{r})}{\sum\_{q=1}^{R}\hat{P\_{q}}\*f(Y\_{i} ; \hat{π}\_{q})}$

Each respondent has a different posterior probability of becoming a member of each class, conditional on the observed values of the answers to the three questions associated with awareness of ASF. The minimum BIC criteria indicate the existence of two classes depending on consumers’ answers related to prior knowledge on ASF. Table 1.1 shows the goodness-of-fit statistics when only the constant is included in class membership prediction. The estimated class population shares ($\hat{P\_{r}})$ and the estimated class conditional response probabilities ($\hat{π}\_{jrk}) $are reported in Table 1.2. Two classes can be labeled as a class with higher prior knowledge on ASF and a class with lower prior knowledge, according to the class conditional response probabilities ($\hat{π}\_{jrk})$; and, the estimated class population shares ($\hat{P\_{r}})$ show that the prior probability of a consumer being a member of the class with lower prior knowledge on ASF is higher (72.9%).

The class with higher prior knowledge tends to believe that they are well aware of ASF, with a 0% chance of answering that they are not at all aware of ASF. Among this group, there is a 73% chance that a member in this group has heard of the recent ASF outbreak in China and other countries. On the contrary, the class with lower prior knowledge has a 67% chance of answering that they are not at all aware of ASF and only has a 9% chance of answering that they have heard of the global ASF outbreak.

Notably, among the respondents with a latent class indicating higher awareness, there was a 47% chance of selecting ASF as a potential threat to human health. This implies that even if individuals are aware of the global ASF outbreak, it is highly likely that they are uninformed of the human impact of ASF, and being aware of the global ASF outbreak and human health impact of ASF are uncorrelated.

**Table 1.1. Results from Basic Latent Class Models Fit to the Questions Regarding Prior Knowledge of ASF** (N=1052)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of Classes** | **Number of Parameters** | **Log likelihood** | **AIC** | **BIC** |
| 1 | 6 | -2713.110 | 5438.220 | 5467.970 |
| 2 | 13 | -2580.520 | 5187.039 | 5251.499 |
| 3 | 20 | -2576.967 | 5193.934 | 5293.103 |
| 4 | 27 | -2575.627 | 5205.254 | 5339.132 |

**Table 1.2. Conditional Item Response Probabilities by Question for Each Class** (N=1052)

|  |  |  |
| --- | --- | --- |
|  | **Class with higher prior knowledge on ASF** | **Class with lower prior knowledge on ASF** |
| Estimated class population shares **(**$\hat{p\_{r}}$**)** | Estimated class population shares **(**$\hat{p\_{r}}$**)** |
| 0.271 | 0.729 |
| **Survey questions** | **The estimated class conditional response probabilities (**$\hat{π\_{jrk}}$**)**  | **S.E.** | **The estimated class conditional response probabilities (**$\hat{π\_{jrk}}$**)**  | **S.E.** |
| **Knowledge of ASF** |  |  |  |  |
| Not at all aware | 0.000 | 0.000 | 0.671 | 0.038 |
| Slightly aware | 0.149 | 0.031 | 0.174 | 0.016 |
| Somewhat aware | 0.270 | 0.034 | 0.121 | 0.017 |
| Moderately aware | 0.308 | 0.034 | 0.016 | 0.015 |
| Very aware | 0.273 | 0.033 | 0.019 | 0.015 |
| **Awareness of global outbreak of ASF** |  |  |  |  |
| Yes | 0.732 | 0.089 | 0.094 | 0.013 |
| No  | 0.268 | 0.089 | 0.906 | 0.013 |
| **Perceive ASF as a human health threat** |  |  |  |  |
| Yes | 0.469 | 0.038 | 0.249 | 0.017 |
| No | 0.531 | 0.038 | 0.751 | 0.017 |

**Figure 1.1. General awareness of various swine diseases**

Notes: All differences (mean awareness of ASF and mean awareness of another swine disease) statistically significant at p ≤0.01.

**Figure 1.2. Perceived human health impact of various swine diseases**

**Appendix 2. Instructions and information treatments provided to contingent valuation experiment respondents**

**Group 1:** **Direct messaging of food safety both in the headline and in the contents**

**The following article describes a HYPOTHETICAL SITUATION. The article is what you may see if there is an outbreak of African swine fever in the United States. You will be asked to respond to a hypothetical scenario. Please answer the questions as if you were actually facing the situation.**

**Deadly African swine fever found in pigs: Still safe to eat pork**

African swine fever (ASF) has landed on our doorstep. The virus has been wreaking havoc in Asia since it was detected in northeastern China in August 2018 and could potentially kill up to 40-65% of the world’s pig population.

ASF is a severe viral disease affecting domestic and wild pigs. This animal disease can be spread by live or dead pigs, either domestic or wild. Transmission can occur via contaminated feed and objects such as shoes, clothes, vehicles, knives, equipment, etc. A stop-movement order has been issued to ban the transport of pigs, feed, and manure. Export markets were immediately closed to our pork, flooding the domestic market and dragging down prices for farmers.

There is no approved vaccine against ASF. Among pigs, it spreads rapidly and kills in high numbers. It does not affect humans or other non-swine farm animals.

It is not a food safety issue. ASF cannot be transmitted from pigs or pork to humans. In addition, the United States Department of Agriculture (USDA) has measures in place to prevent sick animals from entering the food supply, including ASF.

**Keeping the news article about the outbreak of African swine fever in mind, you will be asked whether you would be likely to buy a boneless pork chop with a given price. The average retail price of boneless pork chops was $3.35 per pound before the outbreak.**

**Group 2:** **Direct messaging of food safety only in the headline**

**The following article describes a HYPOTHETICAL SITUATION. The article is what you may see if there is an outbreak of African swine fever in the United States. You will be asked to respond to a hypothetical scenario. Please answer the questions as if you were actually facing the situation.**

**Deadly African swine fever found in pigs: Still safe to eat pork**

African swine fever (ASF) has landed on our doorstep. The virus has been wreaking havoc in Asia since it was detected in northeastern China in August 2018 and could potentially kill up to 40-65% of the world’s pig population.

ASF is a severe viral disease affecting domestic and wild pigs. This animal disease can be spread by live or dead pigs, either domestic or wild. Transmission can occur via contaminated feed and objects such as shoes, clothes, vehicles, knives, equipment, etc. A stop-movement order has been issued to ban the transport of pigs, feed, and manure. Export markets were immediately closed to our pork, flooding the domestic market and dragging down prices for farmers.

There is no approved vaccine against ASF. Among pigs, it spreads rapidly and kills in high numbers. It does not affect humans or other non-swine farm animals. According to Department of Agriculture, ASF is not a threat to human health and cannot be transmitted from pigs to humans.

**Keeping the news article about the outbreak of African swine fever in mind, you will be asked whether you would be likely to buy a boneless pork chop with a given price. The average retail price of boneless pork chops was $3.35 per pound before the outbreak.**

**Group 3:** **Direct messaging of food safety only in the contents**

**The following article describes a HYPOTHETICAL SITUATION. The article is what you may see if there is an outbreak of African swine fever in the United States. You will be asked to respond to a hypothetical scenario. Please answer the questions as if you were actually facing the situation.**

**Deadly African swine fever found in pigs: No vaccine available**

African swine fever (ASF) has landed on our doorstep. The virus has been wreaking havoc in Asia since it was detected in northeastern China in August 2018 and could potentially kill up to 40-65% of the world’s pig population.

ASF is a severe viral disease affecting domestic and wild pigs. This animal disease can be spread by live or dead pigs, either domestic or wild. Transmission can occur via contaminated feed and objects such as shoes, clothes, vehicles, knives, equipment, etc. A stop-movement order has been issued to ban the transport of pigs, feed, and manure. Export markets were immediately closed to our pork, flooding the domestic market and dragging down prices for farmers.

There is no approved vaccine against ASF. Among pigs, it spreads rapidly and kills in high numbers. It does not affect humans or other non-swine farm animals. According to Department of Agriculture, ASF is not a threat to human health and cannot be transmitted from pigs to humans.

It is not a food safety issue. ASF cannot be transmitted from pigs or pork to humans. In addition, the United States Department of Agriculture (USDA) has measures in place to prevent sick animals from entering the food supply, including ASF.

**Keeping the news article about the outbreak of African swine fever in mind, you will be asked whether you would be likely to buy a boneless pork chop with a given price. The average retail price of boneless pork chops was $3.35 per pound before the outbreak.**

**Group 4: No direct messaging of food safety either in the headline or in the contents**

**The following article describes a HYPOTHETICAL SITUATION. The article is what you may see if there is an outbreak of African swine fever in the United States. You will be asked to respond to a hypothetical scenario. Please answer the questions as if you were actually facing the situation.**

**Deadly African swine fever found in pigs: No vaccine available**

African swine fever (ASF) has landed on our doorstep. The virus has been wreaking havoc in Asia since it was detected in northeastern China in August 2018 and could potentially kill up to 40-65% of the world’s pig population.

ASF is a severe viral disease affecting domestic and wild pigs. This animal disease can be spread by live or dead pigs, either domestic or wild. Transmission can occur via contaminated feed and objects such as shoes, clothes, vehicles, knives, equipment, etc. A stop-movement order has been issued to ban the transport of pigs, feed, and manure. Export markets were immediately closed to our pork, flooding the domestic market and dragging down prices for farmers.

There is no approved vaccine against ASF. Among pigs, it spreads rapidly and kills in high numbers. It does not affect humans or other non-swine farm animals. According to Department of Agriculture, ASF is not a threat to human health and cannot be transmitted from pigs to humans.

**Keeping the news article about the outbreak of African swine fever in mind, you will be asked whether you would be likely to buy a boneless pork chop with a given price. The average retail price of boneless pork chops was $3.35 per pound before the outbreak.**

**Control Group**

**Suppose you are at the grocery store shopping for boneless pork chops for you or your household. The average retail price of boneless pork chops is typically $3.35 per pound. Please answer the following questions as if you were actually facing the situation.**

**Appendix 3. Double-bounded contingent valuation and a follow-up question**

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