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Fear, Trust and Agroterrorism

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Abstract

This paper presents results from a consumer survey on risk perceptions about agroterrorism and the safety of the US food supply. The survey conducted in the United States during the fall of 2004, provides insights into what consumers are thinking about terrorism against the food system, their knowledge base on food safety, the vulnerabilities of the food supply chain and food categories to terrorist contamination, and their trust in government and groceries to protect the food supply.

Introduction

With increasing concerns in the United States, Europe and elsewhere about the safety of the food supply from purposeful adulteration by terrorists the issue of trust in government, farmers, processor etc to protect the food chain becomes increasingly important. In fact little is known about how consumers will respond to a terrorist attack, what their perceptions are, and who they trust in the advent of uncertainty. The asymmetry in information between consumers and producers and processors is well known via the credence attributes that food brings. Bocker and Hanf (2000) have explored this idea in the context of food safety. They present a model based on Baye's theory that allows individuals to revise their 'trust' in a food supplier after a food scare. They note that after a food scare demand drops, but then slowly builds as probabilistic assessments of food safety from the supplier increases. The mechanism is through reassurance, but Liu et al (1998) have found that reassurance may not cause full restoration. In other words, simply removing the source of uncertainty is not sufficient to regain consumer confidence and a return to initial demand. This may be because food safety has a strong credence component due to the ambiguous causality between eating a food product and getting sick (Caswell and Mojduska, 1996). A consequence of credence is that individuals need more than personal experience to judge the safety of a food item, and rely on third party information (e.g. the supplier) to regain trust and reduce uncertainty (Bocker and Hanf, 2000). For example, Henson and Northen(1998) show that German respondents to a survey indicated that they would look at country of origin in order to qualify food safety. In a non-food example, Zikmund and Scott (1977) provide evidence that a promoter/marketer can increase product demand by identifying product characteristics that potential buyers perceive as being risky, and advertising more positive attributes in order to encourage a revision of probabilities.

This paper reports results of a survey conducted in the fall of 2004 that queried respondents on risk perceptions and trust related to an agroterrorist attack on U.S. soil. Agroterrorism is

defined as the deliberate introduction of an animal or plant disease with the goal of generating fear, causing economic losses, and/or undermining stability and disruption of consumer demand (Runge, 2002). Breeze (2004) expands this definition to include an attack on humans using zoonotic pathogens, and Cupp et al (2004) include the transmission of human pathogens or toxins through the food supply chain. While agroterrorism as defined was the focus of our study, the findings broad insights into how U.S. consumers perceive supply chain vulnerabilities and degrees of trust in groceries or government to protect them from harm.

Methods

A survey instrument was used to collect information on consumer attitudes and risk perceptions toward agroterrorism. Data from non-institutionalized American adults were gathered from October 2004 to November 2004, using telephone interviews. The interviews were completed using computer assisted-telephone interview technology (CATI). Adult respondents were selected from the 50 United States, using random digit dialing, and proportionally selecting for gender. U.S. Census Bureau population estimates were used to verify the approximate distribution for proportionate national coverage. Although many of the numbers dialed were excluded, 60.1% of working residential numbers yielded completed interviews. A total of 1,010 interviews were completed (sampling error $\pm 3.1\%$), and the interviews took approximately 22.6 minutes to complete. The survey collected respondents' information on the effect of four different food contaminants (Anthrax, Botulism, Cyanide, and Salmonella). Another section of the survey was devoted to gathering information on the demographic, economic and value characteristics of the respondents, including age, gender, ethnicity, education, income, family size, employment status, religious practice and social/political views. Also collected was respondents' knowledge information pertaining to the food chain continuum (starting from farm level food production, manufacturing, processing, transportation of the food to the food outlets-groceries), food safety and respondents' confidence in the groceries and federal government to ensure food safety in case of a contamination.

For this analysis, respondents were asked their opinions about the likelihood of potential sources of deliberate contamination of the U.S food supply. However, responses to some of the questions in the survey were not usable, thus excluding some respondents from the sample in empirical analysis. As a result of excluding these respondents, a total of 754 completed surveys were used.

As indicated in the introduction there is a dearth of research on consumer attitudes towards terrorism in general, let alone agroterrorism. Thus there is little guidance from the academic literature on what specific attributes could affect these perceptions. However, one could consider, as we do presently, a number of factors including demography, knowledge, politics and religious beliefs to have some bearing on the outcome. The real issue at hand is how systemic these factors are and whether or not they are useful in explaining the risk perceptions under question.

Consumer Beliefs About the Likelihood of an Agroterrorist Attack

Following the events of September 11, 2001 American consumers have mixed beliefs about the likelihood of an attack on the United States. These beliefs are mixed in terms of the possible target of an attack (physical, water or food) and the likely terrorist (a foreign state sponsored terrorist organization, a foreign non state sponsored organization, or a domestic terrorist).

	Very Likely	Somewhat Likely	Very Unlikely
Nature of Attack			
Attack on Physical Property	0.594	0.293	0.112
Attack on Water System	0.315	0.42	0.264
Attack on Food System	0.215	0.468	0.317
Source of Attack			
Foreign State or State Sponsored	0.479	0.359	0.162
Foreign Non-State Sponsored	0.255	0.377	0.366
Domestic	0.154	0.342	0.503

Table 1 presents some key results on consumers' beliefs and perception about the nature of an attack and the nature of the attacker. Respondents were asked to respond to three questions on likely targets of a terrorist attack ranging from physical property, the water supply and the food industry, and were also asked who the likely attackers would be from a foreign state sponsored terrorist, a foreign non-state sponsored terrorist or a domestic terrorist. The choices were not mutually exclusive. The top panel of Table 1 gives responses to possible targets. Almost 60% of respondents believed that another attack on physical property in the USA was very likely, while only 31.5% believed that an attack on the water system was likely and 21.5% believed an attack on the food system was likely. While only 11% thought an attack on physical properties was unlikely, about 26% did not consider water a hard target and almost 32% did not consider the food system as a hard target. 47.9% of Americans believed that the most likely attack would come from a foreign government or organization sponsored by a foreign government, while only 25.5% believed the attack would come from a foreign non-state sponsored terrorist, and only 15.4% believe the most likely threat comes from a domestic terrorist.

	Foreign State or State Sponsored	Foreign Non-State Sponsored	Domestic	All
Attack on Physical Property	0.324	0.173	0.107	0.594
Attack on Water System	0.209	0.105	0.07	0.315
Attack on Food System	0.151	0.085	0.059	0.215
All	0.479	0.255	0.154	

Table 2 provides the joint frequencies between the target and the attacker based on the ‘most likely’ response. Over 32% of Americans believe that an attack on physical property by or sponsored by a foreign government is very likely, 20.9% believe that an attack on the water system by a foreign government is likely while only 15.1% believe that a foreign government would sponsor an attack on the food system. There was a significant relationship between perceived attacks on physical property, water system and food system perpetrated by a foreign government, respectively $\chi^2(4, N=753)=25.02, P<.05$). Americans do not feel that neither the food or water system is especially at risk, nor do they feel threatened by domestic terrorists. Only 10.7% believe that an attack by domestic terrorists on physical property is likely, while 7% and nearly 6% believe that an attack on the water or food systems by a domestic terrorist is likely. The relationship between the attack linked to a domestic terrorist were also significant at less than 5% for physical property, water system and food system, respectively ($\chi^2(4, N=753)=12.63, 25.02, 36.20$)

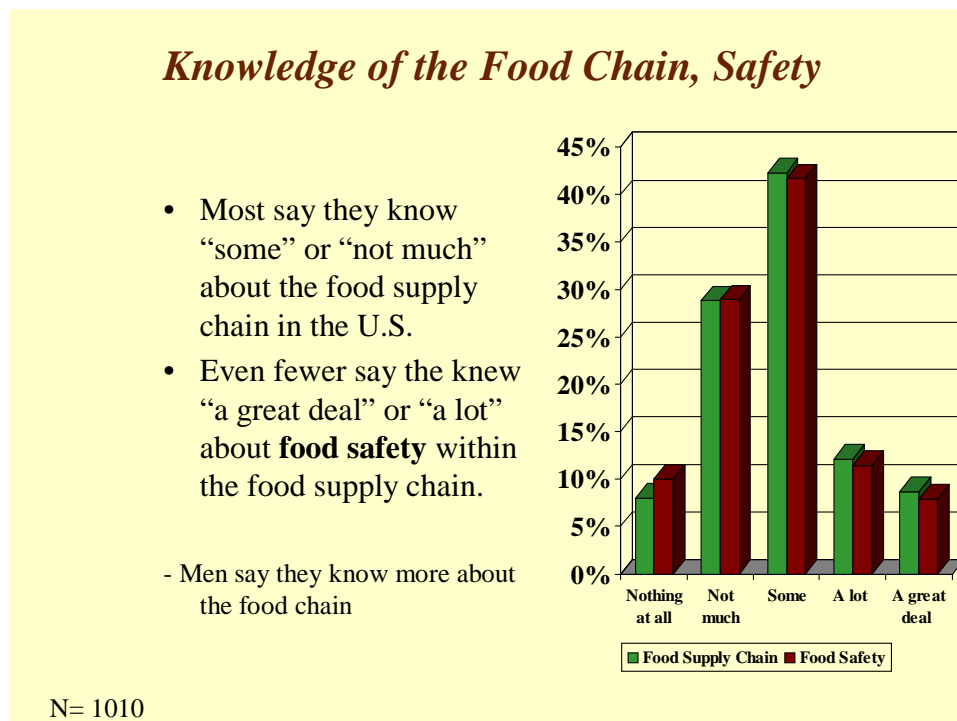


Figure 1. Knowledge of Supply Chain and Food Safety

Knowledge Based Attributes

In order to understand perceptions of risk it was first necessary to gauge consumers’ knowledge base about the food supply chain and food safety. Figure 1 illustrates knowledge responses to food safety. Only 20% of respondents stated that they were knowledgeable of the food supply chain and slightly less were knowledgeable about food safety. Nearly 35% of respondents know little about the food supply chain and nearly 40% know little about food safety.

Confidence in Food Safety

Despite limited knowledge of food safety, U.S. consumers are generally confident that the food they purchase in the grocery store is safe. As illustrated in Figure 2, only about 5% of respondents indicate that the food is unsafe whereas 50% of respondents believe that the food is very or extremely safe. Respondents were then asked to rate the likelihoods that the food at a grocery store could be accidentally or purposefully adulterated. These results are summarized in Figure 3. There are two interesting results in Figure 3. First, consumers have a greater belief that natural/accidental contamination will occur over terrorist contamination. Over 77% of respondents believed that terrorist acts are unlikely whereas only 60% believe that accidental adulteration is unlikely. This suggests in a general way that consumers do not perceive that the threat of accidental or purposeful adulteration is high, but the second interesting result is that nearly 4 in 10 consumers believe that accidental adulteration happens at least somewhat often, while more than 20% believe that the food in their local grocery store is tampered with at least somewhat often. This is a rather striking result, given that the actual incidents of either accidental or purposeful adulteration are so rare in actuality.

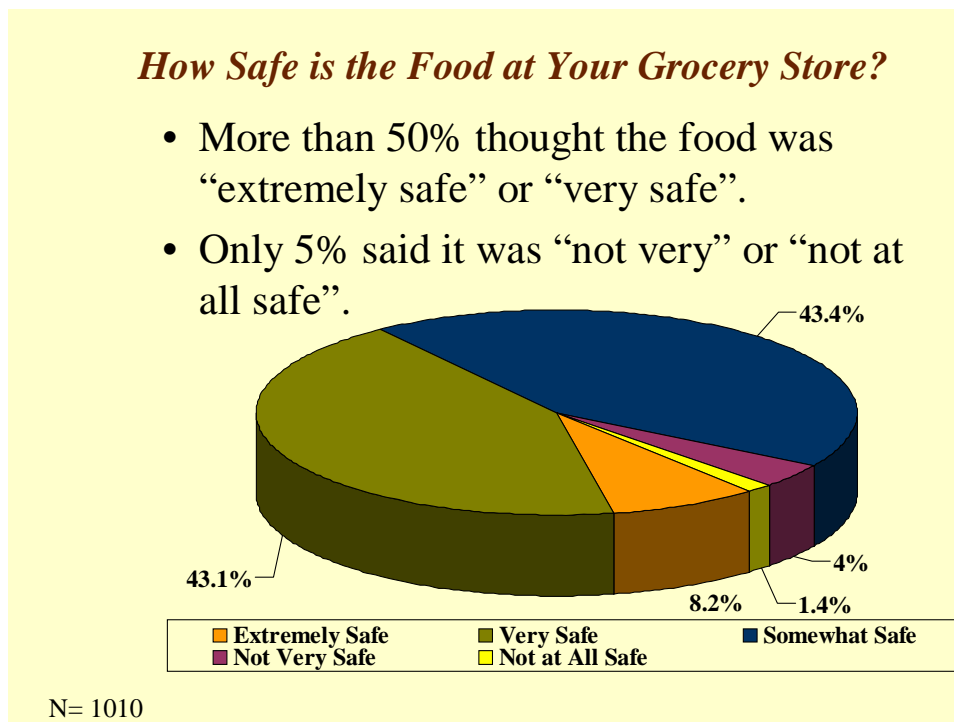
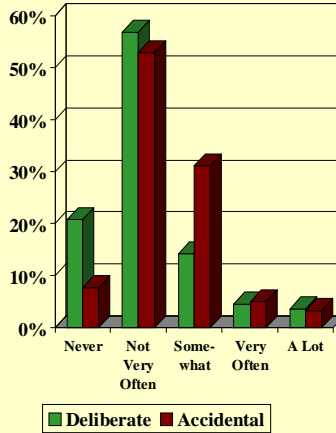


Figure 2. Consumer Response to Safety of Food at Grocery Store

How Often is Food Unsafe to Eat?

How often would you say that products that are in your local grocery store are unsafe to eat because of {accidental errors}/ {deliberate tampering} that occurs somewhere in the food supply chain?

- Deliberate food tampering:
 - 77.6% “not very often” or “never”
 - 14.3% at least ‘somewhat often’
- Accidental food contamination:
 - 60.6% “not very often” or “never”
 - 31.1% at least ‘somewhat often’

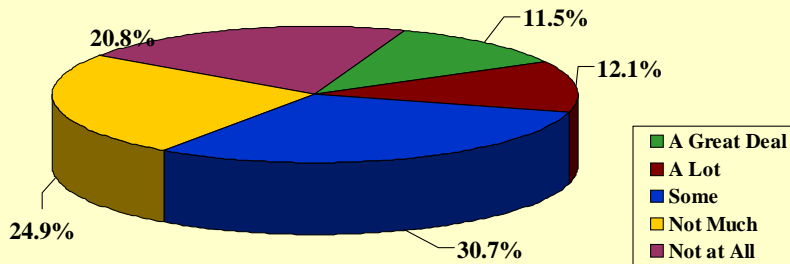


N= 1010

Figure 3. Accidental versus Deliberate Tampering of Food

Thoughts about Terrorism and the Food Supply

- More than half of respondents said they have thought at least “some” about terrorists contaminating the U.S. food supply.



N= 1010

Figure 4. Thoughts about Terrorism and the Food Supply

The Likelihood of a Terrorist Attack

The possibility of a terrorist attack on the food system was on the minds of many American consumers, at least part of the time. Figure 4 reveals that over 50% of consumers had thought about food terrorism, and slightly less than half gave it only a fleeting thought or no thought at all. Unfortunately there is no data pre-2001 and to determine whether those that have thought

about a terrorist attack had also thought about such an attack prior to 9/11. Even so there is a consistency in terms of the thought given a terrorist attack on the food system and the events of 9/11 which was comprised of attacks on physical property and not on the food (or water) systems. Furthermore, this survey was taken during the fall of 2004 leading up to and following the U.S. presidential election. The 2004 election campaign was largely based on issues of security and terrorism, with many unwavering statements linking the terrorist activities of Al Qaeda to the war in Iraq, despite the fact that it was well known by then that no connection existed between Iraq and Al Qaeda, and that Iraq had no weapons of mass destruction that could affect the U.S. food supply.

Elsewhere we have written on the effects of political communication to explain the results in Tables 1 and 2. In particular, we argue that miscommunication of factual information creates an unhealthy ambiguity that gives rise to fear and distorts trust, not only in government, but also in other areas of the food supply chain. Finally, although we cannot say whether the awareness as suggested in Figure 4 is different than before 9/11, we found scant evidence in the academic literature on food safety that would suggest that such perceptions were pervasive. Thus it is entirely likely that the perceptions depicted in Figure 4 are more pronounced in awareness of agroterrorism and the safety of the food supply, than would have been prior to 9/11.

When asked about which part of the food supply chain would be most vulnerable to an attack the results were mixed. As shown in Figure 5 the largest proportion of respondents believed that should an attack occur it would happen in transit, at a food processor, or at a grocery store. Respondents believed that it is less likely to occur at either the farm level or at warehouses. Most food tampering incidents do occur in grocery stores or market places so that finding is not surprising. Also, because warehouses are generally considered to be secure that results is not surprising either. In the United States the Bioterrorism Act is very much concerned with the monitoring of ingredients into the processing of food and the transportation of food with a requirement of record keeping and monitoring of ingredients and raw product as it passes through the supply chain. The FDA was given additional powers to hold in-transit shipments that were suspected of being adulterated.

The perceptions of safety in primary agriculture is quite interesting. It indicates for one thing a trust in farmers to monitor disease etcetera, but from a scientific point of view many scientists believe that agriculture, particularly the implementation of animal and plant diseases is a real vulnerability, that may not affect consumers directly but could have devastating effects on the agricultural economy and the food supply chain.

Consumers were also asked which food items they believed would be most vulnerable to an attack. The results, summarized in Figure 6, show a general belief that meats, fruits and vegetables were most vulnerable while processed foods were least vulnerable. There appears to be a clear demarcation between foods that are perishable and those that are not largely due to the accessibility of perishable versus non perishable foods.

Vulnerability of the Food Chain

Using a scale of 0 to 100 . . . How likely is that food would be contaminated in ____ by terrorists?

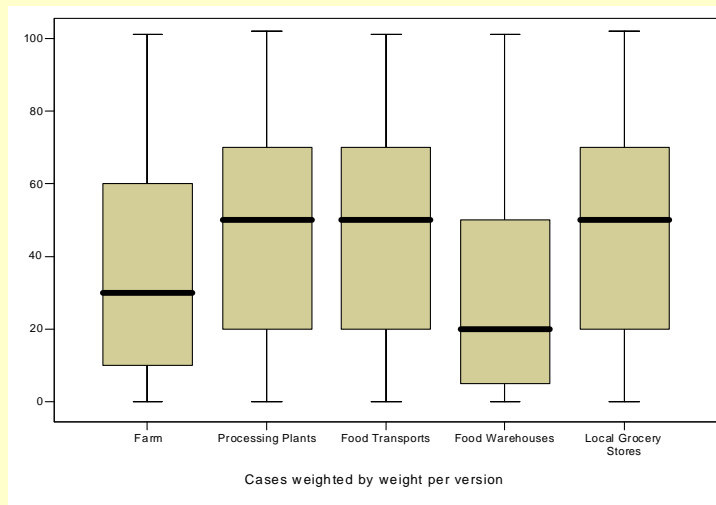


Figure 5. Vulnerability of the Food Supply Chain

Products Most Likely to be Contaminated

Using a scale of 0 to 100 . . . How likely is that ___ would be contaminated by terrorists?

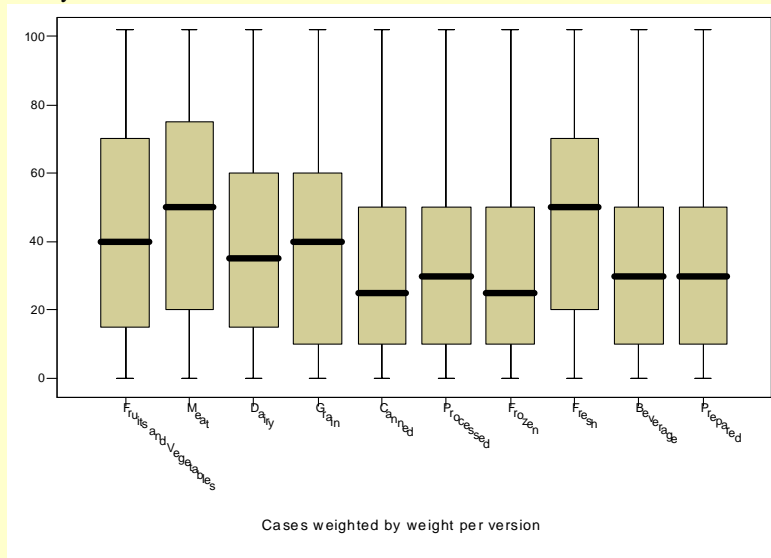


Figure 6. Vulnerability of Food Types to Tampering

Consumer Trust in Government and Grocery Stores

Figure 7 reveals some insights into the trust consumers place on players in the food system. Because most consumers purchase food from grocery stores and because government has oversight of food safety, consumers were asked how confident they were in either of these two groups securing the supply chain.

Only 18% of consumers have very or extreme confidence in their local grocery store to protect them against adulteration, while only 22% believe that the government can ensure food safety. This may appear to indicate that consumers have greater trust in government than their local store, but when looked at differently nearly 80% of consumers are not strongly confident that food safety from an agroterrorist attack can be ensured by either.



Figure 7. Confidence in Grocery Stores and Government in Maintaining Food Safety

Discussion and Conclusions

Ultimately, it is the role of government and the food industry to ensure that the food supply chain is safe. How consumers perceive risk is also related to this aspect of trust. The results of this survey research provide a peak into the mindset of the American consumer as it relates to agroterrorism. For the most part, Americans at the time of the survey gave terrorism only a passing thought. A large proportion of Americans do not fully understand the food supply chain, nor are they knowledgeable about food safety. Overall, Americans believe that any contamination of the food supply will more likely be due to accidental than deliberate means, but still a significant number of Americans believe that there has been purposeful contamination of the food in their local grocery store. Interestingly, while a large number of Americans have given little thought to the idea of a terrorist attack on the food system, a large percentage, nearly 80%, believe that there is little that either government or grocery stores can do about it. This suggests that consumers believe that no matter what preventative measures

are put into place, if a terrorist wants to adulterate food, a way will be found to do it. Still, it may be worthwhile for food retailers to recognize the differential in perceptions and communicate to consumers what actions are being taken to secure the food supply.

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