
Differences in household attitudes on food defence and food safety: an international comparison

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Abstract: This paper reports results from a large, six-nation, internet-based survey of consumer attitudes toward food safety and food defence administered during the fall of 2008. Responses were obtained from separate samples of approximately 1,000 each in Germany, Italy, Japan, Spain, the UK, and the USA. Food defence was generally a greater concern, and respondents were less confident that their food supply was well protected against terrorist attack than they were that their food was safe from contamination from naturally occurring pathogens. Respondents also believed a greater percentage of national food

protection budgets should be spent on food safety rather than food defence. Processors were considered most responsible for both food safety and food defence, with government also playing a major role in food defence.

Keywords: food defence; food safety; terrorism; multi-lateral cooperation; Germany; Italy; Japan; Spain; UK; USA.

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1 Introduction

The world's food supply is almost certainly the safest it has been in history. But, consumers in developed countries may not be as well protected as they believe or as they would desire. There have been occasional well-publicised product recalls, and those recalls have raised the visibility of food safety programmes.¹ But, despite the recalls, households still appear to remain quite confident their food is well protected against the emergence of food borne diseases caused by naturally occurring pathogens. Some believe the recalls can be interpreted as signs that government agencies are exercising proper diligence in protecting the nation's food supply, not as warnings that the food supply is unsafe.²

Following the 2001 terrorist attacks those concerned with safeguarding the public's health by protecting against the ingestion of contaminated foods have faced a second challenge. In addition to their traditional food safety responsibility, protecting the food supply from accidental contamination from naturally occurring pathogens, public health officials must establish a food defence programme to protect their nation's food supply from deliberate contamination of food products by terrorists.

Discoveries following the September 11 attacks on New York city brought that concern to the front for the global food industry. Documents and materials reportedly taken from terrorist strongholds have led security specialists to believe that deliberate contamination of a widely consumed food product has become a distinct possibility. Former US Health and Human Services Secretary Thompson highlighted that concern in late 2004 when he noted that "For the life of me I cannot understand why the terrorists have not attacked our food supply because it is so easy to do". Since the economic and psychological implications of such an action would be substantial, hardening the food supply chain against potential terrorist attacks has moved higher on national priority lists and the food industry has been encouraged to tighten security in its production facilities around the world.

Recognising the need for food defence as well as food safety greatly expands the challenge facing those dedicated to the prevention of the spread of food borne illness. Ensuring the safety of the food we consume is a difficult task. But it is made easier because for each product there is a well-established scientific literature which provides a basis for determining which micro-organisms could appear and the probability that they will be observed. Over time this information has been used to devise modifications for production methods to incorporate processes designed specifically to eliminate the most likely and most dangerous types of contamination.

Unfortunately, defending national food supply systems against deliberate contamination is a much more difficult task. There is no scientific literature to provide guidance about which foods have the highest probability of being affected or the toxins most likely to be found. Those seeking to defend national food supplies from terrorist attacks are placed in the unfortunate position of having to protect every existing food product from all potential toxins, including manmade chemical compounds as well as naturally occurring pathogens. A crude rank ordering of potential targets and potential contaminants is possible since some foods and products are more susceptible to deliberate contamination and some agents are more easily disguised or hidden than others. And, it is also true that some foods will receive additional attention because intentional contamination of those foods would have greater psychological or economic damage than others. But, those principles provide only weak guidance for the deployment of food

defence resources. They do not significantly reduce the size of the challenge for those charged with defending the food system from terrorists since there is no practical way one can completely eliminate the possibility of any food product being deliberately contaminated.

Food terrorism utilises a vector that affects everyone. That makes the stakes for food defence high. The costs of a food terrorism incident will extend well beyond those individuals directly affected and the segments of the food production industry where the contamination took place to produce potentially large impacts on national economies. National consumer confidence would be shaken, not just in food products, but in general, and the resulting decline in consumer spending could easily create a short term economic downturn. Stinson (2007) notes that even under conservative assumptions a food terrorist attack would cause a decline in real GDP growth in the USA. Under some combinations of assumptions current value losses in real GDP in the USA from a terrorist event could easily exceed \$500 billion over a four year forecast horizon. He also notes that those estimates do not include longer term productivity losses which would accompany a catastrophic terrorist attack. Those losses, which would be ongoing and increasing over time, would exceed projected short term losses.

The longer-term economic impacts of an act of food terrorism could easily spread beyond national borders, affecting global trade in agricultural products. The impossibility of inspecting all food originating outside a nation's boundaries for all potential contaminants makes imported food a soft and attractive terrorist target. Creation of an environment where uncertainty about whether particular food imports had been tampered with by terrorists, would almost certainly stifle international trade in certain agricultural products. The demand for imported products ready for consumption would likely see the greatest declines in demand.

Food defence programmes are also hampered because it is unrealistic to expect firms or nations exporting food products to unilaterally put in place the stricter controls needed to reduce the probability of deliberate contamination. Such controls would increase production costs and the benefits to the firm and to the exporting country would be unlikely to offset the additional expenses. Those food defence related cost increases would be passed on to consumers and the resulting higher prices, unless matched by exporters in other countries, would cause firms and countries which had enhanced their food defence capabilities to lose revenue, market share and profits.

But, while it is unlikely that food exporters would unilaterally institute stricter control measures, multi-lateral cooperation could reduce the food supply's vulnerability to terrorism. International agreement on stronger food defence related standards for food imports would strengthen financial incentives for all food exporters to make adjustments needed to reduce the likelihood of success of contamination attempts, since those failing to meet agreed upon standards could face exclusion from attractive international markets.

Some groundwork for reaching agreement on the components of a global food defence programme is already underway, but considerable further international negotiation will be necessary. The establishment of the European Food Safety Authority (EFSA) is an example of multi-lateral action promoting institutional changes designed to protect domestic consumers from contaminated food.

An issue of some concern is that collaborative efforts on food defence by importing nations could be viewed as simply a device for erecting non-tariff trade barriers to protect domestic producers and processors and not as reflecting increased levels of consumer concern about food safety and food defence. To this point cross-national research on

perceptions of food risk has been limited (Giraud and Halawany, 2006; Hohl and Gaskell, 2008; Rozin et al., 1999) and focused on the food safety issue, not food defence concerns. There have also been two special Eurobarometer Surveys – Survey #238 (2006) and Survey #354 (2010) on the topic of food related risks. Both were focused on food safety issues and did not directly address differences in attitudes toward food safety and food defence.

This study adds findings from a six-nation survey of consumer attitudes about the protection of the food they eat to the literature on perceptions about food safety and defence. Results from this cross-cultural survey of attitudes toward food defence activities document similarities and differences in attitudes toward food safety and food defence across national boundaries. It also adds to the limited empirical information now available on how consumers view food defence. The findings should be of use to negotiators seeking institutional changes to deal with increased national concerns in the USA, Europe, and Japan about food terrorism. Findings demonstrating a broad commonality of public support in developed countries for improved food defence practices could help ease the way for more comprehensive multi-lateral agreements on food defence. Results from the national survey also indicate consumer perceptions of the relative magnitudes of spending for food safety and food defence programmes, and the elements of the food supply chain that are likely to be held most responsible for a breach in food safety or food defence.

2 Study design

This paper reports results from a large, six-nation survey undertaken during the fall of 2008. The survey, funded by the National Center for Food Protection and Defense³, was conducted over the internet by TNS-NFO⁴ during the first week of October, 2008. Responses were obtained from separate random samples of approximately 1,000 each in Germany, Italy, Japan, Spain, the UK, and the USA drawn from existing large panels of internet respondents used by TNS-NFO for marketing research. No attempts were made to either include or exclude individuals affiliated with or employed by the food industry. The survey questionnaire administered was a slightly shortened version of similar surveys dealing with attitudes toward food defence and food safety administered in the USA in August 2005, February 2007, and June 2007. The survey began with a set of questions in which respondents were asked their perceptions of the likelihood of six different types of terrorist attacks and about the degree of physical, economic, psychological, and emotional damage the different types of terrorism would inflict on the country and on them personally.⁵ To further quantify each individual's relative concern about different types of terrorist attacks, respondents also were asked how they believed anti-terrorist spending should be allocated for protection of alternative types of targets.⁶

The difference between food safety – protecting the food supply from naturally occurring pathogens – and food defence – protecting against deliberate contamination – was then explained. Following that, respondents were asked several questions specifically probing their attitudes toward the two different types of food protection. Included were questions attempting to assess their degree of concern about food safety and food defence, and the level of confidence that they had in their nation's food safety and food defence efforts. Respondents were also asked to rank the various segments of the food supply chain, from farmer to consumer and government by the

degree of responsibility they assigned to each for both food safety and food defence. That question was followed by separate questions about the relative proportions of the cost of providing food safety and food defence that should be borne by each part of the food supply chain and by government. Finally, respondents were asked their opinion about how the food protection spending should be divided between food safety and food defence.

3 Survey results

3.1 *How concerned are consumers about protecting the food supply?*

Survey respondents were asked to indicate their level of concern about food safety and food defence using a six point, forced choice rating scale, with 1 being not at all concerned and 6, extremely concerned. Individuals choosing concern levels 5 or 6 were considered to be very concerned, those choosing levels 3 or 4 were labelled moderately concerned, and those indicating levels 1 or 2 were considered to be not very concerned. Responses indicated some significant inter-country differences in the level of public concern about food safety and food defence. There were also noticeable differences within each country between the level of public concern about food defence and that for food safety.

In five of the six countries in this study about half of the individuals queried indicated that they were moderately concerned about the safety of their food (Table 1). The exception was Germany where just over 40% of respondents were in the category.⁷ Differences in the percentage indicating that they were either not very concerned or very concerned about food safety were more substantial. In Germany, more than 53% categorised themselves as not very concerned about food safety, while in Japan less than 9% responded in a similar fashion. Just under 20% of US and Italian respondents indicated they were not very concerned, as did slightly more than 25% of UK and Spanish respondents.

Table 1 Expressed level of concern about food safety and food defence by country, percent, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Food safety							
Not very	18.4	19.7	27.4	53.2	25.8	8.8	25.6
Moderate	48.1	50.4	47.8	40.8	46.7	53.8	47.9
Very	33.6	29.9	24.8	6.0	27.5	37.4	26.5
Food defence							
Not very	10.5	22.5	21.3	32.4	29.7	9.3	21.0
Moderate	41.2	33.3	42.4	34.4	33.2	35.2	36.6
Very	48.2	44.2	36.3	33.3	37.1	55.5	42.5

Only 6% of German respondents claimed to be very concerned about food safety. Respondents from Japan (37%) and the USA (34%) were at the other end of the scale. A greater percentage of Italians were very concerned (30%) than not very concerned (20%),

while in both the UK and Spain roughly equal proportion were not very concerned and very concerned about food safety.

Levels of concern about food defence were significantly higher than for food safety in each of the six nations in the survey. However, there were two distinctly different tiers of concern. In Japan, the USA, and Italy more than 44% respondents indicated they were very concerned about food defence. In the UK, Germany and Spain, 37% or less of those surveyed indicated they were very concerned. The proportions not very concerned about food defence in Italy and Spain were larger than the proportion not very concerned about food safety, while in Germany, the UK and the USA significantly smaller proportions were not very concerned about food defence. In Japan there was no significant change.

Earlier in the questionnaire respondents were asked whether they expected to see an attempt to deliberately contaminate their country's food supply within the next ten years. More than 68% of survey respondents in the USA believed there would be such a terrorist event within the next ten years, while 34% of Spanish respondents anticipated an attack within that time frame (Table 2).

Table 2 Percentage of respondents expecting a terrorist attack during the next ten years, by country and type of attack, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Food	68.1	45.8	64.9	45.9	34.2	56.6	50.4
Air transportation	57.1	41.8	70.1	42.1	40.5	41.8	47.5
Other public transportation	79.4	62.3	90.6	69.6	73.8	62.3	70.8
Chemical or biological release	71.4	39.6	62.6	42.1	35.0	39.6	50.1
Electrical power grid	61.6	36.3	53.0	47.9	52.5	36.3	47.8
Monuments	52.4	83.3	92.2	76.2	75.5	68.8	80.5
Any event	89.6	83.3	92.2	76.2	75.5	68.8	80.5
<i>As a percentage of those expecting at least one type of terrorist attack</i>							
Food	76.0	55.0	70.4	60.2	45.3	82.3	62.6
Air transportation	63.7	50.2	76.0	55.2	53.6	60.8	59.0
Other public transportation	88.6	74.8	98.3	91.3	97.7	90.6	88.0
Chemical or biological release	79.7	47.5	67.9	55.2	46.4	57.6	62.2
Electrical power grid	68.8	43.6	57.5	62.9	69.5	52.8	59.4
National monuments	58.5	52.6	54.0	43.4	66.5	63.7	54.8

When the analysis was limited to only those respondents who expected some type of terrorist attack in their country during the next decade inter-country differences were magnified. In Japan, for example, only 56.6% expected a terrorist attack on the food system during the next decade, but 82.3% of those expecting at least one terrorist attack, believed the food system would be targeted. In Spain, the combination of a relatively low expectation of food-based terrorism and a below average expectation of the likelihood of any terrorist event produced the lowest expectation of food terrorism among those who expected one or more terrorist attacks in their country during the next decade. Other

public transportation was seen as the most likely terrorist target among those expecting terrorism.

3.2 *How confident are consumers that the food supply is protected from contaminants?*

Respondents also were asked how confident they were that the food supply was safe from accidental contamination and how confident they were that the food supply was safe from deliberate, terrorist attack. Again a six point forced choice rating scale was used. For these questions a rating of 1 signified not at all confident and 6, extremely confident. Individuals choosing levels 5 or 6 were termed very confident, those choosing levels 3 or 4 were labelled confident, and those indicating levels 1 or 2 were considered not very confident in the current food safety or food defence conditions in their country. As with responses to the concern questions there were significant inter-country differences as well as differences within each country between the level of public confidence on food defence and food safety.

Most respondents were confident about the safety of their food. On average nearly 60% of all respondents chose either level 3 or 4 to describe their confidence in the safety of their food, and more than 25% categorised themselves as very confident (Table 3). Again though there were some substantial differences among countries in the proportion feeling not very confident and very confident. Japanese respondents showed the least confidence in their food safety with only 5% very confident that their food was safe and nearly 34% indicating that they were not very confident in the safety of their country's food supply. In contrast, in the UK, Germany, the USA, and Spain less than 10% of respondents indicated they were not very confident about the safety of their food and more than 30% indicated that they were very confident their food supply was safe. Respondents in the UK were the most confident in the safety of their food supply with less than 6% saying they were not very confident and nearly 42% saying they were very confident.

Table 3 Level of confidence in food safety and food defence by country, percent, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Food safety							
Not very	9.6	16.6	5.9	7.8	8.0	33.7	13.6
Moderate	59.3	67.1	52.3	55.7	61.2	61.2	59.5
Very	31.2	16.4	41.7	36.4	30.8	5.1	26.9
Food defence							
Not very	19.3	26.9	14.3	12.9	12.6	35.8	20.3
Moderate	62.7	63.7	63.3	59.3	60.6	60.2	61.6
Very	18.1	9.4	22.4	27.9	26.8	4.0	18.1

While most respondents also said they were moderately or very confident that their food was safe from terrorist attack, the proportion not very confident was, in every country except Japan, significantly greater than the proportion not very confident in the safety of

their country's food supply. In Italy, the USA and the UK the proportion not very confident grew by about 10 percentage points, in Germany and Spain by about 4 percentage points. While Japanese respondents had the highest percentage indicating not very confident (36%), the percentage not very confident in Italy climbed to 27% and that for the USA to 19%. The percentage of respondents who indicated they were very confident about how well their food supply chain was protected against terrorism was significantly smaller than the percentage very confident in the safety of food, except in Japan where only 5% were very confident in the safety of food from natural contaminants and 4% were confident the food supply was safe from terrorist attack.

When the ratio of the proportion not very confident that their food was safe from a terrorist attack to the proportion of those interviewed who expected a terrorist attack within the next ten years was computed two distinct groups emerged (Table 4). In Japan and Italy, the numbers not very confident that their food was safe from terrorism were 63% and 59% respectively of those expecting a terrorist attack on the food supply in the next decade. In the USA, the UK and Germany, 28% or less of those expecting a terrorist attack on the food supply categorised themselves as not very confident about how well the food supply was protected against terrorists.

Table 4 Ratio of respondents very concerned about food terrorism to those expecting a terrorist attack on their country's food supply in the next ten years, by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Very concerned	19.3	26.9	14.3	12.8	12.6	35.8	20.3
Terrorist attack on food supply in next ten years	68.1	45.8	64.9	45.9	34.2	56.6	50.4
Ratio	.283	.587	.220	.279	.368	.633	.402

3.3 Which products do consumers believe are likely targets for food terrorists?

Respondents also were asked their assessment of the likelihood that certain categories of food would be deliberately contaminated. The categories of food included in the survey were fresh produce, dairy, meat, seafood, baked goods, canned goods, boxed goods, and bottled water. Again a six point rating scale was used with 1 indicating that category was not at all likely to be subject to terrorist attack and 6 indicating that food type was extremely likely to be a target of food-based terrorism. Ratings of 5 or 6 were considered to reflect respondents' beliefs that a particular item was very likely to be targeted by terrorists.

Bottled water was seen as a very likely target for deliberate, terrorist contamination by the most respondents, although the proportions seeing bottled water as a very likely target were significantly different among countries (Table 5). About 59% of Italian respondents believed bottled water to be very likely to be a terrorist target, and on average more than 44% of those interviewed in all countries believed water to be a very likely terrorist target. Even in the UK and Spain, where bottled water was seen as a lower probability target, 36% and 38% respectively believed it to be a very likely target. In all countries other than the USA bottled water received the greatest percentage of very likely responses. In the USA fresh produce was seen as a very likely terrorist target by 43% of respondents; bottled water, by 42%.

Table 5 Percent of respondents indicating product very likely to be targeted by terrorists, by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Produce	42.9	29.4	14.3	15.9	16.4	36.2	25.7
Dairy	30.6	42.4	29.7	27.5	24.5	43.1	32.9
Meat	41.8	34.7	26.0	20.4	21.7	48.1	32.0
Seafood	31.1	30.4	19.5	14.6	20.3	37.9	25.5
Baked goods	16.1	22.2	16.1	14.1	12.2	35.9	19.4
Canned goods	24.3	37.6	23.4	11.2	26.4	33.5	28.5
Boxed goods and mixes	22.8	25.5	17.8	17.2	18.5	36.6	23.0
Bottled water	42.0	58.5	36.3	39.5	38.1	51.2	44.2
<i>Probability of attack</i>	68.1	45.8	64.9	45.9	34.2	56.6	50.4
<i>As a percentage of those expecting a terrorist attack on the food system</i>							
Produce	63.0	64.2	22.0	34.6	48.0	64.0	51.0
Dairy	44.9	92.6	45.8	59.9	71.6	76.1	65.3
Meat	61.4	75.8	40.1	44.4	63.5	85.0	63.5
Seafood	45.7	66.4	30.0	31.8	59.4	67.0	50.6
Baked goods	23.6	48.5	24.8	30.7	35.7	63.4	38.5
Canned goods	35.7	55.7	27.4	37.5	54.1	64.7	45.6
Boxed goods and mixes	33.5	55.7	27.4	37.5	54.1	64.7	45.6
Bottled water	61.7	127.7	55.9	86.1	111.4	90.5	87.7

In general, those in countries having greater percentages of residents very concerned about food terrorism also tended to rate every type of food more likely to be the subject of a terrorist attack. After results were normalised and shown as a percentage of those expecting a terrorist attack on the food supply chain some distinct differences in respondents' perceptions as to which foods were most likely to be subject to a food terrorism event. Bottled water was still the most likely, with more individuals in both Italy and Spain indicating that it was very likely to be targeted by terrorists than believed a terrorist attack likely in the next ten years. Dairy products, except in the USA, and meat products were seen as being more at risk to terrorist attack by those expecting a terrorist attack on the food supply, while baked goods and boxed goods were seen as less subject to intentional contamination. Produce showed an unusual pattern with more than 63% of those expecting a food related terrorist event indicating it was very likely to involve produce in the USA, Italy, and Japan, but only 22% of UK residents expecting a terrorist attack on the food system believed produce likely to be affected.

3.4 *Who is responsible for food safety and food defence?*

There is no firm basis for determining which parts of the food sector should be held most responsible for food safety and food defence. Producers, processors, distributors, retailers, and consumers all bear some responsibility for the protection of the food supply from both accidental and intentional contamination. Government regulation and inspection also should play an important role since food safety and food defence are at

least partial public goods due to the non-rival nature of the consumption of the service. To assess whether the public's perception of who was most responsible for food safety and food defence differed across countries those surveyed were asked "With whom does responsibility for the safety of the food you consume lie?" and then asked to rank segments of the food supply chain, from farmer to consumer and government, from least responsible (1) to most responsible (6). The same question was also asked for food defence. Sectors ranked either 5 or 6 were said to be considered very responsible for food safety or defence and the proportions of each country's respondents considering each segment of the food supply chain very responsible are given below.

Rankings were similar in most countries in this study (Table 6). Food manufacturers and processors were thought to be most responsible for food safety in every country covered in this survey and were ranked very responsible by 30% of all respondents. Country differences from the mean were small and generally insignificant. Germany (36%) had the highest proportion holding manufacturers and processors very responsible for food safety while the USA (26%) and Japan (27%) had the lowest percentages. Government was the other part of the food system held disproportionately responsible for food safety in this survey, with about 20% of all respondents seeing them as either most responsible or second most responsible. There were, however, significant inter-country differences in the responsibility assigned to government. Nearly 28% of Spanish respondents and more than 25% of Japanese respondents considered government to be the most or second most responsible for food safety, while only 15% of German and Italian respondents placed government in either of the top two levels. In Germany and Italy farmers were considered to be second most responsible for food safety. Transporters, distributors, and consumers were not seen as having a great deal of responsibility for food safety. Retailers, other than in the UK, also were not thought to be responsible for food safety.

Table 6 Percent of respondents indicating groups very responsible for food safety, by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Farmers	16.6	21.5	11.6	20.1	11.1	12.0	15.5
Processors	26.3	30.1	30.5	35.5	30.0	27.1	29.9
Distributors	8.8	9.5	7.9	7.3	7.3	11.1	8.6
Retailers	13.5	14.2	21.7	13.3	11.9	10.6	14.2
Consumers	14.6	9.3	13.5	9.1	12.2	14.4	12.2
Government	20.5	15.5	15.2	14.8	27.7	25.0	19.8

When respondents were asked to identify who is responsible for food defence, results were similar to those for food safety (Table 7). There were small, but significant, increases in the percentage believing government very responsible in the USA, the UK, Japan and Spain, and statistically significant decreases in the proportion holding retailers and consumers responsible in the UK. In Germany and Italy the percentages holding government very responsible remained the same for food defence as food safety. The percentage of respondents believing government very responsible was greater than the percentages in Spain and Japan believing processors and manufacturers responsible, with more than 29% of Japanese and more than 32% of Spanish respondents indicating they

believed government very responsible for food defence. In the other countries in the survey manufacturers were seen as more responsible for food defence than government.

Table 7 Percent of respondents indicating groups very responsible for food defence, by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Farmers	14.6	22.8	11.3	20.0	9.8	10.6	14.8
Processors	28.4	30.4	30.4	36.5	30.4	27.2	30.5
Distributors	8.3	8.9	8.5	7.6	6.9	11.8	8.7
Retailers	12.2	13.3	18.8	13.5	9.8	9.2	12.8
Consumers	12.9	8.9	10.4	7.2	10.8	12.2	10.4
Government	23.8	15.9	20.7	15.3	32.4	29.1	22.8

3.5 *Who should pay for food safety and food defence?*

Respondents also were asked to indicate the proportion of the costs incurred to provide food safety and food defence they believed should be borne by each major segment of the food supply chain and by government. Consistent with their position as those perceived to be most responsible for providing for food safety and defence, processors and government were assigned the largest portion of the bills (Table 8). Processors were assigned, on average, responsibility for 24% of the cost of food safety. Other than Germany, all countries were grouped closely around the mean level. Germans thought 28% of the cost of food safety activity should be paid by processors. The average proportion respondents assigned government varied more from its average level of 21%. US respondents thought that 26% of the cost should be borne by government (a higher percentage than that assigned to processors), while Germans believed less the 15% or about half the percentage assigned to manufacturers appropriate. On average it was believed that manufacturers and government should be responsible for about 45% of the costs for food safety activities.

Table 8 Desired percentage of the food safety budget by food industry component and by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Farmers	16.0	23.0	13.7	20.8	18.7	21.6	19.0
Processors	23.8	23.5	25.5	27.9	22.6	21.3	24.1
Distributors	12.7	13.2	11.8	14.0	12.4	13.8	13.0
Retailers	13.7	14.6	18.7	15.6	13.9	12.8	14.9
Consumers	7.4	7.9	7.5	6.8	9.1	11.5	8.4
Government	26.4	17.8	22.8	14.9	23.4	18.9	20.7

The proportion of food safety costs assigned farmers was 19%, although in the UK it was significantly lower. Italy (23%) assigned a significantly higher percentage of the costs to farmers than average. Consumers, transporters, and retailers, except in the UK, all were thought to be responsible for noticeably smaller shares of the cost of providing food safety than were processors and government.

For most countries and most segments of the food supply chain the shares of the costs of providing for food defence thought appropriate were very similar to those for food safety (Table 9). For example, in Italy the largest change between the food safety and food defence allocations was an increase of less than 0.5 percentage points in the share retailers would pay for food defence. In the USA and Britain, however, there were noticeable differences. In both countries the proportion of the cost of food defence that respondents believed should be borne by the government increased significantly. For the USA, the percentage of food defence costs that respondents believed to be the government's responsibility increased by 4.4 percentage points to 30.8%. In the UK, the share assigned government grew by 3.6 percentage points to 26.4%. The increase in the share of food defence costs borne by government came primarily from a shift away from farmers and processors.

Table 9 Desired percentage of the food defence budget by segment and by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
Farmers	13.8	23.3	12.8	20.3	19.0	20.0	18.2
Processors	22.6	23.2	24.0	27.4	21.9	21.3	23.4
Distributors	12.6	13.2	12.0	14.4	12.4	14.4	13.2
Retailers	13.1	15.1	17.8	16.0	13.8	14.2	15.0
Consumers	6.9	8.0	7.0	6.5	9.5	11.3	8.2
Government	30.8	17.2	26.4	15.4	23.3	18.8	22.0

3.6 How should the food protection budget be allocated between food safety and food defence?

Respondents also were asked to choose an allocation of the food protection budget between food safety activities and food defence programmes. On average respondents to this survey would devote 54.7% of the food protection budget to food safety and 45.3% to food defence (Table 10). Although there were some statistically significant differences in country allocations compared to the mean allocation – German respondents allocated 52% of food protection spending to food safety and 48% to food defence and Spanish respondents targeted 57% for food safety and 43% for food defence – differences among countries, while often significant, were generally small.

Table 10 Desired percentage allocation of national food protection budget between food safety and food defence, by country, October, 2008

	<i>USA</i>	<i>Italy</i>	<i>UK</i>	<i>Germany</i>	<i>Spain</i>	<i>Japan</i>	<i>Average</i>
All responses (<i>N</i> = 6,090)							
Food safety	54.8	53.3	56.4	52.1	57.3	54.5	54.7
Food defence	45.2	46.7	43.6	47.9	42.7	43.6	45.3
Omitting 50–50 responses (<i>N</i> = 2,670)							
Food safety	61.3	59.3	62.2	57.5	64.3	59.5	61.0
Food defence	38.7	40.7	37.8	42.5	35.7	40.5	39.0

Some researchers believe that 50–50 responses to allocation questions such as the one above are more likely to reflect the fact that respondents did not know how to allocate resources between the choices offered, not true preferences (Bruine de Bruin et al., 2002). Since more than 56% of respondents indicated a 50–50 split between spending for food safety programmes and spending for food defence, the percentage allocation was also calculated after omitting all 50–50 responses. That subset would, on average, allocate 61% of the food budget for food safety and leave 39% of the combined food safety and food defence budget for food defence. Spanish respondents again devoted the largest portion of food protection spending for food safety, more than 64%, while the Germans surveyed would allocate 57%.

4 Conclusions

Food terrorism poses new challenges for the food industry and for governments. Simply requiring all firms to follow current best practices and enforcing current national food safety regulations are unlikely to be sufficient to provide the degree of protection consumers expect and will demand in the future. Multi-lateral cooperation and global standards for the protection of foods exported to other countries will be needed in addition to increased vigilance on domestic food stuffs.

This six nation study of attitudes toward food defence and food safety found substantial similarities in concern about food defence. While there are certainly noticeable differences in perceptions of the need for food defence activity and the proportion of national food protection budgets that should be devoted to food defence, the similarities in levels of concern about both food defence and food safety in the countries where this survey was administered indicates that considerable common ground exists. That commonality of interest could provide a basis for the multi-lateral agreements needed to improve both national and global levels of food defence. The particular challenges posed by terrorism will require new approaches by governments and by the food industry. Results from this survey indicate the public is concerned about food defence and that food manufacturers and processors and the government will be held responsible should a food terrorism incident occur.

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Notes

- 1 In the USA alone, there have been very visible recalls following discovery of *E. coli* 0157 H7 in spinach and salmonella typhimurium in peanut butter and other processed peanut products, and the recall of more than one-half billion eggs potentially contaminated with salmonella enteritidis.
- 2 Ironically, the food recall that appears to have caused the most damage to public confidence in the safety of the US food supply did not involve food for human consumption (Stinson et al., 2008). The spring 2007 pet food recall made necessary by melamine contamination of wheat gluten imported for use in dog and cat food created a large increase in the number of households expressing concern about the safety of the US food supply, particularly imported foods.
- 3 The National Center for Food Protection and Defense was established and funded by the Department of Homeland Security in July 2004. It is located at the University of Minnesota.
- 4 TNS NFO (formerly NFO World Group) is a leading global provider of panel-based market research. It collects data on consumer behaviour, brand performance, and campaign effectiveness by mail, telephone surveys and online surveys throughout the world. Their online panels are substantial totalling more than 1 million in the USA alone. In return for their participation, TNS panel members receive points they can add to points accumulated from other studies conducted by TNS-NFO to redeem for prizes.
- 5 The actual questions used are available from the authors on request. The separate terrorist acts covered by the survey were another aircraft hijacking, an incident involving another form of public transportation, destruction of a national monument, deliberate contamination of the food supply, disruption of the power grid, and release of a chemical or biological agent in a public area. It was thought that concerns over a possible dirty bomb attack would heavily dominate all other terrorist acts so no questions about how serious that type of act would be were included in the survey. There was also no attempt to elicit a response on spending to

prevent a dirty bomb attack, although an open-ended 'other' category was listed. Only 1.5% listed nuclear weapons in the other category.

- 6 The exact wording of that question was "For every \$100 that you think should be spent to protect the country from terrorism, how would you divide it across the following types of attack? Enter a dollar amount for each. The amounts must sum to \$100". The order of the choices given – another attack using a passenger aircraft, an attack on other public transportation, destruction of a national monument, deliberate chemical or biological contamination of a common food product, disruption of the electrical power grid, the release of a chemical or biological agent in a crowded public area, and other – was randomised across respondents except that the 'other transportation' category always followed the questions on another attack using aircraft and 'other' was always the last option.
- 7 Two-tailed, 95% confidence intervals for the proportional values reported are generally about 3 percentage points.