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**QUANTIFYING CONSUMERS’
PERCEPTIONS OF LEAN FINELY
TEXTURED BEEF**

by

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QUANTIFYING CONSUMERS' PERCEPTIONS OF LEAN FINELY TEXTURED BEEF

by

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Abstract

Consumers today are increasingly interested in how their food is produced, especially meat and livestock products. The media sources consumers use for information on food production and safety are changing, as evidenced by the lean finely textured beef (LFTB) event in the spring of 2012. Social media and online availability of information are changing not only the mode of communication, but rapidly increasing the speed of information and knowledge exchange. The objectives of this analysis are to quantify the media stories surrounding LFTB and to characterize consumers' concern, knowledge and purchasing behavior about LFTB. Media counts were constructed using the LexisNexis Academic Database using "All News English" and "Major World Publications" sources. The main peaks in the number of media stories occurred the week of March 25th, two weeks after the airing of an ABC News story that was widely viewed to have been at the forefront of the LFTB debate in 2012. However, LFTB stories continued beyond March 2012 and were still being published throughout the entire period analyzed. Of the eight topics investigated, consumer and government were the most discussed topics in conjunction with LFTB. LFTB producers and meat processors topics lagged behind other topics, potentially indicating a reactive approach by these groups. In order to better understand consumers' concerns, knowledge and perceptions of LFTB a survey was conducted; most participants had heard of "pink slime" (the name used in the media for LFTB) while only about one-third had heard of LFTB. Only 11% of participants indicated they had purchased LFTB in the past six months, however, 80% reported purchasing ground beef in the past six months, leading to questions surrounding consumers linking LFTB to ground beef. Most participants were not willing to purchase LFTB in the future.

Keywords: beef, consumer perceptions, lean finely textured beef, meat, media, pink slime

JEL Codes: Q13, Q18

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Introduction

Consumers are increasingly interested in practices used to produce food, including on-farm production, processing and preparation; this interest could be fueled by ease of information exchange through the internet and social media. A phenomenon in today's news media is that information is swept through non-traditional channels, like Facebook and Twitter, in addition to major news networks, blogs and popular press outlets. "[F]ood, and its level of safety is an emotional topic, and opinions and statements about it are often not science based" (Pruitt and Detre, 2012). Social media outlets allow for rapid exchange, but are not usually fact checked. The events surrounding lean finely textured beef (LFTB) demonstrate today's rapid information exchange.

LFTB is a beef product that is added to ground beef, sausage, lunchmeat and canned meats to increase the leanness of the meat (Greene, 2012). The process used to create LFTB was developed by Beef Products Inc. (BPI) in 1991 to increase the lean percentage of ground beef (Green, 2012). LFTB is made by heating beef trimmings and then placing them in a centrifuge to separate the fat from the meat; this results in a product that 94% to 97% lean beef (Greene, 2012). Next, LFTB undergoes an ammonium hydroxide antimicrobial process to kill pathogens, specifically, *E. coli* O157:H7,5 and *Salmonella* (Greene, 2012). Then, LFTB is quick-frozen and pressed before being added to ground beef and other meats (Greene, 2012). The process used to create LFTB was, and still is, deemed safe by the USDA (Greene, 2012).

Media outlets were teeming with LFTB, or "pink slime," stories in early 2012. On March 7, 2012, ABC News aired a report highlighting the potentially controversial production practices used to produce LFTB. Additionally, two days prior to the ABC News story, *The Daily* reported that the USDA was buying LFTB for the school lunch program (Greene, 2012). This, however, was not the first exposure of LFTB in popular press. LFTB's safety was questioned in Food, Inc. in 2008, in the *New York Times* in 2009 and on Jamie Oliver's show "Food Revolution" in 2011 (Detre and Gunderson, 2012). The LFTB outcry demonstrates one of the largest uses of social media to condemn a food product (or production process) that was deemed safe by the USDA (Detre and Gunderson, 2012). Restaurants and retail grocers began to take notice; in February 2012, Burger King and McDonald's announced they would no longer use LFTB indicating that the decision to remove BPI from their list of suppliers of ground meat was due to keeping with corporate strategy (Eckley and McEowen, 2012). By April 2012, BPI, the largest producer of LFTB, had suspended operations at three out of its four locations (Eckley and McEowen, 2012).

A better map of the LFTB event and understanding of consumer perceptions of LFTB will aid in the prevention, or at least reduced negative impacts, of future food safety scares. The objectives of this analysis are to quantify the media stories occurring over the time period during which LFTB received the most attention and to characterize consumers' concern, knowledge and purchasing behavior surrounding LFTB. It is hypothesized that the number of media stories will vary among keyword groups (consumer versus government, for example), that participants will indicate limited knowledge about LFTB and that most participants will be opposed to purchasing the product in the future. Through the use of two distinct data sources, media counts and the consumer survey, the authors hope to detail how much information was available to consumers in the media, how much of this information they retained and if knowledge, perceptions and purchasing behaviors surround LFTB are related to demographic information.

Materials and Methods

Lean Finely Textured Beef in the Media

It is widely assumed that publically available information affects consumer perceptions of product quality (Tonsor and Olynk, 2011; Basman, 1956; Mojduska and Caswell, 2000; Piggott and Marsh, 2004). These perceptions then have influence over consumption decisions. Following Tonsor and Olynk (2011), the LexisNexis Academic Database was used to develop counts of media stories on LFTB using public information. In particular, the core keywords used in the searches were:

((pink slime) or (lean finely textured beef) or (lean beef trimmings) or (LFTB) or (boneless lean beef trimmings) or (BLBT) or (soylent pink)) AND ((ground beef) or hamburger or burger or filler or beef or meat or (ground chuck) or beefsteak or (ground sirloin) or (ground round) or food)).

In order to better understand the content of LFTB media stories, additional constraints were needed to differentiate these media stories by topic. The general LFTB search was categorized in eight additional ways that can be found in Appendix A. These additional topics are referred to as: retailers, consumer, food safety, beef producers/agriculture, government, fast food chains, meat processors (excluding BPI and Cargill and AFA), and LFTB producers. By introducing these topic specific counts, a more accurate depiction of the article content and information can be created.

Two different source types were utilized within the LexisNexis database, “Major World Publications” (MWP) and “All News English” (ANE). According to LexisNexis (2013), MWP “contains full-text news sources from around the world which are held in high esteem for their content reliability. This includes the world’s major newspapers, magazines and trade publications which are relied upon for the accuracy and integrity of their reporting.” A total of 631 sources are listed for MWP. Additionally, the ANE “group file contains English language, full-text news sources” (LexisNexis, 2013); nearly 6000 sources are listed. It should be noted that the ANE sources include the MWP sources. The selection of these two source categories allows a picture to be created of the major news sources (i.e. MWP) versus more “popular press” (i.e. ANE) sources.

No distinction is made between articles that are against the use of LFTB and those that are for the use of LFTB; these are equally considered in the count. Daily counts were limited to a five month period surrounding the March 7, 2012 ABC News segment (Avila, 2012a), which ignited intense public backlash against the use of LFTB. Although the March 7th airing is attributed to have sparked the largest response, LFTB has been featured in other stories in past years (Andrews, 2012). Therefore, a longer period was analyzed on a weekly basis to allow expansion beyond the period of concentrated focus on LFTB in the Spring of 2012. Weekly information was collected for November 1, 2011 to October 15, 2012, while daily information was collected for January 1, 2012 to June 15, 2012.

Consumer Survey Methods to Assess Perceptions of Lean Finely Textured Beef

A total of 798 respondents completed an online survey in June 2012. Internet surveys are becoming more popular because of their low costs and fast completion times (Louviere et al., 2008; Gao and Schroeder, 2009; Olynk, Tonsor and Wolf, 2010; Tonsor and Wolf, 2010; Olynk and Ortega, 2013). Decipher, Inc., a marketing research services provider that specializes in

online survey programming, data collection, data processing and custom technology development, was used to administer the online survey. Participants were recruited from a large opt-in panel by Survey Sampling International. Only respondents who were at least 18 years of age and familiar with their household's food purchasing behaviors qualified for the survey. Additionally, the sample was requested to be representative of the US population in terms of state of residence, gender, age, pre-tax income and education level. Questions were asked to discern consumer perceptions of livestock products and purchasing behaviors. Additionally, questions specific to participants' knowledge, concern and purchasing behaviors regarding LFTB were asked. Demographic information was also collected. Cross tabulations and z-scores are used to make comparisons throughout the paper.

Results and Discussion

Lean Finely Textured Beef in the Media

The documentary "Food, Inc." exposed LFTB to consumers in 2008 (Detre and Gunderson, 2012). Then, on December 20, 2009 the safety of the processes behind LFTB were questioned in the New York Times (Moss, 2009). Almost two years later, on April 12, 2011, Jamie Oliver on the television show "Food Revolution" ran a segment in which he publicly criticized the process used to produce LFTB (Detre and Gunderson, 2012). The purpose of Oliver's segment was to inform viewers of the use of LFTB in school lunch programs (Eckley and McEowen, 2012), but following the airing, social media outcries were fierce. In February 2012, McDonald's announced they would no longer use LFTB in their burgers, stating it had been out of their supply chain since August 2011 (McDonald's, 2012). Finally, the expose on March 7, 2012 airing on ABC News, following news that ground beef with LFTB was being purchased for the school lunch program, brought LFTB to the attention of more consumers. Throughout the rest of March 2012, multiple food companies, including BUBBA Burger, Safeway, Kroger, Supervalu, Wendy's and Wal-Mart, announced either they did not use LFTB, would discontinue its use or would give their customers an option (Meatingplace, 2013). Additionally, although the USDA issued a statement to reassure citizens about the safety of LFTB, multiple school districts including those in New York City, Miami and Memphis stated they would not serve ground beef with LFTB (Meatingplace, 2013). Following this chain of events, BPI suspended operations at three of its four plants and AFA Foods filed for bankruptcy (Meatingplace, 2013). In order to better understand the gravity of the LFTB event and the information available to consumers, media story counts were constructed.

The weekly media counts generated using the LexisNexis database for the LFTB keywords for both ANE and MWP are shown in Figure 1. The overwhelming majority of media responses to the core keywords from the LFTB incident came from the ANE sources. At the peak of the media responses, 3/25/12 to 3/31/12, more than 425 ANE and 50 MWP stories were published in one week. It should also be noted that following the main burst of media stories, the week of 3/25/12 to 3/31/12, three follow-up spikes in the number of media stories occurred, 5/6/12 to 5/12/12, 6/3/12 to 6/9/12, and 9/9/12 to 9/15/12. While the LFTB story seems to be dominated by ANE sources, it is important to keep in mind that it is not possible to determine which sources had the most impact on readers. Different media sources are likely to have different impacts on audiences and have diverse target audiences.

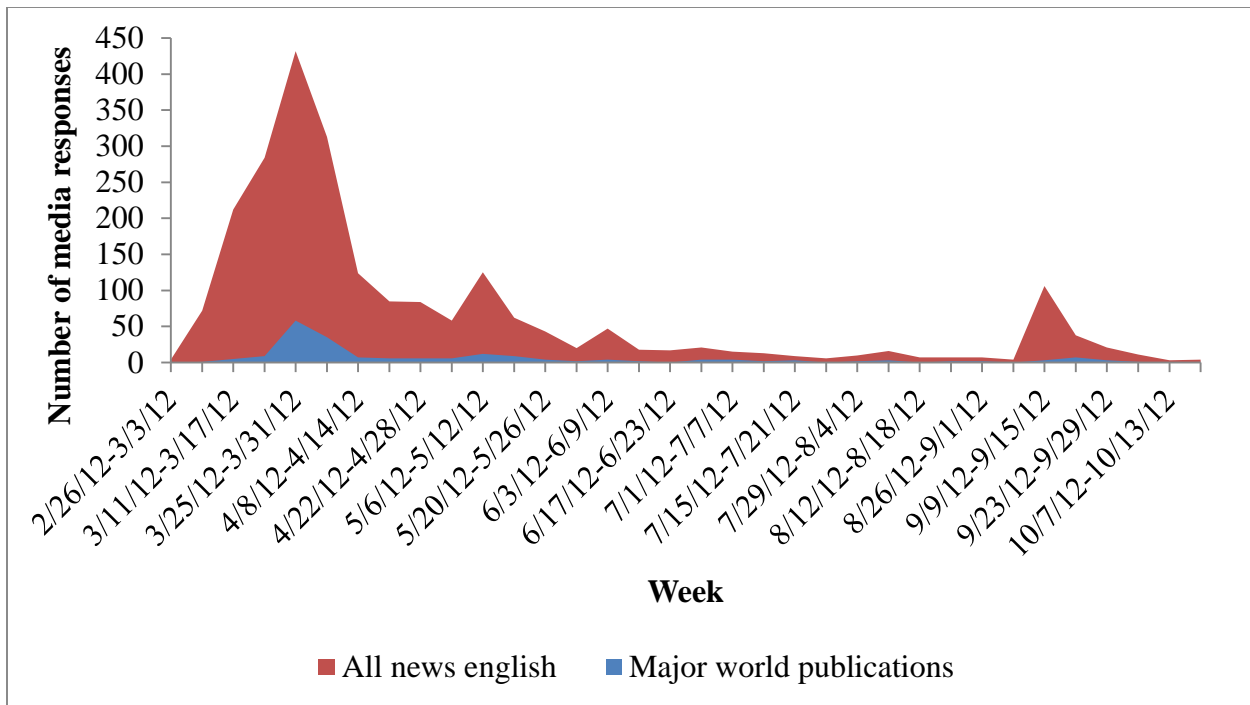


Figure 1. Count of “All News English” (ANE) and “Major World Publication” (MWP) media sources, by week, for the core keywords from 2/26/12 to 10/13/12

Analysis of Figure 2 shows the majority of keyword searches for MWP peaked the week of 3/25/12 to 3/31/12. Notably, the consumer keyword group had the highest count, followed by government, beef producers and agriculture, and food safety. Overall, the consumer keyword group led the media counts in terms of the topics discussed. There was only one week, 4/22/12 to 4/28/12, that the consumer keyword group was not tied for or the overall leader for the number of total media responses. Therefore, the keywords in the consumer group were the most mentioned in articles about LFTB in MWP sources. Of interest is that two keyword groups, LFTB producers and meat processors, peaked in the number of media reports the week following the main peak, 4/1/12 to 4/7/12. Going into the week after the major media reporting, the focus of the reporting increased on these two groups while it decreased for every other group.

Weekly ANE counts in Figure 3 show a similar but slightly different picture as the MWP sources weekly counts. Consumer and government keyword groups are the main focus of attention up through the peak in Figure 3. However, similar to the weekly MWP reports, for every week the consumer group was either tied or the overall leader for the most reports of the keyword groups investigated. In the early stages of the LFTB reporting for ANE reports, the consumer and government keyword groups appear to be moving together. After 3/25/12 to 3/31/12, these two groups do not follow as tight of a relationship. Potentially, many of the stories published regarding LFTB mentioned both of these keywords.

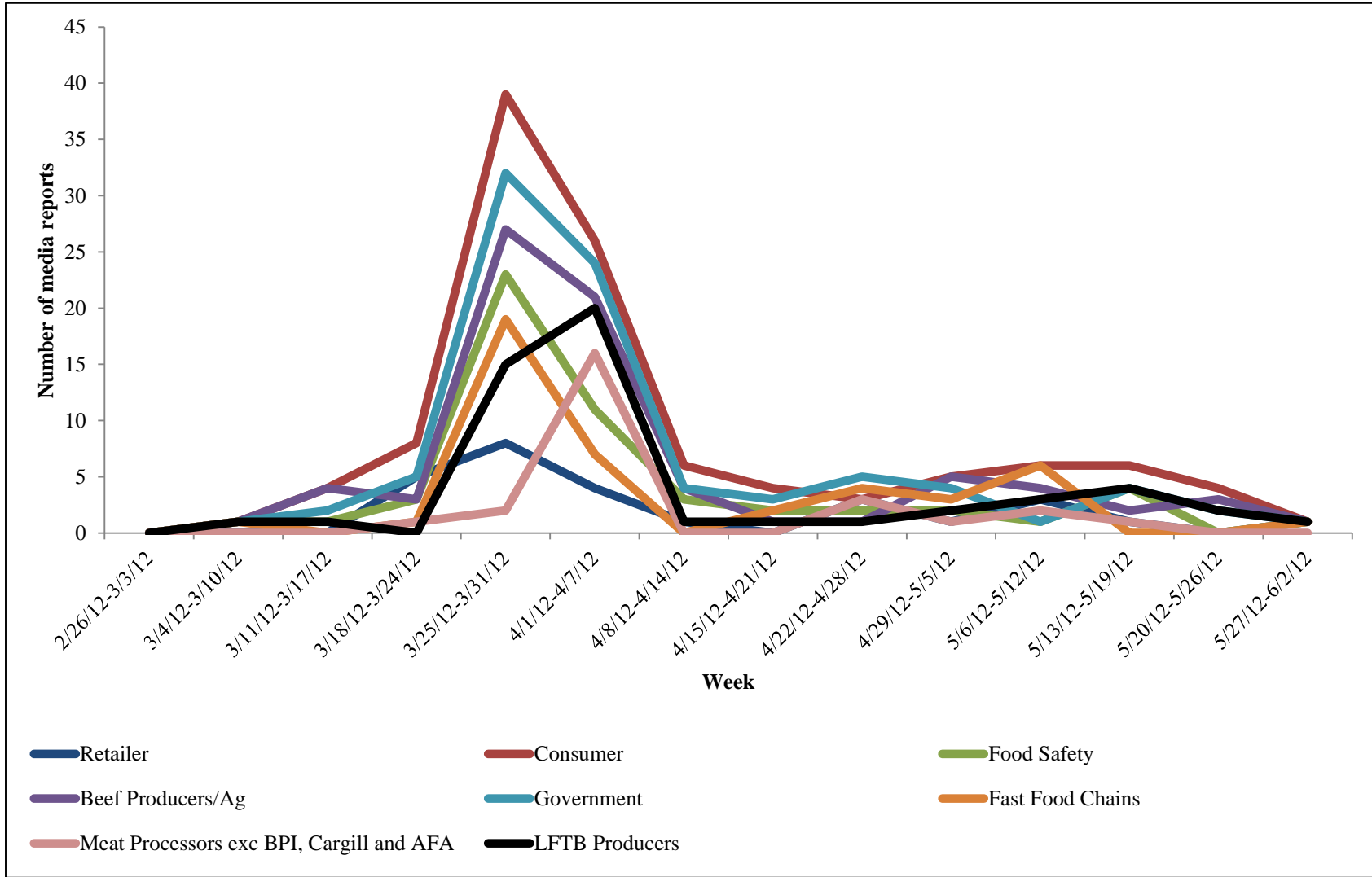


Figure 2. Count of “Major World Publications” (MWP) media sources, by week, for the eight keywords from 2/26/12 to 6/2/12

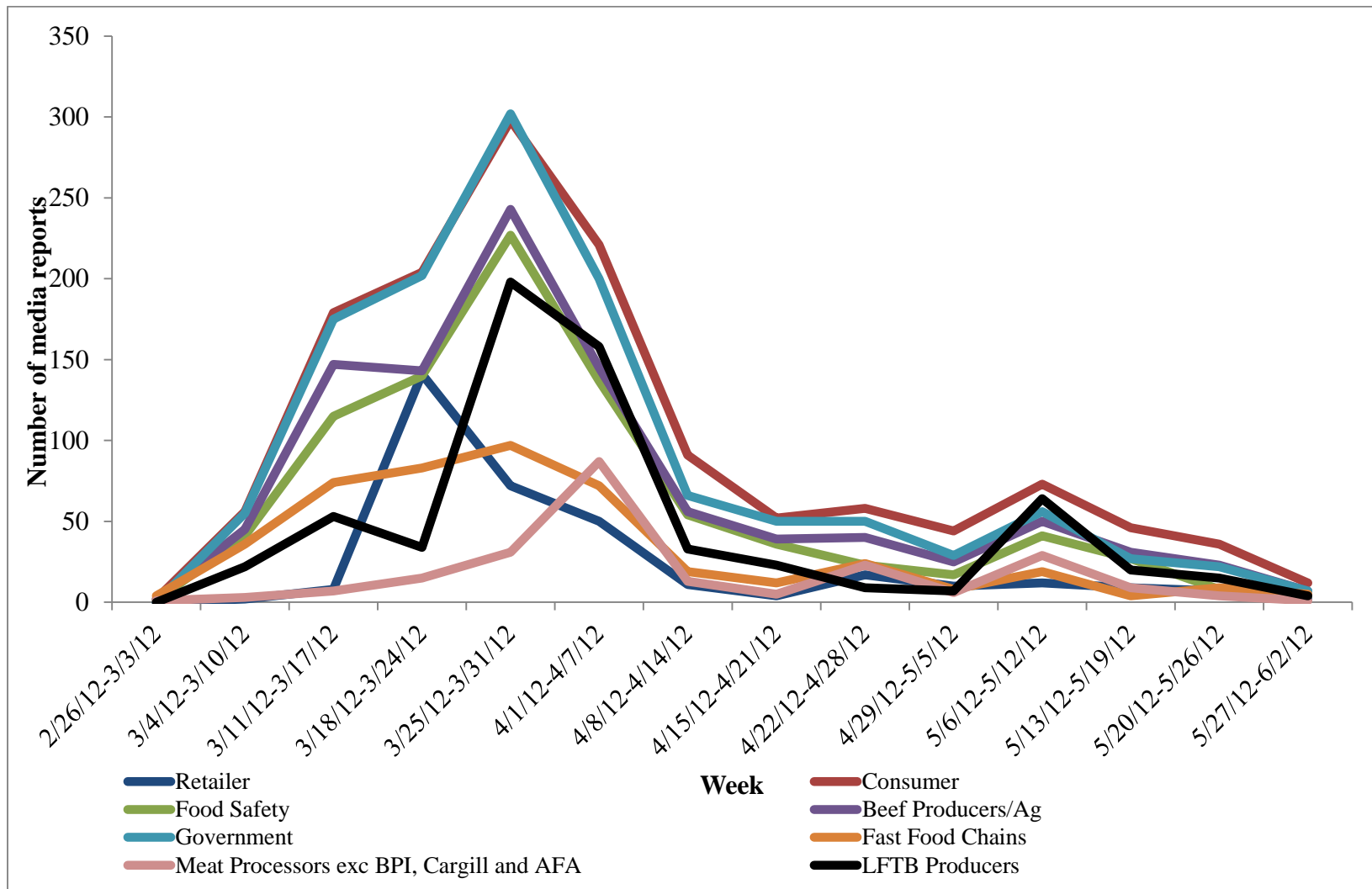


Figure 3. Count of “All News English” (ANE) media sources, by week, for the eight keywords from 2/26/12 to 6/2/12

The LFTB producers' keyword group also hit its highest number of media stories the week of 3/25/12 to 3/31/12 compared to 4/1/12 to 4/7/12 in MWP. Although there was a decrease in the quantity of reports including LFTB producers the week after the main peak, this decline was not as substantial as the other groups. Following the main peak, the meat processor keyword group hit its peak. During the week of 5/6/12 to 5/12/12, there was a slight increase across all keyword groups in the number of reports, however this bump was very noticeable in the LFTB producer keyword group; the focus of that week's media reports appear to center on that group.

Daily media story counts for MWP and ANE sources for 3/1/12 to 4/15/12 are displayed in Figure 4 and Figure 5, respectively. The daily ANE media counts appear to begin activity around 3/7/12 and continue through 4/15/12. On the other hand, the MWP media counts appear to have a slight increase on 3/16/12, but momentum does not pick up until around 3/27/12. For daily MWP media reports, the main peak of stories occurred on 3/31/2012, two days after the 3/29/12 peak for ANE sources. Also noteworthy, the main peak (3/31/2012) in MWP had zero reports for the LFTB producer keyword group. However, this keyword group was tied for the most stories on the following peak occurring on 4/3/12.

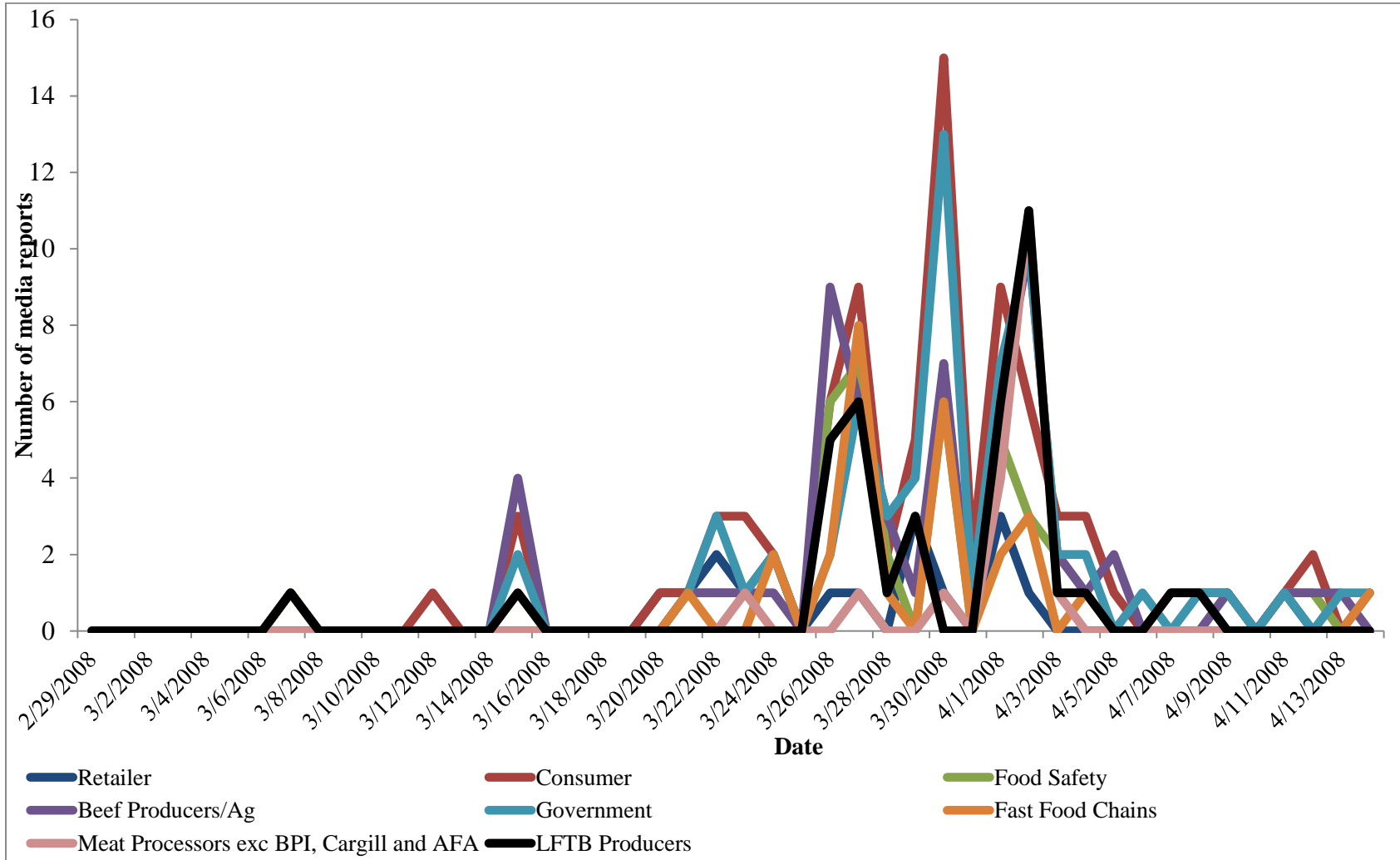


Figure 4. Count of “Major World Publication” (MWP) media sources, by day, for the eight keywords from 3/1/2008 to 4/15/2008

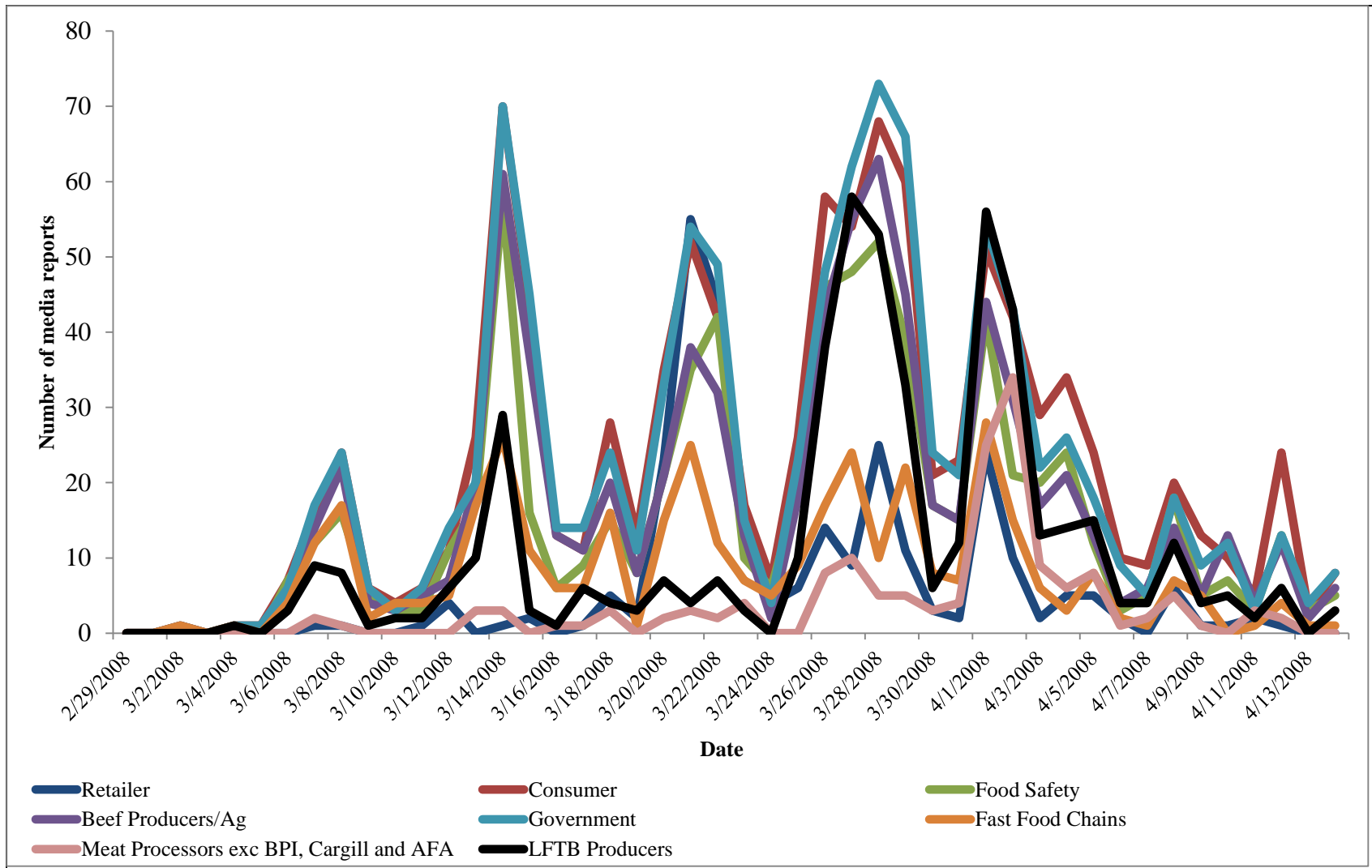


Figure 5. Count of “All News English” (ANE) media sources, by day, for the eight keywords from 3/1/2008 to 4/15/2008

It should be noted that the fast food chains and retailer keyword groups did not follow a similar path to the other keyword groups. The fast food chain keyword group had continuous activity throughout (for both ANE and MWP), but the ranges of activity were comparatively small. The retailer group, on the other hand, yielded less stories in MWP sources until the main media event, 3/29/12, then re-peaked on 4/2/12, and then this keyword group was mentioned less frequently throughout the remaining timeframe. When comparing the fast food chain and retailer keyword groups, the fast food chain keyword group appeared to become active earlier and remained more active throughout the timeframe evaluated.

The daily MWP peak events – 3/8, 3/15, 3/24, 3/27, 3/31, 4/3 – occurred on a Wednesday, Wednesday, Thursday, Sunday, Thursday, and Sunday, respectively; two Wednesday events, two Thursday events and two Sunday events. When looking at the peak dates for total daily ANE reports - 3/9, 3/15, 3/19, 3/22, 3/29, 4/2, 4/5, 4/9, 4/13 - the peaks occurred on Wednesday, Tuesday, Saturday, Tuesday, Tuesday, Saturday, Tuesday, Saturday, and Wednesday, respectively. For the nine peak media dates, four occurred on Tuesdays, three on Saturdays, and two on Wednesday.

Consumer Perceptions of Lean Finely Textured Beef

Summary statistics for the sample are shown in Table 1. The average age of the survey respondents was 47, with 48% of the sample being male. The average household in the sample was comprised of 1.93 adults and 0.50 children. The majority of the sample reported a yearly household income of less than \$60,000, with 97% at least graduating from high school and 33% receiving a Bachelor's degree or higher. According to the US Census Bureau (2013) the average US household was 2.60 people, with an annual average income of \$52,762. Additionally, 85.4% of Americans over the age of 25 are a high school graduate and 28.2% hold Bachelor's degree or higher (US Census Bureau, 2013).

Table 1. Descriptive statistics of survey respondents (n=798)

Descriptive Statistics	Value
Mean age of survey respondent in years	47
Male	48%
Adults in household	1.93
Total children in household	0.50
<i>Yearly household income</i>	
Less than \$20,000	19%
\$20,000 - \$39,999	31%
\$40,000 - \$59,999	22%
\$60,000 - \$79,999	12%
\$80,000 - \$99,999	7%
\$100,000 - \$119,999	3%
\$120,000 - \$139,999	2%
\$140,000 or more	4%
<i>Education level of respondent</i>	
Did not graduate from high school	3%
Graduated from high school, Did not attend college	23%
Attended College, No Degree earned	26%
Attended College, Associates or Trade Degree earned	14%
Attended College, Bachelor's (B.S. or B.A.) Degree earned	23%
Graduate or Advanced Degree (M.S., Ph.D., Law School)	10%
Other	1%
<i>Geographic Region ¹</i>	
Northeast	25%
South	25%
Midwest	27%
West	23%
Vegetarian	4%
Vegan	2%

To better understand participants' knowledge and perceptions of LFTB, a series of six questions, with one follow up question if "Yes" was selected for question three, were asked (Table 2). Only one question was shown at a time, and respondents could not go back to change their answer to previous questions. Questions were shown in the order presented in Table 2. The first question was "Have you heard of pink slime?" to which 63% of participants indicated yes. Fewer yes responses, 34%, were selected in response to question two, "Have you heard of lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)?" Therefore, more

¹ Northeast included CT, ME, MA, NH, NJ, NY, PA, RI, and VT. Midwest included IL, IN, IA, KS, MI, MO, MN, NE, ND, OH, SD, and WI. South included AL, AR, DE, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. West included AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, and WY.

participants had heard of “pink slime,” the name commonly used in the media for LFTB, than the actual scientific name. Only 38% reported that they knew what LFTB was and of that 38%, only 35% knew what LFTB was 6 months ago (January 2012). Only 11% reported they purchased LFTB in the past six months, while 13% indicated they would purchase LFTB in the next six months. The final question regarding LFTB gave participants a definition of LFTB and asked if they knew what it was whenever they answered the previous questions. Only 37% stated they knew what LFTB was when they answered the previous questions. To better understand the responses to these questions, further analysis is warranted.

Table 2. Responses to lean finely textured beef survey questions

Question 1	Have you heard of pink slime?	Yes	63%
		No	37%
Question 2	Have you heard of lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)?	Yes	34%
		No	66%
Question 3	Do you know what pink slime (also known as lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)) is?	Yes	38%
		No	62%
Question 3a	If yes was selected then: Did you know what pink slime (also known as lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)) was 6 months ago?	Yes	35%
		No	65%
Question 4	Have you purchased pink slime (also known as lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)) in the past 6 months?	Yes	11%
		No	89%
Question 5	Would you purchase pink slime (also known as lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)) in the next 6 months?	Yes	13%
		No	87%
Question 6	Pink slime is also known as lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT). It is a beef-based food additive that may be added to ground beef and beef-based processed meats as inexpensive filler. It consists of finely ground beef scraps, sinew, fat, and connective tissue which have been mechanically removed in a heated centrifuge from the fat into liquid fat and a protein paste. The recovered material is processed, heated and treated with ammonia gas or citric acid to kill E. coli, salmonella, and other bacteria. When you answered the earlier questions did you know what pink slime (also known as lean finely textured beef (LFTB) or boneless lean beef trimmings (BLBT)) was?	Yes	37%
		No	63%

Cross tabulation analyses of questions one and two by demographic information is shown in Table 3. Other demographic factors besides those shown in Table 3 were also tested, but not found to be statistically significant. The capital letters (A, B, Y, Z) in the table represent a statistically significant difference at the five percent level and the lower case letters at the ten percent level. The letter that indicates a significant difference is always located next to the highest value of the two different numbers being compared (only A and B can be compared to each other and only Y and Z can be compared to each other). For example, when reading the “age” row in Table 3, columns A and B are significantly different at the five percent level with the capital letter indicating a statistically significant difference appears in column A because A has that largest value, 48.47. Therefore, interpreting the results in Table 3, those who answered yes to question one were statistically older and more frequently reported being a college graduate with household incomes over \$60,000 than those who had not heard of “pink slime.” Those who answered yes to question two more frequently reported being a college graduate than those who had not heard of LFTB.

Table 3. Cross tabulations of demographic information and lean finely textured beef recognition²

	Q1- Have you heard of pink slime?		Q2- Have you heard of LFTB?	
	Yes n=500 A	No n=298 B	Yes n=268 Y	No n=530 Z
Age	48.47 B	43.32	46.94	46.35
Male	46%	50%	50%	47%
Female	54%	50%	50%	53%
Not a-college graduate	49%	60% A	48%	55% Y
College graduate	51% B	40%	52% Z	45%
Yearly household income below \$60,000	69%	76% A	69%	73%
Yearly household income greater than \$60,000	31% B	24%	31%	27%
Northeast	27%	22%	27%	24%
Midwest	26%	24%	24%	27%
South	23%	33% A	29%	25%
West	25%	20%	21%	24%

Table 4 displays cross tabulation results for questions one through six. Although the majority of participants had heard of “pink slime,” slightly under half of those who had heard of “pink slime” had also heard of LFTB. Those who stated yes to question one, more frequently reported yes to question two than those who answered no to question one. Additionally, those

² Statistically significant differences between two measures at the 5% level are indicated by a capital letter, while 10% is indicated by a lower case letter. The letter that indicates a significant difference is always located next to the highest value of the two different numbers being compared.

who answered no to question one more frequently also answered no to question two. Therefore, if a participant had not heard of “pink slime” then they had probably not heard of LFTB. Furthermore, the majority of participants who had heard of LFTB had also heard of “pink slime.” This potentially indicates that “pink slime” was used more commonly than LFTB during media stories and discussions regarding the product.

Of those who had heard of “pink slime” only 55% stated they knew what it was, while 75% of those who had heard of LFTB stated they knew what it was. Those who answered no to questions one and two more frequently reported not knowing what LFTB was. Therefore, not everyone who had heard of LFTB stated they knew what it was, however, if someone had heard of LFTB (not just “pink slime”) they more frequently reported knowing what it was. When looking at cross tabulations with question four (across the row), those who had heard of “pink slime” (question one) or LFTB (question two) and those who stated they knew what LFTB was (question three), more frequently reported having purchased LFTB in the last six months than those who had not heard of LFTB. If someone answered no to question one through three, they more frequently reported no to question four, that they had not purchased LFTB in the past six months. Overall, most survey participants stated they have not purchased LFTB in the past six months, but if someone knew what LFTB was, they more frequently reported purchasing it. However, this was still only a small number of participants.

The cross tabulations for question five, tell much of the same story as question four. If someone had heard of “pink slime”/LFTB or knew what LFTB was, they more frequently reported being willing to purchase LFTB in the next six months. Additionally, 61% of those who answered yes to question four, indicating they had purchased LFTB in the past six months, also answered yes that they would purchase LFTB in the next six months. Overall, if a participant did not know what LFTB was, they were not willing to purchase it in the next six months. However, it is worth noting that no statistical differences were found between those who had and had not heard of pink slime (question one) based on their willingness to purchase LFTB in the next six months. Regardless of how the participants answered the questions, the majority (87%) of respondents were not willing to purchase LFTB.

The final cross tabulations in Table 4 compare the answers to question six to questions one through five. Of those who had heard of “pink slime” 53% answered yes, they knew what LFTB was after seeing the definition. However, a higher percentage of those who had heard of LFTB answered yes to question six. The majority, 78%, of those who answered yes to question three also answered yes to question six indicating they reportedly knew what LFTB was when they answered the previous questions. The majority of those who indicated they had purchased or would be willing to purchase LFTB in the next six months stated yes to question six.

Table 4. Cross tabulation across lean finely textured beef questions³

	Q1- Have you heard of pink slime?		Q2- I have heard of LFTB?		Q3- Do you know what pink slime/ (LFTB)/ (BLBT) is?		Q4- Have you purchased pink slime/ (LFTB)/ (BLBT) in the past 6 months?		Q5- Would you purchase pink slime/ (LFTB)/ (BLBT) in the next 6 months?	
	Yes (A) (n=500)	No (B) (n=298)								
Q2- Have you heard of LFTB?										
Yes (n=268)	44% B 219	16% 49								
No (n=530)	56% 281	84% A 249	Yes (D) (n=268)	No (E) (n=530)						
Q3- Do you know what pink slime/ (LFTB)/ (BLBT) is?										
Yes (n=302)	55% B 276	9% 26	75% E 201	19% 101						
No (n=496)	45% 224	91% A 272	25% 67	81% D 429	Yes (G) (n=302)	No (H) (n=496)				
Q4- Have you purchased pink slime/ (LFTB)/ (BLBT) in the past 6 months?										
Yes (n= 87)	13% B 67	7% 20	19% E 51	7% 36	22% H 66	4% 21				
No (n=711)	87% 433	93% A 278	81% 217	93% D 494	78% 236	96% G 475	Yes (J) (n= 87)	No (K) (n=711)		
Q5- Would you purchase pink slime/ (LFTB)/ (BLBT) in the next 6 months?										
Yes (n=103)	14% 71	11% 32	22% E 59	8% 44	22% H 65	8% 38	61% K 53	7% 50		
No (n=695)	86% 429	89% 266	78% 209	92% D 486	78% 237	92% G 458	39% 34	93% J 661	Yes (M) (n=103)	No (N) (n=695)
Q6- After being shown the definition of LFTB, did you know what LFTB was when answering the previous questions?										
Yes (n=294)	53% B 264	10% 30	65% E 175	22% 119	78% H 237	11% 57	64% K 56	33% 238	62% N 64	33% 230
No (n=504)	47% 236	90% A 268	35% 93	78% D 411	22% 65	89% G 439	36% 31	67% J 473	38% 39	67% M 465

³ Statistically significant differences between two measures at the 5% level are indicated by a capital letter, while 10% is indicated by a lower case letter. The letter that indicates a significant difference is always located next to the highest value of the two different numbers being compared.

In the survey instrument used for this analysis, participants were also asked about their food safety concerns for livestock products and if they had purchased the product in the last six months, including ground beef. Given that LFTB was added to the majority of ground beef (Avila, 2012), if participants indicated purchasing ground beef in the past six months, they probably purchased ground beef that included LFTB. Cross tabulations for food safety concern about ground beef and ground beef purchase by the six LFTB questions are shown in Table 5. Those who had heard of “pink slime” or LFTB or reportedly knew what LFTB was, more frequently reported being concerned about food safety in ground beef. When looking at those who indicated they purchased ground beef versus those who reported purchasing LFTB in the past six months, only 80 of the 638 participants who purchased ground beef also recognized purchasing LFTB. Therefore, it is hypothesized that most people who purchased ground beef in the past six months did not realize they were also likely purchasing LFTB.

Table 5. Cross tabulation with food safety concern and purchase of ground beef ⁴

	Are you concerned about the food safety of ground beef?		Have you purchased ground beef in the last 6 months	
	Yes (n=554) A	No (n=244) B	Yes (n=638) Y	No (n=160) Z
Q1- Have you heard of pink slime?				
Yes (n=500)	65% b 358	58% 142	62% 398	64% 102
No (n=298)	35% 196	42% a 102	38% 240	36% 58
Q2- Have you heard of LFTB?				
Yes (n=268)	36% B 200	28% 68	35% b 224	28% 44
No (n=530)	64% 354	72% A 176	65% 414	73% a 116
Q3- Do you know what pink slime/ (LFTB)/ (BLBT) is?				
Yes (n=302)	42% B 230	30% 72	38% 244	36% 58
No (n=496)	58% 324	70% A 172	62% 394	64% 102
Q4- Have you purchased pink slime/ (LFTB)/ (BLBT) in the past 6 months?				
Yes (n= 87)	12% 67	8% 20	13% B 80	4% 7
No (n=711)	88% 487	92% 224	87% 558	96% A 153
Q5- Would you purchase pink slime/ (LFTB)/ (BLBT) in the next 6 months?				
Yes (n=103)	13% 71	13% 32	15% B 94	6% 9
No (n=695)	87% 483	87% 212	85% 544	94% A 151
Q6-After being shown the definition of LFTB, did you know what LFTB was when answering the previous questions?				
Yes (n=294)	39% b 215	32% 79	38% 240	34% 54
No (n=504)	61% 339	68% a 165	62% 398	66% 106

⁴ Statistically significant differences between two measures at the 5% level are indicated by a capital letter, while 10% is indicated by a lower case letter. The letter that indicates a significant difference is always located next to the highest value of the two different numbers being compared.

Comparison to other products and market implications

The growth in “politics by other means – politics practiced through the market” has changed how special interest groups, or various other consumer groups, pursue change through the market system rather than traditional legislative channels (Schweikhardt, and Browne, 2001). The LFTB event could arguably be considered an example of politics by other means.

“A well-functioning market allows consumers to signal to producers what they desire and are willing to pay for. Through market channels changing consumer tastes and preferences are communicated to suppliers through changes in their demand. Changes in policies and production practices by food producers have been increasingly driven by consumer demand rather than governed by changing regulations.” (Cook-Mowery, Olynk, and Wolf, 2008).

Oftentimes the response to negative media attention occurs through media releases and increased press coverage; other times, companies choose to remove the product in question, even though it may be deemed safe by the USDA or another governing agency. A potential parallel example is the use of recombinant bovine somatotropin (rbST) in dairy cattle which was largely discontinued due to market pressures, rather than legislative changes (Cook-Mowery, Olynk, and Wolf, 2008). Meijer, Inc., a retailer who chose to switch to milk from cows not treated with rbST stated (2008), “We’ve researched the topic and have listened to our customers. This move is not a reaction to any health concerns. It’s a decision to give our customers what they want.” According to this statement, the move towards the procurement of milk from cows not treated with rbST was driven by changing consumer preference, thereby illustrating the move by a food retailer to serve the changing tastes and preferences of their market. The large-scale movement away from rbST by corporations was not limited to supermarkets and food retailers. Starbucks was reportedly “[r]esponding to customer concerns about genetic engineering and food safety [and] the company committed to making 100 percent of the milk supply for its more than 5,600 American locations free” from rbST by the end of 2007 (Coles, 2007).

Retailers and restaurants react to serve customer demands for food produced certain ways or possessing certain attributes, and in turn individual food producers, dairy farmers in the case of rbST and beef processors in the case of LFTB, must in turn adjust their practices to fulfill the demand of their customer – namely the retailer or restaurant. Following the illustration of the example of rbST in dairy cattle of Cook-Mowery, Olynk, and Wolf (2008), it is through market-based changes, such as those illustrated here, or politics practiced through the market (Schweikhardt, and Browne, 2001) that LFTB moved out of the marketplace although no regulatory or legal actions had been taken to eliminate the product. Decisions by major fast-food chains, such as McDonald’s, Burger King, and Taco Bell to not use LFTB in their products are arguably in direct response to outcry for change by their customers. McDonald’s and Burger King indicate their decisions to move away from BPI as a supplier were based on corporate strategy (Detre and Gunderson, 2012); Starbucks and Meijer indicated that their reasoning behind the provision of milk produced from cows not treated with rbST was in an effort to give their customers what they want (Cook-Mowery, Olynk, and Wolf 2008).

Detre and Gunderson (2012) assert that as social media continues to debate food safety in the supply chain it will become commonplace for agribusinesses to react to those debates. This analysis has found that agribusinesses do indeed react to media stories, oftentimes peaking in the number of media hits after other major categories of media hits and with fewer total hits, in many

cases. Given the outcome for LFTB to this point, resulting from the media frenzy, is reacting to negative media coverage after it happens the optimal strategy for agribusinesses? The sequence of events in reaction to the supply chain could be related to the business' location in the supply chain and who the business' customer is. Arguably, the end consumer or user is not LFTB producers' customer; the retailers, restaurants and fast food chains are LFTB producers' customers. Therefore, those who are the end of the supply chain, and thus interact more with consumers, will be more sensitive to changing consumer demands.

Conclusion

Consumers today are increasingly interested in how their food is made. "The debate on food production practices did not start with LFTB, nor will it end with it, but social media will certainly be a future battlefield where consumers' food preferences and opinion on food and agricultural practices will be shaped" (Pruitt and Detre, 2012). Clearly, examples exist in the marketplace of widespread change occurring due to consumer (or retailer) demands for change. According to Pruitt and Detre (2012), fewer US residents have knowledge of agricultural practices – and – those same consumers are becoming more accepting of new media sources for information. Thus, it is hypothesized that market pressures will continue to shape product offerings.

The speed and media through which consumers exchange information, including food safety information, is changing rapidly. LexisNexis searches revealed that more media stories occurred in the ANE sources for a longer period of time than the MWP. Furthermore, the largest number of media hits occurred weeks after the ABC News airing on March 7, 2012. Peaks in media reports mentioning various topics analyzed differed considerably; media stories mentioning consumers and the government keyword groups appeared most frequently and consistently in the counts.

As evidenced in other industries, media stories can have profound impacts on product offerings and consumer acceptance of various products and/or practices. The majority of survey participants had heard of "pink slime," but fewer had heard of LFTB. Those who have heard of "pink slime" or LFTB more frequently had a college education. A majority of survey respondents indicated they had purchased ground beef in the past six months, but only 13% of ground beef purchasers also stated they purchased LFTB. Whether or not respondents had heard of LFTB, they did not want to purchase LFTB in the future. Overall, there is a negative perception of LFTB amongst survey participants, regardless of their level of knowledge about the product.

Literature Cited

- Andrews, J. (2012). BPI and 'Pink Slime': A Timeline. *Food Safety News*. Retrieved from <http://www.foodsafetynews.com/2012/04/bpi-and-pink-slime-a-timeline/#.UZG2CrU-bIV>
- Avila, J. (2012, March 7). 70 percent of ground beef at supermarkets contains 'pink slime'. *ABC News*. Available at <http://abcnews.go.com/blogs/headlines/2012/03/70-percent-of-ground-beef-at-supermarkets-contains-pink-slime/>.
- Basman, R. L. (1956). A theory of demand with variable consumer preferences. *Econometrica, Journal of the Econometric Society*, 24, 47-58.
- Coles, T. (2007, September 7). Monsanto's Growth Hormone Being Driven off the Market. *Reuters*. Retrieved from http://www.organicconsumers.org/articles/article_6974.cfm.
- Cook-Mowery, C., Olynk, N. J., & Wolf, C. A. (2008). Farm-Level contracting for production process attributes: An analysis of rBST in milk production. *Journal of Food Law & Policy*, 4, 177.
- Detre, J. D., & Gunderson, M. A. (2012). Did the "Pink Slime" Controversy Influence Publicly Traded Agribusiness Companies. *Choices*, 27(4).
- Eckley, E. K., & McEowen, R. A. (2012). Pink Slime and the Legal History of Food Disparagement. *Choices*, 27(4).
- Greene, J.L. (2012). Lean Finely Textured Beef: The "Pink Slime" Controversy. Congressional Research Service. Available at <http://www.fas.org/sgp/crs/misc/R42473.pdf>
- Gao, Z., & Schroeder, T. C. (2009). Effects of label information on consumer willingness-to-pay for food attributes. *American Journal of Agricultural Economics*, 91(3), 795-809.
- LexisNexis. (2013) <http://www.lexisnexis.com.ezproxy.lib.purdue.edu/hottopics/Inacademic/>
- Louviere, J.J., T. Islam, N. Wasi, D. Street, and L. Burgess. (2008). Designing Discrete Choice Experiments: Do Optimal Designs Come at a Price? *Journal of Consumer Research*, 35, 360-375.
- McDonald's. (2012). Discontinued Use of Select Lean Beef Trimmings (SLBT). Retrieved from [http://news.mcdonalds.com/US/Media-Statements/Discontinued-Use-of-Select-Lean-Beef-Trimblings-\(SL](http://news.mcdonalds.com/US/Media-Statements/Discontinued-Use-of-Select-Lean-Beef-Trimblings-(SL)
- Meatingplace (2013). Lean Finely Textured Beef Interactive Timeline. Retrieved from <http://www.marketingandtechnology.com/repository/webFeatures/meatingplace/lftbtimeline.html>
- Meijer. (2008). Meijer offers milk produced without artificial growth hormone. *Meijer News Release*. Available at http://www.meijer.com/assets/cms/pdfs/news/20080219_meijerMilkRelease.pdf
- Mojduszka, E. M., & Caswell, J. A. (2000). A test of nutritional quality signaling in food markets prior to implementation of mandatory labeling. *American Journal of Agricultural Economics*, 82(2), 298-309.
- Moss, M. (2009, December 30). Safety of Beef Processing Method Is Questioned. *The New York Times*. Retrieved from http://www.nytimes.com/2009/12/31/us/31meat.html?_r=1&pagewanted=all
- Olynk, N. J., & Ortega, D. L. (2013). Consumer preferences for verified dairy cattle management practices in processed dairy products. *Food Control*.
- Olynk, N. J., Tonsor, G. T., & Wolf, C. A. (2010). Consumer willingness to pay for livestock credence attribute claim verification. *Journal of Agricultural and Resource Economics*, 35, 261-280.

- Piggott, N. E., & Marsh, T. L. (2004). Does food safety information impact US meat demand?. *American Journal of Agricultural Economics*, 86(1), 154-174.
- Pruitt, R. J. & Detre, J. D. (2012). Theme Overview: Pink Slime, Marketing, Uncertainty, and Risk in the 24 Hour News Cycle. *Choices*, 27(4).
- Schweikhardt, D. B., & Browne, W. P. (2001). Politics by other means: The emergence of a new politics of food in the United States. *Review of Agricultural Economics*, 23(2), 302-318.
- Tonsor, G. T., & Olynk, N. J. (2011). Impacts of Animal Well-Being and Welfare Media on Meat Demand. *Journal of Agricultural Economics*, 62(1), 59-72.
- Tonsor, G.T., & Wolf, C.A. (2010). Drivers of resident support for animal care oriented ballot initiatives. *Journal of Agricultural and Applied Economics*, 42(3), 419-428.

Appendix A- LexisNexis search parameters

General Lean Finely Textured Beef Search Keywords

Core Keywords

((pink slime) or (lean finely textured beef) or (lean beef trimmings) or (LFTB) or (boneless lean beef trimmings) or (BLBT) or (soylent pink)) AND ((ground beef) or hamburger or burger or filler or beef or meat or (ground chuck) or beefsteak or (ground sirloin) or (ground round) or food))

Lean Finely Textured Beef Search Keyword Groups

1) Retailer

Core Keywords AND ((Wal-Mart) or (Wal-Mart Supercenter) or (Wal-Mart Neighborhood Market) or (Marketside) or (Kroger) or (Ralphs) or (Fred Meyer) or (Safeway) or (Vons) or (Tom Thumb Safeway) or (Supervalu) or (Save-A-Lot) or (Albertsons) or (Shaws) or (Star Market) or (Ahold) or (Stop & Shop) or (Giant-Landover) or (Giant-Carlisle) or (Publix) or (Publix GreenWise) or (Delhaize) or (Food Lion) or (Hannaford) or (Sweetbay Supermarket) or (HE Butt Grocery) or (HEB) or (HEB Plus) or (HEB Central Market) or (Great Atlantic & Pacific Tea Company) or (Pathmark) or (SuperFresh) or (Walbaums) or (Meijer))

2) Consumer

Core Keywords AND (consumer or shopper or family or household or children or kids or (school lunch))

3) Food Safety

Core Keywords AND ((food safety) or (E. Coli))

4) Beef Producers/Ag

Core Keywords AND ((beef industry) or (agriculture) or (beef producer) or (farmer) or (rancher) or (National Cattlemans Beef Association) or (National Cattlemans Association) or (Farm Bureau) or (American Farm Bureau) or (National Farmers Union))

5) Gov't

Core Keywords AND ((United States Department of Agriculture) or USDA or (Food Safety and Inspection Service) or (Food Safety Inspection Service) or FSIS or (Animal and Plant Health Inspection Service) or APHIS or (Grain Inspection, Packers and Stockyards Administration) or GIPSA or (Food and Drug Administration) or FDA or (Federal Government) or (State Government) or (Environmental Protection Agency) or EPA or (Agricultural Marketing Service) or AMS or (Animal Welfare Information Center) or AWIC) or governor)

6) Fast Food Chains

Core Keywords AND (Sonic or KFC or (Pizza Hut) or (Dunkin Donuts) or (Taco Bell) or Starbucks or (Wendys) or (Burger King) or Subway or McDonalds)

7) Meat Processors excluding BPI and Cargill and AFA

Core Keywords AND ((beef processor) or (meat processor) or (beef slaughter) or (Tyson) or (Tyson Foods, Inc.) or (Smithfield) or (Smithfield Foods, Inc.) or (Smithfield Beef Group) or (JBS) or (JBS USA) or (ConAgra) or (ConAgra Foods) or (ConAgra Beef Company) or (National Beef))

8) LFBT Producers

Core Keywords AND ((BPI) or (BPI, Inc.) or (Beef Products, Inc.) or (Beef Products Inc.) or (AFA Foods) or (AFA Foods Inc.) or Cargill or (Cargill Meat Solutions))