Assessing Information Bias and Food Safety

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Abstract

Imperfect information can lead to market failure and be an external factor impacting managers of agribusiness firms. A matrix method approach to content analysis was conducted by independent judges based upon established typologies. Food safety articles from consumer publications were examined, and information received by consumers was found to be biased.

Keywords: food safety, information bias, consumers, media

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In the late 1960s, the terms consumerism and consumer movement began to appear in professional literature in both advertising and economic contexts. Research began to focus more attention on issues of information and its effects on consumer wants, preferences, and the role of information in a market economy. Since that time information studies included how information is formed, used, channeled, and delivered in a number of different contexts.

As a consequence of the consumer movement, people have become even more concerned about the safety of the U.S. meat supply, including pork, and the government's ability to guarantee a consistently safe product (Heimbach). Well-publicized incidents, such as the contamination of hamburgers with E.coli bacteria, sulfa residues in pork, the pesticide Alar on apples, and salmonella growth in under-cooked pork, are widespread. Yet, conflicting media reports may leave consumers uninformed and confused.

The public frequently relies on the media for information regarding their food purchases and consumption. As informational reliance on the media has grown, concerns over possible misinformation, or bias, toward food and agricultural commodities have also grown (Jones; Foster). As stated by Jones, "There is a tendency for consumer concerns about food safety issues, however, to be exaggerated by the popular press."

The Consumer's Information Environment

In a book by Michael Schudson, Advertising: The Uneasy Persuasion, concepts of information, advertising, and consumer and economic theory are brought together with the recognition that consumers do not associate decision making with a specific, singular process. Consumers operate in an "information environment" which recognizes that normal consumers have a lifetime of informational resources and a complex cognitive makeup which either increases, decreases or eliminates completely that individual's ability to receive and process information. This "experience filter," among other things, makes the study of consumer information and decision making more individualistic and more complex.

The news media provides a great deal of information when the subject becomes an issue of political or social interest - when it becomes "newsworthy." News organizations cover topics and products that make news. Food irradiation, micro-pathogen contaminated beef, beef patty recalls, and sulfa residues in pork become more newsworthy as consumers die, which increases airtime or column space devoted to these topics.

The media also provides a critical, but less sensational role, in consumer information by informing consumers of new products and trends in consumption. It is doubtful that consumption of sushi, tofu, and similar products would exist without media coverage.

In addition to media sources, taxpayer funded consumer education programs provide consumer education to the public. School system curricula, including home economics and foods classes, provide information to millions of children and young adults annually. Recently, the National Pork Producers Council, Cattlemen's Beef Association, and National Livestock and Meats Board sponsored consumer education programs in conjunction with the U. S. Department of Agriculture in American junior and senior high schools. University research on such things as biotechnology, governmental studies, and legislative activities on food safety and nutritional labeling, and nonprofit consumer advocate groups all provide product and general information to the public.

 Information is costly to obtain, whether in dollar terms or in terms of time spent collecting it. In the decision making process, it is seldom convenient or possible to gather all relevant information prior to the decision or purchase being made. In addition, the search for information delays purchase of the needed item which can negatively impact the utility derived from the good. Given our understanding of the information environment at this point, the benefits gained from new information may be marginal and simply not worth the effort. This disinclination to seek out information should not be dismissed as evidence of irrational behavior on the part of consumers even though it results in imperfect knowledge of prices and qualities. Gathering and processing information adds substantially to the total cost of the purchase (Chaffee and McLeod).

At any one time, a given level of information exists that is readily available to the average consumer. Yet, the consumer fails to utilize all of the information at his or her disposal in the decision making process. Again, this disinclination to seek out information should not be dismissed as evidence of irrational behavior on the part of consumers. According to Carlton and Perloff (pp. 556-57), it is often efficient for consumers to use simplified rules to process information. They rationally use only some of the information they have collected because it is too costly to process it. While a consumer may have the ability to calculate price per ounce or per gram at the grocery store, they probably don't consistently because they want to get out of the store and on with their lives. Consumers in this case are making a rational decision not to use all of the information at their disposal because they value their time, or what they can do with the time, more than they value the extra financial savings.

In addition, some consumers do not have sufficient education or intelligence to process available information. Complex issues such as scientific research or

statistical analysis may be outside the scope of some consumers understanding. The same holds for some who report on these topics to the public.

Objectives

The objective of this study was to determine the incidence of informational bias regarding pork consumption in print media. The word "bias" is commonly used to imply media distortions and inaccuracies, misrepresentation of truth or fact, sensationalism, or faithful reflection of a dominant ideology. In journalistic circles this type of bias is refereed to as "slant," while public relations firms might call it "spin." For the purpose of this research, bias was defined as "an intentional or unintentional misrepresentation or distortion of generally established truth or fact as depicted by inaccuracies, omission and/or impartiality reflecting the author's subjective viewpoint as perceived by referees."

This analysis is important because of the major role information plays in consumer decisions. Even under the assumption that consumers behave rationally, a lack of information, or misinformation regarding the safety of pork consumption will lead to a reduction in consumer welfare.

Review of Literature and Methodology

A review of literature is given in Appendix A and includes a survey of past research studies focused on content analysis of print media and information bias. Details on the methodology used in this study are given in Appendix B. It includes a review of similar research done by others and their methods; an explanation how the sample of articles from the print media were selected; how a panel of judges evaluated the articles; more detail on the typologies to evaluate media bias; a test for the reliability of the judges' evaluations; and a statistical test (Chi-square) for the presence of bias in the complete sample of articles.

Results

As reported in Conley and Wade (International Food and Agribusiness Management Review), five focus groups, containing six to ten participants each, were conducted in three cities in the Northern Plains region of the U.S. The focus group results indicated that their information came from a variety of sources, with television being reported by 85.2 percent, followed by magazines (29.6 percent), newspapers (22.2 percent), and radio (14.8 percent). When asked to respond to the general nature of the information received, 51.9 percent of those that received information about beef said the information was negative. Twenty-two percent said the pork information they received was negative, and 33.3 percent said that poultry information was negative.

Two hypotheses were tested utilizing this data. The first hypothesis was that consumers have not altered their pork consumption levels in response to food safety concerns. The hypothesis was rejected and supported previous research that consumers changed their levels of pork consumption based on health and food safety concerns (van Ravenswaay; Henderson; Kinnucan, et.al.).

The second hypothesis was that consumers respond to information in an identical manner regardless of the presence of information bias. This hypothesis was rejected since over 66 percent of those surveyed said they respond differently to information perceived to be biased compared to information perceived as objective. While results from the Conley and Wade study were based on five focus groups made up of consumers, the results from this study were based on a panel of three judges. The panel evaluated a selected set of print media articles for positive or negative bias or no bias at all. Of the 50 articles evaluated, three were judged to be positively biased, 16 were negative and 31 were unbiased. See Table 1.

Table 1. Evaluation of Media Bias

	Judge 1	Judge 2	Judge 3
Unbiased	31	31	31
Negative	16	16	16
Positive	3	3	3

About one-third or 32 percent of the print media articles had a negative bias caused by one or more of the six categories of media manipulation (See Appendix B, Table 2). The three judges had to be unanimous on their conclusion regarding the negative bias. Six percent or about one-twentieth of the articles had a positive bias. In this analysis the ratio of negative-to-positive articles was about 5 to 1. However, 62 percent or three-fifths of the articles were unbiased, which was about double the number of negatively biased articles.

Implications for Managers

American consumers arguably face the most abundant and varied supply of safe, nutritious foods in the world. Yet, consumers are overwhelmed by warnings from consumer protection organizations, industry advertising, the government, the media, and from conflicting scientific studies. In this study, a sample of nine years worth of consumer accessible newspaper and magazine articles were evaluated, and it was concluded that information received by consumers is biased, both positively and negatively. The complementary research by Conley and Wade based on consumer focus groups concluded that consumers do respond to biased information and adjust their pork consumption accordingly.

The agribusiness manager can consider two strategic actions. One is to do nothing and continually expose the business to an external factor – negative information bias – that may materially affect the financial performance and future of the business. Doing nothing is a strategic choice that carries with it an element of risk.

A second strategic action by the manager of a firm, and even more broadly the collection of firms that define the industry, is to monitor print media publications for negative bias. Depending on the incidence and scope of bias, managers will need to assess the expected impact on consumers. If significantly negative, then a tactical action would involve a formal information campaign. As a starting point that campaign could use the six categories of media manipulation (Appendix B, Table 2) to determine the cause of bias. The next step would be to develop appropriate responses and make them available to consumers through media outlets. Continued monitoring on the incidence and scope of bias would still be needed.

Finally, as suggested in the article by Conley and Wade (*International Food and Agribusiness Management Review*) in the section on Implications for Managers, scanner data would provide a tangible measure of consumer response to an information campaign.

Conclusions

The implication for managers of agribusiness firms in the food chain for pork is that the role of information in the market place is not neutral. All indications support claims made by previous researchers that generic advertising and promotional campaigns help mitigate negatively biased information and hopefully increase demand. Failure to have a campaign exposes management to an external factor, namely negative information over which management has no control that can have a detrimental affect. There exists a substantial incentive for managers to explicitly have a positive information campaign at both the firm and industry levels.

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Appendix A.

Review of Literature

According to consumer theory, simply recognizing that information is relayed from sender to receiver fails to consider two important components of this transfer - what

has been published or broadcast and the content in which it is presented. Content analysis is the analysis of communication content by one or more individuals using objective criteria. It is particularly useful when the data of interest are limited to documentary evidence or when the material is too extensive for one researcher to evaluate systematically. Content analysis can be used to assess what and how information is presented to the public. Bernard Berelson (Newsom, Scott, and Turk, pp. 115-116), called content analysis a research technique for the "objective, systematic, and quantitative description of the manifest content of communication."

Haefner and Permut examined consumer complaints as indices of more global consumer issues through the use of content analysis. Content categories were not predetermined, but were created after all content analysis was completed. An index of incidence was created by counting the number of times a given consumer complaint was discussed in fourteen consumer and general business magazines. During a twelve-month period, 150 complaints were recorded and classified into fifteen major categories. Haefner and Permut failed, however, to precisely define how issues were determined to be complaints rather than negative arguments in a discussion of issue pros and cons, and who would make these determinations.

Smith and Bloom improved considerably upon the content analysis methodology utilized by Haefner and Permut. Smith and Bloom constructed a systematic, reliable index of news stories that dealt with consumer issues in the American Council of Consumer Interests Newsletter and New York Times, over a fourteen-year period (1969-1982). The study identified five variables or coding categories each of which was well defined. The coding was done by two individuals with the reliability of their coding tested by having both code the same two years of events and actions. Intercoder reliability was calculated by dividing the number of coding agreements by the total number of coding decisions. While the reliability score was 0.92, Smith and Bloom recognized that inherent bias existed in published news. While bias was not the focus of their research, two types of bias were addressed. First was through distortion in the content of the news, such as through inaccurate reporting and unbalanced interpretation of events. The second means of bias occurred through the selection of news events on which to report.

Radar Hayes followed a similar methodology in examining news content from the news producers' viewpoint. Content analysis was used to produce "an objective, systematic, and quantitative description of the manifest content of text" (Hayes, p. 132). Every stage in the coding process was based on explicitly formulated procedures consisting of a series of questions and decision rules. To ensure independent coding decisions, coders were instructed not to discuss decisions with others. Four coders were utilized, yielding a reliability coefficient ranging from 0.82 to 0.99 (0.80 was considered acceptable). In his conclusion, Hayes remarked that this study's methods might also provide the means of investigating the consumer information gap which is the difference between the information consumers need for

competent decision making and the information they actually possess. Hayes suggested that such things as political party in power, social trends, type of personnel employed by the media, and media competition may influence the size of the information gap.

A 3x2x2 matrix design was employed by Burton and Andrews to evaluate the effects of age, product nutrition, and label format on consumer perceptions. Rather than utilizing a formal content analysis approach, members of a consumer research panel provided input as to the influence of nutritional labeling on product appeal. Burton and Andrews reported only mixed results regarding demand applications of label format.

While many articles and previous research mention informational bias, few have empirically demonstrated the presence of media bias (Zipperer, Goode, Goidel and Langley, and Raybon). Content analysis has been most commonly used to examine the content and influence of the media, but has not been extended to address bias specifically.

In the 1993 article by Carlson, Grove, and Kangun, "A Content Analysis of Environmental Advertising Claims: A Matrix Method Approach," the authors created a matrix approach to content analysis that specifically addressed information bias. Two typologies were defined which required that criteria from both typologies be met in order for a bias classification to occur. Advertisements from popular magazines and newspapers were categorized under strict guidelines by three independent judges. Efforts were made to establish objectivity by providing rules and procedures to the judges. As in previous content analysis research, an interjudge reliability coefficient was calculated and was found to range from 0.82 to 0.92.

Appendix B.

Methodology

The research on consumers, information and food safety was done in two stages. In the first stage (Conley and Wade), focus groups totaling approximately fifty individual consumers were asked to complete a short questionnaire regarding their attitudes about food safety and their consumption patterns. While existing research concluded that consumers do have food safety concerns, the first stage survey collected original data on consumer attitudes about the information they received, such as their ability to recognize bias, and the influence this recognition may have had on their consumption behavior. Simply stated, this research component answered the question, "Do consumers recognize media bias and how do they respond if biased information is received?"

The second stage of the research was aimed at the question, "Is the media biased in its coverage of issues related to the safety of consuming pork?" This was done by empirically evaluating magazine and newspaper articles written about food safety and pork consumption. A panel of three judges was used so that reliable primary data could be generated. Each article was evaluated by the judges individually, with each following specifically stated criteria of evaluation. Each article was either determined to be biased or unbiased based on the summarized panel evaluations. Quantitative measures, including content analysis and survey research, provide evidence of the kinds of information various publics are being exposed to (Newsom, Scott and Turk). Previous research by Smith and Bloom; Hayes; Maynes and Assum; Haefner and Permut; and Burton and Andrews, utilized content analysis, primarily as a tool to evaluate the mass media's reliability or adequacy as a source of consumer information.

As employed by Carlson, Grove, and Kangun, a matrix method approach to content analysis was utilized to test the hypothesis that the print media provides an impartial or unbiased representation of the safety of meat (pork) consumption to consumers. Specific attention was devoted to the criteria of sampling method (unbiased sample selection), systematization (utilizing a data collection or evaluative design that describes identifiable characteristics), objectivity (providing rules, training, and insuring independence of assessments) and reliability (trustworthiness of assessments) in order to ensure the highest quality of content analysis research (Kassarjian).

To generate a sample of print publications, InfoTrac SearchBank was used to access magazine and newspaper articles from over 400 general interest titles. In light of previous research in this area, total sampling was employed rather than limited sampling. A variety of keyword searches were used to maximize the number of citations available. Keywords included, but were not limited to (1) "Food Safety and Meat," (2) "Food Safety and Pork," (3) "Salmonellosis and Meat," (4) "E. coli and Meat," (5) Trichinosis and Meat," (6) "Food Safety," and (7) "Meat Industry." While it would be extremely difficult to find all possible citations cataloged on InfoTrac, these searches provide a sufficient number of articles to analyze. Articles not pertaining to the health and safety of pork consumption or not available in their entirety were eliminated. To ensure consistency the investigator acted as sole referee in determining if the above criteria were met.

Two typologies shown in Table 2 investigate the interaction between the presence of bias (positive, neutral and negative) and Parenti's six methods of media manipulation.

Table 2. Typologies to Evaluate Media Bias

Three Types of Media Bias	
Positive Bias	Bias in "favor" of consumption of a specified product or commodity
Neutral Bias	Absence of bias, unbiased
Negative Bias	Bias "against" consumption of a specified product or commodity
Six Categories of Media Manipulation	
Suppression by Omission (Selectivity)	Omitting of key information or topics from publication
Labeling	Predetermining the reader's perception of a subject with a positive or negative label or term.
Attack and Destroy	An unrelenting barrage of repetitive lies or mistruth.
False Balancing	Not representing both sides of an issue.
Face-Value Transmission	Accepting at face value what are known to be lies.
Framing	Bending rather than breaking the truth.

Each article was evaluated by three judges based upon the established typologies. While each article may have numerous incidence of bias, each article was scored, overall, as being positively biased, negatively biased or unbiased, based upon the overall average incidence of bias. In other words, incidence of negative bias offsets incidence of positive bias, so that the net bias is determined. Each positive incidence equaled plus one, each negative incidence equaled negative one, while unbiased incidences equaled zero. Both individual and overall bias scores, from each judge, were summed and evaluated. To provide a stronger test of bias, and less ambiguity, the final decision on article bias must be made unanimously. For example, all three of the judges must find the article to be negatively biased in order for the article to be labeled negatively biased.

Example of Information Bias

The following article provides an example of how it would be evaluated by a judge using the typologies developed in previous research to evaluate media bias. While knowledge of the subject matter varies from judge to judge, just as it varies from consumer to consumer, the method or criteria utilized by each judge is consistent. The article is from *Time* magazine (Toufexis) and is entitled, "Linking Drugs to the Dinner Table."

> *"If antibiotics have proved to be wonder drugs for medicine, they have been nothing short of miracle workers in agriculture over the past quarter-century. Today, about 15 million lbs. a year, nearly half of U.S. annual production of antibiotics, are fed to farm animals, primarily cattle, poultry and pigs. Although the drugs help check the spread of bacterial infections among closely penned animals, their use is prompted as much by a happy side effect: for reasons not yet understood, they accelerate animal growth. But the lacing of animal feed with antibiotics is being increasingly challenged by scientists who*

claim it is a major factor in a fast-growing medical problem: the resistance of disease-causing microbes to antibiotics.

Nearly 25% of Salmonella bacteria - organisms that commonly cause food poisoning - are now resistant to many antibiotics. Critics charge that routinely putting antibiotics in feed promotes bacterial resistance by wiping out the less hardy of the vast array of microbes normally present in animals, leaving those that are drug resistant to flourish. If they are transferred to humans through meat and poultry products, these bacteria could then colonize their new hosts or pass on their antibiotic resistance to other bacteria already in residence . . . "

Judge A reads each sentence and analyzes its content. If the judge feels a statement is biased, it must fit into at least one of the six categories of media manipulation. If the statement in question cannot be categorized, it is considered to be neutral. If the statement is categorized, it must also be labeled as positively biased, negatively biased or unbiased. Only statements meeting both criteria are counted on the evaluation grid. For example, Judge A might score the article as follows:

1. "Today, about 15 million lbs. a year, nearly half of U.S. annual production of antibiotics, are fed to farm animals, primarily cattle, poultry and pigs."

   According to the Institute of Medicine, feed grade antibiotic use increased annually from 1962 to 1987. In 1987, only 5.5 million pounds of antibiotics were fed to farm animals, far below the 15 million pounds reported in 1984. *This statement (incidence of bias) is biased by Face-Value Transmission and is negative.*

2. " ... for reasons not yet understood, they accelerate animal growth." Antibiotics improve rate of growth in three ways: Disease Controlling Effects, Nutrient-Sparing Effects, and Metabolic Effects. Each of these effects is documented and understood by animal scientists. *This statement is biased by Face-Value Transmission and is negative.*

3. "But the lacing of animal feed with antibiotics ... " "Lacing" has a negative connotation to Judge A. "Lacing" is usually used in context with putting something undesirable in a food or drink; an undesirable addition. *This statement is biased by Labeling and is negative.*

4. " ... scientists who claim it is a major factor in a fast-growing medical problem: the resistance of disease-causing microbes to antibiotics."

   Research has shown that while resistance to antibiotics can develop in disease-causing microbes, in a majority of cases, this results when

antibiotics are fed at relatively high (therapeutic) levels, not the low (sub therapeutic) levels used to increase weight gain and feed efficiency. *This statement is biased by False Balancing and is negative.*

5. "Nearly 25% of Salmonella bacteria - organisms that commonly cause food poisoning -are now resistant to many antibiotics."

    Salmonella bacteria are naturally resistant to many antibiotics. When organisms were never susceptible to an antibiotic it is called Natural Resistance. An example of this is treating respiratory diseases, which are gram positive, with gram-negative spectrum antibiotics, like apramycin. Therefore, 100 percent of salmonella bacteria are resistant to many antibiotics. *This statement is biased by False Balancing and Suppression by Omission, and is negative.*

6. "Critics charge that routinely putting antibiotics in feed promotes bacterial resistance by wiping out the less hardy of the vast array of microbes normally present in animals, leaving those that are drug resistant to flourish."

    Critical charges are stated, while evidence discussing reasons low-level feeding of antibiotics will not promote bacterial resistance are not provided to the reader. *This is Suppression by Omission and False Balancing, and is negative.*

7. "If they are transferred to humans through meat and poultry products, these bacteria could then colonize their new hosts or pass on their antibiotic resistance to other bacteria already in residence."

    Resistance resulting from genetic mutation and/or plasmid transfer does occur, but not all antibiotics respond the same to antibiotic pressure. The transfer of animal resistance to humans has never been demonstrated scientifically, but is believed to occur by many in the medical profession. *This again is Suppression by Omission and False Balancing, and is negative.*

If these seven scores were the only scores recorded for this article, the article would be deemed by Judge A to be negatively biased, with a net score of -7. Judge A's article evaluation sheet would look like the one shown in Table 3. If there were one positively biased statement, the article would be negatively biased with a net negative score of -6. After Judges B and C score the article, the overall evaluation of bias for this article is made. If Judges A and B score the article as negatively biased while Judge C scores it unbiased, then a consensus is not reached and the

article is eliminated. It must be pointed out that it is not a matter of how severe the bias is, only that it exists.

Table 3. Article Evaluation Grid – Example

	Judge A		Article 1
Typologies	**Positive Bias**	**Unbiased**	**Negative Bias**
Suppression by Omission			∗ ∗
Labeling			∗
Attack and Destroy			
False Balancing			∗ ∗
Face-Value Transmission			∗ ∗
Framing			
Total Incidence	0	0	- 7
Bias Evaluation			∗

Efforts to establish objectivity were made through providing rules and procedures to the judges and insuring independence among their assessments. Three judges were used to classify the articles according to the specified criteria. The judges were all faculty at the same community college, each having a minimum of a Master's degree and four years teaching experience. The judges were instructors in the fields of computer science, literature and language, and business administration. As noted by Carlson, Grove, and Kangun, the participation of these individuals can be more expected to reflect the views of the general consumer population than judges with extensive scientific backgrounds. Each of the judges was given written and verbal instructions as to the typologies and study in general. Each judge was given a packet consisting of the articles, each identified by number, evaluation grids, one per article, and a deadline for completion of their evaluations. Upon completion, the packets were returned for tabulation and summation.

Finally, reliability among judges' assessments was calculated using an interjudge reliability coefficient by dividing the number of coding agreements by the total number of coding decisions (Perreault and Leigh; Carlson, Grove, and Kangun; Kolbe and Burnett). Overall reliability for all coding decisions was 0.82, which is better than the acceptable 0.80 coefficient value recommended by Kassarjian. In addition, the calculated coefficient understates the reliability because all judges' decisions in this research required unanimous agreement making the decision process more stringent.

A Chi-Square goodness-of-fit test was used to determine whether there was a statistical difference between those articles judged to be biased and those judged to be unbiased. For the test of hypothesis the expected probability of no bias was set equal to 0.05 and the expected probability of a biased response was set at 0.95.

Nineteen articles from both of the positive and negative categories were treated as biased. Thirty-one articles were treated as unbiased. Using the appropriate formula, a Chi-Square value of 114.632 was calculated. A table generated critical value of 3.841 was found utilizing the alpha value and k-1 degrees of freedom. The null hypothesis would be rejected if the Chi-Square value was greater than the critical value. The null hypothesis of no media bias was rejected at the 5 percent level of significance.

Data Set

The InfoTrac search produced 114 articles relating to pork consumption and food safety. Forty-nine articles were eliminated because they failed to meet the established criteria, mainly that the entire article be available. The judges evaluated the remaining 65 articles and four were determined to be inappropriate leaving a total of 61. Following the methodology of applying a stronger test for identifying bias, eleven were eliminated because a consensus on bias could not be reached. Of the remaining 50 articles – three were unanimously determined to be positively biased, 16 were negative, and 31 were unbiased. See Table 4.

Table 4. Media Articles Evaluated

	Judge 1	Judge 2	Judge 3
Unbiased	34	32	35
Unanimous	31	31	31
	91.2%	96.9%	88.6%
Negative	20	24	22
Unanimous	16	16	16
	80%	66.7%	72.7%
Positive	7	5	4
Unanimous	3	3	3
	42.9%	60%	75%

% indicates the percentage of total articles determined to be biased or unbiased by unanimous consent.