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An Analysis of Media Reports on Key Issues of Mad Cow Disease in South Korea

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Abstract

Since 2008, South Korea has seen controversy over the risk of mad cow disease (bovine spongiform encephalopathy [BSE]) and its potential to lead to variant Creutzfeldt-Jakob disease (vCJD) in humans. National news organizations have covered the topic differently according to their ideological positions. This study sought to quantify these differences focusing on the five key BSE-related issues covered by the media as follows: 1) possibility of confusion between vCJD and degenerative brain disease, 2) vCJD incidence in humans, 3) risk of vCJD infection from eating beef from cattle aged 30 months or older, 4) scope of specified risk, and 5) vulnerability of South Koreans to BSE infection. Based on the analysis of media reports on each issue, we found that the progressive media tended to emphasize the risks of BSE more than the conservative media who promoted views opposing those of the progressive media. National public broadcasting companies tended to take a neutral position. Despite the scientific findings on each issue mentioned above, the South Korean press has failed to provide them to the public unbiasedly. We identified the need to reduce politicization and promote scientific approach in media coverage of the issues of mad cow disease in South Korea.

Key words: bovine spongiform encephalopathy, mad cow disease controversy, degenerative brain disease, Creutzfeldt-Jakob disease infection risk, newspaper agendas, media coverage

Ⅰ. Introduction

With the spreads and popularization of knowledge of science and technology, the media is receiving attention as an important social apparatus affecting scientific/technical knowledge and its dissemination. This is because of the media's role in conveying science and technology expertise to the public for use in their daily lives. Unfortunately, the South Korean press has tended to not present science and technology news from an expert perspective, which has led to a failure to help the public better understand science. The relatively small number of journalists with scientific expertise makes it difficult for them to write professional articles, and the tendency to select sources whose positions confirm the journalist's own position rather than balanced, unbiased sources has been highlighted as a problem

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(Svalastog & Gajović, 2015; Kim, 2010).

Controversy over bovine spongiform encephalopathy (BSE), commonly known as mad cow disease, sparked in South Korea by candlelight rallies against the import of US beef, is one such case. In the course of the mad cow disease debate, governments and civic groups have emphasized their claims by selectively citing data that are favorable to their positions. News organizations were not an exception; they tended to report information selectively based on their ideological dispositions. This influenced the implementation of government policies in international trade and other areas, and caused social confusion, raising public anxiety(Park & Sohn, 2013; Kim, 2014).

In particular, zoonoses, including mad cow disease, require expertise in a wide range of areas, such as epidemiology, administrative science, and economics, not to mention medicine and veterinary medicine. In addition, zoonoses, especially mad cow disease, are very complex diseases, and even general medical personnel cannot provide sufficiently informed opinions on these topics. This is a frequent problem since newspapers often consult general medical personnel rather than infectious disease and veterinary medicine specialists with a clear focus on and interest in these topics. Therefore, it is important for the media to provide specialized information about mad cow disease to the public. If the report is non-professional or biased, media outlets cannot be exempt from criticism that they deepened social conflicts by giving a false impression of mad cow disease to the public(Bum & Yun, 2013).

For these reasons, this study investigated news coverage of mad cow disease and reporting tendencies according to the ideological positions of major South Korean news organizations, to help understand overall science news media coverage and to explore desirable ways to deal with science news. An analysis was also conducted from the viewpoint of veterinary medicine. Accordingly, the research questions of this paper were set as follows:

RQ 1) What is the main focus of media reports on the mad cow controversy in South Korea?

RQ 2) How is the news content covered by news organizations related to their reporting tendencies for controversial issues?

RQ 3) From a pathological perspective, how truthful and accurate is the news content and the way the news is covered?

II. Theoretical Background

1. South Korea's Mad Cow Controversy

On April 18, 2008, US and South Korean negotiators reached an agreement that would allow for imports of all cuts of US bone-in meat from cattle older than 30 months. This measure significantly lowered a US-South Korean protocol on import regulation in effect since 2003, after US government insistence; it also led to anxiety and fear about mad cow disease among South Koreans. Protestors called for a renegotiation of the beef agreement and strongly expressed their opinions in collective actions, including candlelight rallies. The raging controversy has subsided, as the two governments agreed to renegotiate the import rules and reached consensus on revised terms at the end of June 2008. However, conflicts surrounding US beef have clearly not been resolved yet(Lee, 2018: 41). In particular, after outbreaks of mad cow disease in Alabama in July 2017 and in Florida in August 2018, the South Korean government strengthened the quarantine process. Since late 2018, after a US man suffering from variant Creutzfeldt-Jakob disease (vCJD), also known as the human form of mad cow disease, died within eight months of diagnosis, mad cow disease has been attracting

attention again(Huffstutter, 2018; Kaplan, 2018).

Regarding media coverage during this time, the media was unable to deliver scientifically proven facts or mediate disputes. In fact, it fueled the dispute and contributed to division in South Korean society over the issue, creating vast social turmoil. Furthermore, the media was partly responsible for allowing the mad cow controversy to spill into the political arena, influencing governmental diplomatic and trade policies(Bak & Kleinman, 2017).

2. Review of News Coverage of Scientifically Controversial Issues in South Korea

According to a 2016 report from the Korea Foundation for the Advancement of Science and Creativity, the majority of the South Korean public obtain the latest science and technology news from broadcast (36.8%), Internet (35%), and print media (11.6%).(Korea Foundation for the Advancement of Science and Creativity, 2016) This illustrates the importance of the media's role in transmitting scientific information to the public.

Prior research on media coverage of the mad cow controversy from this perspective has tended to analyze its (negative) social influence on the South Korean public(Lee & Koh, 2010). In other words, it has focused on the public's change perception according to news reports. However, media coverage of scientific facts, content analysis, and news reports' biases have not been addressed. More importantly, identification of key issues related to the mad cow controversy and analysis of scientific facts behind the issues have not been conducted.

Within this context, this paper makes a substantial contribution to the field, as the authors—a journalist and veterinarian (doctor of pathology) and a journalist and doctor of economics—have defined key issues by analyzing news coverage, along with evaluating reports' veracity and accuracy in terms of veterinary medicine.

Ⅲ. Research Methodology

1. Research Subjects

First, seven newspapers and broadcasting companies, known to be most influential (by sales and viewer ratings, respectively) among South Korean media outlets, were selected as subjects. To examine how scientific news is covered according to ideological positions, four major dailies and three national public broadcasting companies were selected: two progressive papers, Kyung-Hyang and Hankyoreh; two conservative ones, Chosun-Ilbo and Donga-Ilbo; and the three broadcasting companies with the highest viewing rate, KBS, MBC, and SBS. The broadcasting stations were not divided by ideological positions due to a lack of preceding studies on the topic(Kim & Kim, 2013).

For convenience, these media outlets are referred to in this paper as Progressive Newspapers(PN) A and B, Conservative Newspapers(CN) C and D, and National Public Broadcasters(NPB) E, F, and G. The subjects have been reported to have shaped public opinions on US beef imports and to have influenced protests culminating in candlelight allies(Im, 2009; Choi, *et. al.,* 2011).

2. Data Collection

For the analysis, data were collected from all articles reported by the seven news organizations on their websites from January 1, 2007, to December 31, 2014, when the issue of mad cow disease was most heavily covered. Search words used to gather data included as many terms as possible related to mad cow disease: "import of US beef," "sCJD" (sporadic CJD), "vCJD," "degenerative brain disease," "Alzheimer's," "human form of mad cow disease," "SRM" ("specified risk materials," or specific

materials designated as risky, such as offal), “cattle age,” and “Korean genes,” among others. The searching staff consisted of five researchers, including veterinary and media communication researchers. These five individuals separately collected data, and “inter-observer reliability tests were performed to check for consistency between the researchers.” The disagreements between observers were addressed through discussion to build the final data set.

3. Classification of the Tendencies of News Reports on US Beef Imports

To assess the reported degree of risk for BSE infection due to US beef imports, the articles were rated by the criteria presented for each issue in <Table 1>, as “dangerous,” “neutral,” or “safe.” The content of the news articles and expert opinions were analyzed according to issue to assess and classify the positions on US beef imports based on the criteria.

4. Measurement Tools : Classification of Mad Cow Disease Reports

The articles were analyzed to identify five key issues as follows: 1) relationship between degenerative brain disease and vCJD; 2) likelihood of vCJD incidence in humans; 3) risk of vCJD infection from beef from cattle 30 months or older; 4) SRM scope; and 5) Korean

Table 1. Reports on the relationship between degenerative brain disease and vCJD

Relationship between degenerative brain disease and vCJD (Issue 1)		Degree of danger from US beef imports			Total	χ^2 (p-value)
		High	Medium	Low		
PN A	Fre.	12	4	1	17	49.948*** (.000)
	News organization %	70.6%	23.5%	5.9%	100.0%	
	Total %	8.8%	4.0%	0.8%	13.6%	
PN B	Fre.	11	1	1	13	
	News organization %	84.6%	7.7%	7.7%	100.0%	
	Total %	8.8%	0.8%	0.8%	10.4%	
CN C	Fre.	1	4	6	11	
	News organization %	9.1%	36.4%	54.5%	100.0%	
	Total %	0.8%	4.8%	3.2%	8.8%	
CN D	Fre.	1	5	14	20	
	News organization %	5.0%	25.0%	70.0%	100.0%	
	Total %	0.8%	4.0%	11.2%	16.0%	
NPB E	Fre.	3	7	2	12	
	News organization %	25.0%	58.3%	16.7%	100.0%	
	Total %	2.4%	5.6%	1.6%	9.6%	
NPB F	Fre.	7	6	2	15	
	News organization %	46.7%	40.0%	13.3%	100.0%	
	Total %	5.6%	4.8%	1.6%	12.0%	
NPB G	Fre.	15	16	6	37	
	News organization %	40.5%	43.2%	16.2%	100.0%	
	Total %	12.0%	12.8%	4.8%	29.6%	
Total	Fre.	49	46	30	125	
	News organization %	39.2%	36.8%	24.0%	100.0%	
	Total %	39.2%	36.8%	24.0%	100.0%	

* p<0.05, ** p<0.01, *** p<0.001

* CN: conservative newspaper; Fre: frequency; NPB: national public broadcaster; PN: progressive newspaper; vCJD: variant Creutzfeldt-Jakob disease

MM-type genetic vCJD vulnerability.

5. Analysis Methods

We examined 3,121 articles on mad cow disease from seven media outlets from 2007 to 2014. First, five issues related to the mad cow disease controversy and their frequency and ratio of reporting by news organizations were tabulated, and differences between organizations were compared and analyzed. Second, media coverage characteristics were compared and analyzed in relation to the general tendencies of each media organization. Third, the tendencies of report contents were classified and examined from a pathological perspective.

Statistical processing was carried out using the SPSS Windows 14.0 package. In the analysis, the number of response items was larger compared to the number of respondents, and there were cases in which the responses were biased toward specific items and in which the number of cells with an expected frequency of less than five for all results was slightly high. Because the cross-tabulation test statistic did not follow the chi-squared distribution, the exact test statistic and the significance of the chi-squared Fisher's estimates were calculated using the Monte Carlo method. The significance threshold was set at 0.05.

Ⅳ. Research Results

1. Data Characteristics in the Analysis

The results of the analysis of news coverage on US beef imports and mad cow disease are shown in <Table 2>.

1) Distribution of Reports by News Organizations

Regarding news coverage of mad cow disease by organization, PN A took the largest share of media coverage at 22.6%, followed by PN B at 19.9%, CN D at 17.8%, NPB G at 13.2%, CN C at 10.0%, NPB E at 9.8%, and NPB F at 7.0%. The two PNs covered the news much more frequently than their conservative counterparts, with coverage for two PNs being 43% and for two CNs being 28%, respectively. In contrast, NPBs reported the least coverage at an average of 10% per organization. See supplymentary <Table 2>.

2) Tendencies in Coverage of Each Issue by News Organizations

As most people access science and technology information through the media, news coverage trends substantially influence the public. Based on this understanding, we analyzed the articles by issue to examine any differences between news organizations in reporting news on US beef imports and mad cow disease. see <Table 2>.

2. Tendency in News Coverage of Issue 1

Regarding the risk of US beef imports, the analysis of articles and expert opinions on the "relationship between degenerative brain disease and vCJD" (Issue 1) revealed significant differences between news organizations at the level of 0.01 see <Table 1>.

3. Tendencies in News Coverage of Issue 2

The analysis of coverage tendency of "likelihood of vCJD incidence in humans" by news organization showed a statistically significant difference between organizations at a 0.05 significance level, with a χ^2 statistic of 98.313, and significance probability of 0.000 see <Table 2>.

Regarding the possibility of misdiagnosis of vCJD cases, among those with brain diseases, the three NPBs showed the highest rate of concern by indicating further research is needed, with 45.5%, 70.6%, and 68.0%, for

Table 2. News coverage tendencies in likelihood of vCJD incidence rate in humans by news organization

vCJD incidence rate in human subjects (Issue 2)		Possibility of misdiagnosis of vCJD cases			Total	χ^2 (p-value)
		High	Medium	Low		
PN A	Fre.	13	5	1	19	98.313*** (.000)
	News organization %	68.40%	26.30%	5.30%	100.00%	
	Total %	7.80%	3.00%	0.60%	11.40%	
PN B	Fre.	19	5	4	28	
	News organization %	67.90%	17.90%	14.30%	100.00%	
	Total %	11.40%	3.00%	2.40%	16.80%	
CN C	Fre.	0	6	13	19	
	News organization %	0.00%	31.60%	68.40%	100.00%	
	Total %	0.00%	3.60%	7.80%	11.40%	
CN D	Fre.	4	6	27	37	
	News organization %	10.80%	16.20%	73.00%	100.00%	
	Total %	2.40%	3.60%	16.20%	22.20%	
NPB E	Fre.	9	10	3	22	
	News organization %	40.90%	45.50%	13.60%	100.00%	
	Total %	5.40%	6.00%	1.80%	13.20%	
NPB F	Fre.	3	12	2	17	
	News organization %	17.60%	70.60%	11.80%	100.00%	
	Total %	1.80%	7.20%	1.20%	10.20%	
NPB G	Fre.	7	17	1	25	
	News organization %	28.00%	68.00%	4.00%	100.00%	
	Total %	4.20%	10.20%	0.60%	15.00%	
Total	Fre.	55	61	51	167	
	News organization %	32.90%	36.50%	30.50%	100.00%	
	Total %	32.90%	36.50%	30.50%	100.00%	

* p<0.05, ** p<0.01, *** p<0.001
* CN: conservative newspaper; Fre: frequency; NPB: national public broadcaster; PN: progressive newspaper; vCJD: variant Creutzfeldt-Jakob disease

NPBs E, F, and G, respectively. The two CNs followed with 25.0% and 36.4%, while the two PNs recorded the lowest rate at only 7.7% and 23.5%.

It was found that the two PNs reported vCJD cases as highly likely to occur in humans, with rates of 68.4% and 67.9%, respectively. In contrast, both CNs reported that the likelihood of vCJD incidence in humans is low, at the rates of 0.0% and 10.8%, respectively. The three NPBs showed a relatively neutral standing, at 45.5%, 70.6%, and 68.0%, respectively.

4. Tendencies in News Coverage of Issue 3

The analysis in coverage tendencies of the “risk of vCJD infection from beef from cattle aged 30 months or older” (Issue 3) by news organizations showed a statistically significant difference between organizations, with a significance level of 0.05, a χ^2 statistic of 1043.627, and a significance probability of 0.000 see <Table 3>.

PNs A and B showed an overwhelmingly high rate of taking the position that it is “dangerous” at 93%, while only 7% of the articles had a “neutral” position, and no articles took the position of “safe.” In contrast, CNs C and D reported that it is “safe” at rates of 56.0% and 47.6%, respectively, while reports taking a “neutral” position had rates of 35% and 41%, and those considering

Table 3. Reported risk of N (%) vCJD infection of beef from cattle aged 30 months or older

Risk of vCJD infection from beef from cattle aged 30 months or older (Issue 3)		Degree of SRM Scope			Total	χ^2 (p-value)
		All organs	As it is	Enough		
PN A	Fre.	368	28	0	396	1043.627*** (.000)
	News organization %	92.90%	7.10%	0.00%	100.00%	
	Total %	20.80%	1.60%	0.00%	22.40%	
PN B	Fre.	350	27	0	377	
	News organization %	92.80%	7.20%	0.00%	100.00%	
	Total %	19.80%	1.50%	0.00%	21.40%	
CN C	Fre.	11	40	65	116	
	News organization %	9.50%	34.50%	56.00%	100.00%	
	Total %	0.60%	2.30%	3.70%	6.60%	
CN D	Fre.	33	122	141	296	
	News organization %	11.10%	41.20%	47.60%	100.00%	
	Total %	1.90%	6.90%	8.00%	16.80%	
NPB E	Fre.	91	96	18	205	
	News organization %	44.40%	46.80%	8.80%	100.00%	
	Total %	5.20%	5.40%	1.00%	11.60%	
NPB F	Fre.	74	53	7	134	
	News organization %	55.20%	39.60%	5.20%	100.00%	
	Total %	4.20%	3.00%	0.40%	7.60%	
NPB G	Fre.	115	109	17	241	
	News organization %	47.70%	45.20%	7.10%	100.00%	
	Total %	6.50%	6.20%	1.00%	13.70%	
Total	Fre.	1042	475	248	1765	
	News organization %	59.00%	26.90%	14.10%	100.00%	
	Total %	59.00%	26.90%	14.10%	100.00%	

* CN: conservative newspaper; Fre: frequency; NPB: national public broadcaster; PN: progressive newspaper; vCJD: variant Creutzfeldt-Jakob disease

it “dangerous” had rates of 10% and 11%, respectively. NPBs E and G reported it as “dangerous” at rates of about 44% and 48%, respectively, while the “neutral” position took a similar 47% and 46% share of the news coverage, respectively. “Safe” had the lowest proportion at about 9% and 7% for NPBs E and G, respectively. Regarding NPB F, “dangerous” took the highest share at about 55%, followed by “neutral” (40%) and “safe” (only about 5%).

5. Tendencies in News Coverage of Issue 4

The analysis’ result showing the tendency of coverage of “SRM scope” (Issue 4) is shown in <Table 4>. A statistically significant difference was found between organizations at a significance level of 0.05, with a χ^2 statistic of 203.096 and a significance probability of <0.001.

PNs A and B published the highest rates of articles to the effect that the scope of SRMs should include all internal organs, about 77% and 66%, respectively. In contrast, a respective 18% and 28% of their news reports said that additional discussions are needed, and only 5% and 7% argued that only the distal ileum and bottom part of the small intestine should be included in SRMs, as in the current standard. CN C reported that the “current standard is adequate” in 40% of the related articles, followed by “neutral” (37%) and “all internal organs should be removed” (24%). CN D showed the highest rate of showing a “neutral” position at 47%, followed by

Table 4. Tendency of news coverage of the specified risk materials scope disputes

Specified risk materials scope (Issue 4)		Degree of vulnerability of Korean MM type			Total	χ^2 (p-value)
		High	Medium	Low		
PN A	Fre.	176	40	12	228	203.096*** (.000)
	News organization %	77.20%	17.50%	5.30%	100.00%	
	Total %	22.20%	5.10%	1.50%	28.80%	
PN B	Fre.	93	39	10	142	
	News organization %	65.50%	27.50%	7.00%	100.00%	
	Total %	11.70%	4.90%	1.30%	17.90%	
CN C	Fre.	27	42	46	115	
	News organization %	23.50%	36.50%	40.00%	100.00%	
	Total %	3.40%	5.30%	5.80%	14.50%	
CN D	Fre.	29	70	50	149	
	News organization %	19.50%	47.00%	33.60%	100.00%	
	Total %	3.70%	8.80%	6.30%	18.80%	
NPB E	Fre.	20	21	5	46	
	News organization %	43.50%	45.70%	10.90%	100.00%	
	Total %	2.50%	2.70%	0.60%	5.80%	
NPB F	Fre.	12	14	6	32	
	News organization %	37.50%	43.80%	18.80%	100.00%	
	Total %	1.50%	1.80%	0.80%	4.00%	
NPB G	Fre.	37	32	11	80	
	News organization %	46.30%	40.00%	13.80%	100.00%	
	Total %	4.70%	4.00%	1.40%	10.10%	
Total	Fre.	394	258	140	792	
	News organization %	49.70%	32.60%	17.70%	100.00%	
	Total %	49.70%	32.60%	17.70%	100.00%	

* p<0.05, ** p<0.01, *** p<0.001
* CN: conservative newspaper; Fre: frequency; NPB: national public broadcaster; PN: progressive newspaper.

the “current standard” (34%), and “all internal organs” (20%). On the other hand, NPB E reported that all internal organs should be included in SRMs at a rate of 44%, took a neutral position about 46% of the time, and supported the current standard only 11.9% of the time.

6. Tendencies in News Coverage of Issue 5

The analysis’ result of the tendency in coverage of “Korean MM-type genetic vCJD vulnerability” (Issue 5) by news organization showed a statistically significant difference between organizations at a significance level of 0.05, with a χ^2 statistic of 90.161 and significance probability of 0.000 see <Table 5>. PNs A and B reported South Koreans are “vulnerable” at the highest rate of 69% and 60%, respectively, followed by “additional discussions needed” (18%, 25%), and “not vulnerable” at the lowest rate of 13% and 15%, respectively. Conversely, CNs C and D took the position of “not vulnerable” at the highest rate of 50% and 58%, followed by “additional discussions needed” at about 40% and 33%, respectively; “vulnerable” accounted for only about 10% and 8%. NPBs E and F showed a neutral attitude, reporting “additional discussions needed” at rates of about 47% and 50%, while “vulnerable” constituted 29% and 32% of the articles, and “not vulnerable” showed the lowest rates at 24% and 18%, respectively. NPB G’s reports took the

Table 5. Tendency in news coverage of Korea MM-type genetically modified vCJD vulnerability

Relationship between degenerative brain disease and vCJD (Issue 1)		Degree of danger from US beef imports			Total	χ^2 (p-value)
		Dangerous	Neutral	Safe		
PN A	Fre.	31	8	6	45	90.161*** (.000)
	News organization %	68.90%	17.80%	13.30%	100.00%	
	Total %	11.40%	2.90%	2.20%	16.50%	
PN B	Fre.	36	15	9	60	
	News organization %	60.00%	25.00%	15.00%	100.00%	
	Total %	13.20%	5.50%	3.30%	22.10%	
CN C	Fre.	5	20	25	50	
	News organization %	10.00%	40.00%	50.00%	100.00%	
	Total %	1.80%	7.40%	9.20%	18.40%	
CN D	Fre.	4	16	28	48	
	News organization %	8.30%	33.30%	58.30%	100.00%	
	Total %	1.50%	5.90%	10.30%	17.60%	
NPB E	Fre.	6	10	5	21	
	News organization %	28.60%	47.60%	23.80%	100.00%	
	Total %	2.20%	3.70%	1.80%	7.70%	
NPB F	Fre.	12	8	0	20	
	News organization %	60.00%	40.00%	0.00%	100.00%	
	Total %	4.40%	2.90%	0.00%	7.40%	
NPB G	Fre.	9	14	5	28	
	News organization %	32.10%	50.00%	17.90%	100.00%	
	Total %	3.30%	5.10%	1.80%	10.30%	
Total	Fre.	103	91	78	272	
	News organization %	37.90%	33.50%	28.70%	100.00%	
	Total %	37.90%	33.50%	28.70%	100.00%	

* p<0.05, ** p<0.01, *** p<0.001
* CN: conservative newspaper; Fre: frequency; NPB: national public broadcaster; PN: progressive newspaper; vCJD: variant Creutzfeldt-Jakob disease

position of “vulnerable” at the highest rate of 60%, followed by “additional discussions needed” (40%) and “not vulnerable” (0%).

7. General Tendency in News Coverage of Each Issue by News Organization

We examined the tendencies in news coverage of each issue of the mad cow disease controversy above. This section will identify the relationship between each issue and the tendencies in coverage by organization based on the results. To do this, the average rate of coverage (by issue and by news organization) was calculated according to the three outlined positions (dangerous, neutral, and safe). The results are shown in Supplymentary <Table 3>.

V. Results of Report Analysis

This research’s results can be summarized as follows. First, regarding total news coverage by the South Korean media at the time the mad cow controversy was most prevalent in the country, PNs produced the most articles on mad cow disease, followed by CNs and NPBs. In addition, PNs allocated much more space to the issues compared to the other news organizations, which indicates that PNs took more exception to the then conservative administration’s policy of importing US beef

compared to other media outlets.

Second, regarding the distribution of the five key issues by news organization, PN A reported on “SRM scope” most frequently, while PN B and CN C covered “Korean MM-type genetic vCJD vulnerability” the most. CN D and NPB E dealt with “likelihood of vCJD incidence in humans,” and NPBs F and G covered the “relationship between degenerative brain disease and vCJD” more frequently than other issues. The PBNs tended to focus more on the relationship between degenerative brain diseases such as Alzheimer’s and the human form of mad cow disease, which are easier to scientifically explain, while newspapers paid greatest attention to more controversial topics, like SRMs and Korean genetic characteristics.

Third, as for the distribution of the issues, “risk of vCJD infection from beef from cattle aged 30 months or older” represented the highest share of the related reports at 57% of the total media coverage of mad cow disease-related issues. This was followed by “SRM scope” at around 25%, “Korean MM-type genetic vCJD vulnerability” at 9%, “likelihood of vCJD incidence in humans” at 5%, and “relationship between degenerative brain disease and vCJD” at 4%. Among other mad cow disease-related issues, “risk of vCJD infection from beef from cattle aged 30 months or older” and “ SRM scope” were the most fiercely debated because they were directly related to the terms of US beef imports.

Let us now examine the tendencies in media coverage of the five key issues of the mad cow controversy by news organization. First, regarding the “relationship between degenerative brain disease and vCJD,” PNs produced reports indicating a very high correlation between the two three-quarters of the time. CNs reported that the two diseases were unrelated in more than half of their articles, while NPBs reported that further research is required on the possibility of correlation about half the time and mentioned a very high correlation in one-third of the articles.

The results show that PNs were negative toward US beef imports because of the high correlation between degenerative brain disease and vCJD, while CNs were accepting of US beef imports. NPBs were more neutral and precautionary about US beef imports, claiming there was a possibility of degenerative brain disease and vCJD being related but that further research was required to confirm this.

Second, regarding coverage tendencies on the “likelihood of vCJD incidence in humans” by news organization, two PNs showed a high rate of reports stating that there was a high possibility nearly three-quarters of the time. Conversely, CNs cited a low possibility in three-quarters of the articles, a stark contrast with their progressive counterparts. NPBs took a neutral position in about three-fifths of their coverage, but reported a high possibility (29%) more often than a low possibility (8%), taking a neutral, but simultaneously precautionary, position on the danger.

Third, in terms of “risk of vCJD infection from beef from cattle aged 30 months or older,” PNs identified this as being “dangerous” at an overwhelming rate of 93%. In contrast, CNs reported it as “safe” about half the time and “dangerous” in about one-tenth of the cases. For the three NPBs, news coverage of “safe” was extremely low (9% or below), and the rest was divided into “dangerous” and “neutral”; overall, “dangerous” represents the highest rate at 56%, while “neutral” and “safe” account for 27% and 14%, respectively. The results indicate there are differences between the three news organization types in terms of coverage tendencies for Issue 3, but they share deep concerns about the danger.

Fourth, regarding coverage tendency on “SRM scope,”

PNs argued that “all internal organs should be removed” in about one-third of the articles, followed by “additional discussion needed” (approximately one-fifth) and “current standard is adequate” (approximately one-twentieth). Further, CNs reported “additional discussion needed” at the highest rate of about half of reports, while “current standard is adequate” represented a slightly lower proportion. NPBs argued “all internal organs should be removed” at the highest rate of 50%, followed in order by “additional discussion needed” and “current standard is adequate.” Overall, “all internal organs” represented one half of reporting, “neutral” one-third, and “current standard” one-fifth or below. The results revealed differences among the three types of news organizations. In general, the argument that all internal organs should be included in SRMs was stronger than others, meaning there was grave concern about the current standard.

Fifth, regarding the coverage of “Korean MM-type genetic vCJD vulnerability,” PNs reported that South Koreans were “vulnerable” most frequently, about three-fifths of the time, followed by “additional discussion needed” (approximately one-fifth or higher) and “not vulnerable” (approximately 14%). CNs took the position “not vulnerable” in more than half of their reports, followed by “additional discussion needed” (approximately one-third) and “vulnerable” (approximately one-tenth or lower). Last, NPBs reported a need for “additional discussion needed” in half the coverage, “vulnerable” in one-third, and “not vulnerable” in about one-tenth. Overall, there was only a slight difference among “vulnerable,” “additional discussion needed,” and “not vulnerable.” Despite differences in coverage tendencies of “Korean MM-type genetic vCJD vulnerability,” the degree of disparity among the news organizations was less heated than expected.

Sixth, in general, PNs showed a strong tendency to portray US beef imports as “dangerous” in terms of all five issues. In contrast, CNs tended to describe them as “safe” on all issues, and NPBs showed a neutral and precautionary attitude towards most of the issues.

The dramatic differences between the stances of the news organizations can be attributed to the different ideology of each organization. However, news organizations also shared some positions—all reported “risk of vCJD infection from beef from cattle aged 30 months or older” as “dangerous” at a high rate, while describing “likelihood of vCJD incidence in humans” and “Korean MM-type genetic vCJD vulnerability” as “safe” at a relatively high rate.

Ⅵ. Pathological Analysis and Implications of Media Coverage of the Mad Cow Disease Controversy

First, regarding the pathological research on the “relationship between degenerative brain disease and vCJD,” no result confirms a correlation between the two diseases. Although senile plaques, which are found in the cases of prion diseases such as vCJD, are observed in the brains of Alzheimer’s patients, the main component is the amyloid β protein, which differs from the prion protein.(Poleggi, et. al., 2008) It is true that the amyloid β protein, like the prion protein in vCJD, causes atrophy and loss of neuronal cells by accumulating in the neural tissues in the brain, but there is no report of its being introduced to the body through food consumption, unlike the prion protein.(Herzog, *et. al.,* 2005) Radiologic diagnosis, such as MRI, also found differences in, for example, parts of the brain that were activated.(Molloy, *et. al.,* 2000)

Second, regarding “likelihood of vCJD incidence in humans,” prior research has indicated very low

probability. From calculations based on prion diseases spontaneously occurring in cows, the incidence rate of vCJD, probability of mad cow disease outbreak in South Korea from contaminated feed, and possibility of foreign BSE-infected beef being introduced into South Korea, the possibility of vCJD outbreak is as low as a maximum of one case per 20 years.(Gale, 2006; Yoo, 2008)

Third, regarding "risk of vCJD infection from beef from cattle aged 30 months or older," based on when clinical symptoms of mad cow disease are observed in cows, the criterion of 30-month-old cattle seems reasonable for import restrictions to prevent infection from "downer" cattle. A 'Downer' refers to a cow that cannot stand due to illness or injury. In the experiment on six-month-old calves injected with contaminated BSE risk materials, infection was first observed in the bulb of the brain 27 to 30 months after the injection. It was found that it takes four to six years from the time of infection for clinical signs to develop. Another experiment, on over 230 head of cattle, found that the earliest point of discovering abnormal prion protein was 30 months after feeding with 100 g of contaminated brain and 44 months after feeding with 1 g of contaminated brain.(Arnold, *et. al.,* 2007) If cows are infected for the first time around 12 months after birth, it is deduced that the modified prion protein (PrPSc) reaches the brain when the cows are 42 months old on average. However, given that a cow's brain normally weighs around 500 g, 100 g of contaminated brain tissue is a significantly large amount. If 1 g is injected, the infection can be found 56 months after birth. In this respect, "30 months old" seems an appropriate scientific standard upon which to base import policy.

Fourth, pathological and embryological experiments related to the scope of SRMs showed that the abnormal prion does not accumulate in internal organs other than the distal ileum, which causes mad cow disease. Furthermore, tissue characterization experiments confirmed that even the distal ileum is not infectious.(Hoffmann, *et. al.,* 2011) Based on this result, the United States designated only the distal ileum as SRM among internal organs. Conversely, EU nations consider all internal organs SRMs despite the contrary experimental result. This seems to be because, as the EU nation of the United Kingdom was the origin of mad cow disease, other EU nations suffered substantial damage by importing British beef, and there is general agreement that they should be vigilant about a possible outbreak of mad cow disease. Additionally, parts other than the distal ileum are also susceptible to infection while cattle's internal organs are being processed. Therefore, the scope of SRMs cannot be determined solely by the experiment results; social, political, trade, economical, legal, and agricultural background must be considered together.

Fifth, regarding research on "Korean MM-type genetic vCJD vulnerability," it is a known scientific fact that those with the MM genotype are more vulnerable to CJD than those with the MV or VV type.(Mead, *et. al.,* 2003) However, in follow-up research, another vCJD-related part, the GL type (glutamic acid and lysine) at codon 219, received new attention. While the MM type has been at the center of interest due to its vulnerability to vCJD, the GL type is attracting attention because of its protective effect.(Shibuya, *et. al.,* 1998) Human genes are 99.9 percent identical. In the remaining 0.1 percent, Koreans are 5.86 percent different from the Japanese and 8.39 percent different from the Chinese. Hence, Koreans and Japanese can be considered very close, genetically.(Miller, *et. al.,* 2005) In a survey in Japan conducted on 85 CJD patients, no single person had the GL type. The result for polymorphism frequency analysis among Koreans revealed that the GG type takes the largest share at

92.06%, followed by the GL type at 7.94% and the LL type at 0%. Among the Japanese, the GL type represents 14%, while the GG type accounts for 100% among Caucasians with no GL type.(Jeong, *et. al.,* 2004)

As 14% of the total Japanese population have the GL type, and no one had the GL type among 85 CJD patients, it is reasonable to suspect that genetic polymorphism at codon 219 influences the outbreak of prion diseases. Also, with this polymorphism alone, Caucasians with the GG type would be more susceptible to mad cow disease. It remains to be studied to determine why CJD is rare among those with the GL type, but it is clear that a comprehensive understanding of these facts is necessary to determine genetic vulnerability to the human form of mad cow disease.

Ⅶ. Comprehensive Examination and Implications of Media Coverage of Mad Cow Disease

In the early days of the mad cow controversy, many media outlets in South Korea published news stories with a precautionary tone, concerned that public health could be affected by US beef imports. However, over time, news organizations became divided into progressive, conservative, and precautionary positions, and the debate became politicized. During this process, each organization tended to selectively report only scientific evidence favorable to its agenda. The media, which is supposed to help narrow the gap between experts and laypersons in the understanding of scientific knowledge, instead deepened the chasm.

From the pathological point of view, the Korean government's mad cow disease-related policies had scientific grounds. In that respect, it is believed that conservative media outlets, which supported the government, were more consistent with scientific facts than their progressive counterparts. However, it was also found that they failed to retort the argument made by progressive media that the government's policy should be criticized by citing precise scientific facts. Neutral NPBs were also unable to provide solid scientific grounds for policy or clear understanding of the situation, and were therefore also unable to fill their precautionary role.

No news organization included in this study could cite accurate scientific facts to support their claims. In other words, despite the fact that there was a variety of research and verification by experts available related to the five issues, the news organizations tended to fail to cite the research appropriately. It is difficult to say that they faithfully carried out their function as news outlets when they could not find or cite facts appropriately, despite the existence of related published research. Given the lack of BSE experts, it seems one of the fundamental problems was that journalists could not find or analyze research results related to major issues and could not deliver them to the public in layperson language.

In utilizing this study's results, the following limitations should be considered. First, although this study was divided into progressive and conservative media, this distinction included subjective judgments from authors who conducted prior research. Second, the research method is a limitation. In this study, the collected data were analyzed by means of statistical analysis through cross-analysis. However, further development of the research requires qualitative research, such as interviews with media workers and opinion analysis of ordinary citizens. We will conduct a follow-up study on a large-scale sample to verify the reproducibility of the results.

The complex and abstract nature of scientific knowledge requires a high level of expertise to report

science news. In this respect, delivering science news cannot be considered the same as delivering other news. It is necessary to nurture and support professional journalists who have a deep understanding of specific fields to narrow the gap between experts and the non-expert public and, ultimately, to help mitigate social conflicts.

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광우병 파동의 핵심 쟁점에 대한 언론 보도 성향 분석

국문초록 광우병의 위험성은 오랜 논란거리였다. 언론이 각 사의 이념적 성향에 따라 다른 내용의 보도를 한 것이 요인 중 하나로 분석된다. 본 연구는 이런 차이점을 정량화하였다. 언론이 보도한 광우병 쟁점사항 5개를 추려낸 뒤 각 언론사들이 이를 어떻게 보도했는지 분석했다. 5개 쟁점 사항은 다음과 같다. 1) 퇴행성 뇌 질환과 변형 CJD(일명 인간광우병) 혼돈 가능성, 2) 사람의 변형 CJD 발병률, 3) 30개월령 이상 쇠고기 섭취 시 변형 CJD 감염 위험성, 4) 특정위험물질 범위, 5) 한국인의 변형 CJD 감염 위험성이었다. 분석 결과, 진보성향 언론은 전반적으로 위험성을 강조하는 경향을 보였지만, 보수 성향 언론사들은 그와 반대되는 경향을 나타냈다. 지상파 방송사들은 중립적인, 사전 경고성 보도 경향을 보였다. 하지만, 언론들은 공통적으로 각 쟁점과 관련해 적합한 과학적 연구결과를 충분히 제시하지 못하는 한계를 보였다. 과거의 학설 혹은 편향된 연구결과를 선택적으로 채택하는 문제를 드러낸 것이다. 사화 혼란과 불안감을 줄이고, 대안을 제시하기 위해서는 정치적 관점이 아닌 과학적 관점에서 해당 분야 연구에 대한 충실한 취재와 분석이 요구된다.

주제어 : 광우병, 광우병 논쟁, 퇴행성 뇌 질병, CJD 감염 위험성, 언론의 이념적 성향, 언론보도

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