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Sixty-two stories dealing with the first U.S. bovine spongiform encephalopathy incident were subjected to content analysis. Stories – published from December 23, 2003 to October 31, 2004 – were selected through a keyword search from U.S. newspapers included in the LexisNexis database. These stories were divided into two equal groups based on reporters' work-role identity and were analyzed by length, number of sources, and source variety and the employing newspapers' geographical location, circulation and ownership type. ANOVA and bivariate correlation were among statistical analysis techniques used.

Keywords

mad cow, BSE, reporters, sources, newspapers

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Results indicated numbers of stories, story length and numbers of sources per story are related to newspaper location, and use of scientists and agricultural scientists as sources, to newspaper ownership type. Circulation and ownership type explained a statistically significant amount of variance in number of sources used.

Results of this study linking newspaper location (proximity to event, community heterogeneity and urbanity) to crisis coverage as measured by story length and number of sources cited lend support to previous research and lend credence to the assumption that newspaper characteristics influence news coverage. And the correlation between chain ownership and the use of scientists as sources for crisis stories suggests that ownership does matter for news coverage. Thus, in the age of convergence, whether through merger or adoption of new media, the particulars of a given newspaper's identity should be considered when predicting or evaluating the nature of its news coverage.

Although this study was limited by small sample size and restriction to the first U.S. BSE event on December 23, 2003, the above findings may prove useful to agricultural public information officers and media relations practitioners in "pitching" stories and sources for similar agriculture-based crises. In particular, this study addresses priorities stated in the National Research Agenda -- the desire of agricultural communicators to "aid

the public in effectively participating in decision-making related to agriculture,” through providing information on which such decisions can be based (Osborne, 2007, p. 4).

Keywords

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Introduction and Review of the Literature

In dealing with crises, reporters’ abilities to identify and use appropriate news sources are important to effective, reliable news coverage. Therefore, factors influencing these abilities should be identified, and ways should be found to enhance those factors and to optimize such source choices. Previous research has explored factors such as the influence on source choice of reporters’ personal characteristics and of their institutional work routines, but less attention has been focused on the influence of newspapers’ characteristics on the work of their reporters.

Research indicates that in addition to the attributes of sources, reporters and information subsidies, newspapers’ circulation sizes and locations -- for example, geographic placement or classification as urban or rural areas -- may affect coverage and source choice (Caburnay et al., 2003; Crawley, 2007; Marks, Kalaitzandonakes, Wilkins, & Zakharova, 2007). For example, small circulation newspapers may be more likely to use news releases from the *PR News Wire*, an organization featuring news subsidies from providers who pay for their service (Morton & Ramsey, 1994); other research also has highlighted reliance by reporters for larger, regional and national newspapers on news subsidies (Lehman-Wilzig & Seletzky, 2012; Liu, Vedlitz, & Alston, 2008). In contrast, newspapers in larger, more pluralistic communities give greater coverage to controversial science topics such as environmental contamination or political “hot topics” like immigration, although involvement of an area with controversial subject matter in some way — for example, local economic dependence on the covered industry — may affect coverage (Branton & Dunaway, 2009; Eshbaugh-Soha & Peake, 2008; Griffin & Dunwoody, 1995, 1997; Hindman, 1996). Daily newspapers in small but demographically and economically heterogeneous communities may be expected to favor local government and industry when reporting environmental conflict (Griffin & Dunwoody; Hindman; Taylor, Lee, and Davie, 2000).

However, changes occurring in the social structures of smaller media markets may be making them more like their larger counterparts when it comes to patterns of source quotation on controversial issues (Harry, 2001; Pritchard, Terry, & Brewer, 2008; Scott, Gobetz, & Chanslor, 2008; Winseck, 2008). Accordingly, amount and nature of coverage of the 2003 BSE event may have varied with newspaper location and circulation size.

Coverage of the spotted-owl conflict in the Pacific Northwest exhibited differences in number, length, and sources used, based on newspaper location, including physical distance, social distance and place characteristics (Bendix & Leibler, 1999). Similarly, story frames used in coverage of BSE differed along national lines (Cannon & Irani, 2011; Ruth, Eubanks, & Telg, 2005), and objectivity in reporting the crisis varied among one national newspaper and two larger outlets located in different areas of the United States (King, Cartmell, & Sitton, 2006). Thus, readers relying on any particular newspaper may receive different viewpoints of a controversy.

The 1990s saw a sharp increase in newspaper mergers and acquisitions (George, 2006). By 2004, only 20 percent of U.S. dailies were independent (Aronoff, Ward, and Kenyon, 2004), reflecting an increasing trend toward concentration of ownership, with decreases in the numbers of cities with competing dailies and increases in numbers of chain-owned papers and sizes of chains (Fan,

2009). However, the chains themselves remained largely family owned or controlled (Aronoff, Ward, & Kenyon). As the first decade of the 21st century progressed, percentages of ownership remained dynamic as the result of mergers and acquisitions, often of one chain by another (Edmonds, Guskin, & Rosenstiel, 2011; Noam, 2008). The newspaper industry failed to rebound in 2010, and going into 2011-12, most newspapers – faced with declining print circulation and advertising revenues and reduced profit margins -- bowed to the inevitable and added or planned to add Web content (Edmonds, Guskin, & Rosenstiel). More and more newspapers are controlled by outside companies, but recent studies indicate little difference in performance among newspapers regardless of ownership (Lacy & Blanchard, 2003; Pritchard, Terry, & Brewer, 2008; Scott, Gobetz, & Chanslor, 2008). Nonetheless, the current study reflects trends and ownership data current as of October 31, 2004, consistent with the timeframe of stories analyzed.

Research by Donohue, Olien, and Tichnor (1985) indicated that type of ownership a newspaper has may affect its editorial direction most likely through its staffing decisions; newspaper owners can decide who gets hired, who gets fired and who covers what story. Subsequent research does not totally support their conclusions, but later studies do support the contention that ownership consolidation affects news content (Fan, 2009). However, Miljan and Howorun (2003) found that, even though 95 percent of Canada's newspapers were owned by chains, differences existed in coverage within the chains themselves, somewhat easing concerns that chain ownership homogenizes coverage, and George (2006) concludes that ownership concentration encourages story differentiation and variety, thus benefiting news consumers.

Another concern, however, is whether newspaper ownership impacts coverage of issues that constitute a conflict of interest for the owners. Newspapers' coverage of the 1996 Telecommunications Act differed substantially, according to the financial interests of their corporate owners; frequency of coverage did not vary, but content did (Gilens & Hertzman, 2000). Ownership concentration may affect product position, product variety, and readership in markets with daily papers; however, these effects might actually benefit readers through introducing new content, eliminating duplication, and encouraging diversity (George, 2006).

According to the *editorial vigor theory*, corporate newspapers may be more hierarchical and formalistic than those with other ownership structures, putting less emphasis on product quality and more on profits, with reporters at such papers were more likely to “emphasize active, interpretive, investigative, and crucial roles for the news media” (Demers, 1998, p. 574). However, corporate newspapers also may base employment on technical qualifications and exhibit a high degree of efficiency in decision making, with more social criticism of mainstream sources in newspapers located in large pluralistic communities and having a corporate form of organization (Demers; Eshbaugh-Soha & Peake, 2008; George, 2006; Fan, 2009).

Investment in newspapers by major Wall Street investors may cause greater emphasis on financial performance, but most such investors take a long-term view of these papers' performance, not jumping in and out of share ownership (Maguire, 2003). However, caution should be exercised against regarding that long-view as necessarily good, since institutional investors also may want a say in how the paper is run and may be unwilling to subordinate financial objectives to journalistic ones (Edmonds, Guskin, & Rosenstiel, 2011; Maguire).

Perhaps more important than ownership is the extent to which rural areas and smaller municipalities are served by newspapers, since the number of newspapers in small markets has decreased substantially since 1972:

The marketplace of ideas in small media markets is an important commodity that demands careful scrutiny when considering the policies related to the structure of local media. Daily newspapers, television stations and radio stations play a crucial role in the marketplace of ideas (Chambers, 2003, p. 57).

Recognition of the importance of local media has spurred many smaller newspapers to add Web-assisted reporting and Internet editions or access and larger, regional papers to expand into local community markets by offering local sections targeting specific communities (Edmonds, Guskin, & Rosenstiel, 2011; Noam, 2008). Although reporters at smaller papers may be expected to acquire technology training on their own, recent research failed to find much resistance from journalists to adopting new ways of reporting the news, and owners have embraced new technologies as methods of expanding their reach across multiple delivery mechanism (Adams, 2008; Winseck, 2008).

This study examined source choices for the December 23, 2003 bovine spongiform encephalopathy (BSE or mad cow disease) event; this incident was the first such case of BSE in the United States, occurring in one Washington state cow imported from Alberta, Canada. Using the BSE event as a case study of breaking agricultural crisis news, this research sought to discover the sources reporters use when covering such stories and the impact of newspaper differences, including location, circulation, and ownership, on coverage of these issues.

Study Objectives

This study sought answers as to whether newspaper location, circulation size, and/or ownership affect length of stories and number and variety of sources used in reporting crises. Coverage of the first BSE event in the United States was selected for examination, because this event was novel, newsworthy, significant to the public, and agriculturally relevant, requiring reporters to explain complex, science-intensive information.

Data about the relationships between newspaper characteristics and reporters' numbers of stories, story length, and source selection was in turn used to (1) suggest directions for further research into how newspaper characteristics might impact reporters' abilities to cover science-intensive crisis news and (2) suggest implications for "pitches" of expert sources and their research results by agricultural public information officers (PIOs) and media relations professionals to inform news media stories about agricultural crises.

Methods

Study design, population of interest, and sample.

To answer the study's questions about source use in U.S. newspaper coverage of the United States' first BSE event, a quantitative content analysis of stories in selected major U.S. newspapers was conducted (Macnamara, 2003; Stemler, 2001). Results of content analyses have been used to guide planning for crisis communication (Coombs, 2012; Dyer, Miller, & Boone, 1991), although numerous researchers caution that their results cannot reliably be used to analyze complex newsroom issues or to address issues of audience impact, thus limiting framing constructs based on such analyses (Bartlett, Sterne, & Egger, 2002; Heinrichs & Peters, 2004; Lavie and Lehman-Wilzig, 2005).

The newspapers included in the population of interest were those represented in a census of stories on BSE from LexisNexis for the eleven-month period from December 23, 2003 (the date the

first BSE event occurred) through October 31, 2004 (the end of the month just before occurrence in November of the second U.S. BSE event). A search of the LexisNexis database was conducted (search terms “General News,” “Major Papers,” “mad cow” AND “production” AND “agriculture”) and yielded 296 stories, 190 of them from U.S. newspapers. To minimize potential differences in newsroom organization, policies, and practices and in national politics and culture, only newspapers from the United States were included in this study’s analysis. Temporally, the U.S. stories from the search were distributed as shown in Figure 1.

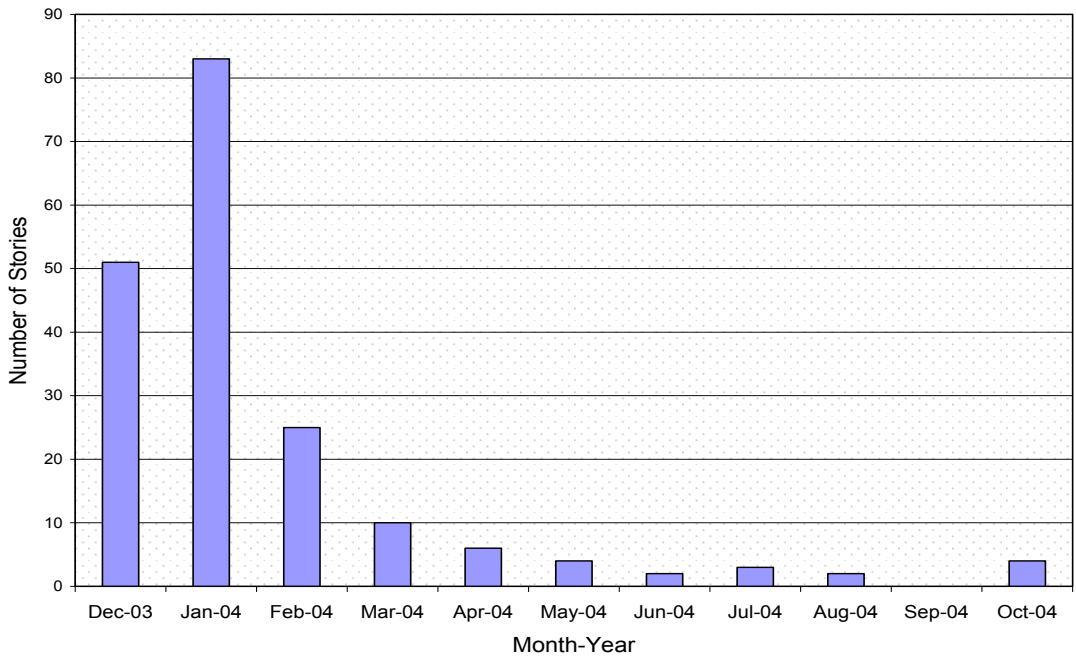


Figure 1. Stories per month about BSE appearing on LexisNexis from 12/23/2003 through 10/31/2004

This distribution helped to determine the study timeframe, as numbers of stories peaked in the three months after the December 2003 BSE event, then dwindled to almost none by October 2004, immediately before the second U.S. BSE event.

The newspapers in the population were grouped by the geographic regions where they were headquartered (Crawley, 2007). The stories from this search represented U.S. newspapers as shown in Table 1.

Of the newspapers listed, only the *Christian Science Monitor*, the *New York Times*, *USA Today*, and *The Washington Post* can be considered “national papers”; the rest “are regional papers with regional influence” (B. Steffens, Executive Director, National Newspaper Association, personal communication, March 7, 2005).

Content analysis was applied to compare a *census* of all stories in the population written by science-specialty beat reporters (31) with an equal-sized *random sample* of stories written by non-science-specialty-beat reporters. Reporter work-role identity was established by byline credit or by referencing the reporter in *Bacon’s Newspaper Directory*, 2004 edition (2004 edition used because stories were written in 2003 and 2004; thus directory information was current for the timeframe analyzed). Stories taken from the Associated Press wire were excluded from analysis in this study, as the study objective was to correlate story characteristics and reporter roles with ownership of specific newspapers.

Table 1

Geographic Distribution of Newspapers in Population, Based upon Regions of the United States as Defined by the Associated Press (Goldstein, 2005) and as Named in Bacon's Media Directory (2004)

Region of United States	Newspaper	Circulation
New England	<i>The Boston Globe</i> [Massachusetts]	448,817
Middle Atlantic	<i>The Buffalo News</i> [New York]	218,385
East North Central	<i>Chicago Sun–Times</i>	492,156
	<i>The Plain Dealer</i> [Cleveland]	373,137
	<i>The Columbus Dispatch</i> [Ohio]	261,566
	<i>The Pittsburg Post–Gazette</i> [Pennsylvania]	248,176
West North Central	<i>Milwaukee Journal–Sentinel</i>	257,599
	<i>Omaha World Herald</i> [Nebraska]	200,238
	<i>St. Louis Post Dispatch</i> [Missouri]	286,939
	<i>StarTribune</i> [Minnesota]	375,504
South Atlantic	<i>The Atlanta Journal–Constitution</i>	410,761
	<i>St. Petersburg Times</i> [Florida]	354,869
West South Central	<i>San Antonio News–Express</i>	239,912
	<i>Houston Chronicle</i>	548,508
	<i>The Times–Picayune</i> [New Orleans]	260,720
Mountain	<i>Denver Post</i>	301,108
	<i>Rocky Mountain News</i> [Denver]	301,005
Pacific	<i>The Oregonian</i> [Portland]	344,550
	<i>The Sacramento Bee</i> [California]	302,804
	<i>The San Diego Union–Tribune</i> [California]	346,387
	<i>San Francisco Chronicle</i>	514,265
	<i>The Seattle Times</i> [Washington]	239,470
National	<i>The Christian Science Monitor</i>	80,191
	<i>The New York Times</i>	1,130,740
	<i>USA Today</i>	2,250,474
	<i>The Washington Post</i>	796,367

Data coding and analysis.

Each story was reviewed and coded by two trained coders, according to a codebook based initially on the variables of interest and refined through four iterations of coder training. Initial coder training was conducted using content analysis of 10 randomly selected stories from the dataset; these sto-

ries were eliminated from the dataset before selection of the stories that form the basis of this study (except for any stories written by science specialty-beat reporters, which were kept in the census of such stories and recoded for later analysis). During coder training, additional coverage themes were identified for use in analysis of the dataset, and coders were instructed in accurate recognition of all themes/content-analysis categories (Holsti 1969; Riffe, Lacy, & Fico, 2005). Coding variations were identified and addressed, and all differences between coders were resolved successfully. Intercoder reliability at the $p < .01$ level was achieved, as indicated by intercoder correlation coefficients for each pair of variables (Field, 2009).

Coding for certain variables was unambiguous. For example, each story was labeled on its face according to its length (interval level data) and its newspaper of origin (nominal). Whether the reporter of each story was a science specialty-beat reporter (nominal) could be ascertained either by a byline containing the reporter's work-role identity (job title) as printed on the story or by consulting *Bacon's Newspaper Guide* (2004). Newspaper circulation (interval) and identity of its owners (nominal) also were determined from its listing in *Bacon's*. Newspapers were classified into location by region (nominal) using the groupings in *The Associated Press Stylebook and Briefing on Media Law* (Goldstein, 2005). The number of sources (interval) included in each story was determined by counting each unique source only once.

Arbitrary categories were created for circulation level (ordinal); newspapers were classified as having 300,000 or fewer subscribers (6 newspapers in sample), as having more than 300,000 but fewer than 500,000 subscribers (7 newspapers), or as having more than 500,000 subscribers (5). Similarly, newspapers in the population were classified as being owned by a chain (12 newspapers in the sample); by an individual, family, or independent corporation (5); by an academic organization (1, Poynter Institute); or by a religious organization (*Christian Science Monitor*, no stories in sample).

Finally, 15 dichotomous nominal variables (present vs. not present) were established for classifying sources into types, based on a list of source types extrapolated from similar studies (Albaek, Christiansen, & Togeby, 2003; Armstrong, 2004; Barr, Irlbeck, & Akers, 2012; Gasher, Hayes, Hackett, Gutstein, Ross, & Dunn, 2007; Sumpter & Braddock, 2002; Sumpter & Lukaszewski, 2001; Telg & Raulerson, 1999; Zoch & Turk, 1998). Dichotomous measurement of independent variables has been found to have little serious effect on the probability statements underlying parametric procedures of inferential statistics, that is, common inferential statistical procedures, for example, ANOVA, may be used on such data (Field, 2009).

Predetermined categories of sources for this study comprised government representatives, government scientists, business representatives, business scientists, agricultural producers (farmers and ranchers), university representatives, university agricultural scientists, all other university scientists, Extension representatives, Extension scientists, trade association representatives, consumer group representatives, media, consumers (general public), and undefined. Each named individual used as a source was placed into the appropriate category based on his or her institutional/organizational affiliation as identified in the story being coded. For example, Secretary of Agriculture Ann Venneman was placed in the government representative category, and the named owner of a meat market was placed in the business representative category. The decision was made to classify veterinarians as scientists rather than merely as representatives of their particular employing organizations, in order to capture their particular expertise for inclusion in the "scientist" category.

An undefined category was included because many sources were unnamed (see Beall & Hayes, 1992, for comparable treatment of unnamed sources). This category was applied to all organizations

for which no individual representative was named, for example, USDA or Extension, and to all generic sources, such as industry experts, consumers, and similarly cited sources. Such a category varies from those used by some other studies, which entirely excluded “collective anonymous sources like ‘voters’ or ‘government officials’” (Sumpter & Braddock, 2002, p. 543). An exception was made for media outlets for which no individual representative was named; all citations of media outlets were coded as media rather than as undefined because it was deemed desirable to track all sourcing of other newspapers, books, Web sites, etc.

Three additional interval variables were calculated from those that had been coded. All scientist categories — business scientists, university scientists, university agricultural scientists, Extension scientists — were summed to yield the variable “total scientists,” and all agricultural scientist variables — university agricultural scientists and Extension scientists — were summed to yield the variable “total agricultural scientists.” Finally, all 15 original source categories were summed to yield the variable “source variety.”

Relationships between coded variables were analyzed to determine statistical significance at $p < .05$ levels. Depending on the levels of measurement for the particular variables being analyzed, the following statistical procedures and tools were employed: comparison of means using one-way ANOVA; bivariate correlation using Spearman rho; and forced-entry linear regression.

This study represents a part of a larger research effort undertaken by the first author in completion of her doctoral dissertation.

Findings

As reported in Table 2, almost half of the stories in the sample (28 out of 62) were from newspapers in the Pacific West region (regions defined by AP, Goldstein, 2005), near where the United States’ first BSE outbreak occurred; 12 of these stories were from the *Oregonian* in Portland.

Newspapers with circulations greater than 300,000 but less than 500,000 accounted for nearly one-half of the stories (11 newspapers, 28 stories). Newspapers with circulations of 300,000 or less and those with circulations equal to or exceeding 500,000 accounted for almost equal numbers of stories, although twice as many papers had the smaller circulation (10 newspapers, 18 stories) as had the larger (5 newspapers, 16 stories).

Table 3 lists intercorrelations among newspaper circulation, circulation level, location, owner, and ownership type.

Newspaper location was found to be statistically significantly correlated with circulation/circulation level. Circulation/circulation level was statistically significantly correlated with owner/owner type.

Table 4 shows intercorrelations between newspaper characteristics and story characteristics.

Numbers of stories written, story length, and numbers of sources per story were found to be related to newspaper location. And selection of scientists and agricultural scientists as sources was found to be correlated with ownership type (chain, independent group, academic institution, or religious organization).

Table 2
Newspapers with Stories in Sample: Circulation, Number of Stories, and Story Length

Region	# Stories	Newspaper and Circulation	# Stories and Length of Each
Middle Atlantic	1	<i>The Buffalo News</i> [New York] 218,385	1 – 1,418
East North Central	2	<i>The Pittsburg Post-Gazette</i> [PA] 248,176	2 – 745; 1,057
West North Central	9	<i>Milwaukee Journal-Sentinel</i> 257,599	2 – 984; 1,157
		<i>Omaha World Herald</i> [Nebraska] 200,238	4 – 652; 969; 1,138; 1,508
		<i>St. Louis Post Dispatch</i> [Missouri] 286,939	1 – 292
		<i>StarTribune</i> [Minnesota] 375,504	2 – 448; 692
South Atlantic	3	<i>The Atlanta Journal-Constitution</i> 410,761	2 – 220; 1,323
		<i>St. Petersburg Times</i> [Florida] 354,869	1 – 1,029
West South Central	3	<i>Houston Chronicle</i> 548,508	3 – 533; 670; 878
Mountain	5	<i>Denver Post</i> 301,108	2 – 304; 424
		<i>Rocky Mountain News</i> [Denver] 301,005	3 – 563; 707; 2,749
Pacific	28	<i>The Oregonian</i> [Portland] 344,550	12 – 524; 801; 956; 1,207; 1,306; 1,337; 1,408; 1,514; 1,519; 1,708; 1,769; 2,433
		<i>The Sacramento Bee</i> [California] 302,804	5 – 413; 1,126; 1,209; 1,244; 1,406
		<i>The San Diego Union-Tribune</i> 346,387	2 – 1,586; 2,248
		<i>San Francisco Chronicle</i> 514,265	2 – 1,154; 1,548
		<i>The Seattle Times</i> [Washington] 239,470	7 – 671; 714; 825; 907; 1,006; 1,094; 1,638
National	11	<i>The New York Times</i> 1,130,740	4 – 843; 1,079; 1,465; 1,815
		<i>USA Today</i> 2,250,474	5 – 466; 497; 1,510; 1,538; 1,685

Table 3
Intercorrelations Between Newspaper Characteristics

	Location	Circulation	Circulation Level	Owner	Owner Type
Location	–	.555*	.587*	.056	-.132
Circulation	.555*	–	.925*	.038	-.400*
Circulation Level	.587*	.339*	–	-.016	-.498*
Owner	.056	.460*	-.016	–	.426*
Owner Type	-.132	-.400*	-.498*	.426*	–

Note. Spearman rho used as test statistic. * $p < .05$

Table 4
Intercorrelations Among Newspaper Characteristics and Number of Sources, Story Length, Source Variety, Number of Scientist Sources, and Number of Agricultural Scientist Sources

	No. Sources	Story Length	Source Variety	No. Scientists	No. Ag Scientists
Location	.329*	.293*	.120	.059	.045
Circulation	.238	.130	.075	-.007	-.017
Circulation Level	.203	.099	.109	.099	.069
Owner	-.182	-.146	-.088	-.216	-.172
Owner Type	-.135	-.058	-.153	-.331*	-.294*

Note. Spearman rho used as test statistic. * $p < .05$

Discussion

Relationships to previous studies.

This study addressed the effect of newspaper characteristics, including circulation, location, and ownership, on reporters' source choices in covering science-intensive crisis stories. Coverage of the first U.S. BSE event was chosen as exemplary of the type of agricultural-related crisis stories frequently generated and of special interest to agricultural communicators. The study found newspaper location to be related to numbers of stories written, story length, and numbers of sources per story; this relationship may be at least partially explained by such factors as links between event proximity and perceived newsworthiness and by the increased resources of national newspapers. The correlation of use of scientists and agricultural scientists as sources with type of newspaper ownership and ownership type data is unanticipated, and no studies were found that explored this relationship.

The authors appreciate the limited sample examined, and they do not attempt to draw generalizations beyond the population considered. However, in general and within its limitations, the findings of this study lend support to previous research showing that the amount and nature of coverage (represented in this case by differences in story length and in number of sources used per story) may vary with a newspaper's geographic location. More stories in this sample were printed by newspapers in the Pacific West region, and the *Oregonian*, located in Portland, printed more stories than any other newspaper. Since the December 2003 BSE outbreak occurred in Washington state, this finding supports the ideas that the closer to an event in physical and social distance and in place characteristics a newspaper is, the more coverage it is likely to devote to the event in terms of number of stories, story length, and source choice (Bendix & Liebler, 1999; Caburnay et al., 2003; Crawley, 2007; Marks, Kalaitzandonakes, Wilkins, & Zakhorova, 2007). Thus, newspapers in the far Midwest and on the West Coast might logically be expected to provide greater coverage of a crisis occurring in Washington state (Branton & Dunaway, 2009; Eshbaugh-Soha & Peake, 2008; Griffin & Dunwoody, 1995, 1997; Hindman, 1996; Taylor, Lee & Davie, 2000). And, given the possible seriousness of the event for public health and for the nation's economy, national newspapers might also have been expected to pay particular attention to the event (Bendix & Liebler; Branton & Dunaway; Cannon & Irani, 2011; Eshbaugh-Soha & Peake; Harry, 2000; Haygood, Hagins, Akers & Keith, 2002; King, Cartmell, & Sitton, 2006; Ruth, Eubanks, & Telg, 2005).

Coverage by the *Oregonian*, located in cosmopolite, urban Portland, also supported previous findings that newspapers in larger, more pluralistic communities tend to give greater coverage to controversial science topics, with mitigation by involvement of a community with the controversy (Branton & Dunaway, 2009; Eshbaugh-Soha & Peake, 2008; Griffin & Dunwoody, 1995, 1997; Hindman, 1996; Taylor, Lee & Davie, 2000). Portland, for example, had no such involvement in the BSE outbreak.

The decreasing numbers of papers located in rural settings and the tendency of urban papers to give little coverage to agricultural news imply that agriculturally relevant events that do not occur near a major urban paper may not receive the coverage they deserve (Caburnay, 2003; Cahill, Morley, & Powell, 2010; Cartmell, Dyer & Birkenholz, 2001; Griffin & Dunwoody, 1995, 1997; Hindman, 1996; Reisner & Walter, 1994; Thompson & Kelvin, 1996). Additionally, unless agriculturally-relevant news is perceived as important to owners of urban papers, fewer agricultural reporters may be needed to join their staffs. These trends may be mitigated somewhat through efforts by larger urban papers to expand coverage into suburban/rural areas through establishment of special editions aimed at such areas; expansion of all coverage by means of online editions of even local newspapers; and inclusion of coverage of agricultural issues in other beats, such as small business, technology, or food/health reporting (Cahill, Morley, & Powell, 2010; De Jonge, Van Trijip, Renes, & Frewer, 2010; Edmonds, Guskin, & Rosenstiel, 2011; Noam, 2008; Reisner, 2003; Saunders, 2002).

However, research indicates that reports written by reporters with low levels of agricultural literacy may be superficial and more likely to perpetuate stereotypes than those written by more expert reporters:

Both farmers and public thus receive biased and fragmented reporting that may polarize their views on current agricultural issues. Even if reporters are aware of critical shortcoming in their coverage, improvement may require reduction in structural constraints on story choice. (Reisner & Walter, 1994, p. 525).

Thus, research showing differences among stories written by reporters assigned to different newspaper beats, such as that by White and Rutherford (2009) and Gasher et al. (2007), remains an important line of investigation. Newspaper editors may in fact realize the importance of agricultural news, but may view it as more appropriately covered by business, technology, or health beat reporters, depending on its subject matter.

The chain-owned newspapers in this sample used a statistically significantly greater number of scientists and agricultural scientists as sources. This contradicts findings of little difference in coverage by chain-owned newspapers compared to coverage by newspapers with other ownership structures (Lacy & Blanchard, 2003; Pritchard, Terry, & Brewer, 2008; Scott, Gobetz, & Chanslor, 2008). Other researchers investigating ownership's impact or lack of impact on news content did not shed any light on this particular result (Aronoff, Ward & Kenyon, 2005; Fan, 2009; George, 2006; Griffin & Dunwoody, 1995, 1997; Picard & van Weezel, 2008). The correlation of use of scientists and agricultural scientists as sources with type of newspaper ownership is unanticipated and apparently has not been explored by other researchers. Although the majority of stories in the sample (48 of 62) were from chain-owned papers, differences existed among these stories, supporting previous findings that individual chain-owned papers exhibit coverage differences, even if their owners are the same (George, 2006; Miljan & Howorun, 2003).

Implications for the National Research Agenda in Agricultural Communications and for agricultural public information officers and media relations practitioners.

This study addresses priorities stated in RPA2 -- the desire of agricultural communicators to "aid the public in effectively participating in decisions making related to agriculture," through providing information on which such decisions can be based (Osborne, 2007, p. 4).

In particular, implications of this study and the support it offers previous research may help agricultural public information officers (PIOs) and media relations practitioners in their efforts to "disseminate . . . relevant information that facilitates public decision making about high priority agricultural issues" and to "improve the effectiveness of mass media coverage of agricultural issues" (Osborne, 2007, p. 4). Improving such professionals' understanding of newspaper characteristics that influence coverage may help them more effectively craft their information subsidies and determine better to which newspapers such subsidies should be pitched.

Concentrating on the newspaper most likely to provide coverage will facilitate effective use of time and other resources by practitioners and improve their chances for placement of important agricultural information. In this instance (2003 BSE event), the knowledge that proximity and urban-location influence coverage might have determined on which newspapers agricultural media relations practitioners would concentrate their attention. Additionally, continuing convergence among media should encourage PIOs to expand their focus to encompass the realities of coverage entailed in increasing reliance on Web-based editions of existing publications (Ruth-McSwain, 2008). It is to be hoped that studies such as this one will contribute to enhancing the effectiveness of practitioners through increasing their ability to target receptive media.

Recommendations for further research.

Because newspapers must pay for the privilege of having their stories listed by the LexisNexis database, the resulting self-selection may obscure possible distinctions between large urban and smaller, rural newspapers in coverage of events like the December 2003 BSE outbreak (Branton & Dunaway,

2009; Caburnay et al., 2003; Cannon & Irani, 2011; Chambers, 2003; Crawley, 2007; Eshbaugh-Soha & Peake, 2008; Marks, Kalaitzandonakes, Wilkins, & Zakharova, 2007; Ruth, Eubanks, & Telg, 2005). Thus, further research replicating this study for similar agricultural crises, including smaller, more rural papers, is recommended.

The closest papers to the outbreak site included in the LexisNexis database were in Seattle, Washington, and Portland, Oregon. Future research samples should include newspapers in communities closer to crises' locations and newspapers in more homogenous, less pluralistic communities and/or with economic interests in the agriculture industry. These geographic locations would allow further comparisons with previous research (Bendix & Leibler, 1999; Cannon & Irani, 2011; Demers, 1998; Harry, 2001; King, Cartmell, & Sitton, 2006; Ruth, Eubanks, & Telg, 2005; Taylor, Lee & Davie, 2000). Similarly, investigation of the other interests held by the owners of the newspapers in this and other samples would allow analysis of possible economic conflicts of interest if such ownership included financial investment in agricultural industries (George, 2006; Maguire, 2003; Picard & van Weezel, 2008).

Since significant differences were found in the use of scientist and agricultural scientist sources by chain-owned papers, focus on these variables with regard to differences among papers owned by different chains and within multiple papers owned by the same chain potentially could be illuminating (Aranoff, Ward, & Kenyon, 2004; Edmonds, Guskin, & Rosenstiel, 2011; Fan, 2009; Lacy & Blanchard, 2003; Noam, 2008; Pritchard, Terry, & Brewer, 2008; Miljan & Howorun, 2003; Picard & van Weezel, 2008; Scott, Gobetz, & Chanslor, 2008).

And although differences in story numbers and types of sources were found, investigation of the role of information subsidies in reporter identification of sources was beyond the scope of this study; additional research is recommended to investigate differences in the ways in which types of newspapers, based on location, circulation, ownership, handle such subsidies (Lehman-Wilzig & Seletzky, 2012; Liu, Vedlitz, & Alston, 2008). Additionally, exploration of the effect of use of stories from the Associated Press should be explored.

Overall, the authors believe that the reach and impact of this study could be increased by its replication for other similar populations and other types of crisis events, allowing the application of a grounded theory approach to the additional data to develop stronger conclusions and more effective applications for agricultural PIOs and media relations practitioners.

Conclusions

Results of this study linking newspaper location (proximity to event, community heterogeneity, and urbanity) to crisis coverage (as measured by story length and number of sources cited) add support to previous research and lend greater credence to the assumption that newspaper characteristics influence news coverage. And the correlation between chain ownership and the use of scientists as sources for crisis stories suggests that ownership does matter for news coverage. Thus, in the age of convergence, whether through merger or adoption of new media, the particulars of a given newspaper's identity should be considered when predicting or evaluating the nature of its crisis coverage and when targeting newspapers for dissemination of important agricultural news to the public.

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