

# **Bovine Spongiform Encephalitis (BSE):**

## **An Annotated Review of International Literature**

April 2006

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## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>...1</b>
<b>SCOPE OF THE REVIEW</b>	<b>...1</b>
<b>GENERAL ANALYSIS OF THE LITERATURE</b>	<b>...2</b>
<b>LITERATURE ORGANIZED BY HEALTH DETERMINANT</b>	<b>...4</b>
<b>BIOLOGY AND GENETIC ENDOWMENT (BIOMEDICINE)</b>	<b>...4</b>
<b>CULTURE</b>	<b>...5</b>
<b>EMPLOYMENT/WORKING CONDITIONS/INCOME</b>	<b>...8</b>
<b>GENDER</b>	<b>...9</b>
<b>HEALTH SERVICES</b>	<b>...9</b>
<b>PERSONAL HEALTH PRACTICES AND COPING SKILLS</b>	<b>...11</b>
<b>POLITICAL ECONOMY</b>	<b>...16</b>
<b>SOCIAL SUPPORT NETWORKS</b>	<b>...20</b>
<b>NEWS ARTICLES</b>	<b>...21</b>
<b>FOREIGN LANGUAGE ARTICLES</b>	<b>...23</b>
<b>GEOGRAPHIC REFERENCE LIST</b>	<b>...25</b>
<b>ASIA SOUTH PACIFIC</b>	<b>...25</b>
<b>CANADA</b>	<b>...25</b>
<b>EUROPEAN UNION, INCLUDING THE UNITED KINGDOM</b>	<b>...26</b>
<b>UNITED STATES</b>	<b>...30</b>
<b>LIST OF AUTHORS</b>	<b>...32</b>
<b>CONCLUSION</b>	<b>...57</b>

## **LIST OF ACRONYMS**

BSE	–	Bovine Spongiform Encephalitis
CJD	–	Creuzfeldt-Jakob Disease
vCJD	–	variant Creuzfeldt-Jakob Disease
EU	–	European Union
FMD	–	Foot and Mouth Disease
MCD	–	Mad Cow Disease
TSE	–	Transmission Spongiform Encephalitis
UK	–	United Kingdom
US	–	United States

## **INTRODUCTION**

This annotated literature review is an initial stage of a larger research program entitled PrionNET: Prion Disease Risk Management, being conducted by Daniel Krewski, Louise Lemyre, Robert Clarke, Carol Amaratunga, William Leiss and others. The overarching objective of that core project is the development of an integrated risk management framework for BSE (Bovine Spongiform Encephalitis) in Canada. Application of that framework requires filling a number of information gaps, and this review contributes to doing so. This is a review of the English-language international literature, excluding Canada, about the psychosocial effects of BSE. It comprises social science literature since 1996 addressing the impacts of BSE (also known as "Mad Cow disease") on farm families and rural communities, with special emphasis on the United Kingdom, Europe and Japan. This written report is accompanied by an electronic searchable database in Reference Manager. An additional companion document provides a detailed review of the comparable Canadian literature.

For background information regarding BSE and its links with Creutzfeldt-Jakob disease, refer to the Public Health Agency of Canada ([www.phac-aspc.gc.ca](http://www.phac-aspc.gc.ca)) and the Canadian Food Inspection Agency ([www.inspection.gc.ca](http://www.inspection.gc.ca)) as starting points.

## **SCOPE OF THE REVIEW**

The review includes peer-reviewed, indexed social science literature, categorized according to the key determinants of health as outlined by the Public Health Agency of Canada. Articles are listed within their primary category to avoid duplication, despite in many cases having relevance to more than one determinant.

Within each category, individual journal articles are cited alphabetically by first author. Keywords for each article are provided, as well as a brief annotation covering, whenever possible, the location, methodology, theoretical framework, gender analysis, main results, recommendations for future research and conclusions of the study. The keyword lists have been edited and simplified to reflect the distinctive social science dimensions of the articles. Full lists of keywords are available on the accompanying electronic database. "Health", "BSE" and/or "vCJD" have not been included as keywords to avoid repetition, despite their relevance to all sources. Although many keyword lists associated with these articles in the databases contain "gender", only articles with explicit gender analysis are noted in the annotation here. In many cases, parts of the published abstract are quoted in the annotation, identified by quotation marks.

Articles from the media are listed separately by author. They often reflect community and family stories not included in the peer reviewed sources. Articles are also sorted geographically as follows: Asia South Pacific, Canada, European Union (including the United Kingdom), Japan, and the United States. No information was found from South America. Canadian articles appear in the geographic listing and the list of authors but not in the annotated section, as they are treated more fully in a companion document that focuses solely on Canada. Articles in the foreign language category often have an English title and abstract but originate from a foreign language journal. Finally, an

alphabetical listing of all authors and corresponding citations is included for easy reference.

Research was conducted between February 20 and March 4, 2006, electronically through the University of Guelph databases, using PubMed through Reference Manager software. Social and Behavioural Sciences databases were the primary sources of information, including Social Sciences Index, Sociological Abstracts, Web of Science, Jstor and Ingenta. Business and Economics databases, including Canadian Newsstand, Agricola and Econlit were also searched, as were Medline and Health Sciences Abstracts, with limited success. For media articles, the Factiva database was searched, as were the websites of the British Broadcasting Corporation, the Canadian Broadcasting Corporation and Eljezeera. Only a selection of articles from those sites has been included here due to the volume of material. Search parameters included "BSE" and "Mad Cow Disease" as the primary terms. "Community", "farm," "family," "stress," "health," "rural," and the names of relevant countries were then individually linked to those two primary terms. "CJD" was not used as a separate search term, but appears frequently in the articles cited here because of its close links to BSE.

This search strategy originally yielded roughly 260 articles. That list was then limited to the approximately 110 sources here, based on retaining those that demonstrated clear focus on at least one social determinant of health.

Interestingly, Sinaceur, M., Heath, C., and Cole, S. (2005) note that articles using the descriptor "Mad Cow disease" appear to be written for a different audience and have a different effect on the reader to that of a vCJD/BSE descriptor. Readers more often experience an emotional response to the use of the term Mad Cow disease and a more rational response to the terms BSE and vCJD. Similarly, in this research process, search terms of BSE and vCJD elicited biomedical reports and Mad Cow disease returned articles relating to psycho-social, personal health, and other descriptors listed among the key determinants below.

### **GENERAL ANALYSIS OF THE LITERATURE**

The biomedical body of literature discussing BSE and vCJD is robust. Most papers address the physical nature of the disease and its possibility for transmission in both animals and humans. The international social science literature, addressing the socially determined aspects of the disease, is far more limited, as this annotated collection demonstrates.

Social science research on BSE emphasizes the role of the media in communicating risk, public perceptions of risk, and changes in consumer behaviour in the face of those perceptions. Peer-reviewed articles lag behind media pieces in quantity and they assume a different stance. Not unexpectedly, news articles focus more intensively on the degree of risk and on personal stories of coping with the uncertainty that BSE presents. Yet the range of topics even within the category of coping skills is noticeably narrow in both areas; several studies and stories seem to investigate similar questions.

Political economy is another relatively well-covered area of research, generating among the highest number of relevant articles. These attempts to analyze the 'big picture' of BSE's social impact are a welcome addition to the literature and would benefit from being significantly strengthened, as there remain many topics yet to be studied.

Methodologically, the majority of peer-reviewed studies are quantitative. Only two qualitative studies emerged from this search of the literature, and even they used quantitative analysis to determine their results. There is therefore very limited documentation of the impact of BSE on various subpopulations including farm families, women or immigrant workers. The more thorough understanding of experiences afforded by qualitative research is missed, and studies addressing such issues as women's health, stress on farmers, and psychosocial trauma are surprisingly absent.

Gender analysis within this body of literature is also extremely limited. While some of the studies provide statistical analysis of the number of men and women who fall into particular categories of interest, only one article adopts an explicitly feminist approach. Indeed, in many instances 'gender' originally appeared in the list of keywords in the social sciences databases for particular articles, yet detailed reading revealed that gender often played a very minimal role, if any, in the article itself.

Broadly speaking, the treatment of social determinants of health in the BSE literature is weak. No articles addressing social status, social environments, physical environments, healthy child development or education and literacy were found. Very few articles relate to social support networks, which offer potential to be significant determinants of health in times of crisis and uncertainty. Even research relating to employment and working conditions – areas that are directly affected by a disease such as BSE – is virtually non-existent. Where one might have expected to find research relating to changes in employment rates in the beef industry (from the farm to the grocery store), or to concerns relating to the health and safety of workers, or to farm income and the loss of livelihoods, or comparisons between family farms and 'big barn' operations, only three articles emerged in total, dealing with efficiencies and profitability in the cattle industry.

There is also surprisingly little mention of globalization in the current BSE literature. While there are numerous considerations of the means of transmission of the disease, these are rarely placed in the broader context of agribusiness and the globalization of food. Food politics are addressed in a very limited way, usually in relation to personal dietary choices. Indeed, there is even some discussion of the nutritional risks of eliminating beef from one's diet, without broader analysis of alternative sources of protein.

The lists of articles sorted geographically demonstrate that the majority of the social science literature on BSE has come from Britain, with the United States not far behind. Not surprisingly, countries that have experienced a BSE scare, and the policy decisions required by such outbreaks, have been propelled to study the related issues more thoroughly.

## **LITERATURE ORGANIZED BY HEALTH DETERMINANT**

Peer-reviewed articles are listed here according to an alphabetized list of social determinants of health, taken from the Public Health Agency of Canada. Articles were not found to fit every determinant, thus education and literacy, social environments, physical environments and healthy child development are not included. Income/Social status and Employment/Working conditions have been combined, and political economy has been added to the list

### **BIOLOGY AND GENETIC ENDOWMENT (BIOMEDICAL)**

As noted above, studies exploring the biological and organic basis of BSE/vCJD appear mainly in medical and scientific journals. Articles listed below begin to cross research lines to question social inequalities and health, individual predisposition to health threats, modes of transmission from animal to human, and the difficulties of separating psychiatric from organic disorders. More research is needed that bridges the biomedical and social science research domains.

**Jones, R.K.** 2004. Schism and heresy in the development of orthodox medicine: the threat to medical hegemony. *Social Science and Medicine*. Feb. 58(4):703-12.

*Keywords:* biomedicine, social construction, social inequalities

Writing from Queen Margaret University College, Scotland, Jones utilizes a postmodern, social construction of medicine as his theoretical framework. Jones states that the post-modern trend is a general denial of universal and objective truth...."In contradiction to scientific wisdom [is the] suggestion that we cannot get the progressive dementia CJD by eating beef of BSE infected cows....BSE is seen as an auto-immune disease. This is contrary to the general scientific community's view that BSE is carried by the protein-like substances called prions that have become infected, despite the scientific failure to isolate such an infected prion or identify it under a microscope" (p 709). Jones challenges research to support or refute the supremacy of biomedicine. Concluding comments state that "social inequalities play a major part in health...there is an increasing tendency to view "diseases" as socially...constructed categories and contingent upon the societal milieu in which they are found...disease and treatment are part of a well developed cultural system and constitute a fully integrated symbolic system."

**Nguyen, S.T. and Rickman, L.S.** 1997. Understanding Creutzfeldt-Jakob disease. *Journal of Gerontological Nursing*. 23(11):22-27.

*Keywords:* age, animals, incidence, infection control, risk factors, United Kingdom, United States

This US study "reviews the etiology, clinical manifestations, and potential for transmission of this unusual infectious agent [CJD]". It concludes "that seniors (over 60 years) may be more susceptible to the disease." This article straddles the border



between biomedical and social science literature as it relates to disease transmission patterns.

**Solvason H.B., Harris, B., Zeifert, P., Flores, B.H., Hayward, C.** 2002. Psychological versus biological clinical interpretation: a patient with prion disease. *American Journal of Psychiatry*. 2002 Apr; 159(4):528-37.

*Keywords:* diagnosis, neurology, psychiatry, United States

This US study contrasts the approaches of psychiatry and neuropathology in the diagnosis of CJD. The article identifies the difficulties associated with the diagnosis of a psychiatric disorder (conversion disorder) versus that of heterogeneous neurologic disorders including CJD. The research confirms the difficulty in discerning the underlying etiology of complex clinical presentations. This article has been included because it highlights the potential for misdiagnosis of vCJD, resulting in potentially problematic courses of treatment that may increase the stress on patients and their loved ones.

## **CULTURE**

Culture can be defined as the predominating attitudes and behaviour that characterize the functioning of a group or organization, including the transmission of attitudes, behaviour patterns, and beliefs. BSE/vCJD are known to the general public due to transmission of information through the media. Articles here question the role of the media, the relationship between science and the public as seen through the media, media and the assessment of risk, sensationalizing media stories, social responsibility in spreading reliable information, and the impact of negative press and advertising. The relative length of this section demonstrates the predominance of issues of risk communication and perception in the BSE social science literature.

**Beacco, J.-C., Claudel, C., Doury, M., Petit, G., and Reboul-touré, S.** 2002. Science in Media and Social Discourse: New Channels of Communication, *New Linguistic Forms. Discourse Studies*. 4(3): 277-300.

*Keywords:* communication, culture, food, France, media, science, transmission

Using discourse analysis, French researchers Beacco et al. conducted this qualitative study focusing on communication. There was no gender specification. Results identify a redefinition of the role of the media between science and the general public. Authors suggest that future research might differentiate between social and linguistic discourse analysis. Further this research has identified a new social-discursive phenomenon which requires further study. Study concludes that science has become the object of debate in the public arena. BSE is used as one example among others.

**Calsamiglia, H. and Ferrero, C.L.** 2003. Role and Position of Scientific Voices: Reported Speech in the Media. *Discourse Studies*. May, 5(2):147-173.

*Keywords:* communication, Europe, media, science

This case study using critical discourse analysis and theory of énonciation was conducted in Spain. The study analyzes the role of scientists as social agents in light of the BSE outbreak in Europe. Authors argue that "the scientific role is not presented as a decisive social role capable on its own of reassuring public alarm, and journalists fail to secure appropriate credibility for the scientific community" Conclusions ask if due to the nature of scientific knowledge, can confidence in scientific knowledge be maintained in the media if what is communicated is partial knowledge?

**Collins, H. M. and Evans, R.** 2002 The Third Wave of Science Studies: Studies of Expertise and Experience. *Social Studies Of Science*. April, 32(2):235-296.

*Keywords:* perception of risk, public opinion, science, social policy

British research examines the intersection of scientists', technologists', and public roles in decision making. Using an expertise and environmental policy framework this study questions the interactions between science and public opinion, decision-making processes, and relationships to social problems. Future research should consider "technical and scientific decision making in the public domain." BSE is referred to as one example among others.

**Girardi, E., Petrosillo, N., Aloisi, M. S., Rava, L., and Ippolito, G.** 1998. Peer-reviewed articles and public health: the mad cow affair in Italian newspapers. *Journal of the American Medical Association*. 280(3):292-294.

*Keywords:* Italy, media, perception of risk, public health, research

"It has been suggested that early announcements of research works to be published in peer-reviewed journals may diminish newsworthiness of scientific articles." Press coverage of CJD and BSE articles were studied in the seven widest circulating Italian newspapers. "Analysis suggests that, in the case of issues of public health importance, when peer-reviewed research is published after a health risk is disclosed to the public, its impact in the media is small. Coordination between news release by public health authorities and publication by peer-reviewed journals may improve the quality of public information".

**Kitzinger, J. and Reilly, J.** 1997. The Rise and Fall of Risk Reporting: Media Coverage of Human Genetics Research, 'False Memory Syndrome' and 'Mad Cow Disease'. *European Journal of Communication*. Sept. 12(3):319-350.

*Keywords:* communication, media, perception of risk

This European case study argues that "far from being eager reporters of risk, the press and TV news are ill adapted for sustaining high level coverage of long-term threats." Media interest is rarely maintained in the face of ongoing uncertainty and official silence or inaction. Conclusions reached suggest that "the media cannot be assumed to be automatic allies in the 'democratization of risk', and the success of some unofficial sources in attracting media attention should not be celebrated uncritically".

**Potter, W. J.** 1998. Misperceptions of risk. *Journal of Communication*. 48(4):162.

*Keywords:* communication, media, perception of risk

The author reviews articles and books on the topic of risk, MCD, and the ethics and practice of health safety communication. Conclusions are not stated.

**Richmond, C.** 1997. Mad cows and Englishmen: the aftermath of a BSE scare. *Canadian Medical Association Journal*. 156(7):1043.

*Keywords:* beef industry, media, public opinion

This British article suggests that "the slaughter of thousands of cows has been compared to witch-burning in order to restore public confidence in the beef industry." The article contends that the media has sought out "potential" CJD patients or family members for the purposes of sensationalizing them. Concluding comments suggest that for an issue that has killed only a handful of people, it seems to be completely blown out of proportion, perhaps resulting in three deaths by suicide of farmers.

**Tacke, V.** 2001. BSE as an organizational construction: a case study on the globalization of risk. *British Journal of Sociology*. June,52(2):293-312.

*Keywords:* business, communication, globalization, perception of risk, social construction

Using a case study methodology and a framework including functional differentiation, social construction of risk, globalization of risk, and sociological concepts of risk, German researchers found that "associations construct... risk in close relation to their horizons of globalization." Research concludes that "while the main organizational domains in the sector tried to cope with the risk problem by different means of local market 'closure', one association, founded in reaction to the BSE problem, took over a 'reflexive' role with regard to the emerging risk communication on BSE in Germany."

**Verbeke, W., Viaene, J., Guiot, O.** 1999. Health communication and consumer behavior on meat in Belgium: from BSE until dioxin. *Health Communication*. Oct-Dec, 4(4):345-57.

*Keywords:* beef industry, Belgium, communication, consumer behaviour, media, perception of risk, public health

"This article focuses on the impact of mass media meat-health information on consumer perception, attitude, and behavior toward fresh meat in Belgium...Empirical research, conducted in April 1998, revealed the tremendous negative impact of mass media coverage of meat-health issues on consumer risk perception, health concern, and attitude and behavior toward fresh meat". Conclusions suggest that "mass media should be aware of its social responsibilities, which include spreading reliable and correct information to the society... the meat industry urgently needs to reorient itself toward quality, safety, and transparency. Finally, future communication dealing with similar

crisis situations requires cooperation across the meat chain, government, and those who are responsible for public health promotion and communication."

**Verbeke, W. and Ward, R.W.** 2001. A fresh meat almost ideal demand system incorporating negative TV press and advertising impact. *Agricultural economics : The Journal of the International Association of Agricultural Economists*. 25(2/3) p. 359-374.

*Keywords:* beef industry, Belgium, consumer behaviour, media, perception of risk

Using economic analysis and demand theory, this Belgian research "provide[s] insights into the impact of negative press relative to advertising efforts... The impact of television publicity is shown to have been particularly negative on beef, veal expenditures in favour of pork, mixture". "[F]inding[s] corroborates expectations since mass media issues mainly pertained to BSE (mad cow disease) and hormone residues during the investigated period. With relatively little effort being undertaken and with its current strategy, fresh meat advertising is found to have only a minor impact compared with negative press."

## **EMPLOYMENT, WORKING CONDITIONS AND INCOME**

According to the Public Health Agency of Canada, "People who have more control over their work circumstances and fewer stress related demands of the job are healthier and often live longer than those in more stressful or riskier work and activities." Income has been associated with wellness, and interruption of income or risk to one's life work are important determinants of health. Limited options and stress can also increase vulnerability to illness. The limited number of articles in this section begins to address the economic impacts of a BSE outbreak.

**Barnhardt, A.** 2004. A kinder, gentler cattle market. *Futures* [Chicago], 33(11):26.

*Keywords:* beef industry, economic impact, United States

This brief article targeting futures traders in the United States comments on the implications of BSE on futures trading related to the cattle industry. The possibility of a BSE crisis has made the industry unappealing to speculators. The article presents a "cattle crush strategy" with straightforward buy/sell signals to assist futures traders in their work.

**Belen, I., Bardaji, I., and Manuel, R.** 2005. The Spanish beef sector in the 1990s: Impact of the BSE crisis on efficiency and profitability. *Applied Economics*. 37(4):473.

*Keywords:* agricultural policy, beef industry, efficiency, Spain

Spanish researchers conducted a quantitative study using farm profitability analysis. The research highlights technical inefficiencies in the Spanish beef farming sector. The results demonstrate the ineffectiveness of agricultural policy regulation to promote efficiency in the sector and suggest that the BSE crisis served to improve efficiency. That

is, the decrease in producer prices triggered by the BSE crisis, alongside agricultural policy reforms at the time, may have induced producers to make more efficient use of available resources. Results also show two counteracting effects from subsidies: positively, they provide needed resources to livestock farmers, while having a significant negative impact on the estimated level of technical efficiency.

**Caskie, Paul, Davis, John, and Moss, Joan E.** 1999. The economic impact of BSE: A regional perspective. *Applied Economics*, 31(12):1623.

*Keywords:* beef industry, economic impact, Ireland

From Northern Ireland, these authors use an input/output model to study the economic impact of BSE in a regional area. "Predicted net losses and regional income are 0.5% of regional GDP with job losses of up to 0.6% of regional unemployment. About 77% of the income losses and 87% of the job losses are in the beef sector, primarily beef production".

## **GENDER**

Gender refers to the array of society-determined roles, personality traits, attitudes, behaviours, values, relative power and influence that society ascribes to the two sexes on a differential basis. Literature that addresses gender issues in relation to BSE is very limited. This one article specifically incorporated feminist thought in its analysis, but did not engage in a gender analysis. Selected other articles did incorporate gender analysis but have been included under the subheadings that were of most direct relevance to their content.

**Adams, C. J.** 1997. "Mad Cow" Disease and the Animal Industrial Complex: An Ecofeminist Analysis. *Environment*. March. 10(1):26-51.

*Keywords:* beef industry, ecofeminist analysis, gender, vegetarianism

Adams argues that TSE (transmissible spongiform encephalopathies of which BSE is a type) research from an ecofeminist perspective asks very different questions than those applied from other research approaches. This gendered research suggests that "Most responses to this crisis represent a search for anthropocentric solutions to an anthropocentric problem: that is, improve the meat supply rather than examine the practice of meat eating...From an ecofeminist perspective, the beef eating crisis represents a small piece of the larger animal industrial complex and its production practices and attitudes. This analysis explains why this is a problem, and stresses a closer examination and a possible rejection of meat eating." Future research might include exploration of the viability of meat eating in the future.

## **HEALTH SERVICES**

Health services, particularly those designed to maintain and promote health, to prevent disease, and to restore health and function, contribute to population health. The health

services continuum of care includes treatment and secondary prevention. Articles in this section refer not only to health services but to perceived safety of health services and assignment of risk. Scenarios include concerns over transmission of BSE through the blood supply and receiving support for family members afflicted with vCJD.

**de Vries, K., Sque, M., Bryan, K. and Abu-Saad, H.** 2003. Variant Creutzfeldt-Jakob disease: need for mental health and palliative care team collaboration. *International Journal of Palliative Nursing*. Dec. 9(12):512-20.

Keywords: mental health, palliative care, uncertainty

This is an inductive, qualitative pilot study of one case of vCJD in the UK. It argues for increased collaboration between mental health and palliative health care workers. Since vCJD presents as a dementia syndrome, some people with the disease have died in psychiatric units rather than receiving the palliative care they needed. The theme of "not knowing" – the risk, the experience, the diagnosis, the care needed – figures prominently.

**Murphy E.L., David, C.L., McEvoy, P., Hirschler, N., Busch, M.P., Roberts, P., Nguyen, K.A., Reich, P.** 2004. Estimating blood donor loss due to the variant CJD travel deferral. *Transfusion*. May, 44(5):645-50.

*Keywords:* age, blood donation, health policy, public health, transmission, United States, United Kingdom

This quantitative survey research in the US investigated the deferral rate of blood donors who have traveled to the UK after the BSE outbreak. "The results estimate a 3.5% deferral rate due to the FDA guidelines. Observed deferrals may be lower." Future research might "determine the difference in deferral rates between first time and repeat donors...and might provide demographic and behavioural research on this population." It was concluded that "the overall loss of blood units resulting from this policy will be substantial".

**Myles, S., Douglas, M.J., Ward, H.J., Campbell, H., Will, R.G.** 2002. Variant Creutzfeldt-Jakob disease: costs borne by families. *Health and Social Care in the Community*. March. 10(2):91-8.

Keywords: caregiving, costs, social policy, social support, United Kingdom

Using semi-structured interviews, this British research included 19 participant families who outlined costs associated with caring for a family member with vCJD. The value of care provided ranged from 0 to £87,303 with the median being £9652 before the patient's death. Costs to families associated with vCJD were substantial and greatly exceeded benefit entitlements...The National Carers' Strategy does not consider fully the needs of some groups of carers or the full range or magnitude of potential costs to families associated with caring.

**O'Neill, K.** 2003. A Vital Fluid: risk, controversy and the politics of blood donation in the era of "mad cow disease". *Public Understanding of Science*. 12(4):359-380.

*Keywords:* blood donation, globalization, health policy, perception of risk, transmission, United States

This US study reviews the links between vCJD, blood transfusions and blood donation policy. Authors suggest that "maintaining a safe and stable supply of blood entails not only maintaining the trust of recipients in the system, but also that of donors, who need to be assured that their blood will be welcomed and used... The article highlights the impact of various forms of globalization -of commerce, disease and travel, and immigration- on blood policies and public and policy attitudes. Third, it assesses the decision by the US to restrict blood donations from Europeans and travelers to combat such a pervasive risk." The conclusion discusses how donor deferral policies may be interpreted by the public.

**Turner, G.** 2004. Emerging concerns related to CJD. *Nursing Times*. Aug. 24-30;100(34):28-30.

*Keywords:* caregiving, costs, diagnosis, social support

This article discusses the significant care demands placed on family, social and health care professionals as a result of a diagnosis of CJD.

## **PERSONAL HEALTH PRACTICES AND COPING SKILLS**

Based on information from the media, from local suppliers and from friends and associates, consumers must determine personal parameters for food risks, eating habits and food safety. The articles in this section analyze consumer response to the BSE outbreak from various perspectives including age, gender, emotion, rational choice, and fear. Responses include diet and behaviour change, however the sustainability of the changes warrants further study. Articles addressing the psychology of risk are also included here. The relatively extensive literature in this section once again underlines the research emphasis on perceptions of risk and strategies for coping with uncertainty.

**Berg, L.** 2004. Trust in food in the age of mad cow disease: a comparative study of consumers' evaluation of food safety in Belgium, Britain and Norway. *Appetite*. 42(1):21-32.

*Keywords:* Belgium, consumer behaviour, food, food safety, gender, perception of risk

European researchers conducted interviews using a comparative analysis of consumers who had (i.e. Britain, Belgium) or had not (i.e. Norway) experienced a food safety scandal. They developed a trust typology of consumers: sensible, skeptical, naïve and denying. Four hypotheses are investigated: Reflexivity, Risk Reducing, Complexity Reducing and Don't Worry, Be Happy to determine how food scandals affect consumers'

confidence in food safety. Gender analysis was included in the study, and it was found that gender differences in trust were significant but small. Gender is a strong determinant of reflexivity, wherein the probability of being conscious about food is 2.5 times higher among women than men. Results show that trust is a fragile process mediated by the complexity of the problem faced. The process of trust requires further study.

**Bradley, B. S. and Morss, J. R.** 2002. Social Construction in a World at Risk: Toward a Psychology of Experience. *Psychology*. August. 12(4):509-531.

Keywords: perception of risk, psychology, social construction

Using qualitative research, British researchers argue for a psychology of experience. Research identifies issues facing "psychologists whose work is to grapple with the problems of those who live 'at risk'". While not addressing BSE directly, this article is of relevance because it discusses the social construction and experience of risk.

**Chamberlain, K.** 2004. Food and Health: Expanding the Agenda for Health Psychology. *Journal Of Health Psychology*, July, 9(4):467-481 .

Keywords: consumer behaviour, food, psychology, New Zealand

From New Zealand, this study "discusses the relationship between health and food, and how our understanding of food is constructed, negotiated, socialized and contextualized."

**Chatard-Pannetier, A., Rousset, S., Bonin, D., Guillaume, S., and Droit-Volet, S.** 2004. Nutritional knowledge and concerns about meat of elderly French people in the aftermath of the crisis over BSE and foot-and-mouth. *Appetite*, 42(2):175-183.

*Keywords:* age, consumer behaviour, food, food safety, France, nutrition

Using comparative analysis, this French study compares the knowledge of youth and elderly relating to meat consumption. Results show that the elderly were more aware of diseases associated with meat consumption than youth, but did not consider meat an essential component of their diet. Concern was expressed regarding the lack of protein in the diet of many seniors.

**Crawford, R.** 2004. Risk Ritual and the Management of Control and Anxiety in Medical Culture. *Health*. October. 8(4):505-528.

Keywords: biomedicine, culture, perception of risk, political economy

This theoretical US study combines political economy and critical health theory to relate anxiety to health issues and resulting demands for control by citizens. These demands are the result of an abundance of health hazards followed by a flow of prescriptive



advice for self care. The political climate in such situations is one of containment. BSE is offered as one example among others.

**Gonzales, T. S. and Rushing, E. J.** 1998. Bad news and good news: what the dentist needs to know about transmissible spongiform encephalopathies. *Quintessence International*. 29(5):319-321.

*Keywords:* dental health, media, perception of risk, transmission

This British study investigates the fear of exposure to vSJD or prion disease as determined by dental patients due to sensationalizing and intimidating articles in the press. Results conclude that "risk for exposure to prion disease is exceedingly remote in the dental practice and that current universal infection control procedures are probably sufficient."

**Harakeh, S., Soweid, R. A., Nassar, N. T., Zananiri, N. S., Tfaily, R., Rola, A. H., Allam, S., Bassim, M., Aram, B. B., Harkous, B., and Nashawi, T.** 2003. Knowledge, attitude, and behavior of students regarding 'mad cow disease'. *The Science of the Total Environment*. 312(1-3):255-260.

*Keywords:* age, awareness, gender, perception of risk

This European study uses questionnaires to interview students to determine their knowledge about MCD. Gender analysis was conducted. "Science students knew significantly more about MCD than did non-science students. Female students were more likely to modify eating habits than male students." Future research should target students attending a variety of European universities to support or refute these findings.

**Harakeh, S., Batal, M., and Barbour, E.** 2003. Nutritional consequences related to "Mad Cow Disease" among homemakers and medical care practitioners in Lebanon. *Ecology of Food and Nutrition*. May-June, 42(3):241.

*Keywords:* age, awareness, consumer behaviour, education, Europe, food safety, gender, nutrition

This gendered, quantitative EU study investigated the dietary changes of homemakers and medical care practitioners as a result of Mad Cow Disease. "The results indicated that sex, age, and professional status affected dietary changes among participants. Women were most concerned and as a result, modified their diet to reduce or eliminate beef intake... people who were 40 years of age or older were most resistant to changing their diet. Profession is associated with knowledge, with medical care practitioners being more aware of MCD. Future research might include more diverse populations".

**Kirk, S. F., Greenwood, D., Cade, J. E., Pearman, A. D.** 2002. Public perception of a range of potential food risks in the United Kingdom. *Appetite*. June,38(3):189-97.

*Keywords:* communication, food safety, perception of risk, United Kingdom

Using a psychometric questionnaire, this quantitative study in the UK sought to determine the public perception of food risk. "Principal components analysis was used to assess the inter-correlations between the items on the questionnaire. Two main components were identified as 'dread' and 'knowledge'. Saturated fats were perceived as the least dreaded and the most known of the potential risks considered, while bovine spongiform encephalopathy and *Salmonella* were the risks dreaded the most." This study has raised a number of important issues for risk communicators. Despite current policy aimed at reducing fat intake, this will be difficult to achieve at a population level since people are not worried about its impact, yet food safety continues to be a significant concern to the public.

**Krebs, J. R.** 2005. The Croonian Lecture 2004 -- Risk: food, fact and fantasy. *Philosophical Transactions of the Royal Society of London: Series B: Biological Sciences*. June 29,360(1458):1133-44.

Keywords: perception of risk, risk assessment, United Kingdom

In a risk assessment framework, this British research utilizes comparative risk analysis to study the relationship between risk assessment and attitudes towards BSE.

**Latouche, K., Rainelli, P., and Vermersch, D.** 1998. Food safety issues and the BSE scare: some lessons from the French case. *Food policy*. 23(5):347-356.

Keywords: economic inequality, food safety, France, perception of risk

This French study uses survey tools to study public confidence in the food supply following the BSE outbreak. "The 'mad cow' disease raises the problem of loss of public confidence and the means to restore it. Consumers are waiting for a greater transparency or 'traceability' and, according to the survey, would accept to pay for it". Understanding consumers is the key to restoring public confidence. "Clearly, labels with geographic indications are an assurance to the public through greater transparency or "traceability" in the food chain from the farmer to the retailer...The risk of a dual market cannot be ruled out: one for people able to pay a greater price for labeled and guaranteed products, the other for the poor persons who accept health risks provided that the beef price is low."

**Morabia, A., Bernstein, M. S., Heritier, S., and Beer-Borst, S.** 1999. A Swiss population-based assessment of dietary habits before and after the March 1996 'mad cow disease' crisis. *European journal of clinical nutrition*. 53(2):158-163.

Keywords: consumer behaviour, food, gender, nutrition, Switzerland

Using repeat population based surveys and semi quantitative questionnaires, this Swiss study, incorporating gender analysis, studies the differences between male and female consumption of animal protein. The reduction in the amount of animal protein consumed by women was significant; men showed a reduction but it was not significant. Results

conclude that the BSE crisis coincided with spontaneous differences in food habits, especially in women, that may have nutritional consequences at the population level.

**Setbon, M., Raude, J., Fischler, C., and Flahault, A.** 2005. Risk perception of the "mad cow disease" in France: determinants and consequences. *Risk Analysis*. 25(4):813-826.

*Keywords:* consumer behaviour, food safety, France, perception of risk

In France, using a framework of risk analysis, "two surveys were conducted on a representative sample of the adult population, the first one in 2000 during the peak of the crisis and the second one 13 months later in a quieter period...The propensity for self-protection through avoiding or ceasing beef eating was more related to feelings of worry than to subjective vCJD risk assessments; the main determinant of less avoidance to beef products was the preference for beef, a feeling identified prior to emergence of the risk of MCD, remaining unchanged in various contexts."

**Sinaceur, M., Heath, C., and Cole, S.** 2005. Emotional and deliberative reactions to a public crisis: Mad Cow disease in France. *Psychological Science*, March, 16(3):247-254.

*Keywords:* communication, consumer behaviour, France, perception of risk

This US field study in France, using a psychological framework of theories of choice and cognitive versus emotional response "showed that individuals reduced beef consumption in months after many newspaper articles featured the emotional label "Mad Cow," but beef consumption was unaffected after articles featured scientific labels for the same disease. The reverse pattern held for the disease-related actions of a government bureaucracy...Mad Cow label induces people to make choices based solely on emotional reactions, whereas scientific labels induce people to consider their own probability judgments. Although the Mad Cow label produces less rational behavior than scientific labels, it is two to four times more common in the environment."

**Weitkunat, R., Pottgiesser, C., Meyer, N., Crispin, A., Fischer, R., Schotten, K., Kerr, J., and Uberla, K.** 2003. Perceived risk of bovine spongiform encephalopathy and dietary behavior. *Journal of Health Psychology*. 8(3):373-381.

*Keywords:* consumer behaviour, food safety, Germany, perception of risk

Using cross sectional surveys and phone interviews, this German research assumed that BSE-related behaviour changes were driven by anxiety. Results determined that attitudes and beliefs were associated with changes in behaviour. Perceived threat or fear of CJD was the strongest emotional variable. The study concludes that the behaviour changes were more emotional than rational since meat consumption returned to pre-crisis levels following the threat.

**Wilson, M.S., Weatherall, A., and Butler, C.** 2004. A Rhetorical Approach to Discussions about Health and Vegetarianism. *Journal Of Health Psychology*, July, 9(4):567-581.

*Keywords:* food, New Zealand, psychology, vegetarianism

Using rhetorical analysis, this research conducted in New Zealand "notes that vegetarianism is a choice and then analyzes the relationship between food and health through rhetorical analysis...[conclusions] suggest that meat-eating as a dominant practice is supported by the rhetorical use of notions of 'balance', implying moderation, inclusion and rationality." The BSE scare has prompted greater consideration of a meat-free diet.

### **POLITICAL ECONOMY**

Encompassing the interrelationships between political science and economics, political economy is not always included in traditional lists of health determinants, yet structural factors such as policy development and practice clearly exert a significant influence on health. This fairly robust selection of literature questions efficiency models, particularly in farming where they can lead to a fragile industry; policy development relating to BSE and subsequent risk management; public relations and decision making. Finally, costs of BSE to global markets, specific countries, individual farmers and human health are addressed.

**Dealler, S.** 1996. Bovine spongiform encephalopathy. Disease is due to pressure on farming industry. *British Medical Journal*, July, 313(7050):171.

*Keywords:* beef industry, efficiency, farming practices, political economy, United Kingdom

This British editorial response in a peer-reviewed journal suggests that "pressure on the farming industry to become more efficient may have serious ramifications...The emergence of [BSE] shows how pressure towards high efficiency leads to nationally organized, relatively fragile, single method systems that can collapse easily and may depend on the suppression or denial of information in the short term for such collapse to be avoided".

**Kim, T. Y., Kim, Y. S., Kim, J. K., Shon, H. J., Lee, Y. H., Kang, C. B., Park, J. S., Kang, K. S., and Lee, Y. S.** 2005. Risk analysis of Bovine Spongiform Encephalopathy in Korea. *Journal of Veterinary Medicine and Science*. 67(8):743-752.

*Keywords:* beef industry, farming practices, Korea

A Korean survey used comparative risk analysis to determine if there had been an outbreak of BSE in Korea. Results indicated that "there had not been an outbreak of BSE in Korea due to various farming practices, however several weak points were identified. These include selection of feed, slaughter practices, feed factory practices, farm

practices, and co habitation of cattle and other animals on the same farm... Improvement of weak practices could help Korea maintain its BSE-free status”.

**Kimball, A.M. and Taneda, K.** 2004. A new method for assessing the impact of emerging infections on global trade. *Revue scientifique et technique*, Dec.,23(3):753-60.

*Keywords:* political economy, trade, transmission, United States

This quantitative US study uses comparative analysis to determine the impact of BSE on global trade. “Economies affected by BSE saw a decline of US \$5.6 billion from hypothetical projections. Research suggests that further studies using similar methods to investigate the impact of BSE on economy are needed... It may be concluded that import restrictions to control the spread of emergent spongiform encephalopathy infection had a significant effect on trade flows”.

**Lanska, D. J.** 1998. The mad cow problem in the UK: risk perceptions, risk management, and health policy development. *Journal of Public Health Policy* 19(2):160-183.

*Keywords:* health policy, perception of risk, transmission, United Kingdom

Within a policy development framework, this UK study investigates the impact of risk perception and risk management on health policy development following the BSE outbreak. “Inconclusive scientific information regarding the transmission of BSE to humans does not negate the need for policy decisions relating to protection of the public.. and not preferentially the economics of an industry, political alliances, or other considerations... [Policy development] should support aggressive intervention...Such policies should be modified as necessary as the developing scientific data warrants”.

**Loader, R. and Hobbs, J. E.** 1996. The hidden costs and benefits of BSE. *British Food Journal*, 98(11):26.

*Keywords:* beef industry, costs, food safety

Within an institutional economics framework, this UK study identifies costs and benefits of the BSE outbreak. “In addition to the direct financial costs of the crisis, additional hidden transaction costs and long-term "transaction benefits" should be considered... Hidden costs include the increased need for monitoring and traceability in the supply chain, while hidden benefits may results from a reorientation of the industry towards a more consumer-driven focus, a greater attention to food safety issues and opportunities for branding and market segmentation.”

**Louis, A., Cox, J., Popken, D.A., John, J., and Ranajit,S.** 2005. Optimal Tracking and Testing of U.S. and Canadian Herds for BSE: A Value-of-Information (VOI) Approach. *Risk Analysis* 25(4):827.

*Keywords:* beef industry, Canada, costs, transmission, United States

Using Value of Information (VOI) strategy to quantify and compare economic costs, this US study seeks to determine the origin of cattle infected with BSE. "Using the VOI would help reduce future losses both in exports and domestic markets... the potential value of tracking information is great enough to justify locating and tracking Canadian cattle already in the United States when this can be done for a reasonable cost. If aggressive tracking and testing can win back lost exports, then the VOI of a tracking program may increase to over half a billion dollars per year."

**Miller, D.** 1999. Risk, science and policy: definitional struggles, information management, the media and BSE. *Social Science and Medicine*. 49(9):1239-1255.

*Keywords:* communication, health policy, media, perception of risk, science, uncertainty

This US study relies on social theory to investigate the process of policy development within the British government in the wake of BSE. "Referring to policy development mechanisms in the British government, this research identifies the possibility that scientists may be divided in their opinions and that uncertainty may exist in scientific findings... It fails to recognize the complex and interactive process of policy development... Neglected areas such as the role of secrecy, public relations and the mass media in the science-policy interface are brought into sharper focus as an intrinsic part of the wider operation of definitional struggles... It is argued that the neglect of questions of agency ...has led to some theorists presenting risks as inevitable concomitants of technological and cultural developments, leaving them in the grip of political quietism."

**Murphy-Lawless, J.** 2004. The Impact of BSE and FMD on Ethics and Democratic Process. *Journal of Agricultural and Environmental Ethics*, 17(4-5):385-403.

*Keywords:* agribusiness, animals, efficiency, food safety, health policy, perception of risk, United Kingdom

From a critical discourse analysis framework, this British study suggests that "The recent crises of BSE and FMD in the United Kingdom have revealed widespread concerns on the part of farmers and consumers about government regulations and handling of animal movements, animal welfare, and food safety." Both crises raised issues of government accountability and the lack of openness in public debate. The issues of democratic process and decision-making were especially strong in relation to the mass slaughter policy of the government to control FMD...Recognizing the impact of agribusiness on human health, this paper identifies the need to "re-examine and re-define the notions of cost, efficiency, safety, and ethics in agriculture and for the development of a more sustainable agriculture."

**Newsinger, J.** 1997. The roast beef of old England. *International Journal of Health Service*. 27(2):243-246.

*Keywords:* deregulation, food safety, health policy, United Kingdom

This British article looks at the "consequences of the government's policy of deregulation and attempts at cover up to defray responsibility." The study concludes that "public health consequences may have been the result."

**O'Brien, C.** 1996. EU stops fiddling while cows burn. *Science*. Nov.22, 274(5291):1297-8.

Keywords: Europe, research, transmission

After spending billions of dollars to slaughter cattle infected with bovine spongiform encephalopathy--"mad cow disease"--and compensate farmers for their lost herds, the European Union has announced that it will spend \$63.5 million on research into BSE, Creutzfeldt-Jakob disease in humans, and scrapie in sheep.

**Paul, R. B. and Phil H.** 2000. Kite flying: the role of marketing in the post-BSE British beef export industry. *British Food Journal*, 102(5/6):454.

**Keywords:** beef industry, consumer behaviour, costs, globalization, trade, United Kingdom

This British article uses historical review and critique to discuss the ramifications of the BSE outbreak in Britain. The article defines the BSE crisis as a global issue governed by political agreements and tariffs. "Marketing schemes to bolster the beef industry must include trade, consumer promotion, pricing, distribution and production of a credible product. All this must be supported by market research, lobbying and intelligence. Consumer opinions and habits are also critical."

**Ratzan, S.C.** 1998. *The Mad Cow Crisis: Health and the Public Good*. New York University Press.

Keywords : costs, perception of risk, transmission, United States

Divided into four major sections -"Scientific, Historical"; "Politics as Health"; "Understanding the Crisis"; and "Lessons Learned" – this American publication assembles the perspectives of a range of experts on BSE, with a view to helping readers comprehend how and why such crises occur. Its focus is on the interpretation of risk and uncertainty and the management of public fear.

**Weiss, R. A. and McMichael, A. J.** 2004. Social and environmental risk factors in the emergence of infectious diseases. *National Medicine*. 10(12 Supplement):S70-S76.

Keywords: transmission

This British study suggests that "changes in human ecology have resulted in the emergence of new disease such as AIDS, SARS, vCJD, and the reemergence of other infectious diseases thought to be eradicated...A better understanding of the evolving

social dynamics of emerging infectious diseases ought to help us to anticipate and hopefully ameliorate current and future risks.”

### **SOCIAL SUPPORT NETWORKS**

Social support networks can include families, friends and communities – all very important resources in helping people solve problems and deal with adversity. Research in this area is very limited. This single article discusses Community Supported Agriculture and its ability to support local communities in changing their diets.

**Sigrid, S.** 2002. Local organic food markets: Potentials and limitations for contributing to sustainable development. *Empirica* 29(2):145.

*Keywords:* consumer behaviour, food, vegetarianism

This British paper discusses the feasibility and benefits of "Community Supported Agriculture" and its ability to provide consumers with organic and locally grown foods. The purpose of such ventures is to revitalize local economies and to protect the environment. As demands for organic foods rise, producers must address environmental concerns, packaging, transportation and timing in order to achieve sustainability. BSE concerns have sparked greater interest in meat-free diets.



## **NEWS ARTICLES**

The following material appears in newspapers, magazines or in a few cases books. Author and citations are provided.

**Bergman, Brian.** The farmers' gamble. *Maclean's* 116[38], 26. 22-9-2003.

**Bing, Stanley.** Mat at Cow. *Fortune*. Jan 26, 2004 149[2], 136. 2006.

**Boyce, Nell.** "I can't stress enough how devastating--". *World Report*, 130(12):52. 26-3-2001

**Bruce, B. Dan.** Risky business. *The Lancet* 352[9127], 583. 15-8-1998.

**Cameron, Grant.** Rising premiums hurt businesses: CIBC/Decima Research poll. *Daily Commercial News and Construction Record* 76(222), Insert. 21-11-2003.

**Cyranoski, David** Japan's first BSE case fuels fears elsewhere. *Nature* 413[6854], 337.

**Florian, E.** Meat market madness. Who are the likely losers (and surprising winners) in the wake of the big beef scare? *Fortune*. 149(2):134. 26-1-2004.

**Gaylor, D. W.** 2004. Mad Cow hysteria. *Risk Analysis*. 24(3):513.

**George, Lianne.** Forget SARs, West Nile, Ebola and Avian Flu. The real epidemic is fear. *Macleans*. 20-9-2005.

**Giles, J.** 2001. Mad cow disease comes to Japan. *Nature* 413(6853):240.

**Hall, A..** Lamb ranchers face 'major stress level'. *Leader Post* , 26-9-2003.

**Hughes, Harlan.** 2004. Post-BSE market price tracking - Part 1: Slaughter cattle prices. *Beef* 40(8):6.

**Japan's Beef Scandal.** 2006 *Nature* 413(6854).

**Kermode, B.** 2003. Mad cow's ill effects will come later in Alberta. *Medical Post* 39(28):49.

**Kirby, Alex.** The Farmer's tale. *BBC News* . 18-6-1999.

**Kleinert, Sabine** The mad cow crisis--the mad, the bad, and the ugly. *The Lancet* 352[9127], 584. 15-8-1998.

**Lemonick, M.D.** 2001. Can it happen here? Panic over mad cow had already infected Europe. Now it's our turn. *Time*. 157(4):58-59.

**Mather, I.** 2003. How Mad Cow Devastated Britain's Beef Industry. *Maclean's* 116(22):19.

**Powell, Douglas Alan and Leiss, William.** Mad cows and mother's milk : the perils of poor risk communication. Montreal ; Buffalo : McGill-Queen's University Press, 1997.

**Ridley Matt.** The End of Agriculture. *Wall Street Journal* , A. 22-3-2001.

**Rohwedder, Cecilie.** Mad-Cow Measures Irk Europe's Meat Industry. *Wall Street Journal* , A. 7-12-2000.

**Steve, M.** 2004. No Fast-Food At Stampede Following Mad Cow Scare. *Broadcasting & Cable* 134(2):42.

**Stipp, D.** Scared of mad cow now? *Fortune*. 143(9):121-4. 30-4-2001.

**Weber, Bob.** U.S. ranchers come for tour: Will view cattle facilities prior to border opening. *Edmonton Journal* , 17-1-2005.

**Williamson, Doug** Face fear with best attitude: Chill out; Mad cow joins list of health threats. *The Windsor Star* , 22-5-2003.

**Wolff, Lisa.** Gourmet, natural food retailers report little beef over mad cow. *Gourmet News* 69[2], 3. 2004.

**Yam, Philip.** 2001. Mad cow's human toll. *Scientific American* 284(5):12.

## **FOREIGN LANGUAGE ARTICLES**

The scope of this review was to include English-language articles. The seven journal articles in this list were retrieved using similar search parameters as the main data base. The title and abstract were in English, however the articles appear in foreign language journals. They cross boundaries of key determinant categories, and are listed here alphabetically by author. Abstracts are included where available.

**Dab,W.** 1998. [Catastrophe and public health: reasons for an impasse]. *Presse Medicale*. 27(27):1385-1386.

Language: French

**Elvbakken,K.T.** 2001. [Food control--between health and honest trade]. *Tidsskrift Norske Laegeforening* 121(30):3613-3616.

Language: Norwegian

"Food control was primarily the responsibility of local health authorities. The process of getting food control legislation in place in Norway was very long and full of conflicts. The initiative for it came from health authorities, while trade and agricultural interests resisted their push...For a long time, food control was uncontroversial and attracted little political attention. The mad cow disease crises in 1996 changed that. Because of the flagging confidence in the safety of food, questions were raised not only about the independence of the authorities, but also about government authority in general. The legislation for food control in Norway is now being revised and the administrative apparatus is overhauled"

**Ibanez,C.A., Jimenez,T.L., Correas,L.J., and Saiz,R.J.** 2002. [Mental disorders related to media influence: phobia and delusional disorder focused on the bovine spongiform encephalopathy mad cow disease]. *Medical Clinic (Barcelona) (Medical Clinics of North America)* 118(17):677-678.

Language: Spanish

**Kulczycki,J.** 2001. [Creutzfeldt-Jakob disease: the most frequent spongiform encephalopathy in humans]. *Przeglda Epidemiologiczny*. 55(1-2):177-182.

Language: Polish

"Susceptibility to prions depends in large part on specificity of host proteins. It creates certain individual and species specific barriers... At the present time we witness, fortunately only in single cases, occurrence in people variant CJD caused by prions originated from animals affected by "mad cow disease... Prognosis for human population is dependent on the effectiveness of between species barrier for prions".

**Lundberg,P.O.** 2001. [Still a small problem with the mad cow disease? Creutzfeldt-Jakob disease and other prion diseases: current status]. *Lakartidningen* 98(1-2):19-24.

Language: Swedish

"Sweden has had no incident of CJD. This may be due to the long standing cattle feeding practices. Due to the long incubation period of BSE, CJD, the maybe introduced into the country by travelers who eat meat in other countries. A second possibility is the illegal importation of human derived growth hormone".

**Rottman,M. and Gaillard,J.L.** 2003. [New foodborne infections]. *Revue Pratique*. 53(10):1055-1062.

Language: French

"The recent "mad cow disease" crisis is another illustration of a food industry gone astray under the pressure of underlying economic stakes...Through unprecedented efforts from the countries involved--epitomized in France by the creation of the Agence francaise de securite sanitaire des aliments in 1999--these diseases are about to be curtailed in their epidemic form. But new dangers emerge yet with Campylobacter infections, Norovirus gastroenteritis or the spread of multi-resistant bacteria. Issues mostly unknown to the general public that are likely to be strongly publicized in the future".

**Verbeke W.** 2006. Consumer reactions and economic consequences of the BSE crisis. *Verh K Acad Geneesk Belg*.2001;63(5):483-92.

Language: Flemish

## **GEOGRAPHIC REFERENCE LIST**

The following section sorts the peer-reviewed literature geographically wherever a particular country or regional focus is specified in an article. Selected news articles from Canada are also included, despite being treated more fully in a companion document.

### **ASIA SOUTH PACIFIC**

**Chamberlain, K.** 2004. Food and Health: Expanding the Agenda for Health Psychology. *Journal Of Health Psychology*, July, 9(4):467-481. *New Zealand*

**Cyranoski, David.** Japan's first BSE case fuels fears elsewhere. *Nature* 413(6854):337. 27-9-2001.

**Giles, J.** 2001. Mad cow disease comes to Japan. *Nature* 413(6853):240.

**Japan's Beef Scandal.** *Nature* 413[6854]. 2006.

**Kim, T.Y., Kim, Y.S., Kim, J.K., Shon, H.J., Lee, Y.H., Kang, C.B., Park, J.S., Kang, K.S., and Lee, Y.S.** 2005. Risk analysis of Bovine Spongiform Encephalopathy in Korea. *Journal of Veterinary Medicine and Science*. 67(8):743-752. *Korea*

**Wilson, M.S., Weatherall, A., and Butler, C.** 2004. A Rhetorical Approach to Discussions about Health and Vegetarianism. *Journal Of Health Psychology*, July, 9(4):567-581. *New Zealand*

### **CANADA**

**Bergman, Brian.** The farmers gamble. *Maclean's* 116(38), 26. 22-9-2003.

**Cameron, Grant.** Rising premiums hurt businesses: CIBC/Decima Research poll. *Daily Commercial News and Construction Record* 76(222), Insert. 21-11-2003.

**Hall, Angela.** Lamb ranchers face 'major stress level'. *Leader Post*, B. 26-9-2003.

**Huebl, Stephen.** Mad cow takes toll on farmers: Health Board wants people to know how to handle stress. *Edmonton Journal*, B. 14-11-2003.

**Huebl, Stephen.** CHR fights mad cow stress. *Calgary Herald*, B. 14-11-2003. Alberta

**Kermode, B.** 2003. Mad cow's ill effects will come later in Alta. *Medical Post* 39(28):49.

**Kirkey, Sharon.** Blood shortage looms as fewer donate: Unless more people give, surgery cancellations likely. *Edmonton Journal*, A. 8-9-2005.

**Lianne, G.** Forget SARs, West Nile, Ebola and Avian Flu. The real epidemic is fear. *Macleans*. 20-9-2005.

**MacBean, Sylvia.** 'Mad Cowboy' says you're safer with organic beef. *Leader Post*, B. 18-2-2006.

**Mather, I.** 2003. How Mad Cow Devastated Britain's Beef Industry. *Macleans* 116(22):19.

**Powell, Douglas Alan and Leiss, William.** Mad cows and mother's milk: the perils of poor risk communication. Montreal ; Buffalo : McGill-Queen's University Press . 1997.

**Sandra, Eagle.** 2003. Cow zero. *Food in Canada* 63(5):7.

**Sean, M.** 2004. Canadian Ranchers, Ag Transporters Still Hurting 8 Months After Incident. *Transport Topics* (3570):26.

**Terri, P.** 2003. Western grocers assist hard-hit cattle producers. *Canadian Grocer* 117(6):12.

**Weber, Bob.** U.S. ranchers come for tour: Will view cattle facilities prior to border opening. *Edmonton Journal*, A. 17-1-2005.

**Williamson, D.** Face fear with best attitude: Chill out; Mad cow joins list of health threats. *The Windsor Star*, A. 22-5-2003.

#### **EUROPEAN UNION, INCLUDING THE UNITED KINGDOM**

**Alex Kirby.** The Farmer's tale. *BBC News*. 18-6-1999. *UK*

**Balter, M.** 2000. Epidemiology: Tracking the human fallout from 'mad cow disease'. *Science* 289(5484):1452-1454.

**Beacco, J.-C., Claudel, C., Doury, M., Petit, G., and Reboul-touré Sandrine.** 2002. Science in Media and Social Discourse: New Channels of Communication, New Linguistic Forms. *Discourse Studies*, 4(3):277-300. *France*

**Belen, I., Bardaji, I., and Manuel, R.** 2005. The Spanish beef sector in the 1990s: Impact of the BSE crisis on efficiency and profitability. *Applied Economics* 37(4):473. *Spain*

**Berg, L.** 2004. Trust in food in the age of mad cow disease: a comparative study of consumers' evaluation of food safety in Belgium, Britain and Norway. *Appetite*. 42(1):21-32. *EU*

**Boyce, Nell.** 'I can't stress enough how devastating--'. *World Report*, 130(12):52. 26-3-2001. *UK*

**Bradley, B.S. and Morss, J.R.** 2002. Social Construction in a World at Risk: Toward a Psychology of Experience. *Psychology*, August, 12(4):509-531. *UK*

**Calsamiglia, H. and Ferrero, C.L.** 2003. Role and Position of Scientific Voices: Reported Speech in the Media. *Discourse Studies*, May, 5(2):147-173. *Spain*

**Caskie, Paul, Davis, John and Joan E Moss.** 1999. The economic impact of BSE: A regional perspective. *Applied Economics* 31(12):1623. *Northern Ireland*

**Chatard-Pannetier, A., Rousset, S., Bonin, D., Guillaume, S., and Droit-Volet, S.** 2004. Nutritional knowledge and concerns about meat of elderly French people in the aftermath of the crisis over BSE and foot-and-mouth. *Appetite* 42(2):175-183. *France*

**Collins, H. M. and Evans, Robert.** 2002. The Third Wave of Science Studies: Studies of Expertise and Experience. *Social Studies Of Science*, April, 32(2): 235-296. *UK*

**Dab, W.** 1998. [Catastrophe and public health: reasons for an impasse]. *Presse Medicale*. 27(27):1385-1386. *France*

**Dealler, Stephen.** 1996. Bovine spongiform encephalopathy. Disease is due to pressure on farming industry. *BMJ* Jul 20, 313(7050):171. *UK*

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## **CONCLUSION**

Being a relatively recent phenomenon, perhaps the limited scope and quantity of research on the social impacts of BSE is not surprising. This review points to numerous topics that could benefit from further study. Social science research into the various macro-, meso- and micro-level impacts of BSE on various subpopulations is needed in order for social understanding to keep pace with and inform biomedical insights into this emerging disease.