Knowledge translation and exchange in the Canadian microbial food safety system: A quantitative assessment of researcher awareness, attitude, and activities with government policymakers

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Abstract

Knowledge translation and exchange (KTE) is a process through which research evidence can more effectively inform decision making in policy and practice environments. A telephone survey of Canadian microbial food safety researchers was conducted in 2009 to examine aspects of researcher KTE activities with government policymakers. Overall, researcher awareness of and engagement in KTE activities was high, although engagement was mainly through end-of-research dissemination activities rather than throughout the research process (integrated knowledge translation) and engagement in some high- quality KTE activities was low. Government researchers were significantly more likely to engage in KTE activities with federal policymakers and did so with greater frequency than non-government researchers.

Introduction

Promotion of the use of research evidence has intensified in the medical field over the last few decades, as a means of ultimately improving health outcomes through the use of the most up-to-date health technologies and practices available. Concurrently, there has been increased focus on determining the ideal mechanisms that encourage the uptake of research evidence in healthcare practice and policymaking (Mitton et al., 2007). Initial assumptions were that decision makers would use evidence, if it was communicated to them. Thus, it was believed that the use of evidence depended largely on effective communication, and that improvement of the distribution of research findings would yield increased evidence-informed decision making (Nutley et al., 2008). However, research has demonstrated that while the distribution of evidence in the form of educational materials may raise awareness of evidence and may initiate an attitude change in a target audience, rarely does dissemination alone provoke behavior change (e.g., lead to a different policy decision) (Grimshaw et al., 2001; Lomas, 1991). Many studies have elucidated key factors facilitating the uptake of research evidence by health policymakers (summarized in a systematic review by Innvaer et al. (2002)). With knowledge of the potential facilitators of research evidence uptake by policymakers and with recognition of the complexity of the policymaking process, models and conceptual frameworks have been developed to aid in the promotion of the use of research evidence within the government policy process (Canadian Health Services Research Foundation, 2000; Ebener et al., 2006; Elliott and Popay, 2000; Graham et al., 2006; Hanney et al., 2003; Jacobson et al., 2003; Lavis et al., 2003; Lomas, 2000; Weiss, 1979). A key concept found in most of these frameworks is the integration of research-policymaker engagement into the various stages of the research process, as well as the dissemination of end-of-research products. Several studies have demonstrated that interaction of researchers and their target audiences throughout the research process increases the use of research evidence by the end-user (Elliott and Popay, 2000; Innvaer et al., 2002; Ross et al., 2003; Walter et al., 2003). This interactive mechanism of promoting the use of research evidence by target audiences has been termed “knowledge translation and exchange” (KTE) (Canadian Institutes of Health Research, 2010).

Although KTE was conceptualized in the healthcare field, many other areas have adopted and adapted the relevant KTE theories (Nutley et al., 2008). To date, however, no research has been conducted to determine the extent to which KTE has been integrated into food safety research and policy in Canada. In Canada, food safety policy is a shared responsibility between federal, provincial/territorial (hereafter “provincial”), and local governments. Within this partnership, the federal government develops national strategies for food safety, while identifying and assessing health risks within the food chain. Provincial mandates include...
surveillance, investigations, and compliance (Health Canada and The Canadian Food Inspection Agency, 2005). Local food safety programs focus mainly upon enforcing provincial policies regulating food retail establishments (e.g., restaurant inspection). Public awareness of microbial food safety (MFS) has heightened over the past few years following several high-profile food- and water-borne disease outbreaks (Ali, 2004; Attaran et al., 2008; Canadian Broadcasting Corporation, 2009). As a result, MFS policy decision making has come under scrutiny (Attaran et al., 2008). Presumably, an evidence-informed approach to policymaking should improve food safety regulations, leading to greater food safety for Canadians and a reduction in the incidence of food-borne disease. Vast bodies of MFS research evidence exist, produced by both government and non-government researchers; however, it is unclear to what extent researchers attempt to inform policymaking. To address this knowledge gap, a survey of MFS researchers in Canada was undertaken. The objectives of this survey were (1) to evaluate Canadian MFS researcher awareness of and attitude toward KTE with government policymakers, (2) to investigate the types of KTE activities conducted by researchers, (3) to assess the frequency at which MFS researchers engaged in KTE activities with government policymakers in the previous 5 years, (4) to determine if government researchers engage in KTE activities at different frequencies than non-government researchers, and (5) to determine if end-of-research dissemination activities occur more frequently than integrated KTE.

Materials and methods

A telephone survey of Canadian researchers who had conducted MFS research on foods of animal origin was conducted. For the purposes of this study, the definition of “MFS research of foods of animal origin” included studies of foodborne pathogens anywhere along the farm-to-fork continuum; foodborne-pathogen surveillance; pathogen test-development research; and human or animal population or public health research. Studies purely evaluating human enteric-pathogen prevalence data were excluded as was antimicrobial resistance research.

Researchers were included in the study sampling frame if they were based in Canada and had conducted MFS research on foods of animal origin in Canada in the previous 5 years. A sampling frame of researchers was populated using a combination of web-search methods followed by a snowball approach. Initially, Canadian authors’ names were extracted from articles pertaining to MFS in the Journal of Foodborne Pathogens and the Journal of Food Protection from January 2004 to January 2009. Second, Canadian authors’ names were extracted from articles found using search terms “food” and “Canada”, “food safety” and “Canada”, “Salmonella” and “Canada”, “E. coli” and “Canada”, and “Campylobacter” and “Canada” (the three most prevalent foodborne pathogens in Canada) between January 2004 and January 2009 in the search engine Entrez Pubmed (http://www.ncbi.nlm.nih.gov/sites/entrez?db=pubmed). Finally, using a snowball approach, additional researchers were identified in publicly-accessible directories of the organizations of previously-identified researchers. Graduate students and post-doctoral students were excluded, as were researchers for whom no contact information was available.

A survey instrument was developed to collect information on researcher demographics (Table 1), researcher awareness and attitude toward KTE, and the frequency at which researchers had engaged in various KTE activities with policymakers in the previous 5 years. Respondent awareness of KTE was assessed using three questions modified from Michel and Sneed (1995): (1) “Prior to this survey, had you heard about KTE?”; (2) “Prior

Table 1
Descriptive statistics of the demographics of participants in a survey of microbial food safety (MFS) researchers in Canada in 2009.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Number of respondents</th>
<th>Proportion of all respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Categorical variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of years conducting MFS research, excluding graduate work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2–5 years</td>
<td>12</td>
<td>18.2</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>54</td>
<td>81.8</td>
</tr>
<tr>
<td>Type of employment while conducting MFS research on foods of animal origin, in the last 5 years (if more than one, the most recent organization was used and further questions were based on this organization)</td>
<td>Government</td>
<td>40</td>
</tr>
<tr>
<td>Topic area of MFS research</td>
<td>Non-government</td>
<td>26</td>
</tr>
<tr>
<td>Veterinary biomedical</td>
<td>10</td>
<td>15.2</td>
</tr>
<tr>
<td>Human biomedical</td>
<td>4</td>
<td>6.1</td>
</tr>
<tr>
<td>Food quality</td>
<td>15</td>
<td>22.7</td>
</tr>
<tr>
<td>Veterinary population/public health</td>
<td>22</td>
<td>33.3</td>
</tr>
<tr>
<td>Human population/public health</td>
<td>15</td>
<td>22.7</td>
</tr>
<tr>
<td>Type of research</td>
<td>Primarily basic</td>
<td>3</td>
</tr>
<tr>
<td>Primarily applied</td>
<td>39</td>
<td>59.1</td>
</tr>
<tr>
<td>Equal mix</td>
<td>24</td>
<td>36.4</td>
</tr>
<tr>
<td>Highest level of post-secondary education</td>
<td>PhD</td>
<td>46</td>
</tr>
<tr>
<td>MSc</td>
<td>17</td>
<td>25.8</td>
</tr>
<tr>
<td>DVM or MD</td>
<td>2</td>
<td>3.0</td>
</tr>
<tr>
<td>Other graduate degree</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Graduate degrees obtained outside of Canada</td>
<td>Yes</td>
<td>26</td>
</tr>
<tr>
<td>No</td>
<td>40</td>
<td>60.6</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>42</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>36.4</td>
</tr>
<tr>
<td><strong>Continuous variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of years since completion of highest level of post-secondary education</td>
<td>Years</td>
<td>18.9</td>
</tr>
<tr>
<td>Number of researchers employed at workplace</td>
<td>People</td>
<td>25.4</td>
</tr>
<tr>
<td>Number of these researchers conducting MFS research</td>
<td>People</td>
<td>7.8</td>
</tr>
<tr>
<td>Number of days spent at conferences or interacting with external colleagues, in the past year</td>
<td>Days</td>
<td>22.3</td>
</tr>
</tbody>
</table>
to this survey, had you read any literature about KTE?"; and (3) "Are you aware of any researchers who have conducted KTE activities with local, provincial, or federal policymakers?". A positive response to any of these questions indicated awareness of KTE. A positive or negative attitude toward KTE was determined by asking respondents, "Do you believe that MFS researchers

Fig. 1. Proportions of respondents who had provided various written documents to federal policymakers, of those respondents who had engaged in KTE activities with federal policymakers, in a survey of Canadian microbial food safety researchers in 2009.

Fig. 2. Proportions of respondents who had provided various written documents to provincial policymakers, of those respondents who had engaged in KTE activities with provincial policymakers, in a survey of Canadian microbial food safety researchers in 2009.
should alter the research process to conduct KTE with policymakers, where it is applicable and feasible to do so?" Respondents were asked with which government level(s) they had conducted KTE activities in the previous 5 years (i.e., federal, provincial, or

Fig. 3. Proportions of respondents that had used various media in their KTE activities with federal policymakers, of those respondents who had engaged in KTE activities with federal policymakers, in a survey of Canadian microbial food safety researchers in 2009.

Fig. 4. Proportions of respondents that had used various media in their KTE activities with provincial policymakers, of those respondents who had engaged in KTE activities with provincial policymakers, in a survey of Canadian microbial food safety researchers in 2009.
local/regional), and for each government level identified positively by the respondent, questions were asked to assess the frequency at which the respondent had engaged in KTE activities. KTE activities were categorized into the following groups: (1) types of written research products provided (e.g., reports of primary research, syntheses, or systematic reviews), (2) media in

Fig. 5. Proportions of respondents that had interacted with federal policymakers at various stages of the research process, of those respondents who had engaged in KTE activities with federal policymakers, in a survey of Canadian microbial food safety researchers in 2009.

Fig. 6. Proportions of respondents that had interacted with provincial policymakers at various stages of the research process, of those respondents who had engaged in KTE activities with provincial policymakers, in a survey of Canadian microbial food safety researchers in 2009.
which the products were provided (e.g., hard copy, email, website, list serve, orally), (3) other KTE activities (e.g., providing a searchable database of research results to policymakers), (4) interactions with policymakers at different stages of the research process, (5) venues of interactions outside of the research process, and (6) respondent evaluation of his or her KTE activities with policymakers (Figs. 1–10). Respondents were asked to consider the frequency at which they engaged in each activity in relation to how often it was feasible to do that activity, not the number of times an activity was performed in the previous 5 years. Respondents were left to interpret the concept of “feasibility” as it would be context specific and dependent on numerous factors. A frequency scale was provided, as follows:

1. **Never**: a particular KTE activity was never undertaken when it was feasible to do so (or it was never feasible).
2. **Rarely**: fewer than half the times that it was feasible to do so.
3. **Occasionally**: approximately half the times that it was feasible to do so.
4. **Frequently**: more than 50% of the time that it was feasible to do so.
5. **Almost always**: almost every time that it was feasible to do so.

All MFS researchers in the sampling frame were contacted initially by email in January 2009, with a follow-up email to non-

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**Fig. 7.** Proportions of respondents that had interacted with federal policymakers at various venues outside of the formal research process, of those respondents who had engaged in KTE activities with federal policymakers, in a survey of Canadian microbial food safety researchers in 2009.

**Fig. 8.** Proportions of respondents that had interacted with provincial policymakers at various venues outside of the formal research process, of those respondents who had engaged in KTE activities with provincial policymakers, in a survey of Canadian microbial food safety researchers in 2009.
respondents 6 weeks later. Respondents were contacted by telephone at a mutually agreed upon time to complete the survey. Prior to completing the survey, respondents were emailed the criteria for the frequency scale described above, and definitions of “KTE activities”, “policymaker”, “primary research”, “syntheses”, “systematic reviews”, and “actionable messages”.

Fig. 9. Proportions of respondents that had used various methods to evaluate their KTE activities with federal policymakers, of those respondents who had engaged in KTE activities with federal policymakers, in a survey of Canadian microbial food safety researchers in 2009.

Fig. 10. Proportions of respondents that had used various methods to evaluate their KTE activities with provincial policymakers, of those respondents who had engaged in KTE activities with provincial policymakers, in a survey of Canadian microbial food safety researchers in 2009.
Surveys were conducted between January and May 2009 by DW and took 1–2 h to complete. A data collection interface was developed within Microsoft Access (Microsoft Corp, 2007) to ensure consistency in question order and phrasing between respondents and to minimize transcription errors. Data were imported into Stata 9 (Stata Corp, College Station, TX) for analysis.

Descriptive statistics were determined for demographic variables. Data from KTE awareness and attitude questions were evaluated to determine the proportion of respondents with previous KTE awareness and with positive attitudes toward KTE. Unless noted otherwise, all associations between researcher type (i.e., government or non-government) and KTE awareness, attitude, and dichotomous activity engagement responses were evaluated using Fisher’s exact tests due to sparse data. Pearson $\chi^2$ tests of association were used otherwise, where the data allowed.

Separate analyses of the KTE activity frequency data were conducted for federal and provincial policymaker levels. KTE with local policymakers could not be evaluated due to a paucity of data. Frequency distributions of the responses for each KTE activity were evaluated visually for respondents as a whole and for government and non-government groups separately. Wilcoxon rank sum tests (Agresti, 2002) were used to test for statistically significant differences in the frequency distributions for government and non-government researchers. Frequency distributions demonstrated to be significantly different were evaluated visually and mean frequencies (determined on a latent continuous scale described below) were compared to determine how the response distributions of the government and non-government groups differed. A latent continuous scale (Powers and Xie, 2008) was assumed to underlie the categorical response scale measuring the frequency of engagement in the various KTE activities. Mean frequencies of engagement were calculated for each KTE activity for all researchers and for government and non-government researcher groups separately on the assumed continuous scale. Using the latent scale, mean frequency of engagement values could assume non-whole numbers and could range from 1 (Never) to 5 (Always), with a value $\geq 3$ indicating the activity was engaged in 50% or more of the times it was feasible to do so.

Fisher’s exact tests were used to compare the proportion of researchers engaging in any end-of-grant activities (KTE activities after the main research process) with the proportion engaging in KTE activities at each of the first five stages in the research process: (1) when developing the research question, (2) when establishing the research design and methods, (3) when executing the research, (4) when analyzing or interpreting the research findings, and (5) when developing the research products. These tests were conducted at both the federal and provincial levels for researchers as a whole.

**Results**

Of the 115 researchers in the sampling frame, 66 surveys were completed (response rate of 57%). Government researchers comprised 61% of the respondents ($n = 40$), while 39% of the respondents were non-government researchers ($n = 26$) employed in academia ($n = 24$) or private organizations ($n = 2$). The response rate was similar in both the government and non-government researcher categories at 56% and 58%, respectively. Of the 49 non-respondents, 12 indicated they could not participate because they were not working (i.e., on maternity leave, sabbatical, etc.), 8 initially agreed to participate but could not be reached in follow-up communications, and 29 did not respond to either recruitment email.

**Demographic data**

Demographic variables are summarized in Table 1. No respondents had been conducting MFS research for less than 2 years.

**Researcher awareness of and attitude toward KTE**

Most researchers (83%, $n = 55$) had heard of the concept of KTE (technology transfer was included in the definition of KTE), while 47% ($n = 31$) had read literature about KTE, and 86% ($n = 57$) knew someone who had engaged in KTE activities. Only 6% of participants ($n = 4$) had no awareness of KTE, indicated by negative responses to all three of the above questions. For each of the three awareness questions, there were no significant differences between the responses of government and non-government researchers (heard of KTE: $p = 0.505$; read about KTE: $p = 0.056$ ($\chi^2$ test); aware of others doing KTE: $p = 0.301$).

Only those respondents who had awareness of KTE as determined by the previous questions were asked about their attitude toward KTE ($n = 62$). These respondents were asked whether they believed that the research process should be altered to include KTE with policymakers, where it was applicable and feasible to do so. Most respondents (92%, $n = 57$) agreed, and this belief was consistent across government and non-government researchers ($p = 0.640$).

**Proportion of researchers conducting KTE and frequency of engagement**

Eight of the 66 respondents (12%) had not conducted KTE with any government policymakers while 50 researchers (75.8%) had engaged in KTE activities with federal policymakers, 42 (63.6%) with provincial, and 9 (13.6%) with local policymakers. More than half of the respondents had engaged in KTE activities with more than one government level of policymaker ($n = 37$). Government researchers were significantly more likely to have engaged in KTE activities with policymakers at the federal level than non-government researchers (85% of government researchers compared to 62% of non-government researchers; $p = 0.030$). Otherwise, there were no significant differences between government and non-government researchers with respect to the policymakers with whom they had engaged in KTE activities. The combination of government levels of policymakers with whom researchers had engaged in KTE activities most frequently was federal and provincial but not local policymakers (48.3% of all researchers conducting KTE; $n = 28$).

The proportion and frequency data presented below are for the subset of respondents who had engaged in KTE activities with either federal or provincial policymakers, not all respondents. Only significant frequency data are shown (e.g., distributions of frequency of engagement that were significantly different on Wilcoxon rank sum tests). Where these data are presented, both the Wilcoxon rank sum $p$-value as well as the mean frequency of engagement (denoted as $x$) of the government and non-government groups are shown, to indicate which group had engaged in the activity at a greater frequency. The proportions of researchers that had engaged in each KTE activity are presented in Figs. 1–10.

Regarding the provision of various written documents to policymakers (Figs. 1 and 2), less than a quarter of researchers had conducted a systematic review of a MFS topic. Government researchers had provided reprints (Wilcoxon rank sum $p = 0.030$; mean frequency ($x$) = 3.1 vs 2.3, on the latent scale), full reports of primary research ($p = 0.046$; $x = 3.3$ vs 2.4), and full reports of syntheses ($p = 0.048$; $x = 3.0$ vs 2.7) to federal policymakers at significantly greater frequency than non-government researchers. There were no significant differences between researcher types in
the frequency of provision of documents to provincial policymakers.

Regarding various media used in KTE activities (Figs. 3 and 4), less than 25% of researchers had provided a searchable database of research evidence for policymakers. The media used by the greatest proportion of respondents to provide research products to federal and provincial policymakers were mail or email and in verbal form. There were no significant differences in the reported frequencies at which government and non-government researchers had engaged in these activities with either federal or provincial policymakers.

Regarding engagement with policymakers at various stages of the research process (Figs. 5 and 6), a significantly greater proportion of all researchers had engaged in end-of-grant activities (i.e., dissemination of research products) with federal policymakers than had collaborated with policymakers at the following early stages of the research process: developing the research question \( (p = 0.031) \), establishing the research design and methods \( (p = 0.008) \), executing the research \( (p = 0.016) \), analyzing or interpreting the research findings \( (p = 0.008) \), and developing research products \( (p = 0.031) \). Government researchers collaborated with federal policymakers at a significantly greater frequency than non-government researchers to develop research questions \( (p = 0.005, \ x = 3.4 vs 2.1) \). No significant differences in frequency of engagement were seen at the provincial level.

Regarding venues used outside of the formal research process to interact with policymakers, (Figs. 7 and 8), formal networks had been used by fewer participants than other venues such as government meetings, expert committees, conferences, and researcher organized events to interact with federal and provincial policymakers. Government researchers had engaged federal and provincial policymakers significantly more frequently at researcher organized events than had non-government researchers (Federal: \( p = 0.007, \ x = 3.2 vs 2.3 \); Provincial: \( p = 0.048, \ x = 3.0 vs 2.2 \)). Government researchers also had engaged provincial policymakers more frequently on expert committees than had non-government researchers \( (p = 0.014, \ x = 2.8 vs 2.2) \).

Compared to the other KTE activities assessed in this survey, evaluations of KTE activities had been conducted by relatively few researchers (Figs. 9 and 10). Less than a third of researchers had formally assessed changes in policymakers’ actual behavior that could have been attributed to their KTE activities, and the very low frequency of engagement in that evaluation activity \( (x \ range = 1.1 \ to 1.5) \) indicates that those who had engaged in the activity did so very rarely.

**Discussion**

By definition, applied research is directed toward a specific practical aim and is more than the creation of new knowledge (Organization for Economic Co-operation and Development, 2002). As a consequence, applied research generally has one or more end-users, with KTE activities facilitating the exchange of knowledge between researcher and end-user. Government policymakers are just one of many potential end-users of MFS research. The high proportion of participants in this survey that agreed that policymakers should be included in the research process and the high proportion that had engaged in KTE activities with policymakers indicate high awareness of KTE with policymakers, beyond traditional KTE with industry partners. In part, this high awareness may be due to major Canadian funding agencies recently beginning to require descriptions of KTE deliverables in research proposals (Ross et al., 2007). As well, some Canadian government organizations employing researchers have added a commitment to KTE with policymakers to their mission statements (e.g., Canadian Food Inspection Agency (2006)). Thus, funding agencies and government organizations may help to drive KTE awareness amongst MFS researchers in Canada.

While awareness of KTE was high amongst survey participants, engagement in activities considered promising to bridge the research-policy gap (Lavis et al., 2010) was low. KTE activities can be divided broadly into three categories: producer-push activities (researcher efforts to disseminate evidence to target audiences), user-pull activities (procurement of evidence from researchers initiated by target audiences), and exchange activities (involvement of target audiences in the research process). Providing systematic reviews and offering access to a searchable database of research findings have been described as promising producer-push and user-pull activities, respectively (Lavis et al., 2010). Systematic reviews and meta-analyses facilitate the uptake of research evidence by reducing the bias and uncertainty inherent in individual research studies and by reducing the time required by target audiences to find, appraise, and synthesize the available literature (Ciliska et al., 1999). Similarly, offering access to searchable databases of research findings facilitates the procurement of relevant evidence from researchers by target audiences. Less than a quarter of participants in this study had engaged in either of these producer-push or user-pull activities, similar to an international survey of health researchers in low-to-middle-income countries (Lavis et al., 2010). If MFS researchers and policymakers in Canada and other countries wish to engage more effectively in KTE, participation in bridging activities by both producers and users should be considered.

KTE research in the medical field has typically focused on determining the most effective practices to increase the uptake and use of research evidence by either health-care practitioners or policymakers (Nutley et al., 2008). In both practitioner and policymaking areas, similarities exist in the effectiveness of KTE interventions. Specifically, passive interventions (i.e., distribution of evidence in written form) are generally considered ineffective in altering a target audience’s decision-making behavior but may be useful to increase awareness of research evidence (Bero et al., 1998; Freemantle et al., 2007; Grimshaw et al., 2001; Lomas, 2000; Matowe et al., 2002). Multifaceted or active approaches to knowledge transfer—e.g., inclusion of policymakers in the research process, termed “integrated KTE” (Canadian Institutes of Health Research, 2010)—are considered to be more efficacious in increasing the use of evidence in decision making (Cranney et al., 2008; Freemantle et al., 2007; Gagnon, 2011; Gibbons et al., 1994; Grimshaw et al., 2004; Grol, 2001; Jack et al., 2010; Lane and Flagg, 2010; Lomas, 2000; McGrath et al., 2009; O’Brien et al., 2007; Osterling and Austin, 2008). In light of the evidence supporting integrated KTE, the Canadian Institutes of Health Research (CIHR), a health-care funding body of the Canadian government, require knowledge-users to be co-investigators for some funding opportunities (Graham et al., 2009). In our survey, researchers generally appeared to have a desire to have their messages heard, indicated by >75% overall prevalence of passive dissemination; however, considerably less involvement in integrated KTE activities was reported, suggesting that, in the past, researchers’ efforts may have served more to raise awareness of MFS issues than to influence policy decision-making. Some respondents who had engaged in integrated KTE were likely researchers working in Canadian government regulatory agencies, where KTE is formally integrated within the research process. Although integrated KTE exists within government regulatory groups, researchers elsewhere should not refrain from engagement in KTE with policymakers. Different groups of researchers have differing capacities to conduct different types of research, and KTE engagement by various groups may contribute a greater scope of evidence relevant to the policy area.
As illustrated within Canadian government regulatory agencies, a research group’s capacity to engage in effective KTE with policymakers may be affected by its location within the policy community. A policy community is “that part of a political system that . . . acquires a dominant voice in determining government decisions in a specific field of public activity . . .” (Pross, 1986). The community can be depicted diagrammatically as a circle, with groups actively involved in the policy process lying centrally (the sub-government) and groups with interest in but less influence over the process lying more peripherally (the interested public). Government agencies, pressure groups, media, and individuals—including non-government researchers—could be part of the policy community. Forbes (1985) modeled the Canadian farm and food policy community, placing government agencies and their researchers centrally and non-government researchers more peripherally. While changes in the Canadian government structure have caused the policy community to be altered considerably in the ensuing 25 years, there is no reason to believe that the relative locations of government and non-government researchers within the community have changed. In this survey, government researchers consistently reported engaging more frequently in most of the KTE activities than non-government researchers, although not all differences were statistically significant. Central placement within the policy community may have contributed to this apparent trend, as well as other potential factors, such as a greater capacity to conduct KTE or a greater value placed on KTE with policymakers in government versus academic organizations.

Promotion of a culture of KTE and research-evidence use within policy decision-making systems may be enhanced through the creation of formal researcher-policymaker networks (Jbilou et al., 2007). Within the educational research literature, network analysts suggest that strong linkages between practitioners and researchers may promote more numerous and meaningful exchanges of information (Huberman, 1990). Similarly, Kiefer et al. (2005) suggest that the development of a Canada-wide network of population and public health practitioners and research experts could potentially identify knowledge gaps, improve methods of conducting research, and increase the uptake and utilization of evidence by policymakers. The development of researcher-policymaker networks was also determined to be a strategy to promote research-based decision making in Canadian health organizations (Jbilou et al., 2007). In this survey of MFS researchers, formal networks to interact with policymakers were used less frequently than other means such as meetings, conferences, and expert committees or groups. In Canada, there is a tendency for MFS research groups to be small and scattered across a broad geographic area, potentially leading to a lack of cohesion in the MFS research sector. This lack of cohesion may limit policymakers’ ability to identify experts. Strong formal MFS researcher-policymaker networks—inclusive of academics and researchers beyond a single government department—and similar to those proposed in the public health and health-care sectors above, could provide a cohesive system of support.

Awareness of KTE with policymakers appears to be high amongst Canadian MFS researchers; however, the survey findings suggest a dearth of high-quality KTE activities, evidenced by low participation in integrated KTE and promising bridging activities and little use of formal researcher-policymaker networks. Elsewhere in the world, food safety systems are developing innovative strategies that address these issues (e.g., the development of the European Food Safety Authority (EFSA) and Biosecurity New Zealand). The creation of EFSA in 2002 established an independent authority to provide timely, impartial evidence-based advice upon request from the European Commission, European Parliament, or European Union Member States regarding emerging and ongoing food safety risks (European Food Safety Authority, 2012; Silano and Silano, 2008). To this end, EFSA engages in integrated KTE, through the exchange of knowledge with policymakers to aid in identification of food safety issues of political concern (Silano and Silano, 2008). Among other duties, EFSA coordinates targeted risk assessments to be completed by its scientific staff and Member States, and has recently committed to adopting systematic review methodology, where appropriate beyond the risk assessment process (a promising producer-push bridging activity) (European Food Safety Authority, 2010). Knowledge exchange is facilitated by the EFSA website, where scientific opinions adopted by EFSA are available for both specialist and non-specialist audiences (Silano and Silano, 2008), and by the Information Exchange Platform, a digital forum to share information on risk assessment activities and completed reports, accessible by Member States and nominated individuals (a promising user-pull bridging activity) (European Food Safety Authority, 2011). To aid information exchange further, several formal networks have been developed and are supported by EFSA: issue-based networks to facilitate scientific cooperation between Member States (European Food Safety Authority, 2011); networks of European organizations capable of collaborating to assist EFSA through grant and procurement schemes (European Food Safety Authority, 2011); and the EFSA Database, a roster of external scientific experts, including academics and other individuals, that can be sourced for participation—sometimes at short notice—in the work of Scientific Panels or the Scientific Committee (European Food Safety Authority, 2011; Silano and Silano, 2008). Through integrated KTE, promising producer-push and user-pull bridging activities, and formal networks, EFSA strives to provide rigorous evidence-based advice to European political bodies. Continually morphing to more effectively meet its goals (European Food Safety Authority, 2012; Silano and Silano, 2008), EFSA represents a useful model, internationally, for food safety KTE in a challenging geopolitical landscape.

Despite having a good response rate, the survey’s small sample size may have reduced the power of the analysis to detect significant differences in some comparisons. As well, the low prevalence of KTE with local policymakers amongst respondents prevented analysis of the data at the local level. Two other issues may have influenced the study findings. First, some non-government researchers may have included funding agencies in the definition of “policymaker”. When asked at the end of the survey to provide names of important Canadian food safety policymakers, approximately 5 non-government researchers who had previously reported to have engaged in KTE activities indicated that they had not interacted directly with policymakers (and, thus, could not name one). Instead, they had provided their research products to the government funding agency that had funded their research, with the assumption that the agency would pass the information to the relevant policymakers. While this revelation occurred infrequently, the true overall proportion of researchers engaging in KTE activities with policymakers should be less than the reported 88%. Because only non-government researchers appeared to misinterpret the “policymaker” definition, the apparent proportion of researchers in this group engaging with federal policymakers was inflated and the true difference in the proportions of government and non-government researchers engaging in federal KTE should be more profound than reported. A second issue that may have influenced the study’s findings was a lack of heterogeneity in the government researcher group. Government researchers were naturally clustered according to the government level in which they were employed (primarily federal or provincial), their government organization (federal researchers), and their province (provincial researchers). Of the 40 government researchers surveyed, the majority were employed at the federal level, reflecting the distribution of researchers in the sampling frame. Thus, the findings of this study, where they relate to government researchers, reflect
mainly the experiences of federal-level researchers. The data could not be analyzed by government or organizational level due to the small sample size. Although the findings of this study are specific to Canada, they indicate an awareness of KTE in the researcher community that we hope crosses geographic boundaries. Internationally, EFSA represents one possible model that incorporates promising KTE strategies. In Canada, the apparent low prevalence of integrated KTE and promising bridging activities are areas where improvement could be made. Focus group studies may illuminate the background mechanisms that are driving the findings of this study. Great understanding of the MFS sector, from both a researcher and a policymaker perspective, will aid, from the development of effective KTE resources, ultimately promoting a culture of evidence-informed policy decision making.

References