



# Background Factors Affecting the Implementation of Food Safety Management Systems

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## ABSTRACT

Why don't workers follow Hazard Analysis Critical Control Point (HACCP) guidelines? Socio-psychological models have been used to describe factors that influence the implementation of food safety management systems (FSMSs) in food processing facilities. The theory of planned behavior posits that perceived control over one's own behavior, one's attitude and the influence of others are antecedents of behavioral intention and/or behavior.

The objectives of this study were to identify background factors that influence food safety behaviors of production workers in small and medium sized meat processing facilities and examine how these factors are applicable to the theory of planned behavior. Using a qualitative approach, the researchers conducted 13 in-depth interviews at five meat plants and two focus group interviews with representatives of government and industry agencies. These interviews generated 219 single-spaced pages of verbatim transcripts, which were analyzed by use of NVivo 7 software.

Ten themes found in the data relate to elements in the theory of planned behavior that were demonstrated to be applicable to a meat processing establishment. Confirmation of factors having the strongest influence on production workers in meat plants may assist in developing targeted interventions that improve the implementation of FSMSs in the meat and other food processing sectors.

## INTRODUCTION

Numerous studies have identified barriers to implementing HACCP in small and medium sized food processing plants (8, 13, 15). Some researchers suggest that factors such as lack of knowledge and/or resources are the main barriers (4, 10, 14, 20, 21).

Several researchers have used socio-psychological models to describe factors that influence the implementation of food safety behaviors in commercial settings (2, 3, 7, 11, 12, 18, 19). Some of these studies applied rigorous analyses and so are able to predict or explain behavior. Predictive power enables interventions to be targeted to the right people, while explanatory power provides information about appropriate types of interventions (23).

Clayton and Griffith (7) determined that the theory of planned behavior (1) is useful for explaining hand hygiene practices of caterers. Hinsz et al. (12) showed that the theory is strongly supported as a way to explain self-reported food safety behaviors of workers in a meat processing plant. According to the theory of planned behavior (1), several elements can be used to predict and understand the intentions and behaviors of individuals: attitude toward the behavior, subjective norms and perceived control over the behavior. Additional elements may be identified (1). Hinsz et al. (12) found that adding work routines improved the

A peer-reviewed article

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**TABLE 1. Profiles of in-depth interviewees**

Interviewee code	Job/Position	Experience in food industry (yrs)	Employment at current plant (yrs)
SrMgr/Owner-1	Co-owner	> 20	> 20
SrMgr/Owner-2	Co-owner	> 20	> 20
SrMgr/Owner-3	Co-owner	> 20	1–5
SrMgr/Owner-4	Co-owner	> 20	> 20
SrMgr/Owner-5	General manager	1–5	1–5
FSC-1	Food safety coordinator	16–20	1–5
FSC-2	Food safety coordinator	6–10	1–5
FSC-3	Food safety coordinator	6–10	1–5
FSC-4	Food safety coordinator	1–5	1–5
Prod-1	Production worker	> 20	1–5
Prod-2	Production worker	> 20	< 1
Prod-3	Production worker	11–15	11–15
Prod-4	Production worker	6–10	1–5

**TABLE 2. Profiles of focus group interviewees**

Interviewee code	Job/Position	Experience in food industry (yrs)	Employment at food plants (yrs)
FGrp1-Int1	Government food safety specialist	1–5	< 1
FGrp1-Int2	Government food safety specialist	6–10	6–10
FGrp1-Int3	Government food safety policy analyst	6–10	1–5
FGrp1-Int4	Government food safety policy analyst	6–10	< 1
FGrp1-Int5	Government food safety policy analyst	1–5	< 1
FGrp2-Int1	Industry association technical director*	> 20	> 20
FGrp2-Int2	Industry association executive director*	> 20	< 1
FGrp2-Int3	Industry association executive director†‡	11–15	< 1

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prediction of intentions and general self-reported food safety behaviors of meat plant workers.

Knowing the antecedents to the elements in the Hinsz model (12) may assist in developing targeted interventions to improve food safety behaviors in meat plants. The objective of this study is to describe background factors influenc-

ing production workers in meat processing establishments with respect to the implementation of food safety management systems (FSMSs).

## METHODS

Using a qualitative approach, we conducted 13 in-depth interviews with

personnel in five small to medium sized meat processing plants (Table 1). According to McCracken (17), eight in-depth interviews are sufficient to generate ideas and assumptions common to a culture.

Additionally, two focus group interviews were held with representatives of the Ontario Ministry of Agriculture, Food and Rural Affairs (FGrp1) and in-

**TABLE 3. Profiles of meat establishments**

Food safety management system	Inspection jurisdiction	Number of workers in production	Number of workers in company
HACCP certified	Ontario	30–99	30–99
HACCP implemented	Ontario	30–99	30–99
HACCP implemented	Canada	< 10	10–29
Working toward GMP certification	Municipal	< 10	10–29
No written system	Municipal	< 10	30–99

dustry associations (FGrp2) (Table 2). Focus groups with three to five participants are suitable when participants are very knowledgeable about or are experienced with the topic being discussed (6, 16).

Businesses were selected purposively on the basis of the stage of FSMS implementation (from no written program to HACCP certified by a third-party audit), as well as inspection jurisdiction — municipal, provincial and federal. All establishments had fewer than 100 employees (Table 3). Although all businesses were known to be members of the industry association, the Ontario Independent Meat Processors, it was unknown at the time of selection that representatives of several plants were directly associated with the Board of Directors.

### In-depth interviews

In-depth interviews allow the exploration of a topic with respondents (17). Using a semi-structured format, interviews of 30 to 60 minutes duration were held at the plants. An interview guide containing a series of open-ended questions for three personnel types was developed to cover themes related to *production systems, organization characteristics and employee characteristics*, as suggested by van der Wende (24).

The interview questions for the senior managers/owners (SrMgrs/Owners) and food safety coordinators (FSCs) were pretested by a manager/former food safety coordinator of a meat plant as well as by two food safety specialists with the Ontario government. The interview questions for production employees were

pretested by a former meat plant line-employee. The pretesting resulted in minor wording changes and a reordering of some questions.

Plant personnel selection was purposive. The researchers requested interviews with owners/senior managers, food safety/quality assurance coordinators or managers, and food safety or production personnel responsible for monitoring and recording FSMS information. Individuals were selected by plant management. In one plant, the senior manager/owner was responsible for food safety and worked directly in production; he indicated that he could provide the information and declined the request for employees to participate.

### Focus group interviews

Focus groups are useful in a number of ways, from stimulating new ideas and creative concepts to generating feedback on specific products, programs, services, and institutions through specific discussions (22). For this study, focus group interviews followed in-depth interviews with the intention of further confirming and clarifying themes identified through the in-depth interviews.

Focus group interviews, each lasting about one hour, were held in industry and government agency boardrooms. A focus group guide provided the framework for discussion (5, 9). The guide had two questions: *What do you believe are indicators of success in companies that have been successful at implementing some kind of food safety management system?* and *What do you believe are the main factors that affect, positively or negatively, the*

*implementation of food safety management systems on the plant floor?* The questions allowed a focus on any aspects that were considered relevant.

Accompanying the first question was a probing question to clarify participants' ideas about indicators of success. Accompanying the second were probing questions related to production systems, as well as organization and employee characteristics. The probes were used as needed to ensure that discussion covered the categories described by van der Wende (24). The focus group guide was reviewed by a qualitative specialist and revised slightly prior to use.

### Data analysis

The audio-recorded interviews generated 219 pages of single-spaced verbatim transcripts. In-depth interviews accounted for 189 pages of transcripts, while focus group interviews provided 30 pages. Repetitions, filler words and hesitations were eliminated from the transcriptions, as they did not add value to the context. The transcripts were verified by a second party. Contradictions within plants were noted immediately following in-depth interviews.

A content analysis of the transcribed data was conducted with NVivo 7 software to identify patterns and themes. The researchers read and reflected on the content of the transcripts. Words and phrases in the transcripts were highlighted and coded under different headings, or "themes." Because the data were collected using questions specific to production systems, employees and the organization, three themes for content analysis were pre-determined. However, new pat-

terns and themes identified from the data were added; thus the analysis was both deductive and inductive (5). Themes/subthemes were then considered in relation to the food safety behavior model of Hinsz et al. (12).

Using multiple data collection methods and data sources helps to increase the dependability of the data by allowing triangulation (5). In-depth interviewees in different positions and from different organizations provided some triangulation. This was strengthened by two focus group interviews, each with representatives of different agencies.

## RESULTS

Themes identified in this study were found to be supported by various respondents from both in-depth interviews and focus group interviews. Ten themes emerging from the data relate to the four factors shown by Hinsz et al. to be predictive of worker intention and self-reported food safety behavior (12). These themes and their sub-themes describe factors that facilitate or inhibit successful implementation of FSMSs.

### Theme 1: Conscientiousness

#### Work ethic

All senior managers/owners identified a positive attitude toward work in general as important when asked about hiring new employees. One identified willingness to work as one of the most important factors affecting food safety.

"[G]ood people who care... It's a hard job [working in the meat industry] and people do not have that ambition anymore. So, good people." [SrMgr/Owner-1]

#### Company/Customer focus

Plant employees appeared to have neutral to positive attitudes toward following FSMSs, with some looking beyond their job tasks.

"[I]t's not just a job... because we know the customers really well, and I think that [it] all boils down to us being a smaller plant. So maybe you take a little more care because you know these people." [FSC-1]

### Theme 2: Adaptability/willingness to change

Several employees and focus group interviewees thought newer employees were more willing and able to adapt to FSMSs than those who had been in the industry for some time. This is supported by others who suggest that full commitment of all employees to the FSMS may not be possible.

"There will always be employees that don't believe in the procedures ... our most trained and most ambitious employee, because he was trained old school, will laugh at a lot of things that we try [to] enforce... There are different levels of buying into the program." [SrMgr/Owner-3]

### Theme 3: Work unit factors

#### Influence of peers

Regardless of one's own attitude toward food safety behavior, the influence of co-workers may make a difference in whether one follows FSMSs. The influence may be positive or negative and may affect the individual's attitude.

"[Y]ou get the training and you know that's all the official, those are all the official rules. Then you talk to the employees and then you get the inside scoop... really, how is it [done] on a day to day basis?" [FGrp1-Int1]

#### Monitoring by food safety personnel

Food safety coordinators were responsible for reminding production workers to complete records and "making sure that people understand what they are looking for, so I guess training and if I see something wrong, like I walk through twice a day or whenever I am downstairs, I see something and I address it right away." [FSC-3]

#### Influence of supervisory personnel

**Enforcement/Reinforcement.** Most senior managers/owners indicated that employees need to be supervised to ensure they are doing their jobs. Several interviewees spoke of the importance of supervisors providing job related feedback regarding FSMSs.

"It goes both ways. If it's good it's good, and if it's bad that's good too sometimes. It makes you aware of what

you are doing wrong. Sometimes you get a little lazy, just like anybody else in any job. So you get feedback whether it's good or bad..." [Prod-1]

**Personal support.** Production workers agreed that feedback on their job roles is valuable. Several employees indicated that there are other ways superiors can have a positive influence on workers.

"Make them feel welcome and know that they have more than just this [job]. They have a personal life ... if they know that you are interested in more than just their work life, that you care, well I am going to give a little extra." [Prod-2]

**Financial incentives.** As a form of exchange, supervisors may also influence the remuneration that employees receive for their work. Focus group interviewees thought financial incentives were an important motivator for following FSMSs. One production worker said, "bonuses are good". However, this was contradicted by several employees who said bonuses were not appreciated. Moreover, production workers suggested they are motivated by time off with pay, regular raises but not bonuses, and positive verbal reinforcement for doing a good job.

"[Y]ou shouldn't be rewarded for food safety... You *have* to do that." [Prod-2]

### Theme 4: Senior manager commitment to food safety

For a fully operational FSMS, having workers and supervisors buy into the programs is not enough for implementation to occur. Several interviewees and focus group participants identified management commitment to the FSMS as being important. This commitment may be expressed in different ways.

"Commitment from upper management is also [important].... Not only from funding but also from their actions, personal actions and so on." [FSC-2]

The senior managers/owners concurred.

"You start at the top and you get the managers involved and you get them to buy into it, and then you kind of let loose there and you support them. You're out in the plant and you see someone without a hair net and you say, 'Has your manager told you that you need to wear a hair net?'" [SrMgr/Owner-4]

... by us giving them positive reinforcement and by us stressing to them that this is very important, and them



buying into the system. And when they buy into the system, then we all win.” [SrMgt/Owner-5]

One food safety coordinator identified that senior manager(s)/owner(s) as well as production workers were not diligent in following FSMS rules and some production employees had negative attitudes about the FSMS. This was in contrast to the responses from the two other interviewees at that plant.

## **Theme 5: Workplace atmosphere**

### *Open communication*

Several employees spoke of being able to communicate openly with supervisors and senior managers at their establishments. Open two-way communication was reported to encourage workers to share information and contribute ideas for improvement to the FSMS and the workplace.

“It is an open door, employees are never, they can all come up, feel free to say their ideas, good or bad and vice versa. There is always a lot of communication going on back and forth, which is really good...” [FSC-1]

### *Teamwork*

Some plant personnel indicated that everyone is responsible for food safety. A few spoke of the importance of working cooperatively for food safety and other initiatives.

“[W]e kind of just all work together like that. It’s a team. That’s basically what it is, but that is the biggest thing. You have to work as a team because you all have to get the job done.” [Prod-3]

## **Theme 6: Training**

Workers need skills and knowledge to be able to follow FSMSs effectively. All the plant personnel thought they were adequately prepared to do their jobs. Production workers and food safety coordinators indicated that training was primarily done in-house and included hands-on training. For new employees in one plant,

“... a day or a week before they start, I do an orientation with them and I go through their GMPs [Good Manufac-

turing Practices] in the areas that apply to them... then the rest of the training [takes place] wherever they are going. Like if you are in the box room, you get hands on training there for two weeks, or longer if needed...” [FSC-3]

Furthermore, training is a continuing process:

“Well, they always come and make sure that I know what I am doing and I always ask. It’s not just a 20 minute training thing. It’s an ongoing training.” [Prod-1]

## **Theme 7: Firm’s production system factors**

### *Product characteristics*

Having objective measures of product characteristics makes it easier for workers to ensure that products meet food safety specifications.

“And now we are watching the pH, because before, with the [previous owner], we used to just know by feel that summer sausage, when it gets to its low pH, you tell by the feel, that it just becomes rubbery. But now we actually check for the pH because it has to be below 5.3 and there is a certain number of degree hours.” [Prod-4]

### *Process characteristics*

**Automation.** Several respondents indicated that automated systems can eliminate variation in the production process. Computerization may reduce the amount of manual record keeping. However, as part of the FSMS at one plant, the temperature of each batch of cooked product is manually verified to ensure product is fully cooked.

**Productivity.** One focus group participant indicated that a FSMS supports production; however, production inefficiencies may cause problems with follow-through.

“If you don’t have good productivity in a plant then you can’t expect to be able to do all of the other things that support the production, like a food safety program. Because if your productivity stinks, everybody is behind the eight-ball and they are scrambling.” [FGrp2-Int1]

## **Equipment and facilities**

**Functional equipment.** According to SrMgt/Owner-1, “Very good equipment” is one of the most significant factors affecting the quality and safety of products. One focus group interviewee identified equipment maintenance as influencing worker behavior.

“If the equipment is not maintained properly... you can’t expect the workers to do the job that you’re asking them to do.” [FGrp2-Int1]

**Suitable facilities.** The building and facilities may also have an influence: the meat plant where FGrp1-Int1 previously worked had to install additional sinks to enable production employees to wash their hands and return to work from breaks in a timely manner.

Sometimes problems arise because busy production workers have limited work space. As one food safety coordinator said,

“... because we have a lot of different activities in such close quarters, it is so easy to contaminate something. Like you have processing going on in the back, you are dealing with nitrates and brines and phosphates and that is right next door to where we deal with fresh stuff...” [FSC-4]

## **Theme 8: Firm’s production priorities**

Perceived or real time constraints may contribute to a sense of urgency about accomplishing work tasks and thereby reduce the likelihood that workers will follow all procedures required by the FSMS:

“We’re the biggest sources of contamination here. We constantly move. We’re always in a hurry. We’re always rushed. We’re always trying to get things done.” [FSC-4]

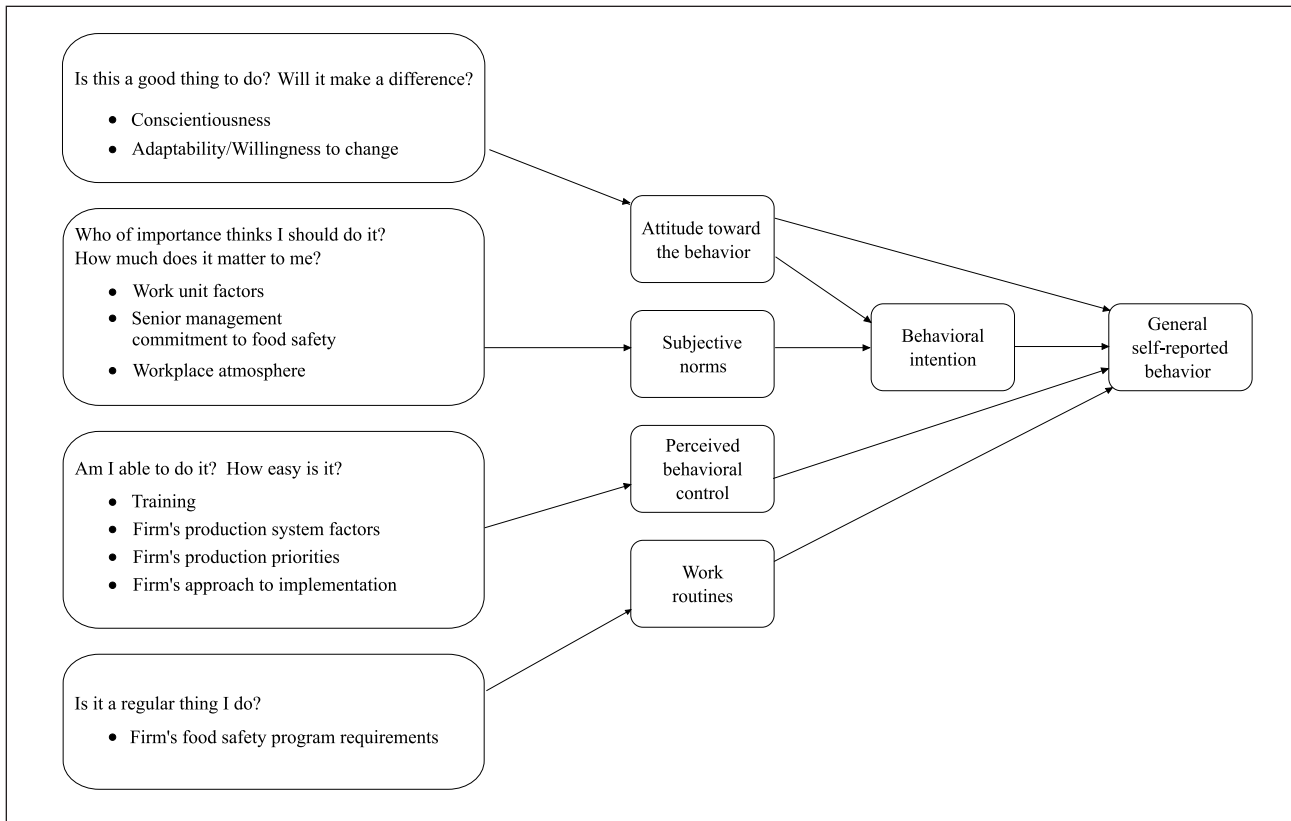
## **Theme 9: Firm’s approach to FSMS implementation**

### *Gradual introduction*

There is evidence of employee resistance to implementing HACCP in some plants. In one plant, resistance was thought to be overcome by introducing HACCP gradually. According to one food safety coordinator,

“The staff has been wonderful in switching over in their record keeping.

**FIGURE I.** Background factors that influence elements predictive of employee intention and food safety behaviors



We have been very lucky. We haven't had any big issues. Everybody is just—and I think because it's so gradual, it did not all happen in one day—that everyone has been very good. It's been a gradual thing." [FSC-1]

**Coordination of records**

Another aspect that may improve implementation of FSMSs is the extent to which food safety record keeping can be coordinated with or used for other purposes. A focus group participant also spoke about how integrating records streamlined work tasks at a plant.

"...the records that were designed for food safety were also incorporated into production records. So a lot of that job was done for them, as an example, so it made everybody's job easier." [FGrp2-Int2]

**Employee input into changes**

Some employees do not perceive themselves as being involved in developing the FSMS at their plants even though they indicated they were asked for input about job tasks. Nonetheless, at establishments with written FSMS, documenta-

tion is continually updated and workers are asked for their input. As an example:

"As we go along, I am learning more about it and I change things as we go and how we operate. That is based on input from the plant, the employees, the staff. We have had two audits and a couple of things didn't jive with the way [the consultants] wrote the book, with the way we actually do the [program]. So we have changed it then." [FSC-3]

**Theme 10: Firm's food safety program requirements**

**Good Manufacturing Practices (GMPs)**

In one plant, the biggest issue in implementing the FSMS requirements, which are primarily GMPs covering general personnel, premises and production/process controls, is...

"Getting the [workers] to abide by them. Habits are hard to break, so [the program] is sometimes a reminder." [FSC-3]

**Standard operating procedures (SOPs)**

Interviewees identified Standard Operating Procedures (SOPs), includ-

ing Sanitation Standard Operating Procedures (SSOPs), as an important aspect of FSMSs. By providing workers with specific directions, SOPs ensure process consistency and reduce the risk of errors that could impact product safety.

"[Y]ou make your fresh sausage in the first part of the day and from there you maybe move on to your kielbasas [which may contain nitrate/nitrite]... so there is just a procedure list on how you do things throughout the day." [SrMgr/Owner-2]

**Record keeping**

Required monitoring procedures at one plant ensured that product did not exceed critical limits and highlighted the value of record keeping to the production worker.

"...as soon as you check it, then you write it down. Because before, someone could say, 'I think I checked it.' But you are never positive if you did unless you write it down right away on the sheet of paper." [Prod-4]

**DISCUSSION**

Ten themes arising from the data support the four elements—attitude,

subjective norms, perceived behavioral control and work routines—that Hinsz et al. (12) identified as predicting behavioral intention and/or food safety behavior. Expanding on the Hinsz model, the authors propose a descriptive model (Fig. 1), in which we show:

- Worker conscientiousness and adaptability/willingness to change as primarily related to attitude toward food safety behavior
- Worker's work unit influences, senior management commitment to food safety and workplace atmosphere as contributing to subjective norms
- Training of workers, and the firm's production system factors, production priorities and approach to FSMS implementation as related to perceived behavioral control
- Firm's food safety program requirements as influencing work routines

According to Ajzen (1), to encourage people to change a specific behavior, one needs to examine the predictive elements of that behavior. Interventions for behavior change need to focus on the factors that influence an individual's behavioral, normative and control beliefs. Furthermore, an intervention has two stages. In the first, the focus is on changing the beliefs and motivating a change in behavior. The second step is to facilitate implementation of the desired behavior by creating favorable conditions for it to occur (1).

The themes emerging from our data may be viewed as background factors. Thus, we categorized the themes according to the four predictive elements that Hinsz et al. (12) identified. We asked one to two questions for each element (i.e. attitude, subjective norms, perceived behavioral control and work routines) to help determine under which of the themes the data best fit.

#### *Is this a good thing for me to do? Will it make a difference?*

An individual's attitude toward a behavior is a function of the person's belief about his/her behavior and expectations that the specific behavior will make a difference to an outcome (1, 7, 12).

The data suggest that a general willingness to work and do required job

tasks, even as the requirements change, are seen as desirable traits in employees. Individuals themselves must also see value in this.

Some employees believe the outcomes of their work tasks make a difference to the company and/or its customers. It is not clear whether the expected outcome relates to safe food production, continuing employment, other outcomes and/or a combination of these.

Our data suggest that it is not necessary for workers to have positive attitudes toward food safety behaviors to engage in those behaviors. It is conceivable that such employees evaluate the outcome of the behavior in terms of continuing employment rather than food safety.

If employees do not believe the food safety behavior makes a difference in the product and/or if there are no repercussions for not following the FSMS, the strength of the behavioral beliefs may be low.

#### *Who of importance thinks I should do it? How much does it matter to me?*

Social influences contribute to subjective norms that are a function of normative beliefs and motivation to comply. Normative beliefs are an individual's beliefs about who approves or disapproves, or engages or does not engage in, the behavior (1). Social pressure is generally greater when most referents with motivating influence think the individual ought to perform, or avoid, a specific behavior. A referent's level of influence may also affect an individual's motivation to comply with expectations (1).

Several social influences emerged from the data. Peers/co-workers were suggested as being highly influential and, depending on their attitudes, may influence a worker to perform or not perform food safety behaviors. Clayton and Griffith (7) report that caterers were more motivated to comply with co-workers' ideas than with wishes of bosses, customers or environmental health officers.

Food safety personnel may have some influence because of their monitoring and training roles; however, in plants where they lack authority to correct non-compliance, a production worker's motivation to comply may not be strong.

Supervision and reinforcement of desired behaviors, whether by lead hands, managers or other supervisory personnel, help workers understand that following

FSMS guidelines is important. Nonetheless, production workers who receive personal support and/or other benefits from their supervisors may have greater motivation to comply with behavioral expectations, whether food safety related or not, than those who do not receive them. In small plants, senior managers/owners may function as supervisory personnel.

Commitment of senior managers/owners to the FSMS has a normative influence in several ways. Senior managers/owners apply social pressure by engaging in food safety behaviors, directing managers to ensure compliance, supporting managers in their efforts to ensure compliance by subordinates and supporting food safety personnel in their efforts, among other actions. Direct or indirect demonstration by senior managers/owners that it is not necessary to perform food safety behaviors may threaten the implementation of a FSMS, as it reduces the motivation for others to comply.

In a workplace where open communication and cooperation are perceived to be part of the culture, it is expected that social pressure would support the continuation of whatever food safety behaviors have become accepted. The sharing of information and working as a team may motivate workers to support or undermine a FSMS.

#### *Am I able to do it? How easy is it?*

Perceived behavioral control is a function of an individual's perception about his/her ability to engage in the behavior and how easy the behavior is to perform. Control beliefs involve perception of both control and opportunity (1).

Relevant skills and/or knowledge form the basis of workers' control beliefs that they are capable of performing food safety related tasks. Nonetheless, resources and opportunities that emerged from the data identify factors that may facilitate or interfere with an individual's ability to apply the skills and/or knowledge.

Production system factors related to products and processes that allow objective measures in decision-making make it simpler for workers to do their jobs well. Simplifying the production process may make job tasks easier and help ensure that procedures are followed. Automated processes reduce repetitive tasks

and guesswork. Well-maintained equipment can also influence worker behavior because the sense of control that workers have over food safety behaviors can be negatively affected by equipment failure. Adequate facilities may enable workers to follow FSMSs efficiently and effectively, reduce expectations of difficulty, and thereby increase perceived control over food safety behaviors.

In the Clayton and Griffith study (7), control beliefs include external barriers that workers believe would prevent them from carrying out food safety behaviors. Two of these control beliefs—lack of resources and equipment, and poor design of workplace—support our theme “equipment and facilities.”

Efficient systems and adequate physical resources need to be accompanied by sufficient time and personnel so that workers perceive they have the opportunity to meet production targets while following the FSMS.

Workers may perceive greater control and fewer obstacles with a new FSMS if it is implemented gradually, allowing them time to adapt to procedures. Coordinating records with other functions and/or streamlining them may simplify record keeping. Furthermore, workers who provide input into continuous improvement efforts that affect them may perceive they have greater control than those who are not invited to contribute.

### *Is it a regular thing I do?*

Hinsz et al. (12) demonstrated that work routines predict self-reported food safety behavior. Included in the numerous components of a FSMS are various procedures that are followed on a regular and/or frequent basis. In some situations, regular procedures may become habitual and be performed without conscious effort (1). In others that require specific thought and action, such as GMP or critical control point monitoring, the routinely performed food safety behaviors were said to become “part of the job”.

## APPLICATION

Hinsz et al. (12) found the four predictive elements of intention and food safety behavior (i.e. attitude, subjective norms, perceived behavioral control and work routines) to be statistically correlated. According to Ajzen (1),

background factors may also be correlated or act as background factors to more than one predictor.

The proposed model (Fig. 1) shows each theme from the data (acting as a background factor) to relate to only one predictor. However, it may be that these themes/background factors relate to more than one of the predictors identified by Hinsz et al. (12).

Knowledge of the background factors that contribute to workers’ various beliefs about food safety and FSMSs will enable the development and testing of interventions that target the relevant beliefs. Additionally, identification of potential obstacles is necessary so they may be removed, thereby enabling individuals to increase the actual and/or perceived control over their food safety behaviors.

## SUMMARY

Worker food safety behavior is influenced by numerous factors. The themes emerging from the data in this qualitative study support the Hinsz model (12) and have been used to describe background factors related to worker attitudes toward food safety behavior, subjective norms (social influences), perceived behavioral control and work routines.

More themes relate to perceived behavioral control than to other factors. However, because of the strong correlation that Hinsz et al. (12) found among their four predictive factors, the strength of each and the qualitative nature of this study, the number of themes should not be used to assess the strength of influence on behavior.

While the Hinsz model (12) may be useful for predicting intention and food safety behaviors in meat plants, further research is needed to confirm background factors that influence the predictors and identify those with the strongest influence on food safety behaviors.

Knowing which of the background factors has/have the strongest influence will assist with the development of targeted interventions to improve the implementation of FSMSs.

**Limitations.** Plant personnel interviewed in this study were selected by management; this may have introduced a positive bias. Additional bias may be present because of a connection between some interviewees and the meat industry

association. Occasional interruptions in some plant interview settings may have influenced responses. Although invited for the government focus group interview, meat inspection/audit staff did not participate. A previous work relationship between the moderator and some focus group participants may have contributed to a bias. Additional in-depth and focus group interviews would have provided supplementary data and enabled stronger triangulation. For example, interviews at additional plants of various sizes, inspection jurisdictions and/or management system types would have strengthened triangulation. Furthermore, food safety consultants, meat inspectors or auditors, and public health officers may have provided different information.

This study focused on small and medium-sized establishments in south-central Ontario. Workers at these plants were not unionized. Representatives from larger and/or unionized establishments or from plants in other regions or provinces may have provided different perspectives.

Although the transferability of the findings (comparable to generalizability in quantitative research) has not been fully assessed, the study provides a basis for comparing these interpretations with findings of research conducted in other meat plant settings and food sectors.

## ACKNOWLEDGMENTS

The authors thank the reviewers for their constructive feedback. They also appreciate the cooperation of the Ontario Independent Meat Processors and its members, the Association of Ontario Food Processors and the Ontario Ministry of Agriculture, Food and Rural Affairs. The first author received the Ontario Food Protection Association Graduate Scholarship in Food Safety and Quality Assurance (2006) that assisted in funding this project.

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