



The perceived openness to interpretation of food inspection grading associates with disagreements between inspectors and food business operators

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ABSTRACT

In many countries, food safety inspection disclosure systems have been implemented in order to improve food control. However, criticism has also been levelled at these systems, especially regarding grading. Moreover, only a few studies have focused on inspectors, despite the fact that they are responsible, in practice, for applying the disclosure system and grading. To investigate inspectors' perceptions of disclosure, disagreements experienced with food business operators (FBOs) over grading and the factors possibly related to such disagreements, we conducted a questionnaire-based study with Finnish inspectors in 2017. We received 148 answers from 52 out of 62 Finnish local food control units. Most inspectors (90.8%, N = 131) considered that Oiva, the disclosure system introduced in 2013, was at least a somewhat positive change, and almost all inspectors (95.1%, N = 143) considered that disclosure enhanced, at least to some degree, the correction of non-compliances. In general, inspectors had experienced a small number of disagreements over grading with FBOs, but, in relation to some topics, over 20% of inspectors had encountered a high number of disagreements. In our multiple linear regression model, disagreements over grading were associated with the perceived openness to interpretation of grading (B = 0.37, p < 0.001) and differences experienced in risk perception between inspectors and FBOs (B = 0.12, p = 0.001). Most inspectors (67.4%; N = 144) preferred the grading guidelines to contain a small amount of openness to interpretation. Inspectors supported disclosure and considered that the Oiva system had improved food control. However, especially related to grading topics where inspectors perceived the greatest degree of openness to interpretation and the largest number of disagreements over grading with FBOs, inspectors should be further trained and supported. In addition, this study highlights the need for improved consistency in grading especially between the food control units.

1. Introduction

Many countries have implemented systems to disclose the results of food safety inspections (Aik, Newall, Ng, Kirk, & Heywood, 2018; Fleetwood, 2019; Jin & Leslie, 2003; Leisner et al., 2014; McKelvey, Wong, & Matis, 2015; Wong et al., 2015). However, to our knowledge, only a few studies have focused on inspectors' views of these systems, despite the fact that inspectors apply the systems and therefore have a significant impact on food safety and the actions of food business operators (FBOs). In one such study, investigating the disclosure of food safety inspection results in Brazil during 2014, health surveillance

auditors reported that the grading system enhanced improvements in food safety, and they supported the continuation of the system (da Cunha et al., 2016). Another study found that health practitioners considered the grading system in Northwest England had led to positive changes in their work and the compliance of FBOs (Assan, 2019).

However, criticisms have been levelled at disclosure systems, especially regarding grading. For instance, it has been claimed both by inspectors (Assan, 2019) and FBOs (Kaskela, Vainio, Ollila & Lundén, 2019) that grading can be subjective and therefore inconsistent. Grading is a demanding task that can be influenced by many factors. For example, in the European Union, food safety legislation is risk-based (EC

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No 625/2017; EC No 852/2004), enabling different interpretations of compliance and thus creating challenges for inspectors in grading.

Indeed, in an earlier study, we observed that disagreements over inspectors' grading were common among FBOs in Finland (Kaskela et al., 2019). Among FBOs, risk perception was shown to associate with disagreements over an inspector's grading and the occurrence of non-compliances (Kaskela et al., 2019). However, inspectors' experiences of disagreements with FBOs over grading have not been studied, even though disagreements may create challenges related to inspections and impair compliance. We do not know, for example, whether inspectors' perception of risk correlates with grading and possibly with disagreements experienced with FBOs. The identification of possible reasons for disagreements between inspectors and FBOs is important because only increased understanding of the phenomenon can lead to new insights.

Oiva, the Finnish disclosure system, was introduced in 2013, after which it has been gradually implemented, introducing several new practices to food control (Finnish Food Authority, 2016). These practices include grading, the use of guidelines on conducting regular inspections and re-inspections (Oiva inspections), disclosure of Oiva reports to consumers and the use of uniform inspection reports for FBOs. The grading scale consists of the grades "Excellent" (no non-compliances detected), "Good" (only minor non-compliances detected), "To be corrected" (non-compliances decreasing food safety or misleading

consumers or repeated minor non-compliances detected) and "Poor" (non-compliances endangering food safety or misleading consumers or repeated non-compliances that have been graded with "To be corrected" earlier). The result of the inspection, represented with the largest smiley in the Oiva report, is determined by the lowest grade given in the inspection.

The aim of the study was to investigate inspectors' perceptions of the disclosure system and the occurrence of disagreements over grading with FBOs. Further, the factors associated with disagreements were studied. The results of this study can be used to improve the efficacy of food control.

2. Materials and methods

2.1. Questionnaire for Oiva inspectors

We constructed a questionnaire to study inspectors' risk perception, disagreements over grading with FBOs and perceptions about the openness to interpretation of grading and other experiences related to Oiva inspections. In line with the suggestions of Taylor and Snyder (2017), we measured risk perception within the framework of unperformed safety measures. The respondents were asked to assess food safety risk on a 5-point scale (1 = no risk at all, 5 = very high risk) in 13 situations where a safety measure had been neglected or not properly

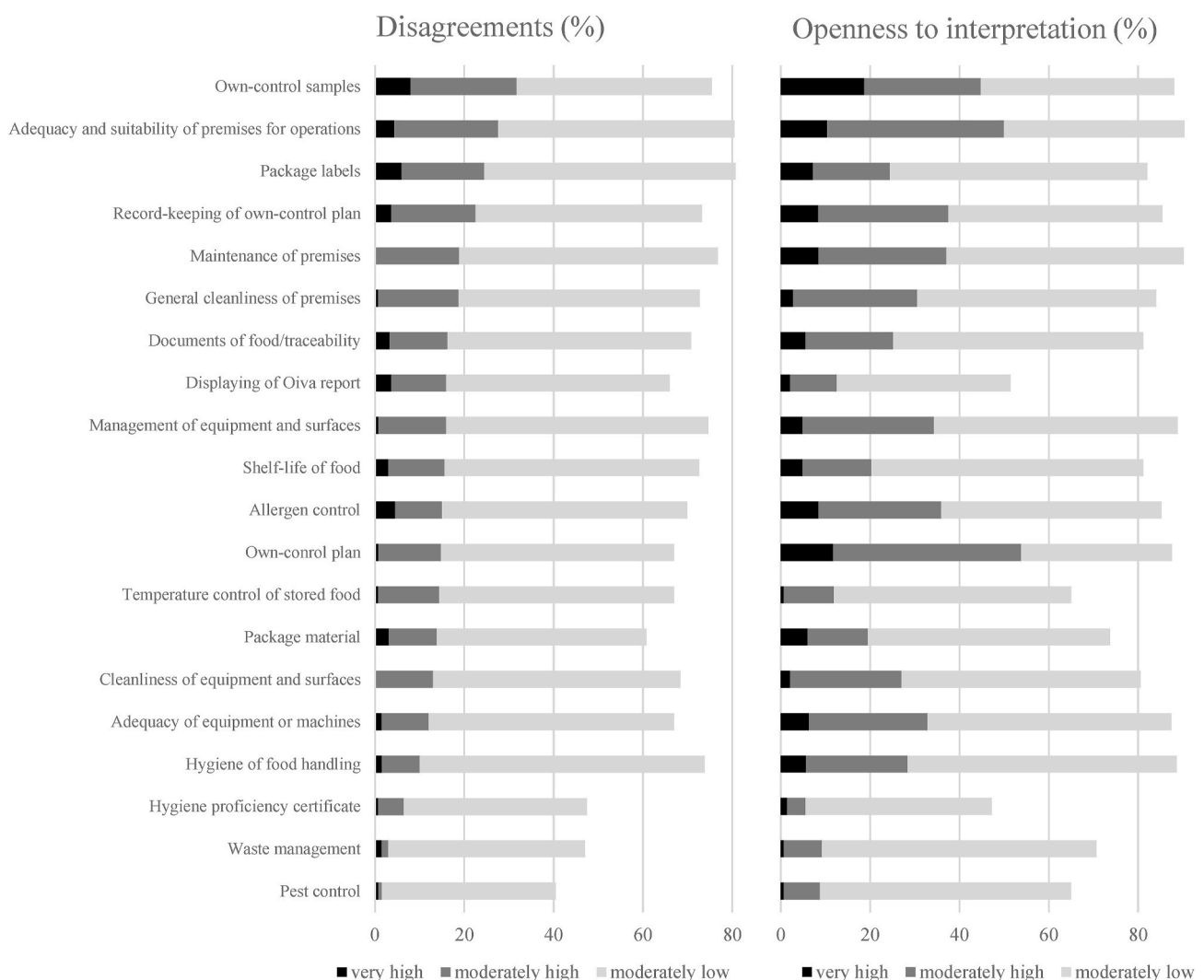


Fig. 1. Proportions of inspectors considering the number of disagreements over grading and openness to interpretation of grading as moderately low, moderately high and very high. N = 123–144.

carried out. In addition, we measured inspectors' experience of a number of disagreements with FBOs over grading during 2016 and the perceived openness to interpretation of grading related to 20 inspection topics; both questions were measured on a 4-point scale (1 = not at all, 2 = moderately low, 3 = moderately high, 4 = very high) (Fig. 1).

Inspectors' positivity about the Oiva system, inspectors' motivation to guide FBOs and the challenges they had experienced related to Oiva inspections were assessed with statements evaluated on a 4-point scale (1 = completely disagree, 4 = completely agree) (Supplementary Table A). In addition, the questionnaire included the following statements concerning the Oiva system: "Oiva has increased the rate of re-inspections" and "Oiva inspections are uniform enough in Finland" (a scale from 1 = completely disagree to 4 = completely agree) and a question: "How good do you consider the determination method of the overall grade to be?" (1 = very poor, 2 = quite poor, 3 = quite good, 4 = very good). Respondents were also able to define the reasons for their opinion on the determination method in an open answer field after the question. In addition, an open answer field situated after the statements provided the respondents with an opportunity to clarify their responses. The following questions on differences in risk perception were included: "Have you noticed differences in perceptions concerning food safety risks between you and food business operators?" and "Have you noticed differences in perceptions concerning food safety risks between you and other inspectors?" (a scale from 1 = "not at all" to 5 = "very much").

Inspectors' opinion on the degree to which the grading guidelines should be open to interpretation was measured with the question "Should Oiva guidelines be open to interpretation?", of which the answer options were: "In my opinion Oiva guidelines should: 1 = not be open to interpretation, 2 = have small amount of openness to interpretation, 3 = have a moderately high amount of openness to interpretation, 4 = have a high amount of openness to interpretation". The response option "I do not know" was also included in the answer options. Such answers were coded as missing values in the data analysis.

The survey also collected background information on the inspectors' education (basic education, upper secondary education, university of applied sciences (UAS) bachelor's degree, UAS master's degree or regular university degree), job title (health inspector, veterinarian), work experience in years, age (20–29, 30–39, 40–49, 50–59, >60 years) and gender (male, female). The survey also asked respondents to provide the name of the local food control unit and the number of given "To be corrected" (0, 1–15 and > 15) and "Poor" (0, 1–3 and >3) inspection result grades during 2016. The survey also enquired about the proportion of inspections that each inspector had conducted in food retail, the service sector and food production in registered food premises and approved food premises on the following scale: "not at all", "a low proportion", "a somewhat low proportion", "a somewhat high proportion", "a high proportion". In addition, we asked if the respondent had worked in food control before the launch of the Oiva system and if the respondents themselves had conducted Oiva inspections. Only respondents who had conducted Oiva inspections were included in this study, excluding 13 respondents who were supervisors of the food control units and did not conduct Oiva inspections themselves.

2.2. Data collection

The questionnaire was piloted by four inspectors, and slight modifications were made based on the feedback. The web-based questionnaire (E-lomake, Eduix Oy) was open for four weeks in February 2017. The link to the questionnaire was sent to all local food control units (N = 62) in Finland with the exception of the Åland Islands, where inspection results are not disclosed. The initial request to answer the questionnaire was followed by a reminder after two weeks. The questionnaire answers were anonymous.

2.3. Statistical analyses

Statistical analyses were conducted using IBM SPSS software 25. We used a significance level of 0.05 in all statistical tests. The internal consistency of the mean score variables were assessed with Cronbach's α , which exceeded the recommended minimum value of 0.7 (Nunnally, 1978) in all mean score variables: risk perception ($\alpha = 0.750$), openness to interpretation of grading ($\alpha = 0.928$), disagreements over grading ($\alpha = 0.948$), experienced challenges related to an Oiva inspection ($\alpha = 0.717$), motivation to guide FBOs ($\alpha = 0.710$), and positivity about the Oiva system ($\alpha = 0.764$). Differences between the groups (age, gender, given grades during 2016 and inspected food premises types) were tested with the Kruskal-Wallis test with adjusted p-values or the Mann-Whitney *U* test. Spearman's rank correlation coefficient (ρ) was used to assess the associations between constructed mean variables and differences with FBOs in risk perception.

A linear regression model was constructed to assess the factors associated with the number of disagreements experienced over grading between inspectors and FBOs. The variables were then selected according to the study's aim of investigating the association between the openness to interpretation of grading, risk perception, challenges related to inspection and the motivation to guide FBOs and disagreements over grading. Only variables that showed a significant correlation with disagreements were included in the model.

3. Results

3.1. Characteristics of the respondents

We received 148 responses from inspectors conducting Oiva inspections. Answers were received from 52 out of the 62 local food control units present in Finland. The inspectors were predominantly female (85.9%, N = 142), and aged between 30 and 59 years (88.9%, N = 144). Most held a bachelor's degree (50.3%, N = 145), or Master's degree (9.7%, N = 145) from a university of applied sciences (polytechnic) or a regular university degree (31.7%, N = 145). One tenth (10.8%, N = 148) of respondents were veterinarians. Most inspectors had already worked in food control before the launch of Oiva (85.8%, N = 148) (Table 1).

3.2. Inspectors' views on disclosure and the Oiva system

Most inspectors (90.8%, N = 131) considered Oiva to be at least a somewhat positive change, and almost all inspectors (95.1%, N = 143) considered that disclosure enhanced, at least somewhat, the correction of non-compliances (Fig. 2). In addition, according to most inspectors, the rate of re-inspections had increased after implementing the Oiva

Table 1
Descriptive statistics of inspectors.

Descriptive variable	% of inspectors (n/N)
Worked in food control before Oiva system	85.8 (127/148)
Inspects	
Service	85.7 (126/147)
Retail	78.9 (116/147)
Registered production premises	62.8 (93/148)
Approved food establishments	32.4 (48/148)
Number of given "To be corrected" grades by inspectors in 2016	
0	8.5 (12/142)
1–15	75.4 (107/142)
>15	16.2 (23/142)
Number of given "Poor" grades by inspectors in 2016	
0	74.1 (106/143)
1–3	22.4 (32/143)
>3	3.5 (5/143)
Inspector's inspection has led to use of enforcement measures	25.2 (36/143)

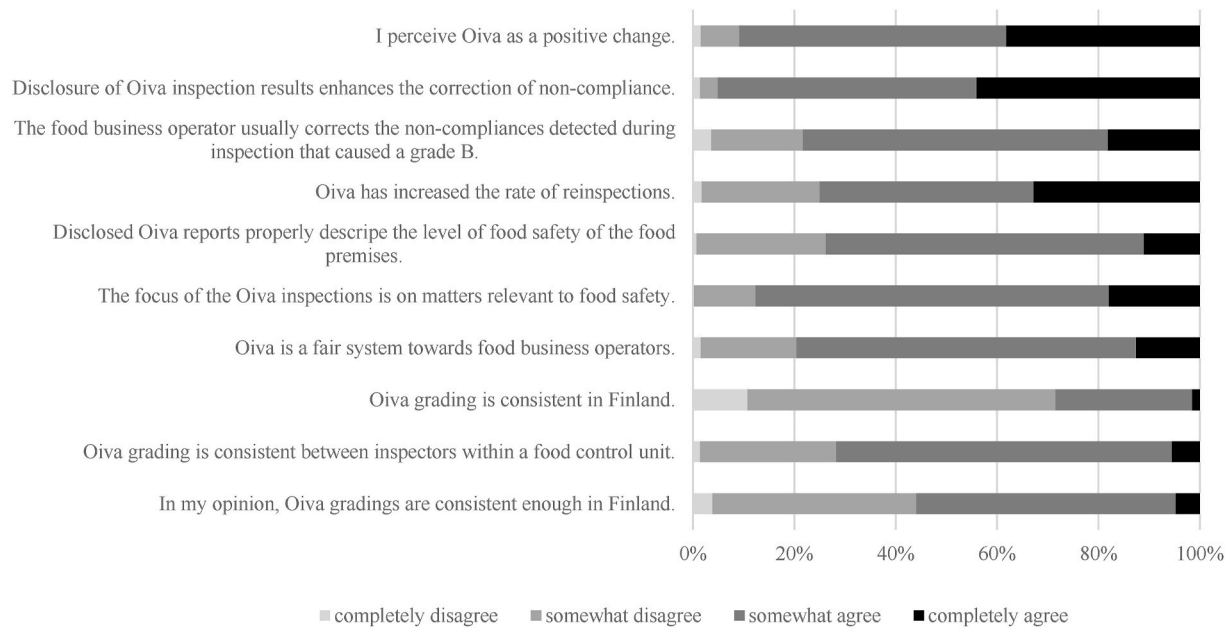


Fig. 2. Inspectors' views on disclosure system Oiva. N = 116–145.

system (75.0% somewhat or totally agreed, N = 116) (Fig. 2). Furthermore, according to the majority of inspectors, minor non-compliances (grade “Good”), which only lead to guidance, were usually or somewhat usually corrected (78.3%, N = 138) (Fig. 2). On average, inspectors were relatively positive about the Oiva system (M = 2.98, SD = 0.38, scale completely disagree = 1, somewhat disagree = 2, somewhat agree = 3, completely agree = 4) (Supplementary Table A). However, only 12.6% (N = 127) of inspectors completely agreed and 20.5% completely or somewhat disagreed that Oiva was a fair system in respect to FBOs (Fig. 2). In their open responses, inspectors described the fairness of the system as depending on the uniformity of inspections. While only 28.5% (N = 130) of inspectors thought Oiva grading was consistent, 55.9% (N = 127) thought it was consistent enough (Fig. 2). Perceptions of the consistency of grading did not differ significantly between inspectors with a high or relatively high or a low or relatively low proportion of inspections in particular food sectors (Mann-Whitney U test, p = 0.82 for service, p = 0.83 for retail and p = 0.116 in approved food premises or registered food premises with food production). In addition, 27.2% (N = 147) of inspectors considered that the way the inspection result was determined was either somewhat or very poor. In their open responses, they argued that the inspection result grade conveyed contradictory information about the risks to food safety in various situations because the same inspection result may be caused by a various number of non-compliances and by different items with varying risks to food safety.

3.3. Risk perception of inspectors

On average, inspectors evaluated the risks to food safety in the situations described in the survey as 3.70 on a scale of 1, “no risk at all” to 5, “very high risk” (Table 2). Risk perception was significantly higher among inspectors with high or fairly high proportion of inspections in approved food premises or registered food premises with food production (M = 3.80, n = 54) than among inspectors with none or only a low proportion of their inspections in those premises (M = 3.63, n = 93) (Mann-Whitney U test, p = 0.011). Inspectors' risk perception was not associated with the number of inspection result grades they had given as “To be corrected” or “Poor” (Kruskal-Wallis Test, p = 0.86, p = 0.38). Neither was it associated with inspectors' gender (Mann-Whitney U test, p = 0.344) nor age (Kruskal-Wallis test, p = 0.394).

According to the inspectors, the greatest food safety risks were

Table 2

Scenarios to assess risk perception of inspectors, means (M), medians (Mdn), and 5th percentile to 95th percentile (P5-P95). The inspectors were requested to evaluate the magnitude of the food safety risk in 13 different situations on a scale of 1 = “no risk at all” to 5 = “very high risk”.

Described situation	M	Mdn (P5-P95)	N
Risk perception	3.70	3.77 (3.00–4.31)	147
Worker who is suffering from acute gastrointestinal symptoms is handling unpacked food	4.92	5.00 (4.00–5.00)	146
Temperature monitoring of cold-stored food is not carried out	4.75	5.00 (4.00–5.00)	147
Cooling heated food which requires cold storage to 6 °C takes 8 h	4.56	5.00 (3.00–5.00)	145
There is expired food in the cold-storage room	4.40	4.00 (3.00–5.00)	146
The same cleaning equipment is used for cleaning surfaces for unpacked foods and other surfaces	4.31	5.00 (3.00–5.00)	142
Soap at the hand washing point has run out in the area where unpacked food is handled	4.03	4.00 (2.35–5.00)	146
A clearly scraped cutting board is used for perishable food	3.61	4.00 (2.40–5.00)	147
Documentation of temperature monitoring has not been performed	3.55	3.50 (2.00–5.00)	146
The FBO does not have its own control plan	3.29	3.00 (2.00–5.00)	144
Adequate trade documents are not available for all foods in the food premises	3.05	3.00 (1.30–5.00)	145
A person who is handling unpacked food has no head cover	2.95	3.00 (1.00–4.00)	147
Cleaning equipment is kept on the floor in the cleaning equipment storage room	2.51	2.00 (1.00–4.00)	146
Documentation of cleaning routines has not been performed	2.12	2.00 (1.00–4.00)	144

related to situations where a worker with acute gastrointestinal symptoms handled unpacked food (M = 4.92), the temperature monitoring of cold-stored food was not performed (M = 4.75), and where the cooling of heated food requiring cold storage to 6 °C takes 8 h (M = 4.56) (Table 2). By contrast, the lowest food safety risks were considered to relate to situations where cleaning routines had not been documented (M = 2.12), cleaning equipment was kept on the floor of the cleaning equipment storage room (M = 2.51), and a person handling unpacked

food wore no head cover (M = 2.955) (Table 2).

Almost all inspectors (95.9%, N = 146) reported noticing at least some differences between their own risk perceptions and those of FBOs. The mean score of differences experienced in risk perception with FBOs was 3.23 (Mdn = 3.00, N = 146) on a scale of 1, “not at all” to 5, “very much”. Older inspectors (Spearman’s rho = -0.18, p = 0.036) and inspectors with more work experience in food control (Spearman’s rho = -0.20, p = 0.020) had experienced fewer differences in risk perception with FBOs. Most inspectors (92.4% N = 144) had also noticed some differences in risk perception with other inspectors (M = 2.48, Mdn = 2.00).

3.4. Disagreements with FBOs and the openness to interpretation of grading

More than half the inspectors had experienced disagreements with FBOs over grading in 17/20 topics (Fig. 1). Most often, inspectors (43.7–63.8% of inspectors) reported having experienced a moderately low number of disagreements, but concerning the items of FBOs’ own-control samples (samples taken by FBOs for laboratory analyses), the adequacy and suitability of premises, package labels, and the record-keeping of FBOs’ own-control plan, the proportion of inspectors experiencing a moderately or very high number of disagreements exceeded 20% (Fig. 1). Disagreements experienced over grading differed between inspectors who had given 0, 1–15 or over 15 “To be corrected” inspection result grades during 2016 (Kruskal-Wallis test, p = 0.026). The mean for disagreements experienced over grading was 1.45 among inspectors who gave 0, 1.89 among inspectors who gave 1–15 and 1.96 among those who gave over 15 “To be corrected” inspection result grades during 2016. Further, the mean for disagreements over grading was significantly higher among inspectors with a high or fairly high proportion of inspections in the service sector (M = 1.91; n = 25) than among inspectors with no or only a low proportion of inspections in the service sector (M = 1.64; n = 114) (Mann-Whitney U test, p = 0.014). Conversely, inspectors with a high or fairly high proportion of inspections in approved food premises (M = 1.65; n = 27) experienced a lower number of disagreements than inspectors with none or only a low proportion of their inspections in approved food premises (M = 1.91; n = 113) (Mann-Whitney U test, p = 0.043).

Most inspectors agreed (16.1% totally and 65.0% somewhat; N = 143) that the instructions for grading inspected items were good. Nevertheless, 31.1% (N = 145) of inspectors disagreed (29.0% somewhat and 2.1% totally) that Oiva guidelines were sufficiently clear. Nevertheless, most inspectors (67.4%; N = 144) answered that grading should allow for a small amount of openness to interpretation, while 25.7% (N = 145) of inspectors replied that there should be a moderately high amount of openness to interpretation. By contrast, very few wanted no openness to interpretation (5.6%, N = 144) or a high amount of

openness to interpretation (1.4%, N = 144).

Disagreements experienced over grading correlated significantly with the openness to interpretation of grading (Spearman’s rho = 0.44, p < 0.001), difference in risk perception with FBOs (Spearman’s rho = 0.36, p < 0.001), experienced challenges related to inspections (Spearman’s rho = 0.25, p = 0.003) and the motivation to guide FBOs (-0.24, p = 0.004) (Table 3). Openness to interpretation correlated significantly with experienced challenges related to inspections (Spearman’s rho = 0.33, p < 0.001) and risk perception (Spearman’s rho = -0.35, p < 0.001) (Table 3). The proportion of inspectors who perceived openness of interpretation to be moderately high or high was the largest for FBOs’ own-control plan, the adequacy and suitability of premises for operations, and FBOs’ own-control samples (Fig. 1). In turn, the proportion of inspectors who considered that there was no openness to interpretation was the highest in the grading of the hygiene proficiency certificate, displaying the Oiva report, and pest control (Fig. 1). The association between the means of topic-specific openness to interpretation and the means of topic-specific disagreements was significant (Spearman’s rho 0.654, p = 0.002).

With multiple linear regression, we identified the factors associated with inspectors’ disagreements over grading with FBOs. The analysis showed that disagreements over grading were positively associated with the openness to interpretation of grading (B = 0.37, p < 0.001) and differences in risk perception with FBOs (B = 0.12, p = 0.001) (Table 4).

4. Discussion

The vast majority of inspectors perceived the implementation of the Oiva system as positive change. Inspectors perceived that the disclosure

Table 4
Multiple linear regression model for disagreements over Oiva grading with food business operators (FBOs).

Variable	B	SE B	beta	p	95% Confidence interval	
					Lower	Upper
Perceived openness to interpretation of grading	0.37	0.08	0.37	<0.001	0.21	0.52
Difference in risk perception with FBOs	0.12	0.04	0.25	0.001	0.05	0.20
Motivation to guide FBOs	-0.18	0.11	-0.12	0.098	-0.40	0.03
Experience of challenges related to inspections	0.09	0.08	0.09	0.27	-0.07	0.26
Constant	1.12	0.49		0.023	0.16	2.09

R2 = 0.343, p < 0.001

Table 3
Spearman’s rho correlation coefficients between variables related to assessments, challenges, guidance of food business operators (FBOs) and risk perception.

Inspector’s	Disagreements over grading with FBOs		Perceived openness to interpretation		Experience of challenges related to inspections		Motivation to guide FBOs		Positivity about the Oiva system		Risk perception		Difference in risk perception with FBOs		
	rho	p	rho	p	rho	p	rho	p	rho	p	rho	p	rho	p	
Disagreements over grading with FBOs	1.00		0.44	<0.001	0.25	0.003	-0.24	0.004	-0.09	0.30	-0.14	0.09	0.36	<0.001	
Perceived openness to interpretation			1.00		0.33	<0.001	-0.25	0.003	-0.27	<0.001	-0.35	<0.001	0.25	0.002	
Experience of challenges related to inspections					1.00		-0.28	<0.001	-0.24	0.001	-0.11	0.18	0.26	0.001	
Motivation to guide FBOs							1.00		0.38	<0.001	0.30	0.000	-0.13	0.12	
Positivity about the Oiva system								1.00		0.28	0.001	0.28	0.001	-0.06	0.47
Risk perception										1.00		1.00		0.01	0.95
Difference in risk perception with FBOs													1.00		

of inspection results had positively affected the correction of non-compliances, and they reported an increased frequency of re-inspections. Re-inspections are important in verifying the correction of non-compliances, which may decrease food safety or mislead consumers. In an earlier study by [Läikkö-Roto, Mäkelä, Lundén, Heikkilä, and Nevas \(2015\)](#), uncorrected non-compliances and deficiencies in verifying the correction of non-compliances were recognized. The findings of this study indicate that the Oiva system and the disclosure of inspection results have led to improvements in food control. Similarly, inspectors in the UK and Brazil have also supported the implementation of disclosure systems and concluded that disclosure has improved food control ([Assan, 2019](#); [da Cunha et al., 2016](#)).

However, in the present study, many inspectors recognized deficiencies in the fairness of the system. Moreover, in an earlier study on FBOs' opinions of the Oiva system, many FBOs perceived the determination of the inspection result grade by the lowest grade as unjust ([Kaskela et al., 2019](#)), and also many inspectors in our study perceived this determination method as problematic. Some inspectors reported that deficiencies in the fairness of the system were related to the inconsistency of grading. Correspondingly, in research conducted only a few months prior to this study, many FBOs considered that grading was inconsistent in Finland ([Kaskela et al., 2019](#)). Only a small part of the variation in grading between food control units has been explained by different factors characteristic to different geographical areas ([Lundén, Kosola, Kiuru, Kaskela & Inkinen, 2021](#)). This means that a large part of the inconsistency is probably due to differences in the interpretation of food safety requirements. Grading inconsistency has also been recognized as a challenge in food control result disclosure systems in other countries ([Lee, Nelson, & Almanza, 2010](#); [Lee-Woolf, Bain, & Fell, 2015](#)), with discrepancies found to originate from the variation between inspectors ([Lee et al., 2010](#)). However, in Finland, implementation of the disclosure system, which includes grading guidelines, might have actually improved the consistency of food control. This study showed that almost one third of inspectors in Finland considered grading to be at least somewhat consistent in 2017. In 2011, before implementation of the Oiva system, only 7.3% of inspectors considered inspections to be consistent throughout Finland ([Läikkö-Roto et al., 2015](#)). This might indicate a rise in consistency, though there is still a clear need for improvement of consistency especially between local food control units.

Higher perceived fairness of the disclosure of food safety inspection results has been shown to associate with higher compliance ([Bavorova, Fietz, & Hirschauer, 2017](#)). Thus, it is also important for food safety that the disclosure system is perceived as fair. Deficiencies in the fairness of the system should thus be addressed, and the improvement of fairness should be monitored. Knowledge of the reasons leading to inconsistent grading, the topics where grading is especially inconsistent and the effect of different measures is essential for improving the consistency of grading. For example, the effectiveness of peer reviews have been demonstrated in increasing grading consistency in food control ([Ho, 2017](#)). However, to ensure effective improvement of perceived fairness, other possible factors that decrease the perceived fairness of the Oiva system, in addition to the inconsistency of grading and determination of the inspection result, should be recognized.

Previous research investigating Finnish FBOs' experiences of the Oiva system revealed that many FBOs disagreed with inspectors' grading ([Kaskela et al., 2019](#)). Correspondingly, this study showed that most inspectors had experienced disagreements over grading with FBOs related to most topics, and for some topics many inspectors had encountered a high number of disagreements. In our study, similar to the service sector FBOs in [Kaskela et al.'s study \(2019\)](#), inspectors with a high proportion of inspections in the service sector reported a higher number of disagreements. This finding is probably related to the fact that service FBOs had a lower perception of risk than FBOs in other sectors, as FBOs' risk perception has been shown to associate with disagreements over grading ([Kaskela et al., 2019](#)). Our linear regression model showed that the more inspectors felt the grading to be open to

interpretation, the more they experienced disagreements with FBOs over grading. Inspectors who perceive the grading to be open to interpretation potentially view it as subjective and difficult to justify clearly to FBOs. This might lead to a higher number of disagreements. Interestingly, also the topic-specific means of openness to interpretation and disagreements were positively associated. Therefore, the number of disagreements experienced with FBOs could possibly be reduced by decreasing the openness to interpretation of grading. Decreasing the openness to interpretation of grading by implementing clear, uniform grading policies in food control could not only improve grading consistency, but also increase perceived fairness and trust.

Both openness to interpretation and disagreements were perceived to be especially high in the grading of the adequacy and suitability of premises for operations and FBOs' own-control samples. The grading guidelines used in 2017 might have been difficult to interpret. However, it is particularly challenging to formulate simple grading guidelines for the adequacy and suitability of premises, because many possible solutions exist for FBOs to achieve compliance. New guidelines for FBOs' own-control sampling were published after the study ([Finnish Food Authority, 2018](#)). Considering the high number of disagreements that inspectors had experienced over the grading of FBOs' own-control samples, the appropriateness of new guidelines should be ensured. It is also important to acknowledge that correction of non-compliances related to FBOs' own-control samples and the adequacy and suitability of premises might require financial investments from FBOs, possibly creating more frequent disagreements. This highlights the importance of equal treatment and consistent grading in these areas. Moreover, it is important to recognize that inspectors may need more support and education in this regard.

However, the openness to interpretation of food safety legislation and the grading of inspection findings is a multifaceted phenomenon. Some openness to interpretation enables FBOs to adjust the implementation of food safety regulations to their own business needs. Therefore, some openness to interpretation is necessary in legislation and guidelines. Indeed, this study demonstrated that most inspectors also preferred grading be open to interpretation to a small degree. Interestingly, a small minority of inspectors preferred to have either no or a high amount of openness to interpretation. This highlights differences in inspectors' willingness or capability to make their own interpretations on how the food safety requirements should be implemented and graded. The openness to interpretation of grading sets demands on inspectors' expertise. Thus, inspectors facing difficulties in a grading situation that demands interpretation should be supported. On the other hand, inspectors who are highly motivated to make their own interpretations may cause inconsistencies in grading, and thus certain limits for interpretations are required in order to assure an adequate level of consistency.

Inspectors tend to attribute the highest food safety risk to situations involving a factor recognized as a risk for a food-borne epidemic by the [European Food Safety Authority & European Centre for Disease Prevention \(2019\)](#). Moreover, the present study found that, compared to FBOs in a study by [Kaskela et al. \(2019\)](#), inspectors assessed the food safety risks as higher in high-risk situations and lower in low-risk situations. In addition, inspectors in our study displayed less variation in their perception of risk than the FBOs in [Kaskela et al. \(2019\)](#). The higher consistency of risk perception among inspectors may stem from inspectors' more extensive and uniform food-safety-risk education. However, these results on the consistency of risk perception may also have been affected somewhat by differences in study design: FBOs were requested to assess the risks related to their own food sector, while inspectors were not requested to consider a certain food sector. Moreover, risk perceptions have often been shown to depend on age and gender ([Siegrist & Árvai, 2020](#)). Nevertheless, the present study found no significant differences in risk perception between inspectors of different ages or gender. This too may be the result of food safety education.

In addition, we observed that inspectors with a higher proportion of

inspections in food production premises had a significantly higher perception of risk than other inspectors. This is understandable, as food products may be distributed widely, and processes may involve high risks to food safety. By contrast, we found no association between a higher perception of risk and giving a higher frequency of “To be corrected” or “Poor” grades or with a higher number of disagreements over grading during 2016. This finding is interesting, as Kaskela et al. found FBOs’ risk perception to be associated with received “To be corrected” or “Poor” grades and disagreements over inspector grading in that same year (Kaskela et al., 2019). Our results indicate that the measured differences in risk perception have only weak or insignificant association with risk mitigation demands, as suggested in some other studies (Rundmo & Moen, 2006; Sjöberg, 1999). This also may imply that grading guidelines strongly steer grading.

Inspectors relatively often experienced differences in perceived risks with FBOs. Moreover, a higher level of such differences predicted more disagreements over grading. Consequently, differences in perceived risk may cause disagreements over grading. FBOs should understand the food safety risks related to detected non-compliances in order to understand why a certain grade is given and to correct non-compliances appropriately and maintain compliance. A lack of adequate food safety knowledge has been recognized as a barrier to compliance among FBOs (Yapp & Fairman, 2006). This highlights the importance of explaining the food safety risk related to detected non-compliances. Adequate knowledge of food safety risks is crucial not only for FBOs but also for inspectors, as it allows them to perform grading appropriately and explain the grading based on a certain risk. In particular, areas with a high amount of openness to interpretation require profound knowledge and understanding of food safety risks.

This study is representative of the perceptions of Finnish food safety inspectors, as we received answers from the majority of Finnish food control units. However, one limitation of the study is its inability to demonstrate causal relationships. Moreover, all the items measured in the study were based on the judgement of inspectors. Thus, for example, disagreements with FBOs over grading were studied from the perspective of inspectors. Consequently, the perceived number of disagreements may be influenced by an inspector’s ability to notice disagreements and the nature of the dialogue and relationship between the inspector and the FBO. Nevertheless, awareness of the views of inspectors represents valuable information that can be used in developing food control.

In conclusion, inspectors supported disclosure and considered that the Oiva system had improved food control. However, improvements in the consistency of grading are required to increase the fairness of the system. Inspectors are in particular need of further training and support in areas perceived as being the most open to interpretation and where the number of disagreements experienced with FBOs was the highest. Importantly, most inspectors preferred grading to be at least somewhat open to interpretation, which is important, as it enables risk-based food control. Applying risk-based food control requires understanding of food safety risks; therefore, it is important to ensure that inspectors possess adequate knowledge of these risks.

Declaration of competing interest

None.

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Appendix A. Supplementary data

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