Ipsos MORI
Social Research Institute

The use of a spotter initiative to assist post mortem inspection in UK slaughterhouses

Contents

Glossary

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Ante-mortem Inspection	The checks are usually carried out by the Official Veterinarian (OV) and must take place before an animal can be slaughtered (if an animal is slaughtered without ante-mortem inspection then it must be declared unfit for human consumption). The OV checks for any signs of disease, injury, fatigue, stress and mishandling. The animal can then proceed to be slaughtered.
Enforcement action	Action required that pertains to a breach in legislation, non-compliance or an endangerment to food safety that is enforced by the official vet of a plant.
Food Business Operator (FBO)	The Food Business Operator (FBO) is the legal person/s responsible for ensuring that the requirements of food law are met within the food business under their control.[1] Throughout this report, the FBO refers to the person who self-defined as such during the case-study visit.
Food Standards Agency (FSA)	The FSA was created in 2000 as a non-ministerial government department, governed by a board, and tasked with protecting consumers in relation to food. It is the role of the Agency to help ensure that the meat industry safeguards the health of the public, and the health and welfare of animals at slaughter.
Hazard Analysis and Critical Control Point (HACCP)	HACCP is a system which a Food Business Operator (FBO) (excluding farmers and growers) is required to have in place to implement and maintain hygiene procedures by identifying food safety hazards and ensuring they are controlled for.
Lairage	The lairage is the area where animals are held before slaughter. This is usually where the ante-mortem inspection takes place.
Meat Hygiene Inspector (MHI)	They carry out a number of official tasks including post-mortem inspections.[2]
Offal	Offal refers to the internal tissue of a dead animal excluding the carcass and bones. This is further divided into red offal (including heart, lungs, liver and kidney) and green offal (including stomach and intestines).
Official Veterinarian (OV)	They perform a range of official tasks, including ante-mortem inspections, and have responsibility for keeping a record of the findings of the inspections, including details of contraventions, actions required and monitoring of these actions.
Plant Inspection Assistant (PIA)	Plant Inspection Assistants (PIAs) are employed by the FBO, typically work in white meat plants, and are responsible for post mortem inspection but sometimes carry out evisceration.
Post-mortem Inspection (PMI)	Inspection carried out after the animal has been killed and processed through the plant. The inspection is usually carried out by the Meat Hygiene Inspector (MHI) (but occasionally by the OV) and involves checking the carcass and head for signs of disease or meat that is not fit for human consumption. If the carcass is passed fit for human consumption then it will receive a health mark; at other

[1] Regulation (EC) 178/2002

[2] The OV need not be present during post-mortem inspection if:

- an MHI carries out post-mortem inspection and puts aside abnormal meat with uncommonly occurring conditions and all other meat from the same animal;
- the MHI documents their procedures and findings in a manner that allows the OV to be satisfied that standards are being met, and:
- the OV subsequently inspects all such meat.

	times the whole carcass or parts of it will be declared unfit for human consumption.
Quality Control	A line operative who is nominated by the FBO to perform a quality control role. The person is usually positioned just before an official meat inspection point where they are responsible for presenting a well-dressed carcass for inspection i.e. any contamination is remove prior to inspection.
Service Delivery Manager	FSA official with overall manage responsibility for a cluster of slaughterhouses

Executive summary

Executive summary

In 2014, the Food Standards Agency (FSA) commissioned Ipsos MORI to examine if and how slaughterhouse line operatives could assist meat hygiene inspectors in their detection of unsafe meat.

In examining the trial, the FSA asked Ipsos MORI to assess its effectiveness and impact using the following criteria:

1. Detection – the operation of the spotter initiative will increase, decrease or have no discernible effect on the overall level of abnormality and contamination detection rates by officials within a slaughterhouse.

2. Accuracy – spotters can either be accurate or inaccurate in the identification of abnormalities and contamination.

3. Ownership within operatives – sense of ownership[3] around ensuring food safety will either increase or decrease or remain unchanged amongst slaughterhouse staff when the spotter initiative is adopted.

4. Views of Meat Hygiene Inspectors (MHIs) – amongst MHIs, attitudes towards their role / food safety may be positively or negatively affected by the introduction of the spotter initiative.

A mixed method study was used to examine the four research areas.

- Collection and analysis of pre and post intervention detection rates – using a quasi-experimental approach detection rates pre and post intervention in each of the eight trial plants were compared with a control group of eight matched plants.

- Collection and analysis of trial data: count of spotter's accuracy – this provided trend data for each trial plant and when reviewed alongside findings collected in case study visits helps to strengthen the conclusions.

- A longitudinal case study approach – to complement quantitative data collection, a case study approach was deployed to provide a detailed understanding of trial implementation and perceived impact.

Key findings

A scoping report[4] conducted at the outset of the study provided evidence of comparable initiatives in other sectors. A key finding is there could be scope for non-specialist staff in the meat industry to play a role in detecting abnormalities and contaminations, without this having a negative impact on public health. Analysis of data pertaining to the four criteria used to assess the spotter initiative further strengthens the conclusion that

[3] In 2012, Ipsos MORI published findings from the Slaughterhouse Social Science Research Project which can be accessed at: https://www.food.gov.uk/sites/default/files/795-1-1408_FS145004_-_Social_Science_in_Slaughterhouse_0.pdf. The report identified a number of factors that facilitate ownership of food safety. These include views of food safety risks among slaughterhouse staff, resources available to an FBO, a slaughterhouse's relationship with their customers, a line operative's perception of their role, and relationships between slaughterhouse staff and officials. For the spotter study Ipsos MORI have explored ownership of food safety using just one of these factors: views of food safety risks since the trial is aimed at raising awareness of abnormalities and increasing their detection.
[4] This report forms part of the evidence base for deciding whether or not to roll-out the spotter initiative more broadly.

line operatives can play an important role in assisting in the identification of abnormalities. The key findings in relation to each criterion are discussed below.

Detection rates of abnormalities and contamination

- There are significant differences in the number of contaminations in sheep for trial and control groups. While control groups saw an increase in the number of contaminations, the trial group saw a decrease. This suggests the trial had an impact on the amount of contaminations in sheep.

- There are significant differences in the number of sheep and pig abnormalities in trial and control groups. In both species there was an increase in the number of abnormalities in the control group and a decrease for the trial group, meaning there was a large difference in difference.[5] This is a positive finding as it suggests fewer cases of abnormalities were missed on the production line in the trial group.

Accuracy of "spotting"

- Involvement in the trial was reported to increase a spotter's accuracy in terms of their ability to identify abnormalities, which can be detected without incision or palpation.

- As the trial progressed spotters developed a more detailed understanding of different types of abnormalities, what symptoms / conditions might indicate their presence, and the position on a carcass where they can occur.

- Despite the seemingly positive impact on accuracy, there were occasions during the trial period when the number of missed abnormalities increased. This occurred when the spotter failed to tag and did not verbally communicate an abnormality. This suggests that a tagging system is crucial.

Ownership of food safety

- Spotters developed a more comprehensive understanding of food safety risks, in particular around abnormalities.

- Spotters applied this knowledge and became extra vigilant in checking for abnormalities. Although this did happen prior to trial implementation, it was often a cursory check at best.

- In general line operatives worked hard at becoming an effective spotter. They saw the spotter trial as a challenge and tried to prove they could accurately "spot".

- The trial also impacted line operatives that did not carry out the spotter role. For this to happen, "ordinary" operatives had an interest in the trial and interacted with officials to learn about defects.

[5] The data provided by the FSA enabled statistical analysis to establish the effect the trial intervention had on abnormality detection rates, using a difference in difference methodology. This is a recognised approach for evaluating the impact of an intervention on a treated group with a matched control sample and where data have been collected both pre and post-intervention. The significance testing was carried out using a Poisson random effects model. The model is used to test whether the interaction of the predictors of the outcome ((e.g. time (pre/post trial); treatment (whether or not in the trial group)) is significantly related to the outcome (e.g. rate of abnormality/contamination), since this indicates there is a significant impact of being in the trial group. This is known as a significant difference in difference.

Views of Meat Hygiene Inspectors towards the trial

By the end of the trial most MHIs involved gave conditional support for the spotter initiative despite initially being against it. MHIs believed the trial had the overall aim of reducing their number and /or replacing them altogether with FBO staff.

However, their involvement in the trial; having seen it work in practice, and properly understood why it was trialled led many to see it could contribute to improved public health outcomes. Some felt they could be even more supportive if the following measures were implemented, namely:

- An assurance from the FSA that a rolled-out spotter initiative would not affect MHI employment prospects. Without this, some MHIs refused to support it; and some said they would be reluctant to be involved in it if it was rolled out more widely.

- A spotter must always assist post mortem inspection and should never be responsible for its delivery even if they equipped to do so, due to the potential for conflict of interest whereby a spotter could be influenced by the FBO.

- It must be the most experienced operatives selected as spotters since they have a basic level of knowledge of abnormalities.

- A briefing session like the one that was trialled is inadequate for the responsibility associated with having a formalised role in post mortem inspection. Further classroom based training and "on the job" training coaching would be required before they can be considered suitable.

Implications of trial challenges on research findings

The findings set out in this report suggest that the use of a spotter initiative in UK slaughterhouses could lead to a number of key benefits including higher detection rates and the adoption of proactive behaviours to mitigate food safety risks. These benefits have the potential to realise improved public health outcomes.

A decision on whether a spotter initiative is rolled out more widely will partly be informed by evidence in this report. The conclusions in this report should be read alongside methodological and trial challenges which may have biased the overall findings: namely:

- Selection of spotters – despite instruction to the contrary, many FBOs, in medium and large throughput plants, selected operatives who were specialist staff. They carried out a quality control role whereby they are responsible for presenting a clean carcass for post mortem inspection. Consequently, they had a better understanding of pathologies than 'ordinary' line operatives, both in terms of symptoms and where on a carcass they can occur.
- Sample limitations – despite the implementation of a pre-trial communication strategy run by the FSA and Ipsos MORI project teams and deploying engagement measures throughout the trial period, it was not possible to achieve the desired sample. This was due to an FBO of a large plant being unable to commit to the trial, and in addition a couple of plants pulled out part way through and it was not possible to replace like with like. Consequently, the sample size was small and was skewed towards plants which FSA information showed had an audit compliance rating of satisfactory or better. This has implications for the strength of conclusions on all four assessment criteria.
- Variation in implementation – despite running a spotter briefing session in each trial plant, there was variation in terms of its implementation "on the ground". Although this provides learning in the event the initiative is rolled out more widely, it does mean that between plant comparisons are more difficult.

Despite these issues, the synthesis of quantitative and qualitative data in this report provides more robust conclusions than would otherwise be possible if only a single methodology had been chosen. The report discusses trial implementation and explores each of the four criteria used to assess the trial's impact. The final chapter presents conclusions and details key learning points for wider roll-out of a spotter initiative more widely.

Introduction

1 Introduction

In 2014, the Food Standards Agency (FSA) commissioned Ipsos MORI to examine if and how slaughterhouse line operatives could assist meat hygiene inspectors in their detection of unsafe meat. This initiative was named the spotter trial.

The report synthesises qualitative and quantitative data to provide conclusions on the effect of the trial. It also details learning and best practice recommendations for the successful implementation of the spotter initiative more widely.

1.1 Background

The Food Standards Agency (FSA) regulates the whole food industry – from farming, food production and distribution, to retail and catering. It delivers official controls such as inspection for the verification of compliance with food law and takes enforcement action where non-compliance is identified.

Officials (i.e. Meat Hygiene Inspectors) are permanently present to conduct post mortem inspection of animals in approved slaughterhouses. This is aimed at ensuring the removal of abnormalities and contamination present in the meat which could be indicative of a public health issue.

In UK slaughterhouses, the responsibility for producing safe food lies with the Food Business Operator. The FSA wanted to investigate what outcomes might occur if production line operatives had a formalised role in assisting officials in post mortem inspection, by flagging any abnormalities they identify during animal processing. To reflect the task which an operative would be asked to perform during the trial they were assigned the term “spotter”. The FSA suggested the benefits of involving operatives in this way may be:

- Firstly, the fact that officials are informed by additional input from line operatives may mean that officials can focus their inspection on flagged meat defects. This may enable them to detect abnormalities at an increased rate.

- Secondly, encouraging line operatives to actively assist meat hygiene inspectors may instil a greater sense of “ownership” towards meat-safety responsibility. Greater abnormality detection rates and a greater sense of ownership are expected to contribute to the production of meat fit for human consumption, and as a result lead to better public health outcomes.

1.1.1 Research into food safety ownership among slaughterhouse staff

A scoping report conducted at the outset of the study provided the FSA with evidence of comparable initiatives in other sectors. A key finding is there could be scope for non-specialist staff in the meat industry to play a role in detecting abnormalities, without this having a negative impact on public health. This report forms part of the evidence base for deciding whether or not the spotter initiative is rolled out more widely.

Desk research also highlighted that measuring ‘ownership of food safety’ would be challenging as it has no formal definition. In 2012, Ipsos MORI published findings from the Slaughterhouse Social Science Research Project[6] identifying a number of factors that facilitate ownership of food safety. These include views of food

[6] https://www.ipsos-mori.com/researchpublications/publications/1569/Slaughterhouse-Social-Science-Research-Project-for-the-Food-Standards-Agency.aspx

safety risks among slaughterhouse staff, resources available to an FBO, a slaughterhouse's relationship with their customers, a line operative's perception of their role, and relationships between slaughterhouse staff and officials. For the spotter study Ipsos MORI have explored ownership of food safety using just one of these factors: views of food safety risks; this is because the spotter initiative is aimed at raising awareness of abnormalities and increasing their detection.

1.2 Study scope and methodology

In examining the trial, the FSA asked Ipsos MORI to assess its effectiveness and impact using the following criteria:

1. Detection – the operation of the spotter initiative will either increase or decrease or have no discernible effect on the overall level of abnormality detection rates by officials within a slaughterhouse.

2. Accuracy – spotters can either be accurate or inaccurate in the identification of abnormalities and contaminations.

3. Ownership within operatives – sense of ownership around ensuring food safety will either increase or decrease or remain unchanged amongst slaughterhouse staff when the spotter initiative is adopted.

4. Views of Meat Hygiene Inspectors – amongst officials, attitudes towards their role / food safety may be positively or negatively affected by the introduction of the spotter initiative.

A mixed method study was used to examine the four research areas.

1.2.1 Collection and analysis of pre and post intervention detection rates

Using a quasi-experimental approach detection rates pre and post intervention in each of the eight trial plants were compared with a control group of eight matched plants. Plants were matched by level of throughput (i.e. number of animals processed in each year) and also their audit compliance rating. Matching was particularly important as a number of other factors are likely to influence detection rates, such as seasonal differences which may affect the condition of livestock supplied to slaughterhouses.

The data provided by the FSA enabled statistical analysis to establish the effect the trial intervention had on abnormality detection rates, using a difference in difference methodology. This is a recognised approach for evaluating the impact of an intervention on a treated group with a matched control sample and where data have been collected both pre and post-intervention. The significance testing was carried out using a Poisson random effects model. The model is used to test whether the interaction of the predictors of the outcome ((e.g. time (pre/post trial); treatment (whether or not in the trial group)) is significantly related to the outcome (e.g. rate of abnormality/contamination), since this indicates there is a significant impact of being in the trial group. This is known as a significant difference in difference.

1.2.2 Collection and analysis of trial data: count of spotter's accuracy

The spotter initiative involved line operatives inserting a plastic tag into a carcass if they believed it warranted further inspection by an official. Using their expertise, the official recorded whether the spotter was correct or not. Each trial plant was sent an online questionnaire which required the official to input data for each day processing occurred. This provided trend data for each trial plant and when reviewed alongside findings collected in case study visits helped to strengthen the conclusions.

1.2.3 A longitudinal case study approach

To complement quantitative data collection, a case study approach[7] was deployed to provide a detailed understanding of trial implementation and perceived impact. The approaches utilised were:

- A one-day on-site visit to each of the trial plants c. 2 weeks after the spotter initiative briefing. Slaughterhouse staff including the FBO, line operatives (those selected as spotters and those who were not), and officials were interviewed so that views could be triangulated. The focus of these interviews was the briefing session trial implementation, with a focus on emerging good practice.

- Follow-up telephone interviews with the FBO c.7 weeks after the trial began. These interviews focused on the four criteria for assessing the trial's impact.

- A second one-day on-site visit took place c.14 weeks after the trial began. The same individuals were interviewed but with a focus on impact.

Case study selection

To understand the spotter initiative in a range of contexts, the sample matrix covered a mix of plants in terms of:

- Throughput (i.e. number of animals processed) to understand how the trial worked in plants that have differences such as physical space for processing, size of workforce etc.

- FSA audit compliance rating[8] which provided a proxy for food safety ownership.

The initial sampling matrix was designed to be reflective of the range of slaughterhouses in the UK. There were originally 11 slaughterhouses taking part in the trial, and 11 matched controls. There are sixteen plants in the achieved sample, which can be seen below. Two plants pulled out despite alternative dates being offered. Another one was unable to continue as they weren't able to run it every day for the 12 week duration of the trial.

	Size of slaughterhouse (i.e. throughput)					
	High		Medium		Low	
	Trial	Control	Trial	Control	Trial	Control
Active	1	1	0	1	2	2
Broad	1	0	0	0	3	3
Weak	0	0	0	1	1	1
Sub-total	2	1	0	2	6	5
Total	16					

[7] The implementation of the case studies is outlined in the appendix of the report.
[8] Audits of meat establishments have two key aims. First, to make sure that FBOs are complying with food law requirements. Second, to ensure that FBOs are meeting relevant standards in relation to public health, and in slaughterhouses, animal health and welfare. The audits look at the effectiveness of the food business operator's food safety management systems .The dataset provided by the FSA categorised slaughterhouses into one of three outcome compliance ratings: active, broad, weak. In 2014, the FSA updated its audit outcome compliance ratings as good, generally satisfactory, improvement necessary, and urgent improvement necessary. For the purposes of this study we

1.3 Interpreting the findings

The views expressed are those of the participating slaughterhouse staff and officials alone. It should be noted that these views and perceptions may not be factually accurate, but they represent the truth to the participants themselves. Moreover, as with any qualitative research, Ipsos MORI is unable to make inferences about whether the views of those sampled are representative of those of the wider population of similar audiences; this is due to the small sample size and the large self-selection element in this research. Rather, the qualitative case studies provide in depth insights into the views and perceptions of participants to understand the implementation of the spotter initiative 'on the ground'. Equally, quantitative data (i.e. abnormality detection rates in each slaughterhouse) cannot be deemed to be representative of all slaughterhouses, but only those that took part in the trial. Detailed discussion on interpreting analysis of detection rate data can be found in chapter 3.

The remainder of this report is structured as follows:

2 The spotter trial – sets out the aims of the trial, its design and pre-trial activities. It also includes a case study on each of the trial plants to illustrate how it was implemented in each of them and any modifications made.

3 Objective 1: detection – explores whether the operation of the spotter initiative increased or decreased or had no discernible effect on the overall level of abnormality and contamination detection rates by MHIs within a slaughterhouse.

4 Objective 2: accuracy – explores a spotter's accuracy when it comes to identifying abnormalities and contamination.

5 Objective 3: ownership of food safety among line operatives – explores whether ownership towards food safety increased or decreased or remain unchanged among line operatives.

6 Objective 4: views of meat hygiene inspectors – discusses their views of the trial, and whether their attitudes towards their role/food safety are positively or negatively affected by the introduction of the spotter trial.

7 Conclusions and key learning points – sets out the study conclusions and provides details of the key learning points for the successful roll-out of the spotter initiative.

The spotter trial

2 The spotter initiative

This chapter sets out the aims of the spotter initiative, its design and activities undertaken prior to its implementation. It uses case studies to illustrate how it was implemented in each of the trial plants and any modifications to its initial design.

2.1 Aims of the spotter initiative

The aim of the spotter initiative was to investigate if and how slaughterhouse line operatives could assist meat hygiene inspectors in their detection of unsafe meat. Specifically, to what extent could an operative flag up the abnormality / defect to assist the official inspection.

2.2 Trial design

The initiative was designed to assess its effect using the FSA's key criteria: abnormality detection rates; accuracy of spotters' detections; ownership of food safety among spotters; and among MHIs, their views of the trial's impact on food safety as well as how they perceive their own role.

2.2.1 Mechanics of the spotter trial

The role of the spotter was carried out by line operatives, who were selected by the FBO in each trial plant. The trial design required by the FSA was a maximum of three spotters, with each one positioned at a specified point in the slaughtering process. First, the point at which the hide is removed from the animal i.e. de-hiding. Second, at the evisceration point – where the offal[9] is removed from the carcass. Third, just after this stage, where the red offal is processed separately from the rest of the carcass.

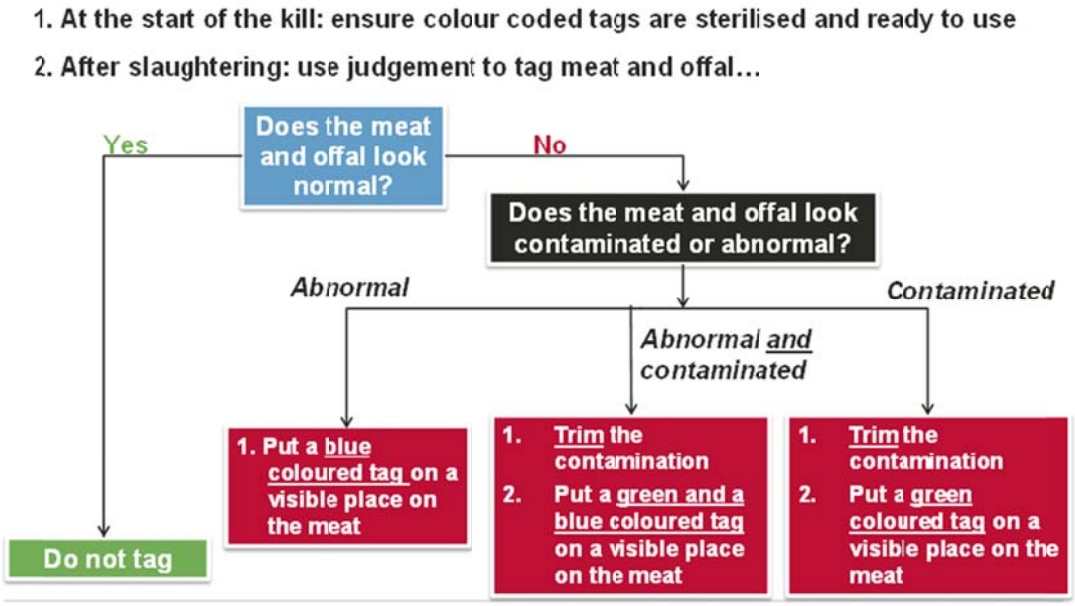
The number of spotters in each plant was determined by its level of throughput. In medium or large plants, line operatives often have a station "on the line" where they carry out a specific task for the duration of their shift. In these plants, up to three spotters were required to fulfil each of the required spotting positions. Lower throughput plants, have fewer operatives, and in general they are all involved in a variety of tasks throughout the slaughtering process. In these plants, it was only necessary to have one or two spotters.

2.2.2 Implementing the spotter initiative

Spotters were asked to identify abnormalities and contaminations by using coloured plastic tags. Each spotter was given a container with two sets of sterilised tags. If a spotter detected contamination, they inserted a blue tag and a green tag was inserted to denote an abnormality. In order to avoid the potential risk of cross contamination while ensuring abnormalities and contamination were easily visible the tags were placed on an accessible area of the meat (e.g. the back of the animal) or on the lungs of the offal as opposed to on the abnormality or contamination. As required by food safety legislation, spotters were required to trim off contamination once they had tagged it, but if gross contamination occurred then the carcass/ offal was detained for further inspection.

[9] 'Red offal' such as the heart, lungs and liver are removed and are processed as a product for human consumption and 'green offal', such as the digestive tract and associated organs is either disposed of or used to produce certain bi-products e.g. tripe.

Figure 1 – how tagging worked in practice

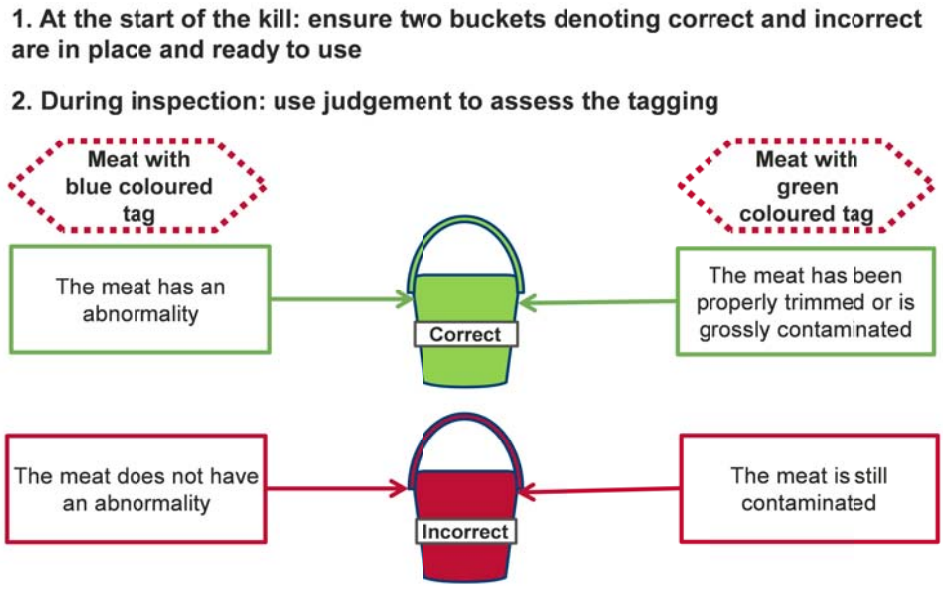


Spotters tagged once per piece of meat or offal rather than per instance of abnormality or contamination so there could only be a maximum of two tags per piece of meat or offal – one of each colour. This reduced the burden on the spotter and made it fairly easy for an MHI to record a spotter's accuracy.

2.2.3 Recording trial data and the role of the inspection team

Inserting tags on the carcass or offal was intended to draw an MHI's attention who would then carry out post mortem inspection. Throughout the trial they used their expertise to judge a spotter's accuracy. If an MHI thought the meat had been tagged correctly they were asked to place a tag into a container denoting "correct" spots. There was another container for tags that would denote an "incorrect" spots. If an MHI detected contamination or an abnormality which had not been tagged, they would note this down as a "missed" spot.

Figure 2 – The role of the Meat Hygiene Inspector



The method for assessing accuracy of contamination and abnormalities was different. Because an FBO, is legislatively required to trim contamination, if an MHI saw a carcass without contamination but with a green tag inserted they were instructed to consider it an accurate "spot". This is because the count of correct / incorrect tags relied upon a line operative adhering to food safety protocol.

The number of tags in each container was fed back to the Ipsos MORI project team. For this to happen, a survey link was sent to the inspection team via email, which was completed at regular intervals during the trial (e.g. at the end of the day or week). The Ipsos MORI project team recommended that this task was undertaken by the OV in order to reduce burden on MHIs, but in practice it varied from plant to plant.

2.2.4 Pre-trial activities

FSA engagement with officials and other key stakeholders

Prior to and during the recruitment phase of the trial, the FSA ran an extensive engagement and communication strategy in order to engage FSA officials, representatives from the meat industry and other key stakeholders.

Internal engagement included the publication of an article in the Inspector magazine (a monthly printed newssheet for FSA Operations staff) as well as an article in the "Tec Files", a monthly publication produced in-house also for issue to FSA operational staff. These articles covered the rationale behind the trial. A page on FSA's website[10] was created with further information on the trial and how it would be assessed – a link to this page was posted on the FSA's Yammer page (a social media account which the FSA uses to cascade information to its staff).

Additionally, the FSA meat hygiene policy team discussed the initiative with the FSA's Operations Group[11] , including the devolved offices and contractors to ensure that officials based in slaughterhouses and their line managers were aware the trial was going ahead. In terms of industry representatives and other key stakeholders, the FSA held discussions with the Association of Independent Meat Suppliers (AIMS) and The British Meat Processors Association (BMPA) to raise awareness of the trial. An informative Q&A document was also circulated to all relevant parties, including UNISON and the FSA's devolved offices.

Engagement with slaughterhouses and officials

To complement the FSA communication work, the Ipsos MORI project team implemented a recruitment and engagement strategy. At the recruitment stage, the FBO and inspection team were sent an initial letter requesting participation in the trial. A few days later a member of the Ipsos MORI project team worked through a sample inviting slaughterhouses to participate in the research.

Once the plants had been recruited and assigned into the trial group, each was assigned a researcher. The researcher communicated regularly with the FBO to ensure they understood the purpose of the trial, its design and research requirements. Researchers used a pro-forma to capture information about each trial plant including workforce structure and size; and the inspection team structure and size. This helped to ensure that practical considerations, such as the number of spotters required and responsibility for recording spotter

[10] https://www.food.gov.uk/enforcement/monitoring/meat/reviewofmeatcontrols/spotter-trial
[11] The FSA Operations group ensures consistency in compliance and enforcement within the UK and across food industry sectors. It was formed in 2010, when the Meat Hygiene Service merged with the FSA.

accuracy data, were all established and agreed prior to the start of the trial. If trial plants were part of a chain, regional and technical managers were also contacted and included in arrangements for the research visits.

Researchers also engaged with officials in each of the trial plants, and Service Delivery Managers, and their line managers, to answer any questions and concerns as well as to provide more detailed information than could be included in the initial letters.

Briefing session

Before the official start to the trial, a date was arranged with the FBO for a spotter briefing session to take place. The aim of the session was to brief line operatives, FBOs and officials in the spotter initiative and how it was designed to work in practice.

The session was designed for a non-specialist audience so that by the end of it a spotter felt capable of distinguishing between meat which is 'normal' and 'abnormal'. The information conveyed was basic, pointing to things like colour, shape, smell and size. Furthermore, it covered the process for judging accuracy of spotting and recording and returning this data.

The session was also designed to be as brief as possible in order to minimise the amount of time staff and officials were away from their work, whilst still long enough so attendees understood the trial's purpose, and how it should run. The session lasted approximately 40 minutes with enough time for a question and answer session. Each session was run by a suitably qualified individual who was unaffiliated and independent, but had extensive knowledge of the meat industry, having previously worked for FSA as an official. They were identified by the FSA

2.3 The trial in practice

The section contains a case study on each of the trial plants; covering details of the plant, the way in which the trial was implemented and resultant implications and key learning. It starts with a summary of the common factors which influenced trial implementation.

Most spotters had long-term experience in slaughterhouses

The trial was designed so that a production line operative could carry out the role of a spotter. FBOs were asked to select line operatives who, in their day-to-day role, carried out one of the following tasks: de-hiding, evisceration and removal of offal.

In practice, however, the spotter role was typically assigned based on experience. FBOs thought taking on extra duties could slow the pace of production and were concerned this would have implications for their ability to fulfil customer orders. As a result, spotters were often better trained than other ordinary line operatives and in addition were often involved in quality control. In a number of plants, this also resulted in a design which did not include all of the required spotting stations.

Stage in processing where spotting occurred

Spotting was rarely carried out at all of the required spotting points along the production line. The de-hiding point was considered impractical in many trial plants. Most plants did not assign a spotter to this position, but in those that did, there were concerns that the position was too early on in the slaughtering process. Because

contamination usually occurs due to the process itself, some spotters placed a tag on the carcass prior to the hide being removed.

Larger plants found a separate position for tagging offal impractical. Hanging the offal is considered a fairly low skill task so it tends to be carried out by an operative who is relatively inexperienced. FBOs considered such operatives unsuited to the role of spotting. Indeed, a common spotting position in large plants was the end of the line by an operative who carries out a quality control function; they tend to have long-term experience of working in slaughterhouses. This is further discussed in Chapter 4.

In smaller plants there were typically two or three operatives and it was common for there to be a nominated spotter while their colleagues assisted in identifying defects. Any uncertainty an "unofficial spotter" had regarding tagging criteria was quickly overcome by the advice of the spotter.

Inconsistent application of tags to identify abnormalities and contaminations

There was variation in the application of tags. In one plant, they were not used due to a concern they would result in cross contamination despite instruction to sterilise. In most plants, tags were initially used, but ultimately discarded.

Many plants found it more practical for spotters to flag up abnormalities and contaminations by pointing to them on the carcass or speaking directly to an MHI. This method was fairly easy to implement in smaller plants due to the limited space in the slaughtering area, but also in larger plants where spotting was carried out by the operative who was positioned next to the final inspection point.

Case Study 1

Plant details

This is a large/very large plant with throughput of 45,000-50,000 animals per year. The plant slaughters cattle 5 days a week. According to FSA information it has an active compliance rating. This plant is run by a site manager who is the nominated FBO. There are approximately 29 workers on the production line, with two staff who carry out a quality control function just before post mortem inspection. They stand either side of the carcass. The inspection team consists of three full time MHIs and one full time OV. The trial ran for 14 weeks between November 2014 and January 2015.

Trial in practise and implications

The first spotting station was at de-hiding. Although this is in line with the trial design, the fact that the process creates contamination resulted in this spotter tagging every carcass by default. Consequently, the spotter would apply a tag without doing a thorough check.

There was no spotter at the offal station. The FBO did not consider the operative who presented offal for inspection – sometimes called “the pluck” – to be an appropriate person. They did not have the long-term experience they felt was needed to spot abnormalities, despite the operative having attended the briefing session. In addition, the FBO was concerned a high number of missed defects might have a detrimental impact on the plant’s reputation with the FSA.

The trial was designed to have production line operatives as spotters i.e. those who had not been trained in quality control. However, the FBO at this plant chose to appoint one of his QC staff as a spotter. He thought they would make an effective spotter. Their proximity to the MHI facilitated feedback on their accuracy.

Data was inputted regularly and correctly by the inspection team.

Key learning

The de-hiding position may not be an effective spotting position.

The QC position worked well in this plant. The spotter was able to tag any defects that had been missed before the PMI.

In medium / large plants the optimum positions for tagging may be the evisceration point and the QC point.

Case Study 2

Plant details

This is a very small, micro-plant that kills less than 500 animals per year. The plant slaughters cattle, sheep and pigs around three times per month. According to FSA information it has a weak compliance rating. There are two line operatives, one of whom is the FBO. The trial ran for 14 weeks from October 2014 until January 2015.

Trial in practise and implications

The visits to this plant highlighted the differences between the larger and smaller slaughterhouses. At this plant, there are two line operatives who work together in processing, and as spotters. The regular flow of communication ensured the majority of detections were accurate and very few were missed.

Unlike other trial plants, the slaughterhouse does not have a designated MHI or OV; as officials are present on rotation. Consequently, each MHI/OV had to be individually briefed by the Ipsos MORI team and / or the slaughterhouse staff to ensure they understood the mechanics of the trial.

When the trial began, a number of abnormalities that can only be detected via incision / palpation were recorded as missed. This plant recorded every instance of contamination / abnormality, rather than just one per carcass. These recording issues seemed to be the result of a misunderstanding around trial requirements.

Key learning

If rolled out more widely, the parameters of a spotter initiative need to be clearly communicated (e.g. a spotter will only assist with a visual check for abnormalities).

Officials who serve plants on rotation may need to be briefed separately by their line manager. This will facilitate a shared understanding and buy-in.

Case Study 3

Plant details

This is a medium/high throughput plant that kills approximately 43,000 animals per year. The plant slaughters cattle, sheep and pigs every day. According to FSA information this plant has a broad compliance rating. There are approximately nine workers on the line and only one spotter, who was stationed just before PMI. The trial ran for 14 weeks from November 2014 until February 2015.

Trial in practise and implications

There was one spotter on the line. The FBO was not willing to involve extra staff in case their involvement affected the FBO's ability to fulfil customer orders. The spotter was a trained QC and stood at the end of the line next to the MHI. Due to the relatively limited space in which processing happened, an ordinary line operative would inform the spotter if/when they detected an abnormality / contamination.

As the trial progressed, ordinary line operatives became more confident in identifying abnormalities, for example pleurisy. The feedback from the MHI encouraged spotter and line operatives to request further information about abnormalities e.g. the root causes.

According to the FBO, the tags slowed the line down, making 'a simple job more difficult'. However, the spotter reported they were able to perform day-to-day tasks and spot without it affecting the line speed, even though the application of the tags was seen as a nuisance.

Tags were not used throughout the process; the data recorded on spotter accuracy was noted in the plant's log book. This was used to feedback spotter accuracy as part of the trial. The data is therefore more comprehensive, but not comparable with other data from other plants.

Key learning

The FBO would only select a trained QC for the role of the spotter.

The FBO was concerned about the initiative slowing production; these concerns were not realised.

Positioning the spotter next to PMI can facilitate dialogue and coaching. The proximity means using tags is less important, as the spotter and other line operatives are able to verbally communicate defects.

Case Study 4

Plant details

This is a small plant, attached to a butcher's shop, which kills less than 5,000 animals per year. The plant slaughters cattle, sheep, goats and pigs twice a week. According to FSA information this plant has a broad compliance rating. There are usually three workers on the line, all of whom are fairly inexperienced. The trial ran for 14 weeks from October 2014 until January 2015.

Trial in practise and implications

Unlike in other plants, the designated spotter did not have long-term experience of working in slaughterhouses. The MHI encouraged other line operatives to flag if/ when they saw any abnormalities or contaminations. The MHI felt this collaborative work might instil the right "mindset" among all ordinary line operatives.[12]

Whilst the MHI acknowledged the operatives remained engaged during the trial, they questioned whether this would be sustained beyond the lifetime of the trial. The operatives considered the trial a significant "bolt on" to their day-to-day duties, which they are not incentivised to carry out.

Key learning

It cannot be assumed that a production line operative would willingly take on a spotting role without being incentivised.

Due to their lack of experience, it seems the briefing session was not sufficient to ensure a spotter felt sufficiently confident to spot defects.

[12] The importance of mindset is discussed further in Chapter 4.

Case Study 5

Plant details

This is a very small plant attached to a butcher's shop, with a throughput of less than 1,000 per year. The plant slaughters sheep, cattle and goats one day per week. According to FSA information this plant has an active compliance rating. There are two line operatives. The trial ran for 14 weeks from October 2014 until January 2015.

Trial in practise and implications

On the processing line, there is a production line operative who is responsible for de-hiding, and the spotter, who is the FBO, whom is stationed at evisceration. Although there is officially only one spotter, they both work together to detect contaminations and abnormalities.

The spotter at this plant tagged larger instances of abnormalities. The same protocol was applied to contamination prior to it being trimmed.

Half way through the trial, the FBO decided to change this approach. Rather than tag and trim contamination, they would only trim after consulting with the official. This was so there could be a shared understanding of the criteria being used to assess accuracy.

Key learnings

Only larger abnormalities and contaminations were tagged. As a result, tags were used infrequently and retained their significance.

There was an on-going conversation between the MHI and the spotter. This can be an effective way to coach a spotter while they work on the job.

Case Study 6

Plant details

This is a small plant with a throughput of 1,000-1,500 animals per year. The plant slaughters cattle, sheep, pig and goats once a week. According to FSA information this plant has an active compliance rating. This plant is run by the site manager and is attached to a butcher's shop. There are usually two workers on the production line. The trial ran for 14 weeks between October 2014 and January 2015.

Trial in practise and implications

There are no specific stations for de-hiding or evisceration; the two line operatives work alongside each other in processing the carcasses. There was one official spotter, who applied the tags, although in practice, they both spotted. The operatives described the process of spotting as being an interactive one, whereby they communicated with each other and the MHI to flag issues as they arose.

The spotter felt the trial was fairly easy to implement in terms of identifying abnormalities, due to the fact they had long-term experience of working in the industry.

To begin with the spotter was uncertain of the criteria used to judge accuracy. This was important as the spotter aspired to be accurate. As a result, the plant staff and MHI agreed to put a rule in place; anything that was the size of a thumbnail or greater would be tagged. This was considered a useful guide for the remainder of the trial.

Key learning

A shared understanding of contamination / abnormalities that are considered cause for concern could increase the efficacy of spotting.

Case Study 7

Plant details

This is a small plant with a throughput of less than 2,000 animals per year. The plant slaughters cattle, sheep and pigs once a week. According to FSA information this plant has a broad compliance rating. The FBO runs the slaughterhouse and a small butcher's shop on the same site. The trial ran for 14 weeks between November 2014 and February 2015.

Trial in practise and implications

The spotter was involved in all stages of the slaughtering process, although other line operatives did collaborate to identify defects. In this plant, only abnormality and larger instances of contamination were tagged.

This plant was served by an official on rotation and there were some disruptions in the running of the trial on the days when someone not familiar with the trial visited. The data stopped being uploaded with the same regularity. This makes the data slightly less reliable.

Key learning

Despite engagement with the trial, it was not always possible to brief those who are less familiar with the details of the trial. There is learning that if rolled out more widely, the FSA would need to ensure that all officials understood the trial's rationale as well as its mechanics.

Tagging criteria must be established to facilitate a shared understanding.

Case Study 8

Plant details

This is a large/very large plant with throughput of 50,000-55,000 animals per year. The plant slaughters cattle 5 days a week. According to FSA data this plant has a broad compliance rating. It has recently been taken over by a large chain; the site manager is the FBO. There are approximately 45 workers on the kill line, two of which perform a quality control role at the end of the line, just before post mortem inspection; they both observe separate sides of the carcass The trial ran for 14 weeks between November 2014 and February 2015.

Trial in practise and implications

Having trialled it for a few days, the FBO of this plant decided the trial design was not suited to their plant. It was considered a health and safety risk for an operative working on a rise and fall platform to spot as well as carry out their day-to-day duties. A new approach was developed with input from an MHI, which involved two line operatives, who did quality control, working together to gain a whole carcass perspective.

The tags were not deemed to be suitable. Because they are not metal detectable, there was a concern that one could snap and break off in the carcass so therefore spotters verbally communicated an abnormality to the MHI. The spotters recorded their detections and the MHI calculated the accuracy by comparing their own records. This was the safest and most efficient way of assessing accuracy.

Like several of the other plants in the trial, the FBO decided to assign the spotter role to the most experienced staff: the QCs. This was due a concern that a less experienced spotter may compromise the speed of the line.

Key learnings

At larger plants where operatives use a rise and fall platform there may be a safety concern for those who are asked to tag. To avoid this, spotters who are stationed opposite each other on rise and fall platforms can effectively carry out a whole carcass inspection.

Objective 1: Detection rates

3 Objective 1: detection rates

This chapter explores whether the operation of the spotter trial increased, decreased or had no discernible effect on the overall levels of abnormality detection rates by slaughterhouse MHIs.

3.1 Dataset used in analysis

Detection data are records of the number of instances and details of pathologies and contaminations found by official inspection teams during ante-mortem and post-mortem inspection. Detection rates are the number of recorded instances as a proportion of the throughput. Cattle and pig detection data are recorded every day and detection rates are calculated according to daily throughput. Sheep detection and throughput data are recorded weekly. The official inspection team within each plant send the detection data to FSA on a daily or weekly basis.

To explore hypothesis 1, only post-mortem detection data was considered. This is because the spotter trial involved line operatives assisting with post-mortem inspection.

The Ipsos MORI project team received, from the FSA, detection and throughput data for both the trial and control plants for the 12 week trial period, as well as data between four and eight weeks prior to the trial inception – this is to account for plants starting the 12 week trial at different times. Consequently, a full 20 week period was requested from 15th September 2014 to 2nd February 2015, which provided a dataset that covered all plants. Data for the 22 trial and control plants was received as part of a group of 50 in order to protect the identity of the plants involved in the trial.

Also received was data for the same 20 week period for 2012/13 and 2013/14. This is referred throughout as the “pre- trial” period. This was to mitigate the potential effect of a number of factors such as policy announcements, changes in plant practices and potential effect of seasonality – the trial period ran over the winter when contamination rates can rise due to inclement weather. The “post-trial” period included data from the day after the end of the trial up until the 2nd February. This provided more data points for the post-trial period for plants which started and ended the trial earlier.

The analysis of detection data focusses on a comparison of trial and control slaughterhouses. The number of instances of abnormalities and contaminations were compared across control and trial slaughterhouses to identify whether and to what extent there is a change in detection rates. It should be noted that the sample size was too low to allow quantitative analysis to be reliably carried out for all separate matched pairs. Instead samples have been merged across all control and trial slaughterhouses to provide sufficient sample size to enable analysis.

3.2 Comparing the throughput of control and trial slaughterhouses

The first stage of analysis compared the throughput of control and trial slaughterhouses. It revealed a number of differences in throughput by species, and in the pre-trial rates of contamination and abnormalities. These differences are likely to bias the conclusions which can be drawn from the impact analysis. These differences are described below.

Difference in throughput

In terms of throughput, the profiles of the control and trial groups were different. Table 1 shows there were more sheep and fewer cattle in the control slaughterhouses; 86.99% of the total throughput (i.e. the combined pre and post-trial throughput) in control slaughterhouses were sheep, compared with 41.00% of the total throughput in the trial group. Similarly, 10.71% of the total throughput for control slaughterhouses was cattle, much lower than the equivalent figure for trial slaughterhouses (56.77%). Additionally, the overall difference in throughput between control and trial was large.

Difference in species

There were also differences within the control and trial groups over time. Table 1 also shows the species profile of throughput at pre-trial was different to the profile post-trial, both for the control and trial slaughterhouses. The proportion of cattle increased in both control and trial groups.

Table 1 Profile of throughput in trial and control plants

	Pre trial		Post-trial		Overall	
	Control	Trial	Control	Trial	Control	Trial
Cattle	7.6%	51.8%	38.2%	90.3%	10.7%	56.8%
Sheep	90.7%	46.1%	54.2%	7.2%	87.0%	41.0%
Pigs	1.7%	2.2%	7.7%	2.6%	2.3%	2.2%
Total throughput	507,912	152,639	56,867	22,875	564,779	175,514

NB: Percentages may not add up to 100% due to rounding.

Rates of contamination and abnormality

Rates of contamination and abnormalities were reviewed next. The data in Table 2 overleaf shows the pre-trial rate of abnormalities and contamination (i.e. the rates *before* the trial could have any impact). The rates vary by sample type (control versus trial) and species. Abnormalities are generally lower in sheep (for both control and trial sample). There is also some difference in contamination rates between the control and trial samples. Contamination rates in the trial sample vary across the different species, from 14% for cattle to 4% for pigs. However, those for the control sample are fairly stable, around 1% for all species. The figures suggest there were differences between control and trial group before the trial started, which means we are not comparing like with like.

Table 2 Rates of abnormalities and contamination in trial and control plants before the start of the trial

	Control		Trial	
	Abnormality	Contamination	Abnormality	Contamination
Cattle	51%	1%	56%	14%
Sheep	20%	1%	43%	8%
Pigs	49%	1%	57%	4%
Overall	23%	1%	50%	11%

NB: Rates are calculated as total number of abnormalities for a specific species divided by the throughput for that species. These were calculated separately for both control and trial sample.

The information in Table 1 and Table 2 highlights there are differences in the characteristics of the trial and control slaughterhouses that are likely to bias the analysis and the conclusions which can be drawn from it.

The control sample contains more sheep than the trial sample (as shown in Table 1) and sheep generally have lower rates of abnormalities pre-trial (as shown in Table 2). This means the control sample will have lower rates of abnormalities than the trial sample, *even if there were no other differences at all between control and treated slaughterhouses*. Similarly, the control sample has more cattle post-trial than pre-trial (Table 1 shows 38% of the throughput is cattle post-trial and only 8% pre-trial). Cattle have higher rates of abnormalities, meaning the overall number of abnormalities in the control sample will increase from pre to post-trial, even if nothing else had changed. A similar thing happens to the trial group. These differences mean we are not comparing like with like.

The differences in pre-trial rates highlighted in table 2 are magnified by the small number of slaughterhouses in the sample; a change in the throughput of an individual slaughterhouse will have a larger impact on the overall sample when there are fewer slaughterhouses in the sample. The matching exercise at sampling was intended to make the profile of the control and trial samples similar. Whilst profiles may have been closer at the time of sampling, they may have become outdated. The throughput of a slaughterhouse can naturally change over time or season in response to industry and consumer demand.

3.3 Statistical testing of differences in abnormalities and contamination

The testing used is called differences in differences. This is a standard approach for evaluating the impact of an intervention on a treated group with a matched control sample and where data have been collected both pre and post-intervention. It compares the amount of change in the rates of abnormalities and contamination from pre to post-trial for the trial group verses the control group.

The significance test is testing whether the value in the difference in difference column was significantly greater than zero (since we expect the difference in differences to be zero if there is no trial impact). The testing was carried out overall and by species to mitigate some of the issues with differences in profile of throughput by species discussed above.

The significance testing was carried out using a Poisson random effects model. This model is appropriate for analysing count data that are clustered. The data are count data because information was collected about the

number of cases with a particular trait i.e. detection of abnormality / or contamination. Data are clustered because information was collected at repeated intervals from each slaughterhouse (i.e. data was collected over time). The model outcome is rate of abnormality/contamination and the predictors (the factors used to predict the outcome) are time (pre/post-trial), treatment (whether or not in treated group) and an interaction of the two. The model is used to test whether the interaction is significantly related to the outcome, since this indicates that there is a significant impact of being in the treated group during trial – in other words, that there is a significant difference in difference.

The model also included some slaughterhouse characteristics (namely size, frequency of audit and compliance) as predictors to attempt to control for some of the differences between control and trial groups and bring the two profiles closer. As noted in Section 3.1, despite the matched design, there were some differences in the characteristics of the control and trial sample which are introducing bias into the analysis. Including these characteristics in the model was an attempt to mitigate those differences, although it could not remove them entirely. There are many reasons for the differences in rates of abnormalities and contaminations at pre-trial. We have information about some of these factors, including species throughput, size, etc. but others such as staff motivation cannot be included in the model. The bias for these factors cannot be controlled for and remains in the sample. That said, these other factors and their reported effects are discussed throughout this report, in particular in the chapters on accuracy and ownership of food safety.

3.4 Key findings

Table 3 below shows the average rates of contamination (C) and abnormalities (A) for the control and treatment slaughterhouses. It shows the rates for the pre and post-trial periods and the difference between the two. The final columns show the difference in differences and the results from a significance test, an asterisk shows where the difference in difference was significantly larger than zero ($p<0.05$).

Table 3 Differences in pre and post-trial contamination rates by species, with significant differences flagged

	Control			Trial			Overall	
	Pre	Post	Difference between pre and post for controls (a)	Pre	Post	Difference between pre and post for trial (b)	Difference in differences (b) – (a)	Sig
(C) Cattle	1%	1%	-1%	14%	14%	1%	1%	
(C) Pigs	1%	2%	1%	4%	4%	0%	1%	
(C) Sheep	1%	4%	2%	8%	1%	-7%	-9%	*
(C) All	1%	2%	1	11%	13%	2%	1%	

NB: Rates are calculated as total number of abnormalities for a specific species divided by the throughput for that species. These were calculated separately for both control and treated sample.

Table 4 Differences in pre and post-trial abnormality rates by species, with significant differences flagged

	Control			Trial			Overall	
	Pre	Post	Difference between pre and post for controls (a)	Pre	Post	Difference between pre and post for trial (b)	Difference in differences (b) – (a)	Sig
(A) Cattle	51%	51%	0%	56%	65%	9%	9%	
(A) Pigs	49%	57%	8%	57%	44%	-13%	-21%	*
(A) Sheep	20%	22%	1%	43%	34%	-9%	-11%	*
(A) All	23%	35%	12%	50%	62%	12%	0%	

NB: Rates are calculated as total number of abnormalities for a specific species divided by the throughput for that species. These were calculated separately for both control and treated sample.

Eight tests were run (contamination and abnormalities were tested separately and there were four tests for each; one for each species and one overall). The key findings are set out below:

- There are significant differences in the number of contaminations in sheep for trial and control groups. The control group saw a small increase but the trial group saw a decrease in the number of contaminations. This suggests the trial had an impact on the amount of contaminations in sheep.
- There are no significant differences in the number of contaminations in cattle and pigs. The difference in difference for both these species is around 1%, which is not significantly different to zero. This suggests the trial is having no impact on contaminations for these species.
- There are significant differences in the number of sheep and pig abnormalities for trial and control groups. In both groups there was an increase in the number of abnormalities in the control group and a drop for the trial group, meaning there was a large difference in difference. This is a positive finding as it suggests fewer cases of abnormalities were missed on the production line in the trial group.
- There are no significant differences in cattle abnormalities. The trial group saw an increase but the control group experienced no change. The difference in difference is nine percentage points. However, this was not large enough to be statistically significant. This is further explained in 3.5, below.
- There are no significant differences in the overall numbers. The difference in difference for overall contaminations is around one percentage point; the difference in difference for abnormalities is zero. Neither of these differences is large enough to be significant.

3.5 Discussion of significant findings

The significance test was used to test whether or not the value in the difference in difference column was significantly greater than zero. The results in Table 3 and 4 show that the difference in differences test result was significant for abnormalities in pigs and sheep and for contamination in sheep but not significant for

abnormalities in cattle and contamination in pigs and cattle. The difference in differences for cattle abnormalities may look relatively large (nine percentage points) but the results of the significance test tell us that this difference is still small enough to be caused purely by chance[13] i.e. though the figures appear to differ between conditions, the difference was not significant.

The results of the statistical tests need to be interpreted with caution. As shown in Section 3.2 there were large differences in throughput of trial and control slaughterhouses and throughput over time that could bias the test result. We have made some attempts to reduce the effects of this bias. A comparison of post-trial results to pre-trial figures from the same months in previous years in order to mitigate the potential effect of seasonality, and an attempt to control for some slaughterhouse characteristics (information about slaughterhouse size, type, number of audits and compliance) by including them in the model. However, we are unable to remove all biases and some will remain.

This means we cannot be certain of causality. We cannot be sure that the significant difference is caused by the trial or by external factors, such as changes in plant procedure. Despite these data limitations the findings revealed via the analysis of detection rates adds useful context to the overall evidence base. Moreover, the findings do reflect findings identified in the case study visits and the overall conclusion that there is value in the use of a spotter initiative to support post mortem inspection.

[13] By 'chance' we mean variance caused by random sampling error. This is the random noise that exists in all samples that is caused by the act of drawing a sample, however representative that sample may be. The cattle data contains a lot of variance, due to fluctuations in numbers of cattle abnormalities across slaughterhouses. When there is a lot of variance in the sample, we expect a lot of variation in the results and we expect large differences between groups to occur by chance. Hence the difference in difference for cattle abnormalities would need to be larger before it tested as significant.

Objective 2: accuracy of “spotting”

4 Objective 2: accuracy of "spotting"

This chapter explores the extent to which spotters were accurate or inaccurate in identifying abnormalities. It highlights a variety of factors that facilitated accuracy and looks at the impact of the trial on the ability of a spotter to accurately identify meat which has defects.

4.1 Factors which facilitate accuracy of identification

A variety of factors contributed to spotters accurately identifying contamination and abnormalities. Knowledge of pathologies and their causes, an understanding of signs that might indicate one (e.g. swelling or discoloration); and where on a carcass they occur. This knowledge was acquired through a variety of ways. First, practices (e.g. 'spotter-like' protocol) in trial plants prior to trial implementation. Second, a spotter's existing knowledge of abnormalities, which is dependent on experience in the meat industry. Third, certain practical issues (e.g. being able to views both sides of a carcass. Before discussing these issues in detail, it is worthwhile exploring how the term accuracy was interpreted.

4.1.1 Interpretation of accuracy

As outlined in Chapter 2, the trial was designed so that accuracy of identification would be judged by the MHI. An issue revealed during the case study visits, was that sometimes there was a noticeable difference in how accuracy was understood. A few MHIs took a whole carcass and offal view which included abnormalities that are detectable only through incision and palpation as well as those that are visible on the exterior of the carcass. This is effectively judging accuracy through the same lens which MHIs use to assess a suspected abnormality/ contamination. MHIs with this view did not attend the briefing session. Those that did, however, adopted a less stringent view as they felt it was not in the spirit of the trial to include pathologies which are not visibly apparent. They understood the initiative was to see if plant staff could assist in PMI. A key learning point for wider roll out is that criteria are needed that detail when a tag should be applied.

4.1.2 Practices which facilitate accurate spotting

Formal and informal spotter like initiatives

In most trial plants a spotter-like initiative was in place prior to the trial. Indeed, officials and slaughterhouse staff thought the spotter trial was "more or less what is happening here". In the design of these pre-existing initiatives the sole focus was instances of contamination.

The initiatives had a desired outcome in common: ensuring a clean carcass is presented at post mortem inspection. In larger plants their approach is more formalised, using tags as a way to flag that corrective action or further inspection is required. A tagging system is necessitated by high noise levels, and the distance that can occur between operatives and / or MHIs which makes it difficult to verbally communicate when a defect is identified. Smaller plants process animals in a fairly confined space. These plants generally have a less formal system whereby identification and communication of defects is done verbally.

Irrespective of the approach taken both formal and informal systems facilitate accurate spotting of visibly apparent defects (i.e. detection which did *not* require incision / palpation). Two trial plants did not use such a system but nevertheless line operatives still felt able to make an assessment of whether meat was abnormal.

MHI coaching of plant staff

In certain plants already running a spotter-like model, there were reports of MHIs and / or OVs tutoring plant staff about symptoms/conditions that are indicative of an abnormality, the names of different pathologies and how they can occur. Spotters and officials felt this coaching helped spotters to be confident with regard to the circumstances they should tag.

This educative approach by officials did not routinely occur. It was facilitated by a variety of factors: there being a positive relationship between an MHI and line operative, as well as both parties having the time and appetite for it. Some plant staff reported that because feedback did not always happen before the trial, knowledge of abnormalities was either lost or only partially retained.

Coaching and feedback from MHIs was maintained throughout the trial. This helped spotters to further build on their existing knowledge of abnormalities which helped to further increase accuracy. An approach taken by an MHI shows how they decided to drip feed information so as to avoid the spotter feeling overwhelmed or confused by technical information while still providing sufficient information so the spotter could 'spot' effectively.

"I showed him a set of lungs with pneumonia. I didn't tell him it was pneumonia; I just told him there's something wrong here. And I don't see anything wrong with doing that. Sooner or later I'll teach him the big words if he wants to learn them". (MHI)

Experience in the meat industry

In general there was a link between experience of processing carcasses and an ability to accurately 'spot'. Being used to seeing defects facilitated accuracy. It was operatives with long term experience who were typically selected as spotters. This is because some FBOs wanted their 'best' operatives in the role, as they felt their plant's participation in the trial would result in an assessment of their plant and / or it would slow the speed of production. By the end of the trial, FBOs believed that less experienced operatives could produce similar levels of accuracy provided they were thoroughly briefed. This was a view that was also put forward by a few MHIs.

Being experienced and established in a role is not always linked to accuracy if the operative is unwilling to spend longer looking for abnormalities or if they feel it is an extra bolt on to their day-to-day activities. This barrier can be overcome if the 'right' mindset is in place.

Having a proactive mindset

A spotter's accuracy can also be dependent on whether or not they have a proactive mindset. Indeed, having this type of mindset contributed towards their effectiveness as they typically informed a MHI when they had identified a defect.

"They're proactive in here. Even before the trial – the guy on the evisceration for example, if he sees abnormality – he'll shout to the inspector and say the liver is bad. He'll identify it to the inspector. They were already doing things like that in here prior to that. Because you obviously can't hang up a liver when it's got an abscess, dripping all over the place, when you could just put it in the bin and tell the inspector and the inspector who can reject it for whatever reason". (MHI)

Line operatives with a proactive mindset in general remained engaged throughout the trial period, even where there was minimal interest in the trial from a supervisor / manager.

Spotter trial briefing session

The briefing handout illustrated examples of different kinds of abnormalities found on different species. This reassured people what should be tagged and that they weren't being assessed which in turn gave confidence just to flag things that could be risky. The 'if in doubt tag' message was said to be important as a spotter was sometimes uncertain if they had definitely detected an abnormality.

"There's stuff that I don't know. I put a tag because the fat's a bit watery, but I don't know what's wrong with it". (Spotter)

A few spotters felt that message was not very helpful particularly when they dealt with bruised meat. A number of carcasses can have instances of very minor bruising and spotters thought that proportionality was required otherwise a majority of carcasses would be tagged. They decided to tag 'big' bruising, although its definition varied between, and even, within plants. This difference of opinion on the criteria for 'abnormal' did impact on accuracy. For wider roll out a shared understanding of tagging criteria is required.

4.1.3 Opportunities that facilitate accurate spotting

There were a number of opportunities that facilitated accurate spotting, these factors are discussed below.

Ability to view both sides of the carcass

The ability to view both sides of a carcass is an important driver of accuracy. Spotters in larger plants who work on a rise and fall platform for the entirety of their shift are only able to view one side of a carcass, which reduces their ability to accurately spot. This issue can be quickly resolved where a spotter and their colleague decide to work together to spot both sides of the carcass. If the spotter's colleague felt there was something that warranted a tag they both would quickly consult and decide if a tag should be inserted. . The colleague was briefed by the spotter on the mechanics of the trial before their shifts began.

"I don't have a 360 degree view, but the person I'm working with on the other side, he will tell me, and they'll say if they see something as well". (Spotter)

Ability to view abnormalities on offal

The ability to view abnormalities on offal was a driver of accuracy. However, there was a noticeable difference of opinion regarding which ones can be viewed using incision. Some spotters suggested that this method must be used to detect pneumonia, while others thought the opposite. Spotters working in a quality control role, and who were generally used to seeing abnormalities post evisceration, were more certain about the pathologies which can be visually detected on offal.

The gutting position was considered to be the optimum position in larger plants for checking offal, but the time taken to eviscerate and 'spot' was felt to be a barrier to implementation in plants with high speed lines. As a result, spotting tended to take place slightly later in the processing i.e. the pluck, though this position was not without issue either. According to an official the individual usually assigned to 'the pluck' is one of the least experienced operatives in the plant as "it's a task that doesn't require a lot of knowledge or skill". They, therefore, felt it was not appropriate for this operative to 'spot' as this increases the likelihood of something

being missed. If the trial was designed to improve public health outcomes they felt a spotter should be a line operative with long-term experience of processing carcasses.

Having time to perform the spotter function

Larger plants tend to have fast line speeds. In two trial plants a line operative had a fixed amount of time (approximately two minutes) to carry out their task before the carcass moved along to the next stage of processing. The processing work and corrective action (e.g. trimming) a carcass requires dictates the amount of time a spotter has to spot. In practice, the role of spotter did not prevent an operative from completing their work as many were able to configure their spotting around their day-to-day duties.

"The way I work is – I do my job at two points. I'm working from the flank, I take a look at that and catch any defects presenting in the front of the beast. Then I'm moving – I'm watching it as it comes up and I take the hide off and take look at the upside. That's the best way to do it". (Spotter)

However, in one plant that processes older cattle on a Wednesday, spotting was less thorough compared to days when processing of younger cattle happened. This was because it takes longer to prepare older carcasses for post mortem inspection. As result, spotters' checks were sometimes cursory or a tag wasn't inserted or there was little or no verbal communication between a spotter and an official. In a smaller plant, sterilising the batch of tags for the next day's shift added an extra half an hour to an operative's shift. There were no reports of the trial causing production delays and /or reduced throughout.

Number of species processed

Of the eight trial plants, six are mixed species plants. The diversity of species was found to affect a spotter's accuracy. In one such plant, a spotter used to seeing signs of abnormalities in sheep was reported as being less accurate or to miss defects on species that were less familiar. A spotter initiative if rolled out more widely would require a spotter who is familiar with all species being slaughtered in their plant.

Condition of livestock

The condition of livestock can also affect a spotter's accuracy. Trial plants were generally supplied with clean, high quality animals. Some MHIs thought this could make it more difficult to accurately 'spot', but, in general, spotters missed fewer defects as the trial progressed. On certain days plants process older and / or dirty animals which are likely to have multiple pathology and / or contamination. This facilitated accuracy as the spotter need only identify one instance to be accurate.

4.2 Effect of the trial on accuracy

Overall spotters began the trial with a fairly good knowledge of a variety of abnormalities. Although awareness among spotters of the names of pathologies was in general low, many were familiar with the symptoms and / or conditions indicative of one before trial implementation.

The study identified a high level of accuracy for common abnormalities. There are a number of abnormalities which spotters are used to seeing (e.g. abscesses, and lesions in the offal), through experience and their position on the production line. This facilitates accurate detection.

Involvement in the trial itself generally led to an increase in accuracy and fewer instances of abnormalities were missed. In carrying out the spotter role, an operative developed a more comprehensive understanding of the different types of abnormalities.

Accuracy was also facilitated where there was a shared understanding of the criteria that MHIs use when judging a suspected abnormality. Indeed, a number of spotters asked the question: what size bruising is considered acceptable? This meant is there any size of bruising, however small, which will be passed fit for human consumption at PMI?

There were occasions during the trial when the number of missed abnormalities rose. This occurred when the spotter failed to tag and did not verbally communicate an abnormality. This suggests that a tagging system is crucial.

Objective 3: food safety ownership among slaughterhouse staff

5 Objective 3: food safety ownership among slaughterhouse staff

This section explores whether ownership of food safety increased or decreased or remain unchanged among plant-staff as a result of the spotter trial.

5.1 Exploring the objective: ownership of food safety

Exploring the effect of the spotter trial on 'ownership of food safety' among slaughterhouse staff is difficult. Desk research undertaken at this study's inception highlighted there is no formal definition of employee 'ownership'. Previous research into 'ownership' in a workplace context has generally focused on 'ownership' in a literal sense, looking at the impacts of employees owning stocks in the organisation that employs them. There has been some research into employee 'ownership' in a psychological or cultural sense, for instance the extent to which employees feel a level of ownership or responsibility towards the organisation and its goals or brand.

Only one study was identified which had considered 'ownership' among employees in the context of food safety. In 2012, Ipsos MORI published the Slaughterhouse Social Science Research Project[14], identifying a number of factors that can facilitate ownership of food safety. These include views of food safety risks among slaughterhouse staff, resources available to an FBO, a slaughterhouse's relationship with their customers, a line operative's perception of their role, and relationships between slaughterhouse staff and officials. For this study we have explored ownership of food safety using just one of these factors: views of food safety risks. This is because the spotter initiative is aimed at raising awareness of abnormalities and instilling a behaviour change to increase their detection.

Responsibility for food safety risks was underpinned by a variety of factors. Firstly, line operatives who were customer focussed recognised the importance of their own role in providing consumers with a safe, quality product, which they aimed to do by minimising food safety risks. Secondly, having the 'right' attitude such as having pride in their work and / or an aspiration to present a clean, safe carcass at post mortem inspection. Evidence of these attitudes and behaviours enabled an assessment of whether and the extent to which the trial led to responsibility for food safety risks. Before looking at these attitudes and behaviours it is worth considering the factors which limit the trial's effect on responsibility for food safety risks.

5.2 Factors which limit the trial's effect on responsibility for food safety risks

The pre-trial context in some plants limited both the trial's effect on responsibility for food safety risks, but also an ability to assess the trial's effect. These issues are discussed below.

Pre-trial practices to mitigate food safety risks

Trial plants typically had in place a systemic approach towards food safety management; this included a plant's HACCP system and use of other measures such as a quality control point and monitoring of defects by the slaughterhouse. A number of plants operated a system whereby a line operative would flag contamination /

[14] https://www.ipsos-mori.com/researchpublications/publications/1569/Slaughterhouse-Social-Science-Research-Project-for-the-Food-Standards-Agency.aspx

abnormalities, either verbally or with plastic tags, to the inspection team. Where these practices did occur, the implementation of the spotter trial was not seen as a significant change of practice.

"No real impact. They do it properly anyway. It can't be better than before because they did it as good as possible before." (MHI)

Pre-trial responsibility for food safety risks

Many spotters were reported to have a sense of responsibility for food safety risks prior to the trial. In large plants the spotter was often the person who did a quality control role. These operatives typically recognised the importance of their role in terms of the impact their work can have on the end product and slaughterhouse reputation. In smaller plants, line operatives generally process each animal from lairage to inspection and this can instil a personal responsibility for 'getting things right'. This is also true in smaller plants due to them having a closer, more direct relationship with the 'end-user'.

"I think the guys here see it as a piece of food. They are aware of that. They knew that before the trial." (MHI)

Good relationships among staff and FSA inspection team

In trial plants, regular communication about the condition of meat between production line operatives and officials was common. This was facilitated by close working conditions common to smaller plants and in large plants by the positioning of staff near to an MHI. In small and large plants there were reports of operatives and officials working together to mitigate food safety risks prior to trial implementation.

"We're all involved; we all work together as much as we can." (MHI)

5.3 Impacts of the trial on responsibility for food safety risks

The trial highlighted one of the factors which Ipsos MORI's 2012 research highlighted as being a driver of food safety ownership: views of food safety risks. A change in attitudes and behaviours towards food safety risks was itself dependent on a number of other impacts associated with the trial. These impacts are discussed below.

A desire to demonstrate accuracy can instil the desired behaviours

As spotters acquired a better understanding of different types of abnormalities and their symptoms / conditions as well as the position on a carcass where they occur it encouraged some to work even harder at becoming an effective spotter. Indeed many saw the trial as a challenge and wanted to prove their accuracy. This is further discussed in Chapter 4.

Increased awareness of abnormalities

Spotters developed a better understanding of food safety risks, confirmed by a number of MHIs. They were keen to absorb more information about pathologies and become more vigilant in checking for abnormalities. Although these checks did happen pre-trial they were sometimes cursory at best, due to line operatives seeing abnormalities as something that an MHI was responsible for.

"I was aware already, but the training made me more aware and now I take more notice of the abnormalities." (Spotter)

Spotters did more thorough checks for contaminations during the trial. Although checking for contamination is a legislative requirement, it was reported that trial involvement encouraged spotters to look harder for them. However, this may be an effect of the special circumstances of being in the trial and if rolled out this behaviour may not occur to the same extent.

"The slaughterman has become more concerned about presenting me with a clean carcass." (MHI)

In a few cases, there was a drop in the sense of responsibility among a small number of ordinary line operatives in terms of managing food safety risks. This issue is discussed further below.

Attitudinal change in line operatives who were not selected as spotters

The trial also affected line operatives who did not perform the spotter role. This happened where 'ordinary' operatives became interested in the trial and wanted to learn about defects via spotters.

"It's taught some of the other lads, they'll ask what it is and they're learning a bit more." (Spotter)

However, in one large plant, there was a concern that the trial had resulted in reduced vigilance. Some line operatives were said to defer to the spotter their responsibility for trimming as they believed it would be dealt with further down the line. As a result, a few MHIs felt the spotter initiative may have had an unintended consequence of shifting responsibility for food safety risks from an ordinary line operative to a spotter.

5.4 Factors contributing to increased sense of responsibility for food safety risks

The research has identified several key factors which contributed to an increased sense of responsibility for food safety risks.

The process of tagging: a visual cue

The requirement to insert a tag prompted spotters to take extra care when checking for contamination and abnormalities.

"It does encourage a bit more to check for things because it's more in your mind. Obviously you've got that mind-set anyway, but it is that bit more incentive to check." (Spotter)

The significance of a tag was not always sustained. In one plant, tagging at the de-hiding position became so common that it led to the spotter inserting them by default, without first checking for contamination.

The role of the spotter as a motivational trigger

Most spotters did not mind incorporating additional tasks in to their day-to-day tasks. For some the spotter role introduced variety into a role that involves a lot of repetitive tasks. Some saw the role as a challenge and a way to prove they could be given more responsibility for food safe practices. A few saw it as an opportunity for

promotion or a way of further their employment opportunities elsewhere. These views of the trial acted as triggers for spotters to stay engaged in the trial.

"It can make the work a bit more interesting for the slaughtermen, rather than just killing animals all day, and getting more buy-in from them in the detection of bad meat or contaminations is obviously a good thing." (MHI)

A few spotters did not embrace the spotter role. There was not always a willingness to do extra work or to take on more responsibility than what they are paid to do in their day-to-day role. In one case, this led to a spotter no longer using tags and simply calling out if they believed one was needed – while this was less involved the fact it did not rely on tags meant that they sometimes forgot to spot.

"Without being prompted it fell by the wayside... not the ideal environment – they've got a job to do and they want to get it done. He's more than capable of pointing stuff out, but he wants to get it done as quickly as possible."(MHI)

Appetite for information on food safety risks

Appetite for information on food safety risks contributed to an increased sense of responsibility for food safety risks. The channels in which this came through were the spotter briefing session and feedback given to spotters by MHIs. The briefing session helped to engage spotters in the trial; it allowed them to see that the initiative fitted into a wider effort to produce cleaner meat and ultimately helped to instil the desired mindset in relation to food safety risks. The trial increased the exchange of information between line operatives and officials; specifically they discussed criteria for judging accuracy as well as defects. For this to happen, there had to be appetite for further information, but it also relied on an MHI passing on knowledge about food safety risks - feedback was common from MHIs who attended the briefing session and worked in close proximity to a spotter.

"We talked a lot. We would go into the names of what things are. The guy on the offal is saying to me 'pleurisy, emphysema' all these things are happening and I think the spotter trial heightened that." (MHI)

Objective 4: Meat Hygiene Inspectors' views of the spotter trial

6 Objective 4: Meat Hygiene Inspectors' views of the spotter trial

This section explores the views of meat hygiene inspectors in terms of whether their attitudes towards their role / food safety were positively or negatively affected by the introduction of the spotter trial.

6.1 Spontaneous views of the spotter trial

Among almost all MHIs, there was an initial negative reaction to the idea of using a spotter initiative in slaughterhouses. This resulted in an initial lack of support and was due to a number of key concerns about the trial, namely:

A perceived outcome to limit independent meat inspection in slaughterhouses

As outlined in Chapter 2, communications work was carried out so that officials would be aware of the trial and its rationale. Despite this, many speculated that its real purpose was to test whether slaughterhouse staff could carry out post mortem inspection.

MHIs pointed to a number of historical and recent changes in the regulatory landscape of slaughterhouses as good reasons to think the spotter initiative was essentially "an attack on jobs". These included: the use of plant inspection assistants (PIAs)[15] in poultry plants, a perceived increase in the use of private companies in the delivery of official controls, and visual inspection[16] by default in pig plants. MHIs in general thought the trial was "the next thing to hit the profession" and considered it the "first step of privatisation in inspection in the red meat sector". Even some FBOs and plant staff who attended the briefing session assumed the trial was aimed at replacing MHIs with plant trained staff.

A belief that only officials should be formally involved in the detection of abnormalities

MHIs were content that plant staff can have an informal role in identifying abnormalities – indeed a number of trial plants were operating a comparable initiative anyway (see Chapter 3) – but many were initially against them having a more formalised role. It was counter intuitive to endorse an initiative which they thought was aimed at reducing MHI headcount and / or replacing them altogether.

The idea was also rejected on the grounds that plant staff do not have sufficient knowledge to detect all types of abnormalities, including those which cannot be visually detected, i.e. require incision and palpation. It is important to note that this was never the purpose of the spotter initiative – it was just to pick up the visually apparent abnormality/contamination. MHIs were concerned that without the required training, operatives would not be able to carry out PMI thus having a detrimental effect on public health outcomes. The importance of their own role in terms of its independence was another reason why the initiative was not supported. There was a concern that having a line operative responsible for post mortem inspection would lead to a conflict of interest whereby a spotter could be influenced by the FBO.

[15] In poultry plants, the OV may be assisted in carrying out post-mortem inspection by official auxiliaries (Poultry Meat Inspectors (PMIs)) and by members of the staff of the establishment that have been authorised by the competent authority (PIAs).
[16] Many said implementation of visual inspection in plants that only process pigs had led to a decline in the number of contracted hours of some MHIs.

Spontaneous positive views about the trial

There were a few MHIs who initially favoured the idea of a spotter initiative as they recognised there are potential benefits to involving the FBO and their staff in the detection of abnormalities.

"At the start of the trial – the specifications looked quite good and how it was going to work. It integrated the FBO into the inspection process." (MHI)

6.2 Considered views of the spotter trial

There was a clear shift in attitudes by the time of the trial's end, with many MHIs accepting that the formalised assistance of plant staff in post mortem inspection was valuable. They acknowledged, that despite their training, even MHIs miss things from time to time so an "extra pair of eyes" which are equipped to detect abnormalities would be valuable. However, this support was often conditional due to the presumed implications of the initiative.

Factors underpinning conditional support for the spotter trial

Involvement in the trial, having seen it work in practice, as well as gaining a proper understanding of why it was trialled, shifted MHI views to the extent they began to see that information about pathologies, that was retained by spotters, could contribute to better public health outcomes. They felt they could be more supportive of it if the following measures were implemented:

- An assurance from the FSA that the use of a spotter initiative would not affect an MHI's employment prospects. Without this, some MHIs refused to support it; moreover some said they would refuse to be involved in it if it was rolled out more widely.
- A spotter must always assist post mortem inspection and should never be responsible for its delivery even if they are equipped to do so, due to the potential conflict of interest.
- It must be the most experienced operatives selected as spotters as they have a basic level of knowledge of abnormalities and therefore are more likely to be effective.
- A briefing session like the one that was trialled is inadequate for the extra responsibility associated with having a formalised role in post mortem inspection. Further classroom based training and 'on the job' coaching would be required before MHIs are likely to consider them suitable.

"I think if you are going down this road with spotters they need a bit more in depth training. Perhaps not to the qualification of an MI – a bit like the poultry industry where they have a PIA. They have X amount of training to be able to identity pathology." (MHI)

- Assistance must have clear terms of reference – MHIs felt that spotters must never be asked to inspect using techniques which they have not been trained in (i.e. incision / palpation).

6.3 Concerns remained despite explanation of the trial's rationale

Variation in trial implementation led some to reject it

In two trial plants, an increasing focus on abnormalities led to their trimming by a few spotters. Although this issue was quickly resolved, there was a concern if the trial was rolled out more widely this situation might arise and, if this was not communicated, would compromise an MHI's ability to deal with pathologies.

"They were given some basic training at the beginning...and because they could identify an abnormality they removed it. I think they knew not to remove anything too big but they removed stuff like peritonitis, pleurisy and abscesses – I think it would have been dangerous to carry on like that." (MHI)

Difficult to sustain engagement in a voluntary initiative

Legislation requires an FBO to produce meat that is fit for human consumption. Even in plants with above average levels of compliance, MHIs reported having to remind an FBO and their staff that carcasses which require corrective action should not be presented at PMI. MHIs felt that the focus should remain on removing contamination as they thought it would prove difficult to sustain engagement in an initiative which is not mandatory.

"Again, they have a routine they've been doing for years. There's legislative requirements that you still have to prompt them on, let alone things that are voluntary. Things that are required to do from our point of view, they still have to be prompted on. Voluntary things tend to go by the wayside." (MHI)

Plants with very fast pace of processing may not be suitable

While some MHIs recognised the benefit of the spotter trial, they also thought that more substantive improvements in food safety could be made if an FBO paid their employees an hourly rate rather than per carcass. While it is beyond the control of the FSA to influence this, it does suggest that in plants where this arrangement is in place, a spotter initiative is likely to be less effective as the pace of processing may inhibit proper regard for the spotter role.

Conclusions and key learning points

7 Conclusions and learning points

Conclusions

The fact that abnormality and contamination is an essential part of processing livestock enables operatives to identify defects - even those with fairly short term experience can 'spot'. Involvement in the trial increased a spotter's accuracy of detection and spotters applied this knowledge of food safety risks to become extra vigilant. The trial had a similar impact on some line operatives who were not carrying out the spotter role. Historically FBOs / line operatives were instructed not to trim suspected abnormalities until they were inspected, which appears to have instilled a mindset that their detection is a priority for officials. If implemented correctly a spotter trial can make abnormality detection a shared one.

FBOs (and MHIs) thought the spotter trial was a precursor to FBO employed staff carrying out post mortem inspection, whilst under the supervision of an OV. This misunderstanding was clarified through pre- and interim trial communication work by the FSA and Ipsos MORI, but ensuring model parameters are clearly communicated is a key learning point if the initiative is to be rolled out more widely.

Operatives who take pride in their work, and recognise the importance of a safe end-product and business reputation were most enthusiastic about the trial. Non quality control operatives were less enthusiastic but were sufficiently curious about the trial to take part and it was liked because it offered more responsibility and sense of purpose. However, interest did dip when the novelty wore off and it was then seen as extra work. There were no reports of spotting impeding their ability to carry out their processing tasks but, if wider roll out happens, this issue will need to be taken into account when deciding where spotters should be positioned.

A number of MHIs were concerned about the potential implications of the trial, perhaps the greatest being regard to their employment prospects, although other factors such as implications on food safety were just as important for many. Despite the concern around their jobs still remaining at the end of the trial, having seen it work in practice and having properly understood why it was trialled, led many to conclude it could contribute to improved public health outcomes.

The statistical (i.e. difference in differences) test result was significant for abnormalities in pigs and sheep and for contamination in sheep. However, there are some caveats around the results due to the differences in sample composition, namely the differences in the species profile of control and trial groups and differences in pre-trial rates. These are discussed fully in Section 3.2. The test results were significant at the 95% but there is a possibility that the results are an artefact of the sample composition. This means we cannot be certain of causality. Despite these data limitations the findings revealed via the analysis of detection rates does reflect findings identified in the case study visits and the overall conclusion that there is value in the use of a spotter initiative to support post mortem inspection

Implementation would be fairly easy. Many plants already operate a "spotter-like" model to identify contamination. Other Ipsos MORI research in slaughterhouses for the FSA has found plants using tags to flag both contamination and suspected pathology, which further strengthens the conclusion that a spotter model has benefits. A spotter briefing session supplemented with a handout is recommended. It would help FBOs realise that only minor adaption of existing processes are required if the requirements of the spotter initiative are to be met. It would also reassure that spotting involves looking for things which are seen daily, instils a shared understanding of tagging criteria.

The use of tags is crucial. The action of inserting a tag seems to prompt a more thorough check of a carcass. However, if every carcass is tagged then their effect can be lost. Operatives further along the production line are in optimum spotting positions because they will use tags less frequently than an operative at de-hiding. Quality control operatives usually have the most in-depth knowledge of abnormalities and their close proximity to PMI brings other benefits, such as MHI feedback.

Ultimately, the evidence outlined in this report suggests that use of a spotter initiative in UK slaughterhouses could lead to a number of key benefits including higher detection rates and the adoption of proactive behaviours to mitigate food safety risks. These benefits have the potential to contribute to better public health outcomes. Therefore, it is worth considering further roll out of the initiative informed by the findings in this report.

Key learning points for roll-out

This brief section details the learning points for the FSA which can be used to inform the implementation of the spotter initiative if rolled out more widely:

- Ensuring a shared understanding of the rationale of trialled initiatives – understanding the purpose of an initiative as well as what the benefits might be can help to mitigate opposition to change, or in certain cases may even generate support for it. If the trial is to be rolled out more widely, the FSA should try and publicise the initiative in such a way that those affected can recognise the advantages of participation despite any perceived shortcomings.
- Messages for specific audiences
    - FBO - in so far as possible, the aim of any messaging should be to be able to answer the question "what's in it for me/my business?". The use of technical terms like 'controls that are risk-based and proportionate' should be avoided. Specifically, it is an initiative whereby a line operative assists MHIs in their detection of abnormalities. We recommend that the message lets them know that this initiative has been successfully trialled and did not slow production or affect throughput.
    - Officials - The FSA would need to ensure that all officials understood the trial's rationale, its mechanics and its parameters (e.g. a spotter will only assist with a visual check for abnormalities). This will facilitate a shared understanding and buy-in. Equally, it is also vital to explain what it is not. It is not about adopting a PIA model in the red meat sector, for instance. Officials who serve plants on rotation may need to be briefed separately by their line manager.
- Spotter selection – line operatives with long-term experience and / or who carry out quality control role may be better suited to the role. They are more likely to spot accurately and be proactive in terms of controlling food safety risks. Non QC operatives, in larger plants, could adequately perform the trial if they are briefed by slaughterhouse staff with the right level of knowledge. However, it cannot be assumed that a production line operative would willingly take on a spotting role without being incentivised.
- Process for identifying potentially problematic carcasses :
    - A tag should be used. They help to prompt vigilance and more thorough checks. They should be used for abnormalities and gross contamination. Moreover, there needs to be a shared understanding of the circumstances in which a tag should be applied.
    - Tagging criteria must be established to facilitate a shared understanding.
    - Larger abnormalities and contaminations retain their significance as tags are used fairly infrequently.

- Spotting positions:

  - It is not recommended that spotting happens at the de-hiding position. Because the process can cause contamination, there is a risk that tags are inserted by default. Over time, checks may not be carried out routinely.
  - In medium and large plants, there are two recommended spotting positions. First, the evisceration or 'gutting' point, is the optimum position for checking the offal. Second, in close proximity to the final inspection point as this can facilitate feedback from MHIs.
  - In longer production lines, particularly those where line operatives use rise and fall platforms it is recommended that spotters work in pairs in order to check of both sides of the carcass.
  - Positioning the spotter next to PMI can facilitate dialogue and coaching. This can be an effective way to coach a spotter while they work 'on the job'.

- Allowing enough time for learnings from the trial to be shared with all - running a trial has many associated challenges, not least the amount of lead-in time required to secure participation, to brief participants so the trial runs consistently across a range of plants, as well as the amount of time required to evaluate lessons learned and understand what worked. As far as possible it is important to allow sufficient time between trialling an initiative and its implementation so its roll out takes account of this learning. If this cannot be achieved a trial may still have value since the learnings from it can still be applied to make the required changes in practice.

Appendix

8 Appendix

8.1 Case study implementation

Practicalities of the case study visits

Each trial plant was visited twice. First, c.2 weeks post implementation, with a focus on trial implementation. At c.12-14 weeks post implementation (i.e. the trial end) they were re-visited, this time the focus was on impact.

Both visits were similar in structure. On arrival at the slaughterhouse, the researchers met with the FBO who was responsible for the day to day running of the site. At this point the researchers reiterated the purpose of the visit and the wider research project, and reassured participants that:

- Their participation was voluntary;
- The research was confidential and anonymous; and
- Ipsos MORI are independent of the FSA or any government organisation and their role was not to pass judgement on practices, but to report views and implementation of the spotter initiative.

Each case study visit lasted one day and was carried out by two researchers: a lead researcher who conducted the bulk of the interviews, with the second researcher using a laptop to take detailed notes.

Interviews during case study visits

Four to five in-depth interviews were conducted at each plant, to include:

- The FBO
- At least one Meat Hygiene Inspector (MHI)
- The Official Veterinarian (OV)
- The selected spotter(s)

Across all plants, the total number of interviewees was:

- 9 FBOs, including one Production Manager classified as an FBO for the purposes of this report, as they had full responsibility for food safety within the plant
- 10 OVs
- 10 MHIs
- 13 plant staff who took on the spotter role

The researchers had to be flexible in the timing of the interviews. In most cases the OV was interviewed at the start of the visit as they tend to be at the slaughterhouse early on, prior to the kill and leave straight after, so there is only a small window of opportunity in which to interview them. The rest of the interviews required the

researchers to be flexible and researchers would interview people from the key audience groups as and when they were available on the day. The aim was for interviews to last around 45 minutes; however, some participants, particularly MHIs, were only free to be interviewed for c.30 minutes. In addition, interviews were sometimes interrupted when interviewees were needed to go onto the line, answer phone calls or check paperwork for the delivery of livestock.

Follow-up interview, 7 weeks post-implementation

The senior researcher carried out an interview with the FBO of each of the eight plants around the mid-way point in the trial. This contact served two purposes. First, it was a way to maintain engagement with the trial plant. Second, it was to see if there had been changes in practice as well as to identify any early signs of impact. Researchers called the FBO prior to the interview to arrange a suitable time to talk. Typically, it happened after the plant had finished processing for the day.

Topic guide

A topic guide was used for the interviews to ensure data was collected systematically across slaughterhouses. This topic guide was semi-structured, which ensured that the same key topics were covered with all participants whilst allowing the discussion to be guided by the answers each participant gave and the context in which they worked. All of the topic guides addressed the same research questions but there was a focus on implementation in the first topic guide and impact in the second and final topic guides.

A topic guide was developed by Ipsos MORI according to audience type i.e. FBO, OV/MHI, spotter. It was designed to explore the FSA's four criteria for assessing the trial, namely:

- Do detection levels of abnormalities/conditions at the official inspection increase or decrease when a spotter initiative is adopted compared to when no spotters are in use?
- How accurate is the identification of abnormalities by spotters? Do they tend to miss a large number of abnormalities, or are they generally accurate in identifying an abnormality?
- Do levels of "ownership" towards food-safety increase or decrease amongst slaughterhouse staff when a spotter initiative is adopted compared to when no spotters are in use?
- Do officials perceive an improvement of "ownership" levels in slaughterhouse staff?
- Does the capability for slaughterhouses to produce "clean meat" improve when operating the spotter initiative compared to when no spotters are in use?
- What is the best way in which to train plant-staff to perform the spotter task?

Observations

In addition to the in-depth interviews, silent observations were carried out on the line where appropriate. The observations had two principal aims:

- To gain an understanding of the slaughterhouse environment and production line, in order to better understand any physical changes to its set-up as a result of the spotter trial.

- To act as a tool for interviewers, providing them with additional material for probing in subsequent interviews.

Given these aims, the observations are not reported on directly; where behaviours are discussed in the findings; these are self-reported behaviours on the part of interviewees.

Observations were carried out after the trial had been underway for two weeks. This was so that researchers could see how each plant was implementing the trial or if they were adapting the initiative to suit the makeup of their particular plant. This was helpful for researchers during the final visit as they could see if any adjustment had been made to the initial trial design.

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