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Rethinking inspection in slaughterhouses: Opportunities and challenges arising from a shared risk management system in poultry slaughterhouses

Morgane Salines ^{a, b, *}, Virginie Allain ^{a, c}, Catherine Magras ^b, Sophie Le Bouquin ^{a, c}

^a ANSES, Ploufragan-Plouzané Laboratory, Avian and Rabbit Epidemiology and Welfare Unit, 22440, Ploufragan, France

^b SECALIM, INRA, Oniris, Université Bretagne Loire, 44307, Nantes, France

^c Université Bretagne Loire, Rennes, France

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ABSTRACT

Health surveillance systems are increasingly managed in a cooperative way, involving several stakeholders sharing tasks. In France, specially-trained poultry slaughterhouse staff are allowed to participate in the tasks of official auxiliaries under the supervision and responsibility of Official Veterinary Services (OVS), on the basis of a risk analysis. To properly organise interactions between stakeholders in this multi-stakeholder risk management, the current control system is based on alerts from Food Business Operators (FBOs) to OVS. A field study was conducted in order to describe the ways alerts are raised in practice, to identify the impact of this method on work organisation and communication, and highlight the opportunities it may offer. Thirty poultry slaughterhouses were surveyed through semi-directive interviews held separately with the official veterinarian/auxiliary and/or the quality manager/assistant. The interviews were qualitatively analysed. A wide range of *modus operandi* — both for control task division and communication tools — was observed in the field depending on slaughterhouse organisation, the alert's severity or the quality of the relationships between stakeholders. Internal alert-raising procedures were implemented in all cases. This surveillance system was considered efficient as long as the work organisation was clearly described, i.e. the organisation of positions, definition of missions and roles, and implementation of specific procedures for information exchange and training programmes. The pivotal challenges entailed limiting the administrative burden and building trusting relationships. In conclusion, this innovative system appears relevant due to tailored alert criteria, pre-implementation preparations and system formalisation, and cooperation between stakeholders. It also offers the OVS an opportunity to reaffirm their central position in risk-based meat inspection.

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1. Introduction

In accordance with the regulatory requirements of the European hygiene package (Anonimous, 2002), the official health inspection of poultry is composed of several successive steps. (1) First, before the flock's arrival at the slaughterhouse, the Food Chain Information (FCI) is examined: this “top-down” form gathers all the relevant information on how a flock has been reared and its health

status (flock identification, number of animals, veterinary medicine withdrawal periods, health status of the flock going to slaughter, etc.). It is a highly valuable source of information for both Official Veterinary Services (OVS) and Food Business Operators (FBOs), enabling them to look ahead and adapt the slaughter of flocks likely to present a potential health risk. (2) Then, when the flock is unloaded at the slaughterhouse, the birds undergo a visual inspection in order to assess the flock's health status and compliance with animal welfare regulations both on farms and during transportation. This inspection is known as the ante mortem examination. (3) During slaughter, the post mortem examination of carcasses is designed to detect and condemn all carcasses and/or viscera unfit for human consumption because of quality or safety defects. (4) Finally, a second “bottom-up” FCI form is used to give

* Corresponding author. ANSES, Ploufragan-Plouzané Laboratory, Avian and Rabbit Epidemiology and Welfare Unit, 22440, Ploufragan, France.

E-mail addresses: morgane.salines@anses.fr (M. Salines), virginie.allain@anses.fr (V. Allain), catherine.magras@oniris-nantes.fr (C. Magras), sophie.lebouquin-leneveu@anses.fr (S. Le Bouquin).

farmers feedback on the quality of their flocks, in particular regarding the rates of and reasons for condemnation of their flocks.

Compared to other animal species, the health inspection of poultry is particularly tricky for several reasons. First of all, the hazards that are most frequently linked to foodborne diseases related to the consumption of poultry meat are bacteria such as campylobacter or salmonella that do not cause any clinical or lesional signs in animals (EFSA, 2012). Thus, they cannot be detected by a visual examination of animals and carcasses alone. Moreover, the ante mortem examination is often performed on a sample of birds that should be randomly chosen, but in practice the inspection is usually performed in the most accessible crates, under poor lighting conditions and with high density animal groups. Only major or frequent clinical signs can therefore be detected. Finally, due to the high speed of the slaughter line — ranging up to 10,000 broilers per hour — each observer's examination time is usually limited to 0.4 s per carcass. The automation of the slaughter line can also complicate the inspection, especially regarding viscera, as it is not always possible to examine some of them (e.g. kidneys and lungs). Although European regulations provide a list of conditions that should lead to condemnation (Anonymous, 2004), these conditions remain too vague (e.g. unspecified threshold, insufficiently clear reason for condemnation ...), and it is necessary to define a clear line of conduct to adopt for each lesion and/or abnormality depending on the associated risk. This procedure must be standardised so that all slaughterhouses follow the same line of conduct (Salines, Allain, Roul, Magras, & Le Bouquin, 2017).

These specificities of poultry slaughter, combined with the need to optimise public resources in a climate of budgetary restrictions, necessarily led authorities and scientists to rethink the organisation of health inspections in poultry slaughterhouses. Regulation EC no 854/2004 requires that “the official veterinarian (OV) [carries] out inspection tasks in slaughterhouses [...], in particular as regards food chain information; ante mortem inspection; animal welfare; post mortem inspection; specified risk material and other animal by-products; and laboratory testing” (Anonymous, 2004). Nevertheless, as the prime responsibility for marketing safe food lies with FBOs, the European regulation also includes the possibility for Member States to allow poultry slaughterhouse staff with adequate qualification and training to assist with official checks by carrying out certain specific tasks under the supervision of the OV. Since 2011, a two-level inspection scheme is implemented in France, with specially-trained poultry slaughterhouse staff being allowed to participate in the tasks of official auxiliaries (OAs) under the supervision and responsibility of OVS and on the basis of a risk analysis (Fig. 1) (Anonymous, 2011a, 2011b). The objective of such a shared system is to develop an optimised, risk-based inspection method by (1) reorganising health inspection in poultry slaughterhouses and adapting the level of intervention of OVS to the risk to public health that the foodstuffs represent (2) and by refocusing the OVS' specific skills on more complex missions and transversal tasks from farm to slaughterhouse. To properly organise the interaction between stakeholders and to guarantee effective risk management in this shared control system, a set of alert criteria have been determined for each inspection task (Anonymous, 2012c). They correspond to science-based data regarding live animals or carcasses that should lead FBOs to alert OVS, who will then decide what further steps should be taken with respect to the flock (e.g. an extended documentary analysis, extended inspection of live animals, carcasses or by-products, or an on-farm inspection) (Fig. 1). Before being allowed to participate in OA tasks, slaughterhouse inspection staff must first be trained to detect lesions through national reference documents designed to standardise the criteria and reasons for the condemnation of poultry carcasses for each species (Salines et al., 2017). As permitted by EU regulation (Anonymous,

2004), a pilot project was implemented in France in 2012 in order to test the efficacy of this method (Anonymous, 2012a, 2012b). Briefly, as described by Allain et al., this organisation was tested in 12 poultry slaughterhouses spread across mainland France (Allain, Salines, Le Bouquin, & Magras, 2018). For one year, FBOs and OVS were asked to record in a standardised database a set of information related to each flock being slaughtered at every step of the process as well as the actions they took.

Conducted a few years after the implementation of this shared risk management system in France, our qualitative field study was designed to obtain feedback from stakeholders regarding their real knowledge of the alert system, the way the system is actually implemented on the ground, the impact and challenges of this method on work organisation and communication, as well as the opportunities it may offer.

2. Material and methods

2.1. Survey design

2.1.1. Survey methodology

Representatives of both the OVS and FBOs were interviewed using semi-structured questionnaires developed according to the methodology applied to a Knowledge Attitude Practices (KAP) survey (WHO., 2008). Two similar questionnaires were designed for OVS and FBOs. After several questions to collect data about the slaughterhouse (tonnage, slaughtered species, work and inspection organisation) and the interviewees (position in the team, professional career), the conversation was directed to address three key points: (1) The level of knowledge of the interviewees, assessed through questions on their specific training on the system and their understanding of the alert criteria. They were also asked to cite the objectives of the system's development. (2) Their practices: the interviewees were first asked to describe the way the system was implemented in their slaughterhouse, then how the system currently worked and the challenges they still faced. (3) Their attitude towards the system: their opinion in terms of the system's relevance, efficiency and convenience was recorded.

2.1.2. Sample selection

Slaughterhouses were sampled as follows: (i) first, the *départements*¹ in which poultry slaughter volume was greater than 1.5% of the national production were selected as major production areas; (ii) then slaughterhouses were selected to represent a broad diversity of situations in terms of tonnage produced and species slaughtered, factors which affect the slaughter organisation, inspection pressure (e.g. number of OA/OV per slaughterhouse, frequency of process controls ...), and the type and frequency of alerts; (iii) finally, we chose to survey stakeholders with various degrees of knowledge and awareness of the alert system. Two slaughterhouses were thus selected per chosen *département* in addition to the slaughterhouses that participated in the pilot experiment (Allain, Le Bouquin, Donguy, & Magras, 2013; Allain et al., 2018) plus several extra slaughterhouses in case of refusal or withdrawal. Finally, 39 slaughterhouses located in 14 *départements* were contacted.

2.1.3. Conduct of the study

Interviews were held between April and July 2015. The heads of the OVS food safety department and slaughterhouse directors received a written request for an interview with the official

¹ In France, *départements* are local administrative areas corresponding to EU NUTS classification level 3.

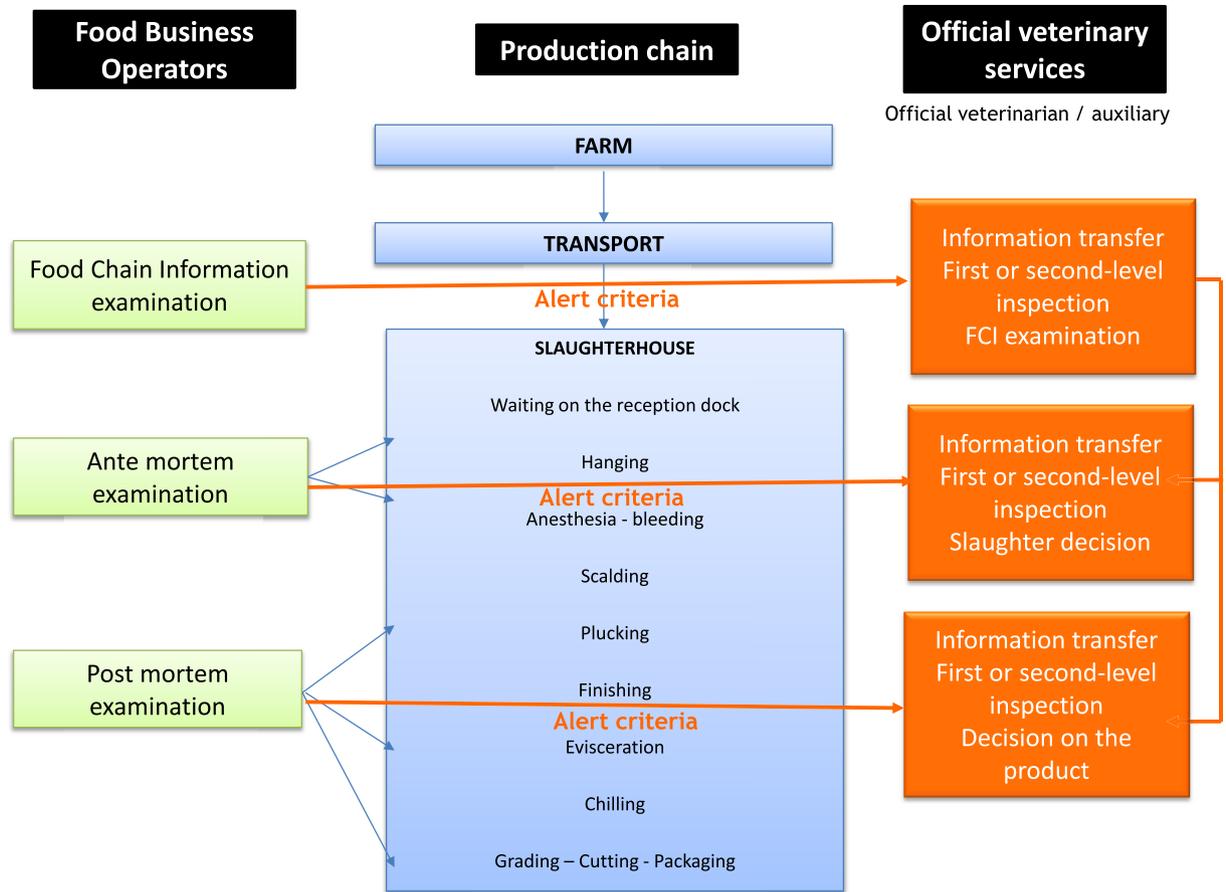


Fig. 1. Organisation of shared risk management in French poultry slaughterhouses.

FCI: Food Chain Information; OVS: Official Veterinary Services; FBOs: Food Business Operators.

A set of alert criteria have been determined for each inspection task in this system. Slaughterhouse staff participate in the tasks of official auxiliaries under the supervision and responsibility of OVS. When they detect a non-compliance with alert criteria, they have to transfer the information to the OVS that take decisions on how to manage the flock (extended documentary analysis, extended inspection of live animals, carcasses or by-products, on-farm inspection, etc.).

veterinarian/auxiliary and the quality manager/assistant respectively. They were informed of the survey's general topic and told that their counterpart was also being asked to participate in the same survey. Once the hierarchy agreed to participate in the study, separate appointments were made with the official veterinarians/auxiliaries and the quality manager/assistants. Interviewing the OVS and FBOs separately ensured honest and clear answers. With the same goal in mind, the questionnaire was not sent to the participant prior to the interview. The interviews were preferably face to face, but some were carried out by phone for practical reasons. With the participants' agreement, the conversations were recorded while notes were taken. All the interviews were conducted by the same interviewer which allowed answers to be compared and avoided information bias.

2.2. Data analysis

All the recorded interviews were transcribed in their original language, and data were qualitatively analysed. Quotes were selected and have since been translated into English to report opinions and situations. Data were also entered in Excel tables to allow for horizontal and vertical analyses. The horizontal analysis corresponds to the examination of the answers of a single interviewee to all questions. The vertical analysis refers to the study of all points of view for a single interview question, in order to explore the diversity of opinions on a particular issue.

3. Results and discussion

3.1. A diverse study sample

3.1.1. Final number of slaughterhouses, interviews and interviewees

Of the 39 slaughterhouses initially contacted, 30 agreed to participate in the study, a lack of time being the main justification for the refusal of the nine others. For 19 of the slaughterhouses included in the study, only the OVS were interviewed, corresponding to 12 interviews since some veterinarians were in charge of several slaughterhouses. In the other 11, both representatives from the OVS and the FBOs were surveyed (ten and nine interviews respectively). Thus, 31 interviews were conducted in all; most of them face to face but five by phone. Some interviews were held with two persons from the same group at the same time, but never with one representative from the OVS and one from the FBOs together. A total of 25 OVS representatives and ten FBO representatives were surveyed (Table 1).

3.1.2. Diversity in slaughterhouse features

The 30 surveyed slaughterhouses were located in three French regions known to be the major poultry production areas: the North-West, South-West and South-East. The sample included multi-species slaughterhouses (36%) or mono-species slaughterhouses. Of the latter, 32% slaughtered broilers, 13% turkeys, 7% force-fed ducks, 6% meat ducks, 3% guinea fowl and 3% other types

Table 1
Number of slaughterhouses and interviewees included in the study.

Slaughterhouses			Interviewees		
Where both FBO and OVS reps were interviewed	Where only OVS reps were interviewed	Total	From OVS	From FBOs	Total
11	19	30	25	10	35

FBOs: Food Business Operators; OVS: Official Veterinary Services.

of poultry. Their tonnage ranged from 1000 to 110,000 tons per year. In total, the interviewed slaughterhouses slaughtered almost 700,000 tons per year, i.e. around one third of the yearly French production. The market opportunities for the products were various: fresh or frozen, whole carcass or cut meat, for domestic or export markets. Most of the sampled slaughterhouses operated on the basis of a 5-day working week, but some also worked on Saturdays systematically while others only worked on occasional Saturdays.

3.1.3. Diversity in interviewee profile

Among the 25 interviewees from the OVS, 21 were OVs, the four others being OAs. They were on average 43.6 years old (range: 32–59). Seventeen were women. Two OVs also had an additional liberal activity. Only three OVs also had inspection missions in cattle slaughterhouses. The average seniority in their position was 7.2 years (range: six months to 29 years) with a diverse previous career path (from liberal activity to research positions).

Among the ten interviewees from the FBOs, eight were quality managers and two were quality assistants. They were on average 37.4 years old (range: 25 to 49). Eight of them were women. Two quality managers were in charge of several slaughterhouses. Their average seniority was 9.2 years (range: one month to 25 years), with various educational backgrounds and career paths.

3.2. Co-adaptation of regulation and practices: one regulatory framework, a wide range of field implementations

3.2.1. A progressive shift towards the formalisation of an alert scheme

Although two-level inspection schemes already existed in a number of slaughterhouses, no alert system was properly formalised before the implementation of the regulation. Both FBOs and OVS explained that their professional practices had to be modified to be in accordance with the regulation, as an OV declared: “They had to take on board the different alert criteria and call us when necessary, and as for us, well it actually changed our way of working.” Although the shift was progressive in most of the slaughterhouses, the interviewees highlighted the importance of being well prepared for the implementation of the alert system: “I can imagine the reaction of slaughterhouses that discovered all this. It must have been quite a shock when they received the instructions. At least we'd been prepared for it,” emphasised a quality manager from a slaughterhouse having participated in a pilot test. The FBOs also appreciated being helped by the inspection services to conform to the regulations: “There was a lot of pressure, for sure, but we also had the support of the veterinary services,” explained a quality manager. Thanks to this progressive shift and the implementation of training programmes, the knowledge of the interviewees was generally satisfactory regarding the objectives of the implementation of this system, the alert criteria, the regulatory requirements, the organisation of their counterpart, etc. For instance, only two interviewees were considered insufficiently knowledgeable about the alert criteria. Another pilot project led in Dutch poultry slaughterhouses in 2011–2012 to test a task transfer from OVs to OAs also concluded to a proper knowledge of alert criteria and a good implementation

of the system (NVWA, 2013a, 2013b). Alert schemes for poultry meat inspection therefore seem to be relevant.

3.2.2. Regulation malleability and variety of implemented alert schemes

In all the surveyed slaughterhouses, internal procedures were implemented and alerts were triggered and managed. However, the division of control tasks varied depending on the slaughterhouse (Fig. 2). In all slaughterhouses, FBOs were involved in three tasks: FCI, ante mortem and post mortem examinations. In 25 of the sampled slaughterhouses, OVS performed second-level inspection of FBO checks (random and unannounced checks to make sure that FCI was being correctly analysed, specific one-off ante mortem inspections, random checks on the condemnation of carcasses) and took action in the case of alerts from FBOs. However, in five slaughterhouses located in two French *départements*, some control tasks were duplicated: FCI and ante mortem examinations were systematically performed by both FBOs and OVS. In the two *départements* where this double-checking system was observed, the joint examination of FCI was decided by OVs and their hierarchy. This organisation did not meet the aim of the two-level control system to optimise use of the respective skills of FBOs and OVS. Nevertheless, some interviewees from OVS reported that this double-checking system made it possible to plan the management of high-risk flocks ahead of time and to organise slaughter days better. Others described this as a consequence of poor FCI control by FBOs: “At one point in time we'd cut down on our inspections but then we realised that some things were slipping through the net, so we decided to check all the FCI forms.” A quality assistant from a slaughterhouse appeared to be reassured by FCI double-checking: “Personally, I think it's a good idea to double-check the FCI. After all, we slaughter 500,000 chickens a day.” Nevertheless, double-checking could lead to a lack of accountability among FBOs, as an interviewed OV explained: “I think that the slaughterhouse is less accountable. As they give us all the FCI forms to look at, they don't really integrate the notion of alert criterion on the FCI.”

3.2.3. The relative fixity of alert criteria

Several alert criteria were sometimes brought into question, either because interviewees did not fully understand them, or because they found them difficult to apply or measure. For instance, a quality manager was confused about condemnation rates, the threshold for an alert varying between 1% and 2% depending on the reason for condemnation: “Personally, I apply a 1% rate all the time, otherwise it's a real pain.” Another interviewee explained that checking the overcrowding of birds in crates was not an easy task: “If we're strict about enforcing the rules, then we're constantly on alert. Overstepping density by 200 g, for example, triggers an alert but in practice, we're not going to ask for an extra lorry.” Some criteria were considered too subjective: “I don't really know what ‘abnormally dirty’ really means; it's not clear” and thresholds were sometimes thought to be absent: “When you have an alert criterion, you need something precise to measure it by, otherwise there's no point,” or inappropriate, for example the mortality rate for small flocks. In some slaughterhouses, condemnation thresholds were considered too low, especially for broilers (1%), and stakeholders admitted that

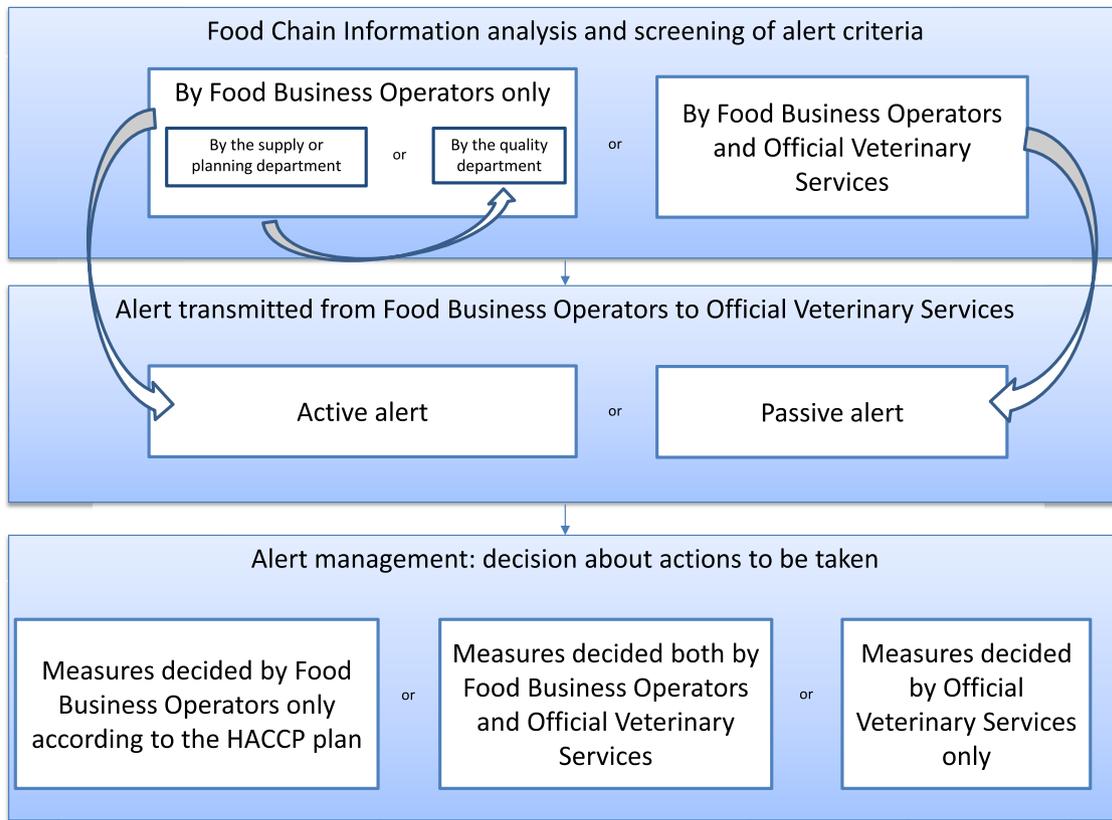


Fig. 2. Observed modus operandi for the detection, transmission and management of alerts in the 30 participating poultry slaughterhouses in France (example for examination of Food Chain Information).

FCI: Food Chain Information; OVS: Official Veterinary Services; FBOs: Food Business Operators.

Regarding the detection of non-compliance with alert criteria, two situations were observed in the field: FCI forms were either examined only by FBOs, or by both FBOs and OVS, separately. In the first case (active alert), FBOs triggered an active alert to OVS, i.e. slaughterhouse staff called or e-mailed the OV to deal specifically with the high-risk flocks. In the second case (passive alert), FBOs only marked on the FCI form that there was a non-compliance with the alert criteria and then transmitted all the FCI forms to OVS staff without specifically warning them about the high-risk flocks. Three management configurations were then observed: (1) control measures were only decided by FBOs according to what was described in the HACCP plan; (2) control measures were discussed by FBOs and OVS; FBOs implemented routine actions, which were then checked by OVS; (3) an administrative decision was taken by OVS. These three situations may be observed in a single slaughterhouse depending on the alert's degree of urgency.

they had set a higher threshold than the official one. Thus, while alert criteria can be considered as a fixed point in a structured framework, their fixity is nevertheless relative to stakeholders. As explained by Jolivet (2013), a regulatory text can enter into conflict with the previously implemented organisation. Indeed, because of its exogenous nature, it can bring tension to the pre-established framework and socio-professional practices. Thus, a local adjustment frequently operates to preserve the initial organisation. This could explain why various alert schemes were observed in the field and why alert thresholds were sometimes adapted. Such adjustments may result in an intermediate text making it possible to preserve the organisation while standardising it. These examples of latitude in the implementation of the two-level inspection system reflect both the co-adaptation of practices and regulations, and that of OVS and FBOs, two evolving professional groups.

3.3. Redrawing the borders of the professional groups involved: turning challenges into opportunities

The two-level inspection system was considered effective and efficient by all but one of the interviewees, as an OV declared: "By combining a system of alerts, surprise checks, the inspection of products and especially inspection of processes, we have a coherent and efficient inspection system. We never find a carcass in the cold

chamber that shouldn't be there." This is in accordance with the results of an epidemiological study of rates of and reasons for poultry carcasses condemnations in French slaughterhouses during the same period (Salines et al., 2017). The Dutch pilot project also evidenced that the alert system did not lead to a decrease in the food safety situation and was perceived as an improvement of the former inspection system by all stakeholders (NVWA, 2013a, 2013b). A study led in the United Kingdom showed that officials in white meat plants were happy with the standard of work of the Plant Inspection Assistants employed by the slaughterhouse, and none advocated a return to directly government-employed inspection for post mortem (Mori, 2013). Our study evidenced that the implementation of this new regulation modified the composition of the FBO and OVS teams by creating new jobs: "All this led to the slaughterhouses taking on quality managers, which they didn't have before" or strengthening positions: "The alert criteria system led to the creation of a real veterinary services team." It led to a structural and organisational reconfiguration of professional teams. From the OVS' point of view, OVs explained that this inspection system matched their vision of veterinary inspection in slaughterhouses better and that it enabled them to diversify their missions. For instance, an OV and OA from the same slaughterhouse were debating: (OA) "I still like taking a look at the slaughter line. Supervising paperwork alone is not really concrete." (OV) "No, but the fact

that you're no longer on the line means you have time to do more useful and interesting things. I think it's a way of professionalising inspection." Still valuing their core business of meat inspection, they appreciated developing the management side of their job: "Our role is shifting more towards managing teams, organising things, relating to professionals rather than a basic technical role. I think it's a really positive development." The reform of the inspection system was also an opportunity for OVS to explain the relevance of risk-based meat inspection and to reaffirm the added value of veterinary expertise. They were also convinced that reducing product-oriented inspections in the two-level inspection system allowed them to better monitor and control the practices of food operators, as well as the hygiene and practices linked to the process and establishments themselves. This shift in the role of the OVS was also indicated by the fact that the presence of OVs on the slaughter line was considered necessary by only 3 out of 10 and 7 out of 25 interviewees from FBOs and OVS, whereas the presence of OVS in the slaughterhouse was considered essential by 7 out of 10 and 20 out of 25 interviewees from FBOs and OVS.

However, most of the interviewees from OVS faced growing administrative responsibilities: "We spend more time proving we've done our job properly than actually doing it" and considered that it showed the State's lack of trust in them. They spent much time meeting registration and recording requirements and some of them felt that actions only existed through procedures. FBOs bore the same administrative burden; they also had to invest time and money to organise staff training sessions and develop a standardised recording and storage system. This strict formalism was nevertheless considered necessary for good traceability and helpful in improving and harmonising the inspection system as well as communication between stakeholders. Using recorded data to produce statistics or to plan inspections on farms was considered valuable and helped stakeholders make sense of administrative tasks.

From the FBOs' point of view, the new inspection organisation gave more responsibilities to slaughterhouse staff: "It's a question of teamwork, I think it's a good thing that the first sorting step is carried out by the operators; it makes them more aware and encourages them to take responsibility." In return, the slaughterhouse workers had to work under pressure both from FBOs and OVS, as an interviewee explained: "Operators dealing with condemnations have a tricky kind of responsibility to cope with, both as regards the farmers and their own superiors." Finally, half of the interviewees from the quality department and all the interviewees from OVS thought that the alert system is a relevant development of their job, making it possible to upgrade the skills of all stakeholders. An OA also underlined the complementarity of FBOs and OVS: "We have administrative and technical skills, while theirs are field-related, so they're complementary." The complementarity of both teams was also illustrated by the fact that OVS often indirectly helped quality managers to affirm and develop their role in the slaughterhouse, as two quality managers explained: "When I first began, we managed to change the position of the quality department within the company; the veterinary services helped us to establish this position" and "It's sometimes hard to get a message across, but if the veterinary services have come across the same problem, it can strengthen our position." This kind of use of regulations by quality departments has already been described in other professional sectors (Jolivet, 2013): stakeholders often make a system their own and use it to encourage the establishment's management to implement action plans that had been left pending. A regulatory reform can thus strategically serve the interests of a specific firm's department and redesign a plant's organisation. Finally, 16 interviewees from OVS considered that they work was acknowledged by FBOs, and conversely 6 interviewees from FBOs thought they work was recognised by OVS.

No agreement was reached on the definition of inspection in the field: FBOs expected inspection to help them enhance their practices, whereas it is not officially part of the State's missions. Adam (2014) described how inspectors were often in an uncomfortable position and struggled between the impossibility of giving advice and the fact that advising was necessary to give meaning to their actions. Bonnaud (2005) also explained how inspectors for classified installations face the same dilemma, and that their actions were half-way between negotiation and strict administrative policy enforcement. The study led in the U.K. also described three categories of OVS: facilitator, educator and enforcer, as well as three classes of FBOs: resistant, reactive and proactive (Mori, 2013). The authors explained that the relationships between OVS and FBOs depended on the stakeholders' profile and could be one of several drivers of, or barriers to, FBOs taking ownership of food safety. In our study, OVS explained that they greatly value the advice aspect of their work: "I find it more beneficial to support slaughterhouses than slap them on the wrist. We make more progress when we help them, even though that doesn't stop us drawing up non-compliance forms when we come across anomalies." The shared risk management system was often found to increase cooperation between FBOs and OVS to make the slaughterhouse progress on larger issues: "Before, discussions were limited to product inspection only, but now we're having a collaborative exchange of views." This is a common process resulting from co-regulation in enforcing food safety. Co-regulation in enforcement involves all modes of regulation in which regulations are designed and set by public authorities and enforced through the coordinated actions of public authorities and regulated firms (Bartle & Vass, 2007). Co-regulation mainly refers to a shift in regulatory practices in the areas of inspection, information and sanctions (Rouvière & Caswell, 2012). Rouvière and Caswell (2012) described a co-regulation system for the enforcement of pesticide residue limits in a French import market for produce. They showed that, under co-regulation, public agents were less focused on sanctions and more on a preventive approach, providing incentives. Mari et al. also evidenced that negotiations seemed to help FBOs understand non-compliances and the corrective actions they have to implement, and could thus be considered a potential incentive for FBOs (Mari, Saija, & Janne, 2013).

3.4. Mutual trust and communication: the key to efficacy

Fifteen out of the 35 interviewees considered that the alert system had an influence on the relationships' quality between OVSs and FBOs, either positive or negative. According to them, mutual trust and communication still remained pivotal challenges. Some OVs raised doubts regarding the efficacy of the two-level inspection system; indeed, they mentioned their lack of trust in FBOs because of poor transparency: "The slaughterer has to check his own work, which makes no sense at all in certain slaughterhouses." However, most of the interviewees judged that they worked in confidence. On one hand, OVS thought that mutual trust was needed: "In our relationship with the slaughterhouses, we have to trust them to some extent, or else we have to do things ourselves." On another hand, they also explained that trust was not self-evident and had to be acquired through inspections: "Trust doesn't rule out inspections. On the contrary, you start to trust when you consider your inspections sufficient and satisfactory." Communication was also considered a key factor in regulation enforcement, as an OV explained: "We have frequent contact with the slaughterhouse and the quality department, so communication is easier when we want to get a message across." The Dutch pilot project also evidenced frequent and adequate communication between stakeholders (NVWA, 2013a, 2013b). Mari et al. similarly reported that the more frequent the official

inspector's visits were, the more positively it seemed to influence the FBOs' attitude towards checks (Mari et al., 2013). Interviewees also lent importance to the differentiated and targeted use of communication tools depending on the alert's severity. In all the surveyed firms, both FBOs and OVs distinguished major from minor alerts. Minor alerts were defined as “usual” non-compliances with alert criteria that frequently occurred and did not cause any particular management issue (e.g. if control measures were already described in the HACCP plan). For this kind of minor alerts, stakeholders favoured indirect means of communication such as e-mail. Conversely, in the case of unusual alerts or values going far beyond the threshold value (clinical signs among live birds, a high mortality rate during transportation, or a high condemnation rate for example), stakeholders preferred to deal with the situation by phone or face to face when possible. As an OV explained, communication created a virtuous circle: “Through this more frequent relational system, we get used to relating to each other, and not just about alert criteria, so the establishment won't hesitate to call us about another problem.” Communication specific to the alert system therefore led to a reconfiguration of social relationships between and within professional groups (Cooren & Robichaud, 2010). Overall, an OV summarised the benefits of the two-level inspection system: “Success is only possible through trust and dialogue, or we'll end up in deadlock. This system encourages communication.” From the FBOs' point of view, two interviewees pointed a remaining communication challenge with a lack of feedback from OVs regarding the actions they took after the alert, as a quality manager explained: “What use is really made of all the information we give them? We don't always get any feedback.” Improved two-way communication would ensure the sustainable involvement of FBOs as well as long-lasting trusting relationships.

4. Conclusions

Professional relationships in slaughterhouses have already been described in a couple of papers (Bonnaud & Coppalle, 2008; Luukkanen, Kotisalo, Fredriksson-Ahomaa, & Lundén, 2015; Muller, 2008). However, the authors dealt with inspection in cow or pig slaughterhouses, in which official services permanently inspect carcasses on the slaughter line. The primary interest of our study lies in its in-depth exploration of the opportunities and challenges arising from the innovative shared risk management system implemented in poultry slaughterhouses through interviews of the two major stakeholders: quality departments and inspection services. Collecting and analysing feedback from stakeholders is of major importance, particularly because the implementation of the new inspection system affected team management and organisation, and led to the redesigning of socio-professional relationships. Overall, the system was found to operate well thanks to good preparation, a clear definition of missions and roles, and the implementation of specific procedures. This is in accordance with studies in other fields having defined several key factors to guarantee the efficacy of a risk management system based on alerts: (i) early warning system; (ii) clear and anticipated planning of the alert system; (iii) discussion, communication and participation of all stakeholders; (iv) training and awareness; (v) simulation exercises (Haynes, Barclay, & Pidgeon, 2008; InVS, 2005; Leonard et al., 2008; Paton, Smith, Daly, & Johnston, 2008). In our case, the system also offers both OVs and FBOs new opportunities for taking advantage of their respective skills and taking on new responsibilities. Conversely, a study conducted in Finnish slaughterhouses showed that OAs were reluctant to task shifting between stakeholders, with only one out of 42 interviewed OAs and none of the OVs or FBOs willing a transfer of ante mortem inspection to OAs (Luukkanen et al., 2015). The main challenges arising from our

study lay in mitigating the administrative burden and sustaining constructive relationships while ensuring a high food safety level. From a result-oriented perspective, co-regulation alternatives are thought to be more effective than traditional approaches in reaching compliance goals and the desired levels of food safety (Rouvière & Caswell, 2012). The shared risk-based inspection system currently implemented in French poultry slaughterhouses has been found to be efficient in terms of both compliance (Allain et al., 2018) and food safety (Salines et al., 2017). The conclusions of the Dutch pilot project were heading in the same directions (NVWA, 2013a, 2013b), which strengthens the relevance of such risk-based inspection systems. Further research would make it possible to assess its cost-effectiveness compared to traditional regulatory approaches, as both public authorities and private stakeholders need clear information on the system's costs and benefits.

Authors' contributions

MS conceived and drafted the questionnaire, sampled and contacted the slaughterhouses and veterinary services, conducted the interviews, analysed the data and drafted the manuscript. VA, CM and SLB initiated and supervised the project. All the co-authors revised the manuscript and approved the final submitted version.

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