

The slaughterhouse as an epidemiological observatory: analysis of inspection data from a pig abattoir serving North and Central Italy

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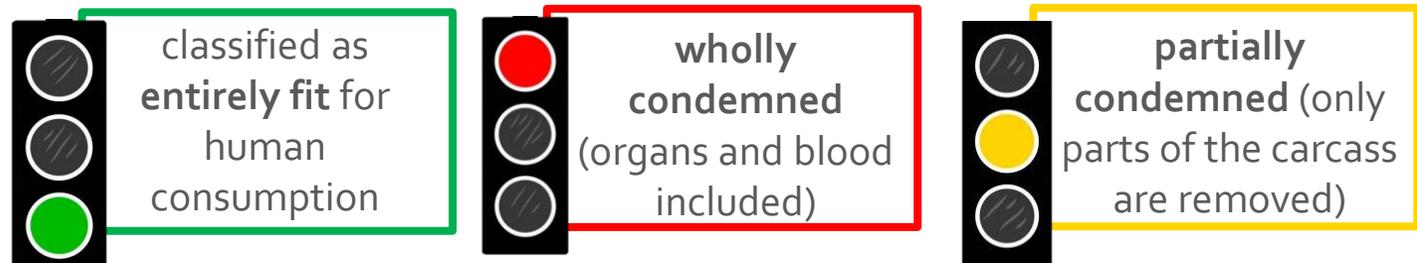
Introduction

- In most cultures **slaughtering** is controlled by **precise sanitary laws**, as the **quality and safety of the meat** depend on the correct implementation of slaughtering procedures and controls
- In **EU countries** food safety is guaranteed by the **synergy between the control authorities and the food business operators**, in accordance with the so-called **hygiene package** (Ceccarelli et al. 2018)
- Slaughtering generally occurs in **authorized slaughterhouses**, where, besides documental controls, animals undergo ***ante-mortem*** and ***post-mortem carcass inspection***, as well as **collection of samples** for further **testing** (e.g. trichinellosis in pigs)



Introduction

- **Official Veterinarians** are **responsible** for supervision and ***ante*** and ***post mortem*** inspections in slaughterhouses (Reg. CE 854/2004; Reg. CE 218/2014)
- **Inspection at the slaughterhouse** is fundamental for:
 - **Public health**
 - **Animal health and welfare**
 - **Meat quality**(Ellerbroek et al. 2011, Harley et al., 2012; Vail & Reist 2014)
- On the basis of **the inspections' result** the carcass can be:



Introduction

- Official veterinarians should also **register and evaluate inspections' results** (Reg. CE 854/2004 All. I)
- The **usefulness** of analysing **abattoir data** for **epidemiological studies** and **disease surveillance** has long been acknowledged and sought (Bäckström and Bremer, 1978; Tuovinen et al., 1994)
- Although some limits exist, the **analysis of the causes of partial and total condemnations** is a **valid tool** for studying the type and prevalence of **lesions** found in slaughtered animals, as well as for investigating the **trend of the major diseases** over time, the **results of their control effort**, and to monitor the compliance with **animal welfare standards** (Ceccarelli et al. 2018; Harvey et al., 2012; Stärk et al., 2014)
- However, the **systematic collection, use and publication of inspection data** for epidemiological surveillance is still **not fully implemented in the European Union** (Harley et al. 2012; Horst et al., 2018; Stärk et al., 2014)

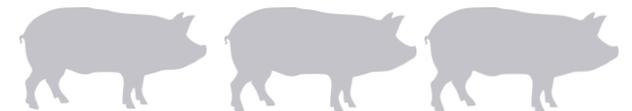
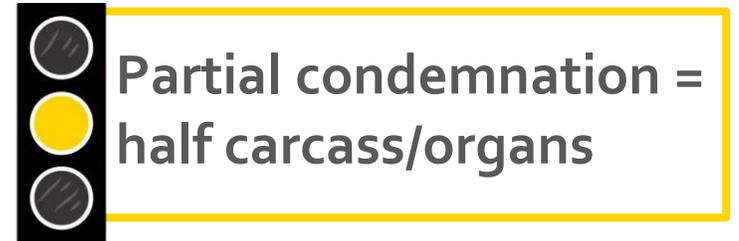
Aim

To evaluate the **frequencies** and **causes** of **total** and **partial condemnations** in a commercial, medium scale **pig slaughterhouse** in **Tuscany**, Central Italy



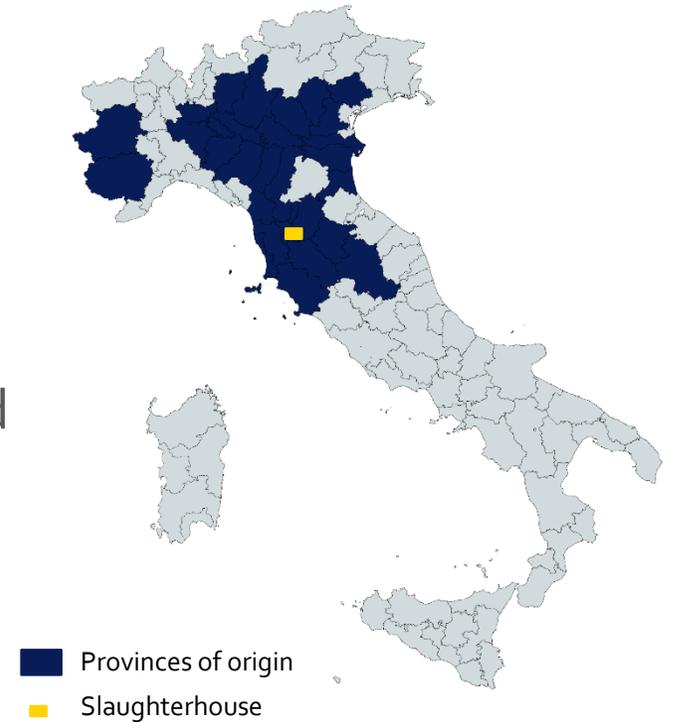
Materials & methods

Inspection data (*ante* and *post mortem*) recorded by the **Official Veterinarians** over the **last 3 years (2016-2018)** were transferred to Excel files and analyzed to assess the **total number of slaughtered pigs** and the **frequency and causes of total and partial condemnations**



Results

- Total number of slaughtered pigs:
384 701 pigs (all “heavy” category)
from **6 different regions** of North and
Central Italy (128 233,7 year average)



Results

- Whole carcasses (total) condemnation:

Period	Nr deaths during transport	Nr of total condemnations
2016	57 (0.04%)	29 (0.02%)
2017	58 (0.04%)	36 (0.03%)
2018	66 (0.05%)	43 (0.03%)
overall	181 (0.05%)	108 (0.03%)

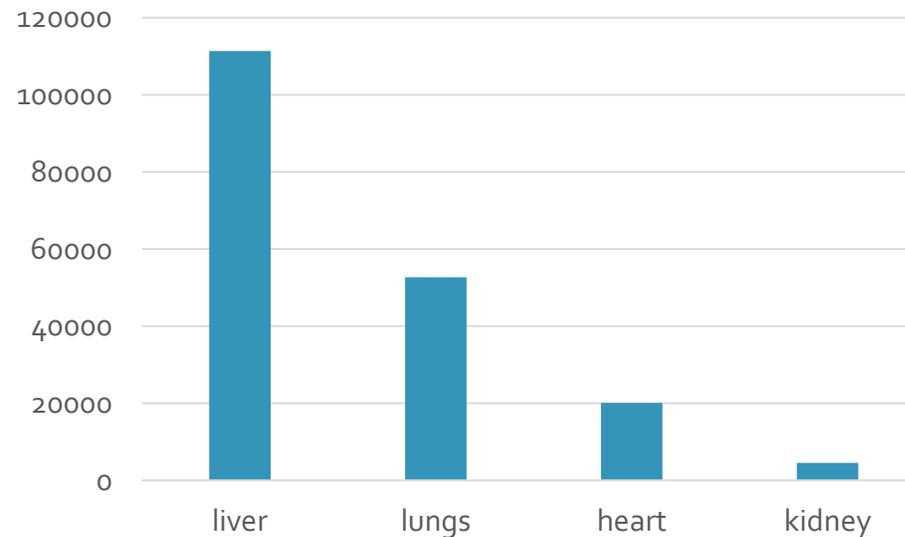
Main reasons:

- swine erysipelas (49.1%)
- generalized jaundice (21.3%)
- Remanining 29.6%:
 - generalized abscesses
 - organoleptic alterations
 - peritonitis
 - enteritis

Results

- **Partial condemnations**

The most commonly seized organ was the **liver** (condemned in around 29% of the pigs), followed by **lungs** (13%), **heart** (5.2%) and **kidney** (1.2%).



Partial condemnations - causes

		N	%	
Organ	Liver	111394	28,95	Of the slaughtered swines
Condemnation reasons	Parasitic hepatitis (milk or white spot liver)	106218	95,35	Of the condemned livers
	Perihepatitis	4666	4,19	
	Other	510	0,46	
Organ	Lungs	52726	13,70	Of the slaughtered swines
Condemnation reasons	Pneumonia (different types)	28233	53,55	Of the condemned lungs
	Pleurisy	22255	42,21	
	Other	2238	4,24	
Organ	Heart	20139	5,23	Of the slaughtered swines
Condemnation reasons	Pericarditis	18848	93,59	Of the condemned hearts
	Other	1291	6,41	
Organ	Kidney	4572	1,19	Of the slaughtered swines
Condemnation reasons	Polycystic kidney	2317	50,68	Of the condemned kidneys
	Nephritis	2163	47,31	
	Hydronephrosis	69	1,51	



Photos: <http://www.cresa.cat/blogs/sesc/un-dia-qualsevol-en-un-escorxador-de-porcs/?lang=en>

Discussion

- Several **recent studies**, with different aims, on **abattoir observations** are available, both analysing **data from official inspection or from specific data collections**, in **Italy and in other countries** (Bueno et al., 2013; Bottaccini et al., 2018; Ceccarelli et al., 2018; Ghidini et al., 2018; Maisano et al., 2019; Mateus et al., 2015; Marrucchella et al., 2019; Merialdi et al., 2012; Kongsted & Sørensen, 2017; van Staaveren et al., 2017; Vial and Reist, 2014)
- **Figures vary widely but comparison is difficult** because of:
 - Different **legislation** (worldwide) or application (EU)
 - Differences in **judgment** (subjectivity) and in **data registration** (among different countries and within them), also due to poor standardization in lesion **classification** (Buncic et al 2019; Horst et al., 2019; Stärk et al. 2014)
 - Different approaches in **data analysis** in scientific publications (Horst et al. 2019)
 - **Pig categories**

Discussion

- **Partial condemnations** much more common than **total ones**
- **Liver:**
 - **Italy:** a retrospective study by Ceccarelli et al., 2018 analysed data from a slaughterhouse over a 7 years period (2010-2016) → **332504 slaughtered pigs**
 - Partial condemnation: the organs or groups of organs that most frequently showed lesions were **liver, heart and pluck**
 - The **liver condemnation** was mainly due to **parasitic hepatitis**
 - **Portugal:** during the slaughter of 14812 piglets and 6094 finishing pigs, 5507 (37%) and 1951 (32%) livers were rejected, 44.1% and 60.3% of these due to parasitic hepatitis caused by migrations of *Ascaris suum* larvae (Mateus et al., 2015)
 - Well known problem also in UK (Correia Gomes et al., 2017; Sanchez-Vazquez et al., 2012)
- **Slaughterhouse** → **farm control of *Ascaris suum*** for production impact, evaluate efficacy of antiparasitic protocols and zoonotic potential

Conclusions & perspectives

- Although an **integrated approach**, along the whole supply chain, is needed **to ensure public and animal health**, and the main limits of traditional meat inspection are well known, the **slaughterhouse** and Official Veterinaries may **still play a pivotal role in surveillance**
- **Data analysed so far in this study is limited**: the systematic analysis will be enlarged to previous years (since 2010) to reinforce epidemiological outcomes. Geographical origin and seasonal trends will also be investigated



Thank you

Thank you

Slaughtered Pig
Attributed to [Caspar Netscher](#)
(Prague or Heidelberg ca. 1639 – 1684 The Hague)
Date ca. 1660–62





KILLING PIGS.
Early Fourteenth Century.
MS. Roy. 2 B. vii.

References

- Ceccarelli et al 2018

Results

- **Partial condemnations**

The main reasons for condemnations were:

- **parasitic hepatitis (white spot liver) (%)**, **perihepatitis (%)** and **pericarditis (%)** for the **liver**
- **Pneumonia (%)**, **pleurisy (%)** and **polyserositis (%)** for **lungs**
- **Pericarditis (%)**, **polyserositis (%)** and **pleural pneumonia (%)** for the **heart**
- **polycystic kidney (%)**, **nephritis (%)** and **hydronephrosis (%)** for **kidneys**

- There is a general consensus in recognizing that traditional meat inspection is no longer able to address the hazards related to meat consumption. Moreover, it has been shown that invasive procedures, such as palpation and incision, can increase microbial contamination in carcasses. For these reasons, legislations all over the world are changing meat inspection techniques, moving towards visual-only techniques
- Back in 2011, EFSA [2] stated that the traditional inspection system in swine is not targeted to the main hazards deriving from meat consumption. These hazards are no longer detectable by classical meat inspection because they are no longer caused by pathogens associated with specific lesions and are sometimes related to chemicals. Moreover, procedures such as palpation and incision of the viscera by veterinarians can lead to cross contamination of the carcasses [3].
- (Ghidini et al 2018)