

## ASSESSMENT OF THE SPOILAGE MICROFLORA IN POULTRY AND CARCASSES CONDEMNATION

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### **Abstract**

*The microbial load play an important role in hygiene abattoirs performance and risk categorisation, as an important part of a risk-based meat safety assurance system. The aim of our study was to investigate if risk categorisation of abattoirs based on microbiological indicators have a similar results like codecs used for condemnation (partial or total) of the carcasses on ante mortem or post mortem inspection. The research material was represented by poultry samples collected in compliance with the current legislation (RU2073/2005) and (RU627/2019) it is used for poultry condemnation. The results showed that differences regarding Campylobacter and Salmonella may be consider as variation in risk abattoir categorisation. A lower risk may be considered regarding Campylobacter level lower than Salmonella. Microbial load from the surface of carcasses is significantly influencing the risk abattoir categorization and the final condemnation.*

**Key words:** microbial residues, consumer safety, sustainable environment.

### **INTRODUCTION**

According to (FAO, 2023; Mottet & Tempio, 2017; USDA, 2023) the meat of the poultries is the most consumed globally and consumption is increasing and in this case food safety for happy and satisfied clients is a very important issue.

Food safety is one direction of European legislation and European Union (EU) designed to prevent risks and hazards on the hole food chain starting with the primary producers (from the farm to the abattoir) ante-mortem inspection (AMI) and post mortem inspection (PMI) of the poultry and broilers carcasses (EU, 2019b).

According to Vågsholm et al. (2023) the purpose of meat inspection is the same in starting past century with the maim focus on protecting health of consumers, (maintain the reputation of the meats in home and export markets and detect communicable diseases of animals before they have spread beyond easy control. Present days added more direction as to protection of animal welfare and consumer health with focus on chemical and biological hazards and food frauds.

The original meat inspection procedures were based on visual inspection of surfaces, and palpation and incision of tissues, particularly lymph nodes, to detect abnormalities (Huey, 2012). The top finding lesions are abscesses,

tuberculous lesions, parasitic cysts and tissues with unusual colors, consistencies and odors affecting the carcass and/or the organs. Today meat inspection added other issues like fraud, adulteration, counterfeiting and other fraudulent practices are the new challenges in meat inspection adding Salmon's paper (1889), the American pioneer of Food Safety new practices. In our days EU legislation establish national surveillance programs available in each European country in live chickens and broiler meat for testing *Salmonella*, *Campylobacter* in live chicken and broiler meat establish in control programmes based on standardised mycological reference analyse systems on (EC, 2003; EC, 2020; EFSA, 2012b).

Also, as mentioned before apart food safety, animal health and welfare may determine indicators for meat inspection, especially ante mortem inspection completing the food chain from farm to abattoir.

The antemortem inspection includes the control of the Food Chain Information inspecting information regarding animal welfare, treatment before slaughtering with the withdrawal period respected, documents and an inspection of the flock before slaughter. The aim of AMI is to verify if any incidents, related to health and welfare, which could have occurred on the farm (illegal treatments, signs of antibiotic

treatments) of during transport processes. Some EU countries deciding for respecting young animals not to slaughter them and with the sop of avoiding transportation and the stress that may occur. In PMI, the detection of lesions/abnormalities as well as visible contaminations on the surface of the carcasses are recorded on the official documents with the result total or partial condemnation of the carcasses (EU, 2019b; Huneau-Salaün et al., 2015).

The EU legislation applicable is represented by article 45 of the Commission Implementing Regulation (EU) 2019/627 with the quotes of 18 reasons for declaring poultry meat unfit for human consumption (EU, 2019b). Most of abattoirs are using national codes based on EU legislation. These codes are covering different fields regarding AMI or PMI. Each EU country is applying some of the codes but not totally, general common use of the codes is differing from country to country or even in the same like in the case of Italy or Germany where each region has a different legislation.

PMI lesions observed in broilers based on anatomopathological inspection are skin lesions, ascites, discoloration, arthritis, polyserositis, and the presence of fibrin in various organs indicating systemic infection, cachexia or mortality before slaughter, contamination of the carcass with crop or intestinal/cloacal contents, or other slaughter process-related defects as mentioned in European codes (Alfifi et al., 2020; Koutsianos et al., 2021).

The aim of this paper was to analyse the codes used in Romania for broiler PMI findings and their implications for food safety, meat quality, broiler health or welfare and if exists a corelation with hygiene criteria.

The study was part from an original paper with the aim of analysing and comparing existing national PMI codes used in Europe and propose a new harmonized risk - based code set for Europe, but in the end the data was not used in the original study.

## **MATERIALS AND METHODS**

Two poultry abattoirs one large sale (A) a one small scale (B) was choose representatively for the subject of the study. The average daily

slaughter for the large abattoir is > 20000 birds and for the small one < 5000 birds.

The data was collected using the official annual abattoirs reports for National Sanitary Veterinary Authority. Three main units was subject of the study. Secondary data were collected using interviews with Official Veterinarians (OV) regarding condemnation criteria used in PMI regarding the code system specified by European legislation and associated condemnation criteria in place applicable for Romanian case. We used data reported end of 2023.

The data analysed in Romania must targets the number of codes available and reported by official vets to national authority based on of PMI findings; if the condemnation was total or partial and the proportion or the number of carcasses declared unacceptable for human consumption.

## **RESULTS AND DISCUSSIONS**

Romania is expected to increase poultry production, encouraged by strong consumer demand and the price competitiveness of chicken meat compared to pork how originally represented national meat. In Romania are licence 37 slaughterhouses authorised for chicken and broilers (ANSVSA). All European countries had implemented the code set based on article 45 of the Commission Implementing Regulation (EU) 2019/627 included Romania. Most commune codes set found in Romania are chronic hepatitis, trauma before slaughter, dead before slaughter, footpath lesions as listed in article 45 of RU 627/2019.

Analysing codes in different countries in Europe according Majewski et al. (2024), “acute arthritis”, “chronic arthritis”, and “footpad lesions” codes did not appear in the most-used codes list that was prepared and that covers 80% of condemnations. However, these three codes reflect broiler health and broiler welfare.

In the end we try to find a corelation between hygiene classification and number of condemnation (partial or total) after PMI.

Abattoirs were also grouped into two class categories (satisfactory or unsatisfactory) according to the current EU legislation.

The National Sanitary Veterinary Authority is auditing each facility annually and based on this evaluation a class of risk is established for each abattoir with the fervency of the official controls based on RU2073/2005. Analysed indicators are *Salmonella* and *Campylobacter*.

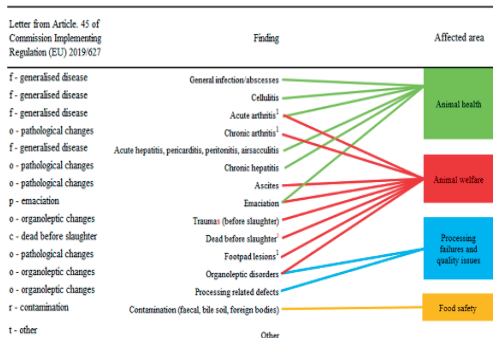


Figure 1. Reasons for declaring broiler meat as unfit for human consumption in European countries, considering the potential impact on food safety, meat quality, broiler health, and broiler welfare, based on the data from eight European countries and covering 80% of all condemned carcasses. The alphanumeric character corresponds to the reasons listed in Article 45 of Commission Implementing Regulation (EU) 2019/627 (EU, 2019b), cited in Majewski et al. (2024)

According to RU2073/2005, *Salmonella* (n = 50, c = 5; m = not detected in 25 g of a pooled sample of neck skin), abattoirs were considered satisfactory if *Salmonella* was detected in a maximum of c/n samples, and unsatisfactory if detected in more than c/n samples. For *Campylobacter* (n = 50, c = 15; m = 3 log<sub>10</sub> CFU/g), abattoirs were considered satisfactory if a maximum of c/n values were >m, and unsatisfactory, if more than c/n values were >m. Risk categorisations of abattoirs were performed based on EU legislation analysing and based on compliance with criteria set by European legislation. For indicators and pathogens, satisfactory compliance was given a numerical score of 1, acceptable by score 2 and unsatisfactory compliance a score of 3, according Cegar et al. (2022). In both abattoirs (small and large scale), all carcasses were *Campylobacter* positive on first sampling day while the small one was positive for two thirds on the second day. Carcasses in small abattoir B were all *Campylobacter* positive on one day, while on the second day, two thirds were positive in small abattoir. Small abattoir B had

the best results for *Salmonella*, with a total of 4% of carcasses being positive and all carcasses being free of this pathogen during one of the sampling days.

The large abattoir A had with on-carcass *Salmonella* prevalences of 32%. *Salmonella* prevalences differed considerably between the two sampling days (i.e., 7-fold - 56% versus 8%)

Table 1. Microbiological status of chilled broiler based RU2073/2005

Abattoir	Sampling day (no. of samples)	<i>Campylobacter</i> mean log <sub>10</sub> CFU/g ± SD/prevalence	<i>Salmonella</i> prevalence
Large A	Day 1 (25)	2.95 ± 0.58 <sup>a</sup> /100%	56%
	Day 2 (25)	4.01 ± 0.28 <sup>b</sup> /100%	8%
	Both days (50)	3.48c ± 0.70/100%	32%
Small B	Day 1 (25)	3.03 ± 0.73 <sup>b</sup> /100%	8%
	Day 2 (25)	0.08 ± 0.70 <sup>a</sup> /68%	0%
	Both days (50)	1.55 <sup>d</sup> ± 1.65/84%	4%

In this study we try to find a connection between the classification of abattoirs and the number of carcass condemnation in analysed facilities.

The Table 2 is presenting the abattoirs in decreasing order of the hygiene criteria with the most commune codes used in Romania expressed in percentage.

Table 2. Correlation in between hygiene criteria and carcasses condemnation

Abattoir (according to hygiene criteria)	Chronic hepatitis %	Traumas (before slaughter) %	Dead before slaughter, %	Footpad lesions, %
Small B	1.04	0.28	0.32	0.01
Large A	1.21	0.25	0.37	0.01
Abattoir	Chronic hepatitis t	Total SNCU, t	Dead before slaughter, t	Footpad lesions, no
Small B	175	234123	46	1246
Large A	250	338802	96	1697

## CONCLUSIONS

The correlation between different codes with the main surveillance objectives in poultry inspection (food safety, meat quality, broiler health, and broiler welfare) is a new approach for the sanitary veterinary inspection objective. The food safety surveillance objective (detection of fecal and intestinal material on carcasses) might be correlated with the hygiene

objective and microbiological indicator (*Campylobacter* and *Sallmonela*) with the impact on the meat quality. These two objectives will be corelated with PMI criteria of Article 45 of the Commission Implementing Regulation (EU) 2019/ 627. The other two objectives: broiler health and broiler welfare will be linked with improvement in live broiler health and welfare will relate to AMI codes.

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