

PREVALENCE OF *LISTERIA* SPP. IN A CHICKEN CUTTING AND DEBONING ROOM IN A REFRIGERATED SLAUGHTERHOUSE

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Abstract - Chicken meat importing countries have been stimulating Brazil to meet their different microbiological requirements, one of the requirements being the quality of products of animal origin. *Listeria monocytogenes* has become a major food-transmitted pathogen, causing worldwide concern for the high mortality rate, beyond being easily isolated from chicken meat. The present study's objective was to verify the prevalence of *Listeria* spp. on meat conveyer belt mats' surfaces in refrigerated poultry slaughterhouses. To this purpose, 160 samples were collected, of which 80 chicken meat cuts and 80 small towels in an area of 100 cm² of their respective conveyer belt mats. Prevalence of *Listeria* spp was found on 88,7% (71/80) of meat cuts and on 49% of conveyer belt mats; highlighting the importance of efficient measures to control such a microorganism in refrigerated slaughterhouses, since current measures are insufficient to insure the absence of the pathogen.

I. INTRODUCTION

Interest in the occurrence of *Listeria* in food (particularly in *Listeria monocytogenes*) grew quickly when a series of food-transmitted listeriosis outbreaks occurred in the 1980's [1]. In spite of recent years' technological progress, chicken meat is still contaminated by several microorganisms [2]. Among foods of animal origin that transmit *Listeria* spp., poultry and its products deserve special attention from researchers due to the association made between the poultry and possible contamination during processing, bringing on the contamination of the final products [3].

Knowing the importance of this microorganism in public health and how it is

considered a sanitary hindrance for meat exportation, the objective of the present study was to evaluate the prevalence of *Listeria* spp. in chicken cutting and deboning rooms in refrigerated poultry slaughterhouses, which are classified as clean areas; from sample meat cuts and the surface of conveyer belt mats.

II. MATERIALS AND METHODS

The samples were collected in cutting and deboning rooms (clean areas air conditioned to 12°C) in chicken freezer-slaughterhouses; submitted to the Service of Federal Inspection (SIF), and to continuous self-control programs (PPHO, HACCP, GMP) with facilities for slaughter, deboning, packing and freezing of the meat cuts. An average 160 thousand birds are slaughtered per day, the average speed of slaughtering is 160 birds per minute and products are destined for the domestic market and exportation. The 160 samples were collected during 8 months, with 1 visit a month, totaling 8 visits; 80 of these samples were frozen chicken meat cuts and 80 were from the surfaces of conveyer belt mats.

The cut samples were collected and conditioned in sterile bags and the conveyer belt mat ones were collected through the use of sterile templates (100 cm²) and small towels that were later immersed in tubes containing *Listeria* Enrichment Broth (LEB), conditioned in isotherm boxes and brought to the LMSA&SA of the University of São Paulo (USP), where they were processed according to a method described by the International Commission on Microbiological Specifications for Foods [4].

The samples of the meat cuts were removed from a 25 gram aliquot and added to 225 mL of LEB; as for surface analysis, the samples were added to 90mL of LEB and incubated at 30°C for 24 hours. Later, 0,1mL aliquots of each sample were transferred to tubes containing 10mL of Fraser broth, incubated at 35°C for 24 to 48 hours. Following the appearance of growth, a sample was transferred to sheets containing oxford agar at 35°C for 24 to 48 hours. The presence of typical *Listeria* spp. colonies proved positive when the sheets presented pigmented growth with black halos in the agar; their morphology and pigmentation were evaluated using gram coloration and their biochemical features were confirmed.

III. RESULTS AND DISCUSSION

Listeria spp. was isolated in 71 of 80 of the chicken cut samples and in 36 of 80 conveyer belt mat samples, respectively (Figure 1). The technological refrigeration process of the carcasses at an ambient 12°C, manipulation and contact of the carcasses with different sections and equipment of the slaughtering apparatus, collaborate with the evidence that *Listeria* spp. becomes more prevalent in cold products and atmospheres, such as the cutting room, due to *Listeria*'s ability to multiply in cool temperatures, cuts and/or carcasses whose competitive microbiota was reduced during the refrigeration process in chillers [5].

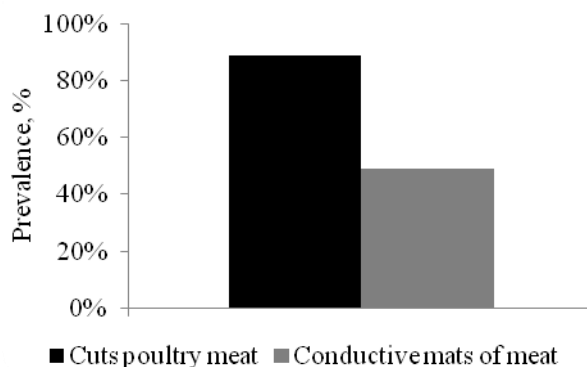


Figure 1. Observed prevalence of *Listeria* spp. in chicken cuts and the surface of conveyer belt mats.

Although *L. monocytogenes* is a pathogen for humans, all species of *Listeria* present similar

growth and behaviors. Therefore, the presence of *Listeria* spp. in 88.7% of the cut samples presently observed show the probability of *L. monocytogenes* occurrence, constituting a risk factor in food safety [6].

In a poultry processing plant in the south of Brazil, *L. monocytogenes* has been found in 35.6% of the cut samples, reaching 100% and 93.3% positivity for chests and frozen wings, respectively. The authors proved a larger prevalence of the pathogen than is currently verified in refrigerated meat [7].

The high prevalence of *Listeria* spp. in chicken cuts in the present study was even higher than the prevalence reported by a study in Iran where it was shown that 134 (33.3%) out of 402 poultry product samples were contaminated with *Listeria* spp., with 34.7% of prevalence in raw products and the same was observed in 30.7% in processed products, showing that the processing did not reduce the microorganism's prevalence in the food. [8]

Investigating the presence of *Listeria* spp. in 3685 raw samples (meat, milk and chicken) from northern Spain, and processed products (cured and cooked meat, frozen vegetables and smoked salmon); the largest occurrence of *Listeria* spp. was found in raw chicken meat samples (76.3%), followed by of ground bovine and swine meat samples (62.3%) [9], emphasizing the importance of chicken meat research.

In studies where two chicken processing industries inside São Paulo state were assessed, they found 23.4% of microorganism contamination on surfaces that touch the food, and 16.8% of surfaces that don't touch the food. This differs from the results of the present study where the prevalence of the microorganism was found to be 49% on surfaces that touch the food [10]. *L. monocytogenes* presents a high capacity of surface colonization and impermeable biofilm formation, it settles inside plants and, when food is processed, it increases the probability of crossed contaminations and environment contaminations [11].

If pathogen bacteria such as *Listeria monocytogenes* form biofilms, consumers' health may be put at risk, this situation being

particularly preoccupying in industries, which can be in fact justified by the prevalence of *Listeria* spp. in 49% of conveyor belt mat samples of this study [12].

IV. CONCLUSION

Due to high prevalence of *Listeria* spp. mainly found in the cuts and mats in the deboning zone, the importance of a more efficient control of this microorganism in refrigerated slaughterhouses is emphasized; given its dissemination and biofilm formation, and transmission by the food, potentially causing food poisoning.

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