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ANTIBACTERIAL ACTIVITY OF LACTIC CULTURES ISOLATED OF ITALIAN SALAMI

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ABSTRACT

Lactic acid bacteria were isolated in the MRS, D-MRS and M17 modified media, during the processing of Italian salami, obtained from two processing plants, in the State of Paraná. The 484 isolates were tested for their antibacterial activity against *Listeria monocytogenes* (Microbiology Laboratory-UFV), *Staphylococcus aureus* (ATCC 25923), *Salmonella enteritidis* (ATCC 13076) and *Escherichia coli* (ATCC 25922), by a deferred method. One hundred and fifteen isolates inhibited at least two of the pathogens. The isolates presented larger inhibition against *L. monocytogenes*. The 45 isolates with antagonistic action on the four indicator bacteria were identified by the system Biolog. *Lactobacillus bifermentans* prevailed among the isolates identified in MRS medium from the samples of the two processing plants.

Key words: Italian salami, lactic acid bacteria, antibacterial actvity.

INTRODUCTION

The Italian salami is a fermented sausage by action of lactic acid bacteria, which transform carbohydrates in lactic acid. In this stage, a value of pH considered safe should be reached in a certain period of time in order that the growth of pathogenic microorganisms be prevented. Flaws in the process, as the retardation of the fermentation and the obtaining of elevated values of final pH, can allow the proliferation of pathogens such as *Staphylococcus aureus*, *Salmonella enteritidis*, *Listeria monocytogenes* and some biotypes of *Escherichia coli*. These microorganisms had been made responsible by foodborne disease outbreaks involving fermented sausages (1,3). The fermentation of the salami can spread under the action of lactic acid bacteria belonging to natural microbial population of the meat or by addition of selected starter lactic cultures, with good fermentation characteristics. The use of starter cultures offers advantages for reducing the risks of foodborne disease, besides improving the quality of the final product. The objective of this work was to select lactic acid bacteria of the fermentation of the Italian salami, with base in its antibacterial properties, in order be tested as starter cultures in the elaboration of fermented sausages.

MATERIALS AND METHODS

The 484 lactic acid bacteria, isolated during the processing of Italian salami (6), had their antagonistic action tested on *L. monocytogenes* (Laboratory of Microbiology – UFV), *S. aureus* (ATCC 25923), *S. enteritidis* (ATCC 13076) and *E. coli* (ATCC 25922), by a deferred method (2). The lactic cultures were cultivated in the MRS (Difco), D-MRS (4) or M17 (Merck) broths, in accordance with the medium used in the isolation, so that they could later on be incubated to 30ºC, for 16 hours. Afterwards, the inoculated was standardized to an optical density of 0.4. Volumes of 10 µL of the lactic culture were sowed on the surface of four plates, in halfway points. After aerobic incubation to 30ºC, for 24 hours, each series of four plates

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received a covering layer, containing each one of the four indicator bacteria cultivated in BHI broth (DIFCO). After aerobic incubation, the plates were examined with regard to the formation of inhibition zones. The isolates that presented inhibition zones on the four indicator bacteria were identified, by using the system Biolog (Microlog System Biolog, USA).

RESULTS

Out of the 484 tested isolates, 115 presented inhibition zones on, at least, two indicator bacteria. The inhibition zones varied of 2 to 26 mm. It was accounted that 61.7% of the isolates formed zones > 10 mm against *L. monocytogenes*. For the Gram-negatives bacteria, that percentile was < 50%. In one of the processing plants, the species of predominant lactic acid bacteria, among the isolates in D-MRS medium, was *Leuconostoc mesenteroides* subsp. *cremoris*. *Lactobacillus bifermentans* prevailed among the isolates in MRS medium, from the samples of the two processing plants. The identified lactic acid bacteria, except species *Lactobacillus alimentarius*, presented larger inhibition on *L. monocytogenes*.

DISCUSSION

The one hundred and fifteen isolates with antibacterial activity presented larger inhibition against *L. monocytogenes*. Considering that bacteria of genus *Listeria* presents taxonomic relationship with lactic acid bacteria, it is possible that the largest inhibition of *L. monocytogenes* can be due to the bacteriocin production through lactic acid bacteria. The bacteriocins are substances of protein nature with antimicrobial action limited the microorganisms closely related to the producer (5). The presence of *Leuconostoc mesenteroides* subsp. *cremoris* in salami, obtained in one of the processing plants, can be due the use of the same production area for the elaboration of meat and dairy products, by the producer in this regard, because that species of lactic acid bacteria is of common occurrence in dairy products. The occurrence of *Lactobacillus bifermentans* in fermented sausages seems not to have been notified. The results obtained in this work demonstrate that there is a diversity of lactic acid bacteria with antibacterial activity against potentially pathogenic bacteria of interest in Italian salami. The use of these microorganisms as starter cultures in the elaboration of fermented sausages would increase the safety for the consumption of these products.

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RESUMO

Atividade antibacteriana de culturas láticas isoladas de salame tipo italiano

Bactérias láticas foram isoladas durante o processamento de salame tipo italiano, obtido a partir de duas plantas de processamento, no Estado do Paraná. Para o isolamento, foram utilizados os meios MRS, D-MRS e M17. Um total de 484 isolados teve sua atividade antibacteriana testada sobre *Listeria monocytogenes* (Laboratório de Microbiologia – UFV), *Staphylococcus aureus* (ATCC 25923), *Salmonella enteritidis* (ATCC 13076) e *Escherichia coli* (ATCC 25922), utilizando-se o *deferred method*. Cento e quinze isolados apresentaram zonas de inibição sobre, pelo menos, duas das bactérias indicadoras. Os isolados apresentaram maior inibição sobre *Listeria monocytogenes*. Os 45 isolados que apresentaram zonas de inibição sobre as quatro bactérias indicadoras foram identificados, utilizando-se o sistema Biolog. *Lactobacillus bifermentans* predominou entre os isolados identificados, obtidos no meio MRS, a partir das amostras das duas plantas de processamento.

Palavras-chave: salame tipo italiano, bactérias láticas, atividade antibacteriana.

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