Effect of lactic acid bacteria cultures in the microbiological quality of fermented salami

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Abstract

This research evaluates the effect of applying lactic acid bacteria (LAB) in meat fermented sausage type salami. Experimental design was used 2K and two levels of interaction. Batches were prepared using different formulation (pork and beef), with Pediococcus acidilactici (Pa) or Lactobacillus plantarum (Lp) as starter cultures and a control without inoculum and fermented at relative humidities (RH) of 70 or 90% for 10 days. Counts were made of total aerobic bacteria, total coliforms and fecal coliforms to Salamis, at baseline and on day 1, 3, 5 and 10. Statistical analysis was performed with the Statistica program. The results of fecal coliform in the beef-pig salami showed a significant difference of p = 0.03891 in uninoculated sausages, for those inoculated with Lp with a decrease of 3.3 CFU / g at day 10. In the beef-pig salami with starter, values were aerobic plate counts (p = 0.00024) and total coliforms (p = 0.03481) at day 10, where the non-inoculated salamis were 4.5 CFU / g over and aerobic plate counts 3 UFC / g more total coliforms on day zero, which on day 10, demonstrating the microbiological control of the LAB. The count of total coliforms in frozen beef salamis, was p = 0.017965 and p = 0.001893 at day 10. Comparing salamis inoculated with Pa, the non-inoculated, highly significant values were aerobic bacteria and total coliforms p = 0.024992 p = 0.000002, respectively, in the frozen meat salamis, with higher values of aerobic plate counts 0.7 CFU / g and coliforms total 0.5 CFU / g in salami made with fresh meat in processed frozen meat. When fermented salamis during ten days at HR = 90%, aerobic bacteria value was 0.9 CFU / g in less than was fermented at 70%.

Key words: starter; BAL; salami; total coliforms; total aerobic bacteria

INTRODUCTION

Today consumers prefer food ready to eat or ready to use, nutritious, safe and with minimal processing [1]. The fermented sausages offer these advantages, and a longer life, due to the presence of lactic acid bacteria (LAB) as starter cultures, which are generally recognized as safe (GRAS) by FDA and are capable of producing a barrier system that favor greater microbiological safety, and develop desirable sensory characteristics to the consumer [2,3]. Microbiological contamination of raw meat with pathogenic and spoilage flora such as Escherichia coli, Enterobacteriaceae, Serratia sp, Brochotrix thermosphacta Pseudomonas putida, lactic acid bacteria, etc. occurs when handling the carcass or meat products during marketing. In the present work is proposed as an alternative technology for the addition of LAB
to develop a mature raw sausage from bovine unconventional cuts, and evaluated the effect on
the microbiological quality of the product in terms of control of the aerobic bacteria total and
fecal coliforms in the sausages [4].

MATERIALS & METHODS

The salamis were made from frozen beef forequarters of European breeding cattle from grain-
fed under confinement or grazing; acquired TIF made with pork meat and lard. This research
evaluates the effect of applying lactic acid bacteria (LAB) in meat fermented sausage type
salamis. Experimental design 2K and two levels of interaction was used. Batches were prepared
using different formulation (pork and beef), with *Pediococcus acidilactici* (*Pa*) or *Lactobacillus
plantarum* (*Lp*) at 1.0x10⁹ CFU/ml as starter cultures, one control batch without inoculum and
fermented at relative humidities (RH) of 70 or 90% for 10 days.

Counts of total aerobic bacteria (TAB), total coliforms and fecal coliforms to Salamis, at begin
and on day 1, 3, 5 and 10 and the microbiological analysis were carried out in accordance with
the APHA [5-7]. Statistical analysis was performed with the Statistica program of Statsoft™.

RESULTS & DISCUSSION

The results of fecal coliforms in the beef-pig salami showed a significant difference of
p=0.03891 in uninoculated sausages, for those inoculated with *Lactobacillus plantarum* with a
decrease of 3.3x10⁷ CFU/g at day 10. In the beef-pig salami with starter, values were aerobic
plate counts (p=0.00024) and total coliforms (p=0.03481) at day 10, where the non-inoculated
salamis were 4.5x10⁴ CFU/g over and aerobic plate counts 3x10³ UFC/g more total coliforms on
day zero, which on day 10, demonstrating the microbiological control of the LAB. The count of
total coliforms bacteria in frozen beef batch salamis, were p=0.017965 and p=0.001893 at day
10. Comparing salamis inoculated with *Pediococcus acidilactici*, the non-inoculated, highly
significant values were aerobic bacteria and total coliforms p=0.024992 and p=0.000002
respectively, in the frozen meat batch, with higher values of coliforms total 0.5 CFU/g and
aerobic plate counts 0.7 CFU/g in salami made with fresh meat in processed frozen meat. When
fermented salamis during ten days at RH=90%, aerobic bacteria value was 0.9 CFU/g less than
was fermented at 70%.

CONCLUDING MARKS

According to the above we can conclude that from the findings in this study, the application of
LAB as starters to prepare fermented salamis improved the sanitary quality of products.
Regarding the results of fecal coliform in the non-noculated sausages, respect for those
inoculated with *Lactobacillus plantarum* or *Pediococcus acidilactici*. The values of aerobic plate
counts and total coliforms at day 10 in salamis with LAB were much lowest that non-inoculated
salamis, demonstrating the microbiological control of the LAB.
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Bibliografía