Study concerning the pH variation depending on starter cultures concentration of lactic bacteria in animal origin products

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Abstract

In the paper it was analyzed the pH variation in Transylvanian salami between the mentioned standard limits in function, by using starter cultures of lactic bacteria in order to insure a higher preservability. The pH value in meat varies naturally from 7.0 right after the animal death to 5.0. The lower values are unfavorable to microbial development. The pH value subverses preservation trough water retention and dense texture.

Keywords: pH, Ardelenese sausage, lactic starter bacteria.

1. Introduction

The starter cultures, like any other bacteria introduced in a new environment (in our case, salami) needs to adapt to new conditions. This phase is called the delay phase. The initial phase is followed by a logarithmic increase phase (exchange phase), characterized by a major acid production, until a constant situation is reached (called stationary phase).

Through a lowering of water or temperature activity, the duration of exchange phase is increased. At the same time, the acidification degree is limited and of course, the pH lowering is less obvious. An increase in either the water activity or temperature activity will cause side effects (the stopping phase in the micro organisms activity).

2. Materials and methods

Transylvanian salami was made, using pork meat work 70/30 and different starter cultures concentrations. The concentrations of starter cultures were between 0% and 2.5%. During the entire maturation phase were examined: the daily measure of the sample’s pH for 7 days, and then for 30 days.

3. Results and Discussions

The experimental obtained values after measurements are given in the table 1.

From the data above it can be observed that during the first days the pH decreases suddenly, then it becomes steady and remains this way during the entire time.

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Table 1. Variation of the pH (Sausages Ardelenesc - Sausages CPL 70:30)

<table>
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<tr>
<th>%</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
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</tbody>
</table>

Figure 1. Time depending variation of the pH for all the concentration starter culture

Figure 2. Growth rate (A) and acidification rate (B) by a Lactobacillus starter culture

In the next chart, is presented the pH variation for raw and dry salami, depending on time and starter culture activity.

The increase of speed and acidification has 4 stages: the delay stage, the exchange stage, the stationary stage and the microorganisms activity stopping stage.
The production of lactic acid decreases the pH of the product. This induces 4 important effects:

1. the preservation effect; the acid-sensitive altered organisms are inhibited.
2. the increase in the salami consistency because of the pH induced coagulation (jellification) of proteins in meat.
3. the drying of salami is accelerated because the capacity of water retention of proteins changes along with the pH and at the isoelectric point of protein in meat is at the lowest level (5.2 – 5.3)
4. in a low pH, the salami reddish (the nitric oxide) is accelerated.

4. Concluzion

In the case of the analyzed salami, for the sample in which it was used starter culture of 0%, the pH value has a small decrease from 5.73 to 5. For the sample in which it was used starter culture of 1%, the pH decreases from 5.6 (registered the next day) to 4.78 pH registered in the 3rd day and is maintained approximately the same to the last day of study (115). In the case of the sample in which it was used starter culture of 1.5%, the pH varies from 4.87 (in the first day), 4.9 (the second day), to 5.02 (the third day).

The maximum pH being registered the fifth day, (5.13), then a decrease was registered to 5.03, and staying rather the same (little variation) until the end of maturation stage – drying (115 days). In the case of starter culture use of 2% or 2.5% it can be observed that the pH decreases from 5.74 to 4.79, then it increases to 5.02 and maintains rather the same (little variation) until the end (115 days).

References