THE ADVANTAGES OF STARTERS IN DRIED SALAMI RIPENING

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Abstract
The decrease of the moist content during the dry salami ripening is the consequence of the drying process that resulted into a relative increase of the total nitric substances, fat, salt and ash. These processes interfere with the lactic acid bacteria from the paste. The starter has a great influence on these evolutions, subsequently influencing the biochemical reactions in the dry salami pasta.
Keywords: starter, acidity, ripening, dry salami

Rezumat
Scăderea conţinutului de umiditate pe parcursul maturării salamurilor crude uscate sunt o consecinţă a procesului de uscare care are drept consecinţă o creştere relativă a conţinutului de proteine totale, lipide totale, sare şi cenuşă. Acest proces influenţează activitatea microorganismelor din pastă. Adaosul de cultură starter influenţează foarte mult procesele chimice şi biochimice care au loc la maturarea salamurilor crude uscate.

Résumé
La baisse du contenu d'humidité pendant la maturation des salamis crus secs est une conséquence du procès de séchage qui a comme conséquence une croissance relative du contenu de protéines totales, lipides totaux, sel et cendre. Ce procès influence l'activité des micro-organismes de la pâte. L'addition de culture starter influence beaucoup les procès chimiques et biochimiques qui prennent lieu à la maturation des salamis crus secs.
Mots clés : starter, acidité, maturation, salamis secs

Introduction

Dry salami is originated along time ago in history, when they were made using the natural fermentation, long before the discovery of the scientific knowledge. This fermentation takes place due to the natural microbial content of the fresh raw meat. The selection of the desired microorganisms was realized by placing the salami in a controlled environment and by adding different amounts of sugar, salt and spices. Any slight mislead of the technological processes were impossible to rectify, so the preparation of such products was considered mostly an art and not science.

The use of starters meets the principles of food safety and lead to a shorter ripening process, which means reduced use of utilities and an increase of economic efficiency. On the other side, the use of aromatic strains leads to products with a better aroma properties and a diversified class of raw meat products.

The use of starters provides a higher safety of the product due to the organic acids, bacteriocins and due to the competition of the lactic acid bacteria with the spoilage microorganisms on the nutritive substances.

Materials and methods

We prepared 2 kinds of dry salami, one based on meat and the other based on pork and meat, with and without starters, as follows (table 1):

The starter used for the ripening is a mixed lyophilized starter for dried salami containing in equal proportions a strain of lactobacilli with high acidification capacities and a strain of staphylococci which produce catalase. There was used 1 g of starter for 10 kg of composition.

The humidity determination according to Romanian standard **STAS 9065 / 3 – 73**

Table 1. The recipes for meat salami (CV) and for the pork and meat salami (CP) with and without starters

Components	UM	Basic materials for 100 kg			
		CV1	CV2	CP1	CP2
Meat	kg	20	20	-	-
Pork	kg	50	50	70	70
Fat	kg	30	30	30	30
Salt	kg	1,4	1,4	1,4	1,4
Glucose	kg	1,5	1,5	1,5	1,5
Spices	kg	0,5	0,5	0,5	0,5
$NaNO_3$	g	5	5	5	5
Starter	g	-	10	-	10

We determined the mass loss of a mixture of salami, dried sand and ethylic alcohol during heating at $(103 \pm 2)^0C$ until constant weight.

The total nitrogen determination according to Romanian standard STAS **9065 / 4 – 81 (Kjeldahl method):**

The protein nitrogen from the salami was converted into ammonia ions due to the catalytic action of the $CuSO_4$ in sulphuric acid environment and potassium sulphate. The ammonia was freed through al alkalinization and was distilled and caught in a boric acid solution that was dosed by titration with clorhidric acid.

The fat determination according to the Romanian standard **STAS 6512 – 73**

We used the determination using the hydrolysis with clorhidric acid followed by filtration and the fat extraction using n-hexane with a boiling point of $68,8^0C$.

The salt determination using the Mohr method according to Romanian standard **STAS 9065 / 5 – 73**

The slightly alkalinized water extract of the salami was used to titrate the chlorine ions with $AgNO_3$ in the presence of $KCrO_4$.

The ash determination according to Romanian standards **STAS 9065/1-71**

The salami was burnt at 550^0C in presence of magnesium acetate until constant weight.

Results and discussions

We studied the evolution of the total protein substances content, fat content, carbohydrates content, salt and ash content and also the pH during the dry meat salami ripening with and without starter for 36 days. The meat dry salami had a initial moist content of 54,02% which during the ripening process without starter reached at 39,2% while during the ripening process with starter it reached 33,29%. The initial value of the pH before ripening was 6,58 and after the ripening without starters it reached at 5,43 while during ripening with starters it reached at 4,83. We can observe that the salami ripened with starter culture reached a lower pH than the salami ripened without starter.

We studied the evolution of the total protein substances content, fat content, carbohydrates content, salt and ash content and also the pH during the dry pork and meat salami ripening with and without starter for 36 days. The pork and meat dry salami had a initial moist content of 55,68% which

during the ripening process without starter reached at 41,63% while during the ripening process with starter it reached 36,72%. The initial value of the pH before ripening was 6,53 and after the ripening without starters it reached at 5,75 while during ripening with starters it reached at 5,51. We can observe that the salami ripened with starter culture reached a lower pH than the salami ripened without starter.

Fig. 1 The evolution of the most important chemical compounds and of the pH during the ripening of the meat salami with starter

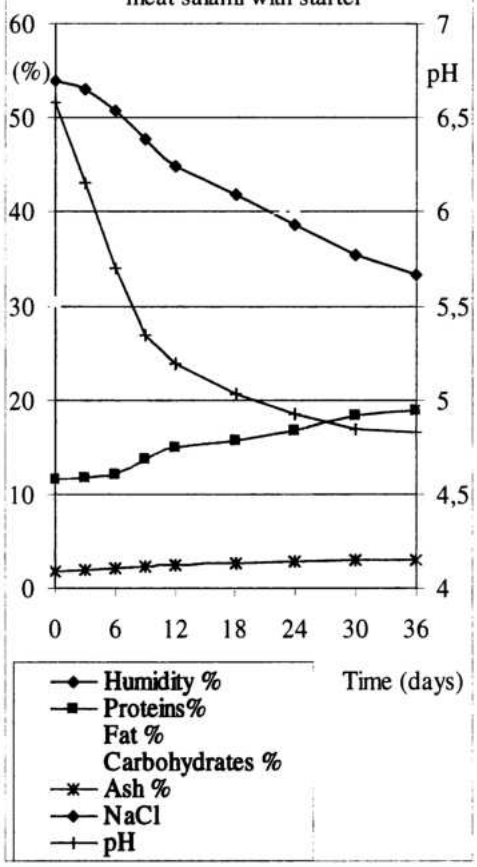
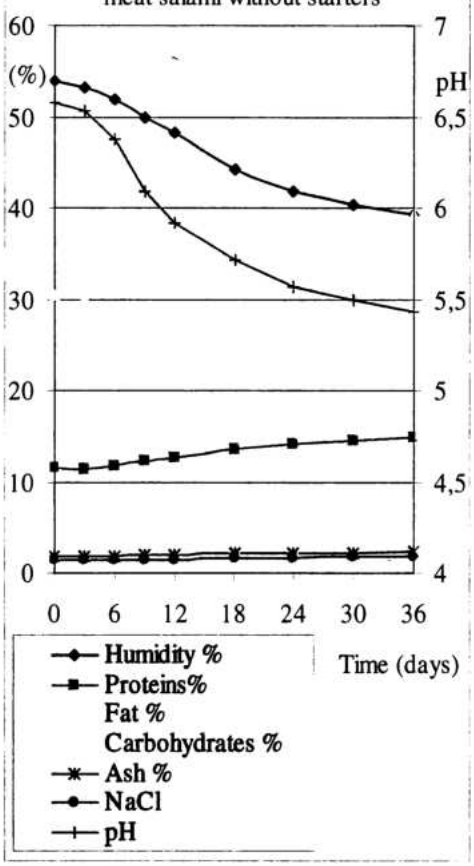


Fig. 2 The evolution of the most important chemical compounds and of the pH during the ripening of the meat salami without starters



The moist content reduction during the dry salami ripening is the consequence of the drying process that resulted in a continuous relative increase of proteins, fat salt and ash when reported to the total weight. On the other side, the content of total proteins, fat, ash and salt was constant during the ripening with or without starters when reporting them to the dry weight of the salami.

Conclusions

The loss of the moist content during the dry salami ripening is the consequence of the drying process that resulted in a continuous relative increase of proteins, fat salt and ash when reported to the total weight. On the other side, the content of total proteins, fat, ash and salt was constant during the ripening with or without starters when reporting them to the dry weight of the salami. We can notice that the general evolution of the most important chemical compounds during the ripening of the dry salami with or without starter is similar, but with several important differences.

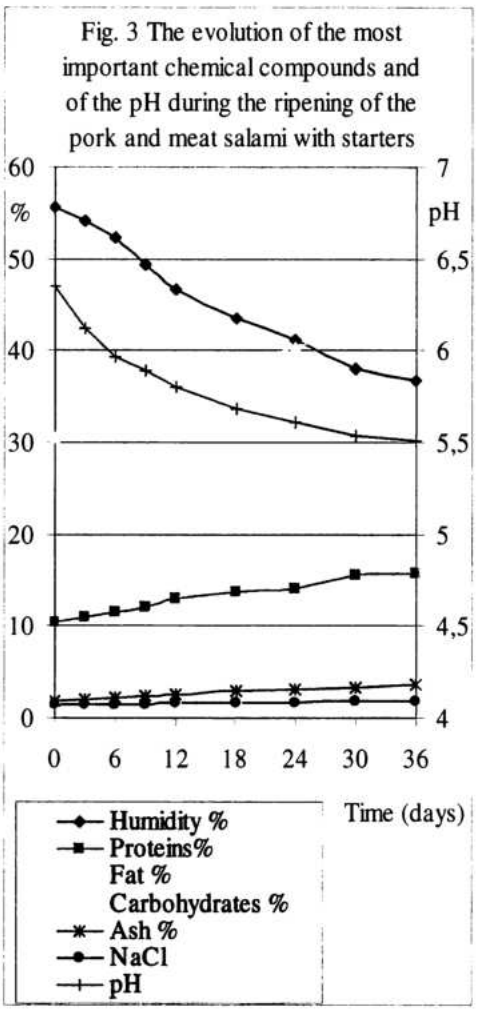


Fig. 3 The evolution of the most important chemical compounds and of the pH during the ripening of the pork and meat salami with starters

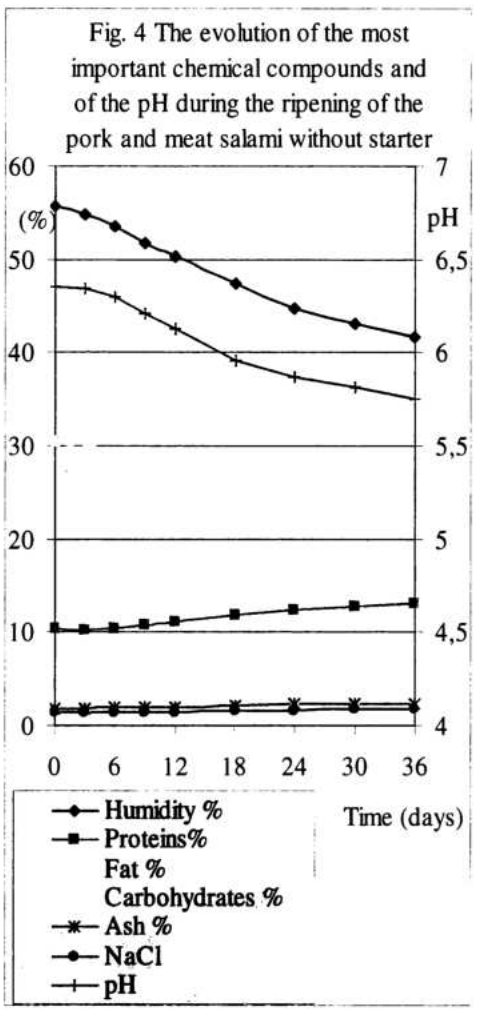


Fig. 4 The evolution of the most important chemical compounds and of the pH during the ripening of the pork and meat salami without starter

The loss of the moist content of dry salami is higher during the ripening with starters than without starters. On the other hand, in the meat salami with starter the final pH reached is 4,83 and in the in the meat salami without starter the final pH reached is 5,43. We can notice that the meat protein isoelectric pH was reached during the ripening with starter in the 8-th day, while during the ripening without starter it was reached at the end of the ripening process. That explains the higher loss of water at dry salami with starters. The pork and meat salami with starter the final pH reached is 5,51 and in the in the pork and meat salami without starter the final pH reached is 5,75. We also notice that the final moist content in the pork and meat salami with starter is 36,72% while the final moist content in the pork and meat salami without starter is 41,63%. We conclude that these 36 days of ripening are not enough for both salamis without starter to finalize the ripening process, but enough for the ripening of the salamis with starters. So we proved that the ripening with starters is faster than the ripening without starters.

The content of the total proteins, total fat, ash and salt are constant during the ripening in the salamis with starter and also in the salamis without starters when reporting to the dry weight.

The final conclusion is that the adding of starter lead to a more effective drying process with a higher humidity loss compared to the salami ripening without starter. That leads to a shorter ripening time which can be translated into a higher economic efficiency due to the reduction of the production

costs, the reduction of the utilities consumption, and diminishes the time between receiving the order from the customer and the delivery of the dried salamis.

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