TO THE QUESTION OF THE FUNCTIONAL-TECHNOLOGICAL INDICES OF MEAT MATERIALS AFTER THE STARTER CULTURES INTRODUCTION

3 year student of the processing technologies department Nagarokova D.K.
4 year student of the processing technologies department Akopian K.V.
kand. tehn. sciences, associate professor Nesterenko A. A.
kand. tehn. sciences, associate professor Keniyz N. V.

Kuban State Agrarian University, Krasnodar Russia

Abstract. *In the experimental and control research of the received data it was proved that it was possible to activate the starter cultures by the electromagnetic treatment. In the article there are the testing results of the intensifying technology of summer sausage produce with the help of electromagnetic treatment with low frequencies of the starter cultures and meat materials.*
Keywords: *starter cultures, summer sausage, meat materials, electromagnetic treatment*

The target use of the starter cultures allows receiving the finished product of stable quality with minimal financial expanse. The starter cultures effect is connected with formation of specific biologically active components among which there are organic acids, enzymes and others [1,2]. These components promote improving organoleptic and sanitary-microbiological indices of summer sausage and also speeding the process of meat materials fermentation that has a positive effect on the terms of summer sausage production [3].

Abiding by the experimental data of the electromagnetic field with low frequencies (EMF LF) influence on the micro-flora [4,5], it has been established that EMF LF is able to intensify the micro-flora growth. Nowadays there are no reliable data of the EMF LF effect research on starter cultures and dynamics of psychical-chemical, biological and microbiological processes that are characteristic of summer sausage technology produce.

To detect the degree of influence on the model system of the introduced starter cultures treated with EMF LF we used the model mince consisting of 60 % beef seasoned and 40 % pork seasoned. The meat materials were minced beforehand with a filling mincer with a grid diameter d=3 mm. As the experimental micro-flora we used the starter cultures Almi 2 made by Almi. In accordance with the recommendations of the firm and instruction to use the starter cultures Almi 2, the starter cultures for the control group were activated by the warm water in amount 100 cm^3 with temperture 25-30°C, they were left for 30 minutes till their full dissolution and after the time expired they were introduced in to the model mince.

For the experimental sample the starter cultures Almi 2 were activated as follows: the starter cultures were dissolved in warm water in amount of 100 cm^3 with temperature 25-30°C, then they were left for 30 minutes till their full dissolution (as it was recommended by the maker), after that they were treated by the EMF LF with frequency 45 Hz for 60 minutes. After the activation the dissolved starter cultures were introduced into the mince and mixed up [6].

About the meat materials hydrolysis degree by the starter cultures we can judge not only by water dissolving proteins formation but also by the qualitative formation of free amino acids [7,8]. In table 1 one can see the amino acid content of the bio-modified model minces.

Table 1. The aminoacid content of the model minces

Amino acid name	Content mg/100 g of the product			
	Control		Experiment	
	Before biomodification	After biomodification	Before biomodification	After biomodification
Lysine	14,87	15,38	14,87	16,00
Phenylalanine	11,02	11,37	11,02	11,84
Leucine	20,45	21,10	20,45	21,97
Isoleucine	10,11	10,44	10,11	10,87
Cystine	2,11	1,66	2,11	1,73
Methionine	5,06	5,26	5,06	5,47
Valine	13,41	13,86	13,41	14,43
Tyrosine	10,47	10,87	10,47	17,4
Proline	4,83	4,97	4,83	5,18
Arginine	8,98	11,02	8,98	11,82
Alanine	42,76	44,43	42,76	46,20
Threonine	10,86	11,25	10,86	11,71
Histidine	16,52	17,92	16,52	18,51
Glycine	12,11	12,72	12,11	13,20
Serine	12,55	12,98	12,55	13,50
Glutaminic acid	7,50	64,2	7,50	66,8
Asparaginic acid	-	8,33	-	8,67

The growth of free amino acids is connected with proteins breakage by micro-organisms enzymes. The received data prove the more effective bio-modification of the model mince by starter cultures activated with the EMF LF treatment.

In our further work we studied the influence of the activated and inactivated by the EMF LF starter cultures on the model mince. During the research we observed the micro-flora growth dynamics, the speed of the pH value drop and amount of the lactic acid. The research results of the micro-flora growth dynamics are given in table таблице 2.

The given data analysis proves that the micro-flora grows quicker in the mince sample from the experimental group in comparison to the control one and such fast micro-flora development tells about a quick fermentation and the pH value drop of the mince to the desired values.

In the summer sausage production the seasoning process end is defined by the stick thickening, the color change and reduction of the pH value of sausage to 5,4-5,3. Studying the received data we took into account the desired level of the mince pH value [9-11].

Table 2 – The micro flora growth dynamics

15 g / 100 kg + EMF LF	20 g / 100 kg
$8,9\times10^5$	$1,9\times10^5$
$2,6\times10^6$	$2,5\times10^5$
$9,6\times10^6$	$1,0\times10^6$
$4,2\times10^7$	$5,2\times10^6$
$8,3\times10^7$	$7,9\times10^6$

The analysis of the received research data proves the quick drop of the pH value in the experimental group. At the first stage of measuring the difference was 0,1 in relation of the experimental group to the control one and by 0,2 and 0,1 in relation to the initial index of the pH value. In the experimental group the desired pH value 5,4 was reached after 24 hours of the model mince seasoning at the temperature 11±1 ^{o}C. In the control group the desired pH value 5,35 was reached after 48 hours. Comparing the speed of the micro-flora growth and speed of the pH value decrease of the mince we can make the following conclusion that with the micro-flora amount increase the speed of the pH value decrease of the mince grows. It proves a drastic increase of the lactic micro-organisms amount and as the result the active accumulation of the lactic acid [12-15].

The dynamics of the lactic acid growth in the experimental samples is as follows. The experimental sample already after 12 hours of the model mince seasoning by the lactic acid amount exceeded the control one by 10 %. After five days of seasoning the difference was 17,5 %, that proves the quick accumulation of the lactic acid in the experimental group.

Conclusions. It has been established that the treatment of the starter cultures Almi-2 with the frequency 45 Hz for 60 minutes stimulate their growth; if the treated by the EMF LF starter cultures into the model mince the pH value of the mince drastically drops – from 5,85 to 4,95; the amount of the amino-acids increases by 6,8 %.

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