

THE WAYS OF IMPROVING THE TECHNOLOGY OF SUMMER SAUSAGE

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Abstract. *In the article there are results of the testing the intensification technology of summer sausage by use of electro-magnetic treatment with low frequencies the starter cultures and meat raw materials.*

Key words: *starter cultures, summer sausage, meat raw materials, electromagnetic treatment*

Lately the success of the scientific research in the biotechnology sphere have brought to development of the new technologies that can speed up summer sausage production, improve their organoleptic characteristics and significantly increase the guarantee the high quality produce of food. One of the ways to intensify the technological process of the summer sausages is using the starter cultures [1-3].

Developing the improved technology of summer sausage we put the following tasks:

- to intensify the technological process by speeding the sausage ripening;
- to suppress the unfavorable micro flora and speed the starter cultures growth;
- to get the high quality product;
- to apply the suggested solutions at any plant without much preparation [4-6].

The pilot-industrial testing was done at CLSC «Meat Processing Plant «Tikhoretsky» in accordance with TC 9213-006-00422020-2002 «Summer sausage semi dry. The technical conditions» developed by the meat processing specialists. To carry out the pilot-industrial testing we chose the recipe of the sausage «Tikhoretskaia» given in table 1.

Table 1 – The recipe of the summer sausage «Tikhoretskaia»

Name of raw materials	Control	Test
Raw materials, kg (per 100 kg of raw materials)		
Trimmed beef of high grade	40	40
Trimmed pork semi fat	35	35
Salted pork fat backbone, side	25	25
Total:	100	100
Spices and materials, g (per 100 kg of unsalted raw materials)		
Edible salt	3200	3200
The color fixator sodium nitrite	10	10
Sugar	500	500
Cardamom or nutmeg	50	50
Black or white pepper ground	150	150
Fragrant pepper ground	50	50
Dextrose	400	400
The starter culture Альми 2	20	15
Output of the finished product %	64,0	64,0

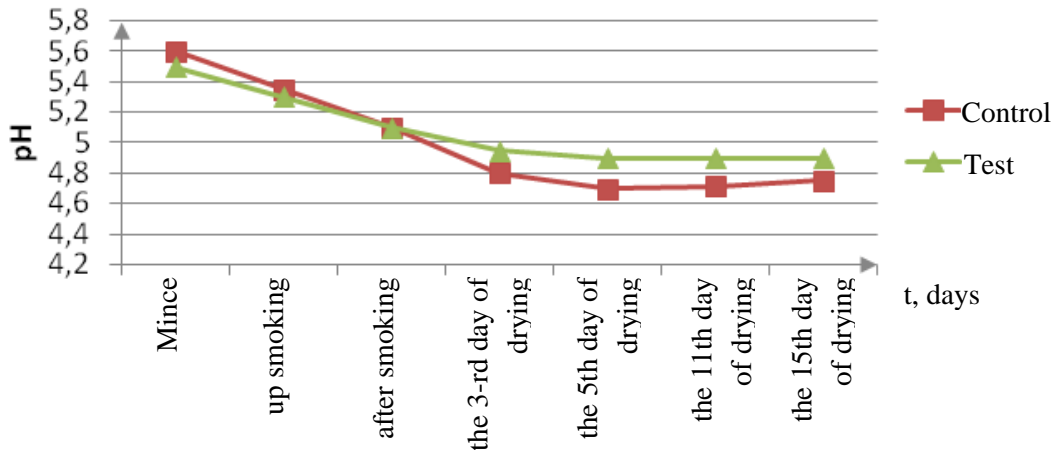
According to our preliminary results of the research [7-9] to provide the normal fermentation the use of less amount of the starter cultures was justified. That is why in the studied sample we used lower amount of the starter cultures that was 15 g. As the technological instruction supposes using the starter cultures it was decided to compare the possible recipes [9].

For the test lot the meat materials were initially put into carts in layers not more than 30 cm and were treated with low frequencies of the electro-magnetic field at frequency 100 Hz for 30 minutes and were sent to freeze up to minus 3 ± 2 °C in the thick piece for 8-12 hours.

After mincing the beef to the pilot lot the activated by the low frequencies of the electro-magnetic field the starter cultures Almi 2 were added and chopped for 0,5-1,0 min, then we added spices, the sodium nitrite salt and operated 2-3 cup revolutions of the grinder, then the pork was put and grinded for 0,5-1,0 min till we got equally grinded meat, the salted pork fat was added and grinded again for 0,5-1,0 min. The rest of the operations were performed in accordance with TC 9213-006-00422020-2002.

During the pilot-industrial test we observed three indices: the pH value, mass fraction of moisture and QMAFAnM.

The change of the pH value is shown in picture 2.

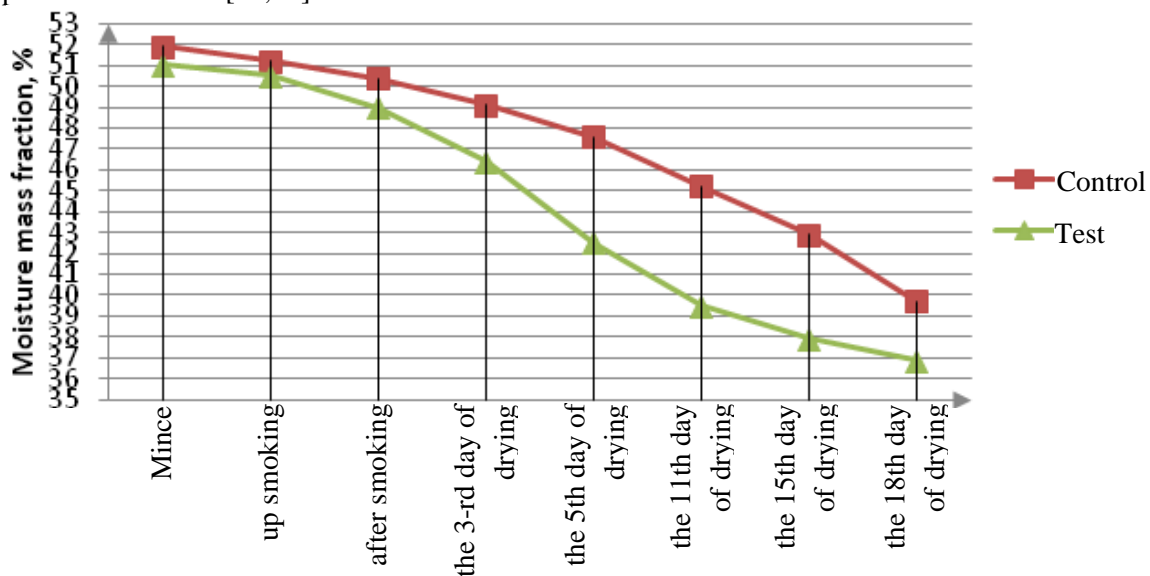


Pic. 2 – The change of the pH value during the summer sausage low temperature treating, smoking and drying

As we see in picture 2, the decrease of the pH value in the pilot lot at the first stages of production goes faster. It is conditioned by a quick development of the starter micro-flora affected by the low frequencies of the electro-magnetic field.

The drying speed depends on several factors: mince pH value, temperature, humidity and moving speed of air [9-11]. At the first stage of summer sausage produce a slow shift of the pH value to the acid side takes place. Approaching the mince pH value to the isoelectric point decrease the water binding capacity that in its turn increase the moisture evaporation in the environment [12].

The analysis of picture 3 shows that moisture evaporation increases during the smoking stage of all sample lots. But the pilot sample lot has a more intense moisture loss. The moisture diffusion from the center to the outer layers of sausage takes place more intensively in case of preserving micro-pores in the mince [12,13].



Pic. 3 – The mass fraction of moisture depending on drying period

The micro-flora growth of summer sausage from the mince composition to the finished product is given in table 2.

Table 2 – Quantitative change of summer sausage micro-flora during the processing

The research period	Micro-flora amount of QMAFAnM CFU/g of product	
	Control	Pilot
Mince after composing	$3,3 \times 10^5$	$2,1 \times 10^6$
Before smoking	$3,5 \times 10^5$	$2,4 \times 10^6$
After smoking	$1,2 \times 10^6$	$9,0 \times 10^5$
On the 3d day of drying	$8,1 \times 10^5$	$1,0 \times 10^5$
On the 5th day of drying	$9,3 \times 10^4$	$2,0 \times 10^4$
On the 11th day of drying	$5,1 \times 10^3$	$4,0 \times 10^2$
On the 15th day of drying	$8,4 \times 10^2$	$3,0 \times 10^2$

The intensive growth of summer sausage micro-flora of the pilot sample lot is conditioned by the preliminary activation of the starter cultures with low frequencies of the electro-magnetic field where the main part of the micro-flora is introduced starter cultures. The intensive development of the starter micro-flora leads to the intensive lactic acid formation and decrease of the mince pH value and at the same time the intensive development of the starter cultures inhibits the pathogens micro-flora development. It is very important at accelerated sausage ripening [14,15].

It has been detected that applying the low frequencies of the electro-magnetic field the length of the technological summer sausage produce the process is reduced by 7 days and is only 14 days, the organoleptic indices and consistency improve.

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