THE PERSPECTIVE OF USING STARTER CULTURES IN SUMMER SAUSAGE TECHNOLOGY

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. *The article concerns the study results of the summer sausage mince with carbohydrates of big molecular mass added. With the carbohydrate molecular mass increasing the accumulation of the fermentation final products comes later. The carbohydrates choice allows programming and controlling the ready product taste and flavor.*

Keywords: *starter cultures, carbohydrates, nutrient medium, ripening, summer sausage.*

Thanks to the scientific research in biotechnology sphere there appear new technologies that allow intensifying the meat produce, improving their organoleptic characteristics and guaranteeing high quality produce, etc.

One of the perspective trends of summer sausages production is using the starter cultures. In most cases the starter cultures containing lactobacillus, micrococcus, yeast in the summer sausages technology [1, 2]. The biggest effect of the starter cultures use is observed in combination in one preparation the microorganisms of different strains, for example, Lactobacillus sake, Staphylococcus carnosus and Staphylococcus xylosus. Usually dry cultures with a carrier, for example, dextrose are used [3,4].

In the process of ripening the bacterial starter cultures produce different exo- and endo-enzymes. Due to the proteolysis activity many starter cultures take part in improving the structure and texture of meat products forming such enzymes as collagenase and elastase that improve the nutritive value and tenderness of meat materials with considerable connective tissue proteins content. The biosynthesis of lactic and other organic acids by bacteria promote the meat tenderness and juiciness increase because they help collagen swelling and in this way tissue loosening and low-molecular bonds hydrolyzing. The hydrogen ion exponent (pH) value of the meat materials plays an important role here. Due to the low pH values the activity of the intra-cell enzymes increases and also of cathepsins the optimal pH value of which is 3,8-4,5 that correlates to the isoelectric point of the meat proteins [5,6].

Adding the starter cultures affects the fermentation speed of summer sausage. While using the dry bacterial preparation which is a concentrate of lactic acid bacteria and micrococcus it was established that under their influence the inhibition of both natural micro-flora of the meat materials so as the development of Streptococcus aureus, Ps. aeruginosa took place [7].

With use of dry starter cultures in the summer sausage technology there is no need to require high demands from the raw materials by its biochemical qualities because there appears a possibility to regulate the pH value of the meat. One can use different raw materials – slaughter-warm, ripened, seasoned or frozen. Using the meat with different biochemical parameters under definite conditions you can get the product of similar characteristics [8,9].

The meat materials micro-flora does not always guarantee the fermentation process in the right direction that can lead to products defect. Instead of unpredictable micro-flora of wild microorganisms in summer sausage the definite flora of the desired microorganisms must dominate. One of the significant characteristics of starter cultures is their ability to produce lactic acid from carbohydrates and thus promote the decrease of the pH value level [10].

As a rule, at summer sausage ripening the lactic fermentative lactobacillus forming from different sugars only lactic acid. Their micro-aerophilous feature allows providing the fermentation process in a low acid medium, for example, inside the sausage with big diameter. During the ripening process the lactic bacteria (lactobacillus) reproduce much quicker than other bacteria species, they intensively break down the muscular tissue glycogen and the added sugars into lactic acid. If the other bacteria species are present there may take place the fermentative reaction due to which the undesirable acids are produced, for example, acetic and propionic acid, which can lead to defect of the finished product.

To provide the brightness and stability of color, to get the characteristic taste into the minced meat they introduce micrococcus that reestablishing sodium nitrite to nitrites promote forming nitrogen oxides which chemically interacts with myoglobin to stable nitrosomyoglobin formation. Under the influence of proteolytic activityof these microorganisms the proteins break down into free amino acids which are important components in taste forming and their lipolytic activity conditions the formation of free (mostly low-molecular) volatile acids, oxidized to peroxides which under the influence of catalase micrococcus activity turn into carbonyl compounds (2-hexane, diacetyl and formaldehyde) promoting to form a distinctive taste [11,12].

In the content of the starter bacterial cultures also go flavor forming bacteria that give the sausage a distinctive flavor and delicious taste.

The formation of sausage flavor is the result of fat breaking down products under the influence of microorganisms that possess a lipolytic activity and also bacteria proteolytic proteins and carbohydrates breakdown [13,14].

From the point of view of flavor formation of great interest is a development of the Dutch meat institute – a starter culture Moraxella phenylpyruvica. It is a psychrophilic culture, a facultative anaerobe that allows its active developing in the thickness of the product and, as the research shows, to produce the flavor predecessors [15].

Along with the bacteria to form color a definite role is played by yeast and sodium nitrite. An important role in color formation of summer sausage is played by bacteria the life products of which are nitric oxide. Micrococcus and to a less degree streptococcus and sarcina bacteria refer to such ones.

The breakdown product of sodium nitrite (nitric oxide) in combination with the muscular meat pigmentation (myoglobin) forms the color of the finished summer sausage. To obtain a good color minimum 50 % of the myoglobin must be steadily bound with nitrite oxide. Sodium nitrite, even in its small amount, is known to prevent development of numerous microorganisms. If its concentration is about 80-150 mg/kg the growth of such microorganisms as Clostridium botulinum, Salmonella, Staphylococcus are hindered. But the nitrite preserving effect is shown in combination with other

influence factors such as water activity, the pH value and temperature. The constant drop of the pH value at the fermentation beginning has a positive effect on the color formation process. The desired drop of the pH value can be obtained by introducing different carbohydrates.

It has been established that if carbohydrates with big molecular mass are added to the minced meat of the summer sausage they promote forming distinctive taste qualities in the finished product. With carbohydrate molecular mass increasing the accumulation of the fermentation products comes later. The choice of carbohydrates allows programming and controlling the taste and flavor of the finished product.

REFERENCES

1. Nesterenko A. A. Stimulating growth of starter cultures of raw sausages / A. A. Nesterenko, N. V. Keniyz // Ceteris paribus – 2015. – № 1 (1) – C. 16-19.
2. Тимошенко Н. В. Развитие сырьевой базы мясной отрасли, прогноз на будущее [Текст] / Н. В. Тимошенко, Д. С. Шхалахов, А. А. Нестеренко // Молодой ученый. — 2015. — № 5-1 (85) — С. 56-60.
3. Нестеренко А. А. Ускорение технологии сырокопченых колбас / А. А. Нестеренко, Н. В. Кенийз // Наука и мир. – 2015. – Т 2 – № 3 – С. 71-74.
4. Nesterenko A. A. The action of starter cultures on the model minced / A. A. Nesterenko, N. V. Keniyz // Ceteris paribus – 2015. – № 1 (1) – C. 31-34.
5. Нестеренко А. А. Применение консорциумов микроорганизмов для обработки мясного сырья в технологии колбасного производства [Текст] / А. А. Нестеренко, Д. С. Шхалахов // Молодой ученый. – 2014. – № 13. – С. 71-75.
6. Нестеренко А. А. Прогнозирование реологических характеристик колбас / А. А. Нестеренко, Н. В. Кенийз, Д. К. Нагарокова // Науч. журн. КубГАУ [Электронный ресурс]. – Краснодар : КубГАУ, 2015. – № 03 (107). С. 289 – 301. – IDA [article ID]: 1071503019. – Режим доступа: http://ej.kubagro.ru/2015/03/pdf/19.pdf, 0,812 у.п.л.
7. Шхалахов Д. С. Исследование биологической ценности сырокопченой колбасы / Д. С. Шхалахов, А. А. Нестеренко, Д. К. Нагарокова // Труды Кубанского государственного аграрного университета. – 2014. – № 51. – С. 148-152.
8. Нестеренко А. А. Интенсификация роста стартовых культур при помощи электромагнитной обработки / А. А. Нестеренко, Н. В. Кенийз // Наука и мир. – 2015. – Т 2 – № 3 – С. 68-70.
9. Нагарокова Д. К. Stimulation of growth of starting cultures by an electromagnetic field [Текст] / Д. К. Нагарокова, А. А. Нестеренко // Молодой ученый. – 2015. – № 2. – С. 182-185.
10. Шхалахов Д. С. Изучение биомодификации мясного сырья стартовыми культурами / Д. С. Шхалахов, А. А. Нестеренко, Д. К. Нагарокова // Труды Кубанского государственного аграрного университета. – 2014. – № 51. – С. 145-148.
11. Нестеренко А. А. Функционально-технологические свойства модельного фарша при действии стартовых культур / А. А. Нестеренко, Н. В. Кенийз // Наука и мир. – 2015. – Т 2 – № 3 – С. 75-77.
12. Нагарокова Д. К. Studying of action of starting cultures on meat raw materials [Текст] / Д. К. Нагарокова, А. А. Нестеренко // Молодой ученый. – 2015. – № 2. – С. 178-182.
13. Шхалахов Д. С. Use of electromagnetic processing in technology smoked sausages [Текст] / Д. С. Шхалахов, А. А. Нестеренко // Молодой ученый. – 2015. – № 2. – С. 229-233.
14. Кенийз Н. В. Технология производства сырокопченых колбас с применением ускорителей / Н. В. Кенийз, А. А. Нестеренко, Д. К. Нагарокова // Науч. журн. КубГАУ [Электронный ресурс]. – Краснодар : КубГАУ, 2015. – № 01 (105). С. 581 – 608. – Режим доступа : http://ej.kubagro.ru/2015/01/pdf/33.pdf.
15. Nesterenko A. A. Perfectionnement de la technologie des saucissons fumes / A. A. Nesterenko, N. V. Kenijz // Austrian Journal of Technical and Natural Sciences. – 2014. – № 6 (11-12). – pp. 62-66.